

NBER WORKING PAPER SERIES

WHAT HINDERS INVESTMENT IN THE AFTERMATH OF FINANCIAL CRISES:
INSOLVENT FIRMS OR ILLIQUID BANKS?

Sebnem Kalemli-Ozcan
Herman Kamil
Carolina Villegas-Sanchez

Working Paper 16528
<http://www.nber.org/papers/w16528>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 2010

We thank Laura Alfaro, Hoyt Bleakley, Roberto Chang, Fritz Foley, Mario Crucini, Aimee Chin, Philipp Schnabl and Bent Sorensen for valuable suggestions and the participants of the seminar at Alicante, Bank of Spain, Brown University, Dartmouth, ESADE, 10th Jacques Polak IMF Annual Research Conference, McGill University, 2010 NBER-IFM Spring Meeting, 2010 LACEA Meetings, Stockholm School of Economics, and Valencia University for their comments. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2010 by Sebnem Kalemli-Ozcan, Herman Kamil, and Carolina Villegas-Sanchez. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

What Hinders Investment in the Aftermath of Financial Crises: Insolvent Firms or Illiquid Banks?

Sebnem Kalemli-Ozcan, Herman Kamil, and Carolina Villegas-Sanchez

NBER Working Paper No. 16528

November 2010, Revised December 2012

JEL No. E32,F15,F23,F36,O16

ABSTRACT

We quantify the effects of the lending and balance sheet channels on corporate investment, by comparing the performance of foreign-owned exporters to that of domestic during two types of financial crises: "currency" and "twin." A currency crisis involves a depreciated currency, whereas a twin crisis is a combination of banking and currency crises. Our measure of balance sheet weakness is based on maturity and currency mismatches between assets and liabilities. During a twin crisis, a 1 percent worsening of the balance sheet translates into a 13 percent decline in investment by domestic exporters relative to foreign-owned exporters, while the latter increase investment by 5 percent in spite of the credit crunch. There is no difference in investment rates between the two set of exporters under a currency crisis, although the deterioration of their balance-sheet is similar. The results suggest a key role for illiquidity in hindering investment in the aftermath of crises.

Sebnem Kalemli-Ozcan
Department of Economics
University of Maryland
Tydings Hall 4118D
College Park, MD 20742-7211
and University of Houston and CEPR
and also NBER
kalemli@econ.umd.edu

Carolina Villegas-Sanchez
ESADE Business School
Barcelona
Spain
carolina.villegas@esade.edu

Herman Kamil
International Monetary Fund
Western Hemisphere Department
700 19th Street, NW
Washington DC, 20431
hkamil@imf.org

A central debate in finance and macroeconomics is whether financial frictions operate via demand for credit or supply for credit in turning financial crises into recessions. The quantitative importance of each friction is fiercely debated not only for domestic monetary policy reasons but also for global financial stability purposes. Identifying the effect of one friction generally requires sacrificing the other in systematic econometric studies. Without knowing the quantitative impact of each financial friction, how to grow after a financial crisis induced recession became the central question with no answer that occupies the agenda of policymakers.

The theoretical and empirical literatures are segmented. On the one hand, the finance literature has forcefully argued that the *lending channel*, i.e., inability of banks to lend to firms in the face of bank-specific liquidity shocks, is the key mechanism that turns financial shocks into recessions (Holmstrom and Tirole (1997)). On the other hand, the macro literature puts the emphasis on the *balance sheet channel* (or collateral channel), i.e., inability of firms to borrow due to lower net worth that results from a negative shock to their collateral, (Bernanke (1983) and Bernanke and Gertler (1989)). Kiyotaki and Moore (1997) shows that both channels can amplify fluctuations and have a significant aggregate impact in a closed economy. Chang and Velasco (2001) and Céspedes, Chang, and Velasco (2004) study the effects of these channels respectively in open economies, demonstrating the possibility of large global recessions as a result of financial crises.

Identifying the effects of both channels on real outcomes such as investment and output has been elusive given the challenge of separating demand shocks to firms from supply shocks to banks, while at the same time accounting for changes in firms' net worth. In a recessionary environment both banks' loan supply and firms' credit demand can go down, and if hit by the same shock, both can see their balance sheet deteriorate.¹ The contribution

¹One can investigate the behavior of firms borrowing from multiple banks (Khwaja and Mian (2008); Jimenez, Ongena, Peydro-Alcalde, and Saurina (2012)). Such a strategy can clearly identify the effect of bank capital shocks on credit provision—the lending channel;—however, it is silent on the balance sheet channel.

of our paper is to identify and quantify the effects of the lending and balance sheet channels on corporate investment. A key advantage of our approach is that we account for firms' willingness to borrow (demand for credit), the ability of firms to borrow based on their net worth (balance sheet channel), and the ability of banks to lend (the supply of credit/lending channel) separately.² This approach allows us to quantify the extra investment undertaken by firms with access to liquidity as well as the decline in investment as a result of a balance sheet weakness: A 1 percent worsening of firms' balance sheet translates into a 13 percent decline in investment for firms who are affected by the shock to the banking sector, whereas the same deterioration in collateral results in 5 percent increase in investment for the firms who did not get hit by the credit supply shock, but still are affected through the balance sheet channel.

The empirical strategy rests on three sources of identification. First, we utilize the experience of six Latin American countries with a range of financial crises during 1990–2005. These often involved twin crises episodes, where prior to the currency crash the banking system collapsed, as shown by Kaminsky and Reinhart (1999) and Reinhart and Rogoff (2010). We rest our identification on the fact that both types of financial crises—currency and twin—share a willingness of exporting firms to borrow to exploit competitiveness effects via a cheaper currency (positive shock to credit demand), share a potential change in firm's debt burden and net worth depending on the level of foreign currency indebtedness given the depreciated currency (balance sheet channel), but most importantly for our purposes, differ in the supply of credit by local banks (lending channel).

The basic story is that a devaluation increases the marginal profitability of capital for firms that export, stimulating investment and leading to an increase in the demand for bank credit by exporters. At the same time a depreciated currency increases firms' debt burden, leading to a negative shock to firms' collateral if firms have a currency mismatch

²Our interest lies on changes in firm investment behavior due to the balance sheet channel and the lending channel. For this purpose it is not relevant whether lower credit provision (i.e., the lending channel) is due in turn to solvency or liquidity constraints on the part of financial institutions.

on their balance sheet (liability dollarization), which in turn compromises their solvency making it harder to borrow to finance an expansion in economic activity.³ Under a “pure” currency crisis (i.e., with no associated banking crisis), and conditional on such balance sheet weakness, we investigate the differential response of foreign-owned versus domestic exporters to a positive demand shock resulting from the depreciated currency. This is our second source of identification where we assume that there is no difference between domestic and foreign-owned exporters in the absence of any credit crunch arising from local banking sector problems. Hence, under “pure” currency crises investment rates of domestic and foreign-owned exporters should not differ since they both want to take advantage of the new investment opportunity as a result of cheaper currency if neither are credit constrained. In contrast, conditioning on the changes in creditworthiness through the degree of balance sheet currency mismatch, foreign-owned exporters will be affected relatively less from a credit supply shock compared to domestic exporters under twin crises due to their direct access to financing from their parent companies.

In order to test these hypotheses, we study four episodes of currency crises (Mexico 1995, Argentina 2002, Brazil 1999 and 2002) using a difference-in-difference methodology. Two of these episodes were twin crises since they were combined with a banking crisis (Mexico 1994, Argentina 2001). In order to have firm level measures of insolvency and liquidity over time, we have hand-collected a unique panel database with annual accounting information for the whole universe of listed non-financial companies in these six Latin American countries, spanning the period 1990 to 2005. We define a potentially insolvent firm as one with high leverage and holdings of *short-term* foreign currency denominated debt that are not matched by a dollar denominated stream of income.⁴ These firms are naturally more likely to experience a decline in net worth in the aftermath of large exchange rate devaluations.

³Recent work by Campello, Graham, and Harvey (2010) surveys 1000+ CFOs in U.S., Europe, and Asia and shows that companies forego profitable investment opportunities when they are credit constrained during the 2008 financial crisis.

⁴This is based on Allen, Rosenberg, Keller, Setser, and Roubini (2002).

We measure the liquidity shock, first, at the country level, by focusing on twin crisis episodes that are characterized by a general dry up of credit in the year prior to the currency crisis for *all* firms. Second, we use foreign ownership (FDI and portfolio equity investment) as our preferred firm level measure of access to liquidity during financial crises. The reason is that foreign-owned firms are likely to have better access to international markets during crises in the absence of well functioning domestic banks, or they can draw funds from the parent company through internal capital-market lending during times of financial distress.⁵

Our third source of identification comes from the panel dimension of our unique data set. It is not only that we can account for unobserved firm level heterogeneity via firm fixed effects, identifying solely from *within* firm changes, we can also account for differences in corporate investment trends together with any other difference between foreign and domestic exporting firms, using *foreign-year* trends. The use of sector-year fixed effects accounts for all industry supply and demand shocks that are common to all exporters within a manufacturing industry. The multi-country panel dimension of our data allows us to condition on many country specific policy changes and other macroeconomic shocks through the use of country-year fixed effects. The country-year effects also allows us to account for the different nature of each crisis, valuation effects and country level trends. Finally, common shocks to all our countries are absorbed by our time effects.

We show that foreign-owned exporters invest relatively more than domestic exporters *only* during twin crises. There is no difference in investment rates during currency crisis. During twin crises, however, domestic exporters suffer from the credit crunch, where they are unable to exploit the growth opportunities and to roll over short-term debt. A 1 percent additional short-term dollar debt implies a 13 percent decrease in investment for domestic exporters and a 5 percent increase in investment for foreign-owned exporters. Our results point to the key role of illiquidity rather than insolvency as the main source of financial constraint that hinders investment. This does not mean insolvency due to balance sheet

⁵Desai, Foley, and Forbes (2008) argue that multinational affiliates access parent equity when local firms are most constrained.

weakness is not important but rather availability of credit in the face of good investment opportunities can overcome short-term balance sheet vulnerability.

We proceed as follows. Section I reviews the literature. Section II presents the methodology. Section III describes the data. Section IV presents the analysis. Section V concludes.

I Related Literature

Our paper is related to both macro and finance literatures. It is related to the finance literature on the bank lending channel that focuses on establishing the causal link between a shock to bank capital and lower lending to firms. Starting with the work of Peek and Rosengren (1997), this literature studied whether bank supply shocks bring credit provision to a halt in the domestic economy and whether this type of shock to banks has real effects on the aggregate economy. Unfortunately due to data limitations on the real side, most of these papers focus on establishing a causal link from bank liquidity shocks to credit supply reduction, such as the work by Kashyap and Stein (2000), Khwaja and Mian (2008), Paravisini (2008), Ivashina and Scharfstein (2010), Schnabl (2012) and Jimenez, Ongena, Peydro-Alcalde, and Saurina (2012).

There are few papers that look at the effects of a supply shock to banks on the real *aggregate* economic activity, however most of these papers use cross-sectional aggregate variation and produce mixed results. For example, Kashyap, Stein, and Wilcox (1993) and Peek and Rosengren (2000) show that negative loan supply shocks have some effects on real economic activity using aggregate data, but Ashcraft (2006) finds no evidence connecting loan supply shocks to real economic activity using similar data. Kashyap, Lamont, and Stein (1994) use U.S. manufacturing firms inventory investment data and underline the importance of separating the “lending story” from the “collateral story” however, the cross-section nature of their dataset does not allow them to do so. Therefore, the mixed results in the early aggregate empirical literature as well as the theoretical underpinnings of the liquidity and

balance sheet channels favor the use of micro level data. Kashyap, Stein, and Wilcox (1993) highlight the change in the firms' composition of financing where firms switched to commercial paper issuance from bank lending as a result of tighter credit conditions. Two recent versions of this early idea are the work by Becker and Ivashina (2011) and Adrian, Colla, and Shin (2012). Both papers criticize the use of aggregate flow-of-funds data and perform their analysis using micro level data on loan and bond issuance, showing an increase in bond financing when there is a reduction in bank loan supply.

The evidence on firm level *real* outcomes is sparse. Two recent papers using micro-level data with better identification techniques try to link credit shocks to firm level exports, showing sizeable effects. Paravisini, Rappoport, Schnabl, and Wolfenzon (2011), investigate the effect of the 2008 crisis on Peruvian exporters and Amiti and Weinstein (2011) investigate the effect of financial shocks to exporters via trade finance using a bank-firm matched data set from Japan. On investment, Duchin, Ozbas, and Sensoy (2010) investigate the effect of the 2008 crisis on corporate investment of U.S. listed firms. This paper shows that firms with more collateral decrease investment less, which is consistent with one of the main results in our paper, showing that firms who suffer from balance sheet weakness decrease investment relatively more.⁶ None of these papers focus on separating the lending channel from the balance sheet channel and providing estimates for each channel though.

There are other papers that investigate the effect of financial crisis on firm-level investment, without focusing on separating shocks to credit supply of banks from changing credit demand by firms. These papers' main purpose is to explore the role of FDI during crises. Desai, Foley, and Forbes (2008) investigate the response of sales, assets, and capital expenditure of U.S. multinational affiliates and domestic firms in the aftermath of a variety of financial crises from 25 emerging market countries and find that foreign affiliates outperform their local counterparts across these performance measures. Their interpretation is that local

⁶A similar paper to Duchin, Ozbas, and Sensoy (2010) is the work by Almeida, Campello, Laranjeira, and Weisbenner (2012), where investment outcomes of firms that differ in their long-term debt maturity structure were compared during the 2008 financial crisis.

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 (2008) extends the analysis of Desai, Foley, and Forbes (2008) by focusing solely on exporting plants and investigate the role of foreign ownership for this group of establishments in Indonesia. Their strategy allows identification of the local firms who would benefit most from the currency devaluation.⁷ They reinforce the conclusion of Desai, Foley, and Forbes (2008) by showing that foreign-owned exporters clearly increase investment relative to domestic exporters.

All these results are consistent with the existence of financial constraints but the source of the constraint is not clear. It is possible that foreign-owned exporters have more resilient balance sheets given lower levels of foreign currency debt than their domestic counterparts. Alternatively they may have more dollar denominated debt but at the same time they may have offsetting export revenues that reduce their currency mismatch. Or simply, foreigners might be better at managing their balance sheet exposures. In any of these cases foreign exporters will have higher net worth and will not be facing solvency issues in the aftermath of large devaluations. This creates a selection problem, where certain firms with no solvency issues are in the exporter sample, biasing results on export performance. Solving this selection bias caused by omitting the balance sheet weakness is at the heart of our paper.

Thus, our paper is also related to the literature that investigates the effect of foreign currency borrowing and the associated weak balance sheets on firms' investment. The work by Aguiar (2005) shows that firms with heavy exposure to short-term foreign currency debt before the Mexican crisis decreased investment compared to firms with lower dollar debt exposure. He shows an increase in sales for both groups but a decrease in investment for

⁷Note that Desai, Foley, and Forbes (2008) also investigate the differential impact of the depreciation on multinationals that are export-oriented by proxying exports with sales from subsidiaries abroad. They did not find a stronger effect though. In their analysis, multinational affiliates do better than local firms, regardless of the fact that they are export-oriented.

the exposed group. Hence, his results support the idea that weak balance sheets can hinder investment during a major currency crisis episode. However, in a very similar study using a bigger sample of Latin American countries during the period 1991–1999, Bleakley and Cowan (2008) show the opposite result focusing on total debt: firms holding dollar debt invest more during exchange rate depreciations. They are the first to argue that firms match the currency composition of their liabilities with that of their income streams or assets, avoiding insolvency during a currency depreciation. Our findings can bridge these two set of studies and provide an explanation for seemingly conflicting results, since neither of these papers separate lending story from the collateral story.

Finally, our paper relates to the incomplete contracts literature. Earlier literature highlights that in presence of contract incompleteness firms who can pledge collateral can borrow more (Barro (1976), Stiglitz and Weiss (1981), and Hart and Moore (1994)). The recent literature highlights the role of incomplete contracts in explaining both the sensitivity of investment to collateral values and the degree of vertical integration of the firm. On the investment sensitivity, the work by Chaney, Sraer, and Thesmar (2012) use data from U.S. firms that own real estate to show that their investment is sensitive to real estate shocks especially when the firms are credit constrained. Notice that this result is fully consistent with our result that balance sheet channel (collateral channel) is only an issue when the credit supply to firms decrease.

On the vertical integration, Antras, Desai, and Foley (2009) develop a model in which firms wanting to exploit technologies abroad will engage in foreign direct investment, acting as multinationals especially in environments with weak investor protection.⁸ External funders require multinational companies' participation in the local project to ensure better monitoring of the investment. As a result, weak financial institutions increase the reliance on capital flows from the parent company. This higher reliance on financing through internal capital markets by the foreign affiliate in general plays a critical role during financial crises. The lack of models that involve direct credit (bond and equity financing) together with in-

⁸See also Antras (2003), Antras (2005), Antras and Helpman (2004).

termediated credit (bank financing) renders it difficult to analyze both debt accumulation and switching to FDI/equity financing during times of crisis.⁹

II Identification

Our objective is twofold: we want to identify whether financial crises translate into lower firm level investment, and if so, which are the main channels they operate through. As explained in the introduction, the main challenge to identification is to separate the demand for credit by firms from the supply of credit by banks holding firms' credit worthiness constant. Exploiting firm level variation during different types of crises that move demand and supply for credit in opposite directions is key for our identification. Currency crises are associated with a positive demand shock for credit by exporters and banking crises are associated with negative supply shocks to economy-wide credit. Therefore, we base our estimation strategy on the following identifying assumptions:

- An exchange rate depreciation creates growth opportunities in the export sector. Exporters would like to increase investment as the exchange rate depreciates.
- Exporters would increase investment more if they are not credit constrained, i.e., if the cost of credit is lower.
- Conditioning on shocks to balance sheet quality, foreign exporters face a lower cost of credit.
- Liability dollarization (short-term) and the associated mismatch on the balance sheet is a sufficient proxy for the balance sheet vulnerability (and hence the collateral channel) in the context of emerging markets.

These identifying assumptions are captured in a triple differences-in-differences specification, as outlined below, that we estimate for the *sample of exporting firms*. Notice that

⁹See Adrian, Colla, and Shin (2012) for an exception.

for the last assumption to hold we will control for the “associated mismatch” via leverage and dollar income/assets of the firm though we do not write these variables in the below specification for space considerations.

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

where $y_{i,c,j,t}$ refers to investment of firm i , in country c , in sector j at time t .

Foreign can be used as a continuous variable in lagged form or as a dummy that takes the value of one if the company is foreign-owned and zero otherwise.¹⁰ *SDDebt* measures lagged short-term dollar denominated liabilities. *Post* is the depreciation dummy and equals to one in the year of currency crisis and one year after.¹¹ 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.¹² By using firm fixed effects we will be identifying solely

¹⁰This variable is based on the percentage of firm’s capital stock held by foreigners (see section III for a description of the data). It is worth noting at this stage that while using dummy variables might restrict variation in terms of amount of foreign investment into firms’ capital stock, given the triple interaction specification, indicator variables make the interpretation of the coefficients straight forward by identifying the groups of interest clearly.

¹¹Investment responds with a lag and hence we follow the literature on defining this dummy over the crisis and the following year. We check this assumption by defining the dummy over two and three years obtaining similar results.

¹²Notice that the *Post* dummy is captured in the country-year fixed effects as other time dummies.

from firm changes over time. Country-year and sector-year effects will absorb the effects of any other macroeconomic and industry level shock.

The triple interaction turns out to be crucial for identification. To see why, we compare the interpretation of the coefficients in equation (1) to those that would result from estimating the following equation, which for completeness we will also present in our empirical section:

$$\begin{aligned}
 y_{i,c,j,t} = & \beta_3 Foreign_{i,c,j,t-1} \times Post_{c,t} & (2) \\
 & + \beta_4 SDDebt_{i,c,j,t-1} \times Post_{c,t} \\
 & + \beta_5 Foreign_{i,c,j,t-1} \\
 & + \beta_6 SDDebt_{i,c,j,t-1} \\
 & + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t}
 \end{aligned}$$

In equation (1), β_4 is the effect of holding dollar debt after the crisis *only* for the sample of domestic exporting firms. This is not the case for β_4 in equation (2) since now this coefficient reflects a combined effect of foreign-owned and domestic exporting firms. Similarly, β_3 in equation (1) captures the investment behavior of foreign-owned exporting companies with no dollar debt relative to those foreign-owned exporting companies with dollar debt at the time of the crisis, β_1 . Compared to equation (2) the advantage is that the coefficient β_3 in equation (1) does not confound the effect of foreign-owned exporting companies holding and not holding dollar debt as it would be the case of the coefficient β_3 in equation (2).

If exporting firms match their dollar debt holdings with export revenue and there are no other difference between foreign and domestic exporters, we expect β_4 in equation (1) to be insignificant since domestic exporting firms who hold dollar debt should not perform differently than foreign-owned exporting firms with dollar debt. We expect them both to have strong balance sheets as a result of offsetting their dollar debt risk with export revenue. Alternatively, if there is no such matching then both set of exporters will suffer from

weak balance sheets, again leading to an insignificant coefficient since there will not be any difference between their performance. The key point is that the possibility of domestic exporters matching their liability dollarization, while foreign-owned exporters not (or vice versa) is completely accounted for by the triple specification. Hence, β_1 compared to β_4 is the incremental effect on investment of being a foreign-owned company among exporting firms holding dollar debt. If $\beta_1 > \beta_4$ (i.e., foreign-owned exporting firms holding dollar debt outperform domestic exporters holding dollar debt) we interpret this as the “access to finance” effect or evidence for the liquidity channel. Both foreign-owned and domestic exporting firms experience a similar change in their net worth but foreign-owned exporting firms manage to increase investment *relative* to domestic exporting firms. This means that there is something different about foreign-owned exporting firms with dollar debt at the time of the crisis. Our interpretation of this difference is access to external funds. The potential finding $\beta_1 < \beta_3$ (i.e., foreign-owned exporting firms with dollar debt underperforming relative to foreign-owned exporters without dollar debt holdings) would highlight the importance of insolvency since compared to firms that have the best access to liquidity (i.e., foreign-owned companies), those with a deterioration in their balance sheet would underperform.

To summarize, if both foreign-owned and domestic exporters with dollar debt holdings can avoid a mismatch on their balance sheet and hence insolvency, then the differential response between the two captures access to liquidity. This result should only hold when domestic companies suffer from a liquidity problem. Hence, we should see foreign-owned exporters with dollar debt investing more relative to domestic exporters with dollar debt holdings only under twin crises. This can only be done by means of a triple interaction rather than a double interaction that would mask the groups of interest. Same reasoning applies when both set of exporters are not matching currency and maturity composition of their liabilities to their income/assets, or even more importantly one set of exporters avoid a mismatch while the other ones do not. A double interaction as in equation (2) will be open to these possibilities. In that case, where balance sheet channel is not explicitly accounted for, the difference between the two set of exporters cannot be attributed to the lending channel.

What about endogeneity? The direction of causality between banking and currency crises is debated in the literature, as summarized in Kaminsky and Reinhart (1999). For our purposes this is not relevant. In the two twin crisis episodes that we consider the banking crises predated the currency crises. Most importantly the banking crises were not the result of firms' widespread bankruptcy. Therefore, both crises are exogenous to the firm.

There are three other sources of endogeneity that might affect our estimation. These are:

- Any other difference between foreign-owned and domestic exporters such as differences in information and anticipation of the crisis; different destination markets; different use of intermediate inputs.
- Prior differential trends in investment of foreign versus domestic exporters.
- Endogeneity and selection for liability dollarization and being a foreign-owned exporter.

We address all these as shown in section C. Using foreign-year trends and predetermined variables for balance sheet weakness and foreign-owned exporter status will go a long way but nevertheless we will look into detail other differences between two set of exporters, prior trends in investments and changes in dollar debt holdings in anticipation or at the time of crisis.

III Data and Crises Background

The empirical analysis draws on a unique database with accounting information for the entire universe of publicly-traded companies in six Latin American countries, spanning the period 1990 to 2005.¹³ The countries covered are: Argentina, Brazil, Chile, Colombia, Mexico and Peru. A distinct feature of this dataset is that together with firm level investment, it contains detailed information on the currency and maturity composition of firms' balance sheets, the

¹³See the data appendix and Kamil (2009) for a detailed description of the dataset and sources.

breakdown of sales into domestic and export revenues, firms' foreign-ownership structure and other measures of access to international markets, such as corporate bond issuances abroad at the transaction-level.

One of the contributions of our paper is to construct a continuous measure of foreign ownership for each firm in our sample. Our indicator of foreign ownership is based on precise dates of ownership changes, foreigner's share in firm's capital stock and the nationality of the parent and global ultimate parent. 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 at a given point in time. Figure 2 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 1990s. Therefore, as expected, foreign ownership has steadily grown over time. Most of our firms are domestic and hence the distribution of foreign ownership has a high concentration of firms around zero, where 70 percent of the firms are domestic, as shown in figure 3.¹⁴ Figure 4 shows that among those firms with positive foreign ownership, 40 percent of the observations are between 85 percent and 100 percent foreign-owned. Hence foreign investors prefer to have a controlling stake in general (or engage in FDI with fully owned subsidiaries). These distributions look similar by country.

A The Crises Episodes

Table 1 shows the currency crisis and banking crisis episodes for our countries together with percent changes in macro aggregates before, during and after the crisis episodes. All the percent changes in table 1 are averages over two years. Following Desai, Foley, and Forbes (2008) we identify a currency crisis in a given year if the real exchange rate increased by more than 25 percent with respect to the previous year. We identify four currency crisis episodes in our sample: Mexico (1995), Brazil (1999), Brazil (2002), and Argentina (2002).¹⁵

¹⁴We choose 2000 for being an intermediate year but similar figures are obtained using any other year.

¹⁵All four episodes imply a considerable depreciation of the real exchange rate: the two episodes in Brazil amounted to a 34 percent depreciation while Mexico witnessed a 47 percent depreciation and Argentina

Following Reinhart and Rogoff (2008) we identify the following banking crises: Argentina (1995) and (2001), Brazil (1995), Mexico (1994) and Colombia (1998). Reinhart and Rogoff (2008) base their classification of banking crises on two types of events. First, they focus on bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions. Second, in the absence of bank runs, a banking crisis involves the closure, merging, takeover, or large-scale government assistance of an important financial institution (or group of institutions) that marks the start of a string of similar outcomes for other financial institutions.¹⁶

Table 1 shows that, with the exception of Argentina, the other countries were showing similar rates of growth of GDP, investment and trade balance, prior to the crisis. During the crisis and in its aftermath, experiences differ from country to country, showing the importance of including country-year fixed effects. A common feature of recovery in all countries is the increase in investment and exports leading to a positive trade balance growth.

A critical assumption for our study is that banks are illiquid only during twin crises and not during currency crises. Notice that our results do not rest on the very strict form of this

96 percent. Notice that Mexico abandoned the peg in December 1994 and consequently the end-of year exchange rate only depreciated between December 1994 and December 1995.

¹⁶ For example, Argentina (2001) and Mexico (1994) were precipitated by different events. In Argentina, in March 2001, a bank run started due to lack of public confidence in government policy actions. There was strong opposition from the public to the new fiscal austerity package sent to the Congress and the amendment to the convertibility law (change in parity from being pegged to the dollar, to being pegged to a basket composed of the US dollar and Euro) as described in Laeven and Valencia (2008). As a result of the bank run, partial withdrawal restrictions were imposed (corralito) and fixed-term deposits (CDs) were reprogrammed to stop outflows from banks (corralon). In Mexico, the 1994 banking crisis had different origins. Until 1991 banks were nationalized. With the privatization process in 1991-1992, investors with scarce previous experience in banking wanting to quickly recover their investment extended large amounts of loans without a proper credit risk analysis. This behavior, together with the stagnation of real estate prices and the increase in US real interest rates eroded banks' balance sheets. In 1994, 9 out of 34 commercial banks were intervened and 11 banks participated in the loan/purchase recapitalization program. These 9 banks accounted for 19 percent of the financial system assets.

assumption. We only need banks to be *relatively* more illiquid during twin crises compared to currency crises. Since the seminal work of Kaminsky and Reinhart (1999), there has been an extensive literature highlighting the role of a troubled banking sector that turns a currency crisis into a twin crisis. This is especially relevant for emerging markets where stock and bond markets are less developed and banks are the main source of credit. Therefore, bank illiquidity means a halt in domestic credit provision. Banks can also be insolvent if they have a balance-sheet mismatch of their own. For our purposes of focusing on the real effects of the crisis, where the investment decision is taken by the firm, the key factor is whether or not banks can provide liquidity to firms, regardless of whether they are themselves illiquid or insolvent. The extensive literature on the bank lending channel also provides evidence on the causal link between a negative shock to banks and the credit provision to firms in a developing country context, as reviewed in the related literature section. The critical issue here is that all the banking crises predate the currency crises and were not originated by firm bankruptcy. If banks become insolvent under a currency crisis and halt domestic credit provision as much as in the case of a twin crisis, then our firm-level access to finance measure—foreign ownership—should not have differential explanatory power among the types of crisis, i.e., domestic firms should do worse than foreign-owned firms under both types of crisis.

Figure 1 demonstrates the case in point and shows that in our sample, countries that experienced a twin crisis witnessed a significant decline in domestic credit provision simultaneously to the currency crisis, whereas this did not happen in countries that went through currency crisis episodes. Figure 1 shows local banks' credit to the private sector (as a percent of GDP). The top panel shows the case of Mexico and Argentina. In Mexico, the banking crisis of 1994 is followed by the currency crisis in 1995. Domestic credit as percent of GDP dropped sharply, corresponding to a 40 percent decline in credit provision to the private sector between 1994 and 1996. In Argentina, the decline in credit as a percentage of GDP was of around 50 percent between 2001 and 2003. The middle panel shows the case of Colombia who had a banking crisis in 1998 that was not accompanied by a currency crisis. The 20 percentage decline in domestic credit is clearly visible. The right middle panel represents

Brazil who did not suffer from a collapse in bank lending during the currency crises of 1999 and 2002.¹⁷ Finally, the lower panel shows local banks' credit to the private sector (as a percent of GDP) in Chile and Peru where no substantial banking crisis and/or currency crisis took place during our sample period.

B Descriptive Statistics

Table 2 reports the percentage of observations by type of firm, averaged over the sample period. Although our foreign ownership variable is a continuous change in the amount of capital stock owned by the foreigners, we prefer to present the statistics in the form of a dummy for ease of interpretation for now. Thus, *Foreign* is a dummy that takes the value of one if the company is majority owned (more than 50 percent) by a foreign investor and zero otherwise. In Argentina 40 percent of the firms are foreign-owned while in Colombia only 7 percent would be considered foreign-owned by this yard-stick. An alternative interpretation is that foreign investment takes the form of FDI and greenfield investment in Argentina in general, whereas in Columbia it is mostly portfolio equity investment. Another important variable in the analysis is export status. Around 53 percent of the observations report some export revenue and half of those observations report a ratio of export revenue to sales greater than 10 percent, captured by the *High Exporter* variable.

We measure dollar liabilities as the ratio of total dollar liabilities to total liabilities and

¹⁷Notice the beginning of the 90s was a very turbulent period in Brazil. Inflation was rampant with a peak of 82.4 percent in March 1990. A new government designed a stabilization program, Plano Real, aimed to reduced fiscal deficit and introduced a new currency. During the 1980s, banks acted as intermediaries of the public sector debt and benefited from high inflation and indexation. To avoid reducing their profits once inflation was brought down, banks initially expanded credit (mostly through consumer and commercial loans). Although the new currency brought down inflation, it could not prevent the banking crisis of the mid 90s. According to Reinhart and Rogoff (2008) in 1994, 17 small banks were liquidated, three private banks were intervened, and eight state banks placed under administration. The Central Bank intervened in or put under temporary administration 43 financial institutions. Private banks returned to profitability in 1998, but public banks did not begin to recover until 1999.

short-term dollar liabilities as the ratio of short-term dollar liabilities to total short-term liabilities.¹⁸ 77 percent of the sample reports some positive debt holding denominated in foreign currency while only 59 percent of the sample reports positive dollar assets. There is also considerable variation across countries in terms of dollar debt holdings. In Argentina, Brazil, Mexico and Peru, over 75 percent of the observations report part of their total debt denominated in dollars.

Table 3 reports the main summary statistics.¹⁹ We will use two variables for investment, both of which shows extensive variation: The change in the stocks of property, plant and equipment from $t - 1$ to t net of depreciation normalized by assets in $t - 1$. This is a commonly used measure in the literature. It is the accounting value of the outstanding stock of physical assets. This measure might be sensitive to valuation changes even it is normalized by assets and hence we will also use the actual funds spend by the firm in purchasing fixed assets in year t , *Capital Expenditure*. On average firms hold 26 percent of their short-term debt denominated in foreign currency while exporters hold on average higher values of their debt denominated in foreign currency (35 percent). Bonds and equity issuance abroad is limited at 2 percent and loan issuance abroad is only 5 percent. Appendix table A-1 shows correlations.

What is crucial for this study is the variation in dollar debt holdings across different types of firms. Table 4 shows that on average exporters hold more dollar debt than non-exporting firms. However, what is important for our differences-in-differences methodology is the difference between foreign-owned and domestic exporters, who seem to hold similar average ratios of short-term debt denominated in foreign currency.

¹⁸Short-term liabilities refer to outstanding debt that must be paid within 12 months.

¹⁹The cleaning procedure outlined in the appendix leave us with complete information for an unbalanced panel of 6,496 firm-year observations, which consist of 969 firms with an average of around 7 years each. Data on additional controls included later on in the estimation leaves us with a sample of 5,265 observations or 906 firms. Notice some of our main regressions are based on a sample of 1,488 observations or 242 firms. This is the subsample of high-exporting firms (i.e., firms with export to sales ratios greater than 10 percent (the 75 percentile of the export to sale ratio distribution)).

There are certain institutional differences across countries in firms' ability to borrow in foreign currency from local banks. In Argentina, Chile, Mexico and Peru firms can borrow in dollars from domestic banks. In the case of Colombia and Brazil, however, most of companies' foreign currency borrowing is obtained abroad (whether bond issuances, bank loans or trade credit). This is because, in these countries, financial dollarization is severely restricted: on-shore foreign currency deposits are banned and private banks cannot lend in dollars. In Colombia, firms cannot borrow in foreign currency from any type of bank (commercial or state-owned). Therefore, firms located in Colombia can only raise foreign currency by issuing bonds, loans and equity abroad or through trade credit with foreign suppliers. In Brazil, firms that want to borrow in foreign currency domestically can only do so through the state development bank (BNDES) under stringent conditions. In fact, only exporters can borrow easily from BNDES by pledging foreign currency revenue as collateral against dollar debt. Given the fact that we will focus on exporters throughout our analysis, we do not worry about firms in Brazil holding significantly less foreign currency denominated debt than firms in the rest of our five Latin American countries. As it is clear from the above table, this is not the case.

IV Results

In order to highlight the critical role of the triple-interaction specification and to test our identifying assumptions, we will start by running the following double-interaction specifications before moving on to our main specification.

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

$$\begin{aligned}
y_{i,c,j,t} = & \beta_3 Foreign_{i,c,j,t-1} \times Post_{c,t} & (4) \\
& + \beta_4 SDDebt_{i,c,j,t-1} \times Post_{c,t} \\
& + \beta_5 Foreign_{i,c,j,t-1} \\
& + \beta_6 SDDebt_{i,c,j,t-1} \\
& + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t}
\end{aligned}$$

where equation (4) is identical to equation (2) and description of variables in equation (3) is similar. *Exports* represents export to sales or exporter dummy if the revenue from exports is more than 10 percent of sales.

A Exporters during financial crises

Our first identifying assumption is that, an exchange rate depreciation creates growth opportunities in the export sector and hence exporters would like to increase investment as the exchange rate depreciates. To test for this, we will run the specification shown in equation (3). We follow the literature and measure investment as the annual change in the stock of physical capital scaled by total assets. This investment to asset ratio is winsorized at the

lower and upper 1 percent level at the country level to control for outliers before it is used in the regression. Country-year fixed effects will account for any changes in the valuation effects that are common. Normalizing with assets aims at controlling for the firm specific valuation changes that will arise due to differencing the capital stock.²⁰ Firm fixed effects help to minimize the effects of accounting bias in the value of capital stock.

Column (1) in Table 5 shows that a higher export to sales ratio does not translate into higher investment during exchange rate crises.²¹ This is expected if our second identifying assumption holds, which says that exporters would increase investment more if they are not credit constrained, i.e., if the cost of credit is lower. Hence we move on with exploration of two main credit constraints in order to see if any can explain this non-responsive behavior of investment to a positive demand shock. The constraints are insolvency on the part of firms and illiquidity on the part of financial institutions. Alternative stories such as adjustment costs, inventories or imported intermediate inputs will be dealt with in section *C.4*.

How can we measure firm insolvency? Our next identifying assumption claims that liability dollarization (short-term) and the associated mismatch on the balance sheet is a sufficient proxy for the balance sheet vulnerability (and hence the collateral channel) in the context of emerging markets. This is our first credit constraint: insolvency on part of firms. Column (2) in table 5 controls for the share of short-term dollar denominated debt in short-term debt. Although firms with greater holdings of short-term dollar denominated debt invest less during financial crises, there is still no evidence that exporting companies increase investment (similar results are found in Aguiar (2005) during the Mexican peso crisis). In other words, controlling for dollar denominated debt is not enough to explain the lack of investment by exporters during financial crises. Controlling the mismatch caused by holding short term dollar denominated debt together with firm leverage delivers the same

²⁰A better way is to use data on capital expenditures directly, which we will also do.

²¹Notice that the post dummy always refers to the year of depreciation and the year after. Given that the treatment is based on a time dummy, standard errors are clustered at the year level throughout the analysis. However, similar results were obtained for when clustering is done at the country level.

result.

Columns (3) and (4) in table 5 provide further robustness checks to the results shown in column (2). In particular, we consider selection into the export market as well as potential changes in dollar debt holdings at the time of the crisis. In column (3) to avoid concerns about selection into the export market at the time of the crisis we use a predetermined export dummy to define the exporter sample. Although changes in export status from non-exporter to exporter at the time of the crisis were relatively limited in our sample and accounted for 5 percent of the exporting observations, we still define an exporter as a firm whose export revenue to sales ratio is more than 10 percent of sales during the three years *prior* to the crisis in column (3).²² The results do not change. This is not surprising, given the findings of Gopinath and Neiman (2011), who show that during the 2002 Argentinean financial crisis there was not a significant change in the number of exported varieties.²³

Similar results are obtained in column (4) when using a predetermined dummy based on short-term dollar debt holdings three years prior to the crisis.²⁴ Firms holding short-term

²²The 10 percent cut-off level corresponds to the 75 percentile of the distribution of exports to sales ratio. In the case of Argentina, we refer to years 1998, 1999 and 2000; Brazil 1996, 1997 and 1998; Mexico 1991, 1992 and 1993. In addition, given the severity of the banking crisis in Colombia, exporters in this country are defined based on reported export revenue in 1995, 1996, or 1997 (three years prior to the banking crisis). In Peru and Chile where no substantial banking crisis and/or currency crisis took place during our sample period, predetermined exporters are defined based on whether firms reported export revenue at any time during the period of analysis. Reinhart and Rogoff (2008) identify a banking crisis in Peru 1999 however, the decline in credit to the private sector as a percentage of GDP was only of 3 percentage points between 1999 and 2000 and 5 percentage points between 1999 and 2001, as oppose to 50 percent decline in credit to private sector in the case of Mexico.

²³Gopinath and Neiman (2011) also show that the extensive margin of imports played a small role during the 2002 Argentinean crisis. For our purposes, another important finding they have is nothing is driven by the differences between domestic firms and MNCs.

²⁴Predetermined Dollar Debt Dummy is based on whether the firm had a ratio of short-term dollar debt to short-term debt greater than 39 percent at any time during the three years prior to the crisis. 39 percent corresponds to the 75th percentile of the distribution.

dollar invest less relative to those without dollar debt holdings. However, short-term dollar debt by itself cannot explain why *exporting firms* do not increase investment. Can this be because not all crises are the same? Some of the exchange rate crises were accompanied by banking crises (the so-called twin crises) limiting credit supply, which is our second source of credit constraint.

Table 6 presents the investment patterns of exporters once we differentiate among types of crises. Columns (1) and (2) show the results during twin crises while columns (3) and (4) focus on currency crises. We keep the *Post* crisis dummy defined as the year of the currency crisis and one year after. However, now we separate the currency crisis that happened together with a banking crisis (twin) from the ones that do not. Columns (1) in table 6 replicates the results in column (2) of table 5, delivering a similar picture. During twin crises, exporters do not increase investment as a response to depreciation and moreover, firms with higher short-term dollar denominated debt decrease investment. These results are robust regardless of the definition of exporter and dollar denominated debt, which we do not show given space considerations.

How about exporting firms *with* dollar debt holdings? Maybe these firms are more in trouble during a twin crises since now they cannot even roll-over their debt. It is in this particular case, that our triple interaction specification is more useful. Column (2) of table 6 shows the result.²⁵ During twin crises firms holding short-term dollar debt still decrease investment and according to the F-test in column (2) exporters holding dollar debt also decrease investment during twin crises. It is still the case that exporters without dollar debt do not increase investment as shown in first line and by the F-test.

These results change drastically when we focus only on currency crises in columns (3) and (4). It is not only that exporters increase investment during currency crises as shown in column (3), but it is also the case that holding dollar debt is not as detrimental during

²⁵In order to properly implement country-year and sector-year fixed effects in the presence of triple interactions and continuous variables, through out the analysis we demean all continuous variables by removing country-year and sector-year averages from firm level values.

currency crises, at least for exporting companies, as shown in column (4). According to column (4) in table 6 it is mainly exporters without dollar debt holdings that increase investment during currency crises while exporters holding dollar denominated debt do not significantly change their investment patterns.

The differential response of exporting firms during twin and currency crises is a new result in the literature and points to differences in the supply of credit under both episodes. If solvency was the main issue preventing firms from increasing investment we should observe exporters with no dollar debt and those holding dollar debt, but with enough dollar income to compensate, increasing investment in both episodes, regardless of what is going on with banks. Results in table 6 show evidence that both set of exporters with and without dollar debt holdings are significantly more constrained during twin crises, regardless of having a balance sheet mismatch or not.

Distinguishing among different types of crisis episodes is revealing and provides important insights about the mechanisms behind the lack of investment during financial crises by exporting firms. However, we can improve on the estimation strategy by identifying a group of *firms* that are less credit constrained during financial crises: foreign-owned companies. This is what we address next.

***B* Foreign-owned companies during financial crises**

Our final identifying assumption says that conditioning on shocks to balance sheet quality, foreign exporters face a lower cost of credit. This is the key assumption that will allow us to separate the effects of balance sheet channel and lending channel. We would like to compare firms with similar balance sheets exposures that only differ in their foreign ownership status. Conditional on the balance sheet channel, lending channel implies that foreign-owned firms should invest more than domestic firms only during twin crises (when bank liquidity constraints are more pronounced) but no significant differences should be present during currency crises. We propose two alternative estimation strategies to address this question.

The first estimation strategy involves defining a sample of firms with no balance sheet currency mismatch (i.e., firms with a dollar denominated stream of income like export revenue that can hedge the holdings of *short-term* foreign currency denominated debt). Table 7 shows how foreign-owned firms perform relative to domestic firms when we focus in a sample of firms with no currency mismatch. To avoid any selection issues at the time of the crisis, we define matched balance sheets based on whether the firm had revenue in excess to short-term dollar liabilities at any time during the three years prior to the crises.²⁶ The idea behind this estimation strategy is to focus on a sample of firms that a priori should have no solvency constraints and study potential differences in the investment behavior of foreign-owned companies during twin and currency crises.

Columns (1) to (4) in table 7 show the results under twin crises while columns (5) to (8) refer to currency crises. Column (1) shows that in a sample of firms with no balance sheet vulnerability, foreign owned firms invest more during twin crises, when economy wide credit supply goes down. This column controls for firm, country-year and sector-year fixed effects as before and it also has additional controls. Since now we are in a sample of all firms with no balance sheet mismatch instead of just exporters, it is important to control for the indebtedness of the firm through leverage. We include the ratio of short-term liabilities to short-term assets to proxy for firm leverage, and as expected firms with higher leverage will invest less. More importantly, we assume that firms are not able to borrow in international markets at the time of the crisis. To check the plausibility of this assumption we use data from Dealogic Bondware and Loanware to include measures of access to international markets; a “bond abroad” dummy that takes the value of one in the year the firm issues a corporate bond abroad, an “international loan” dummy that takes the value of one in the year the firm issues a syndicated loan abroad, and an “equity abroad” dummy that takes the value of one in the year the firm issues stock abroad (either as ADR or GDR, whether in the US or other stock market). Although these measures are good proxies for external sources of financing during tranquil times we believe these measures will be relatively weak measures

²⁶We define firms with no mismatch as those in which $\frac{Exports - ShortDollarLiab}{Assets} \geq 0$.

during financial turbulent times. As argued by the sudden stop literature markets shy away from emerging markets during such times (see for example Calvo and Mendoza (2001) and Reinhart and Reinhart (2010)). Indeed these measures turn out to be insignificant in all specifications. We thus rely on foreign ownership as a main arms' length source of financing for foreign affiliates located in emerging markets, especially during financial crises.

Column (1) measures the foreign ownership variable by using the log of the percentage of foreign-owned capital if this percentage is greater than fifty percent and zero otherwise. It turns out that majority ownership control is crucial in our analysis. Only majority control firms outperform domestic firms during financial crises.²⁷ Columns (2) turns this measure into a dummy, where the dummy variable equals one if the firm is more than fifty percent owned by a foreign investor and zero otherwise. Foreign-owned companies still outperform domestic companies.

Column (3) deals with a potential threat to identification, which arises from the possibility that productive firms are bought out by foreigners during the crisis. Aguiar and Gopinath (2005) show that foreign investors buy inferior firms at fire-sale prices. Notice that this mechanism will work against our result but nevertheless, we define foreign status as a dummy based on the ownership status of the firm three years prior to the crisis in column (3). Clearly, the results are not sensitive to the way foreign status is defined. Results in column (3) indicate that foreign-owned firms with no balance sheet mismatch invest 9 percent more relative to domestic firms with no balance sheet mismatch during twin crises. We believe results are driven by exporters since similar results are found in column (4) that focuses on the sample of exporters with no balance sheet mismatch, where definition of exporters is predetermined. The selection into being foreign owned during crisis is not affecting our results because, although, there are 17 cases in which a domestic firm changed ownership status to majority foreign-owned at the time of the devaluation in the total sample, in the

²⁷This is in line with the results of Fons-Rosen, Kalemli-Ozcan, Sørensen, Villegas-Sanchez, and Volosovych (2012) who show that only firms with more controlling ownerships benefit from the productivity enhancing effects of FDI.

exporter sub-sample there are only 7 of such cases.

A final important threat to identification is the possibility that foreign-owned firms was on a different trend than domestic firms. Hence we include foreign-year fixed effects in columns (3) and (4). Our results remain the same that foreign owned companies outperform conditional on other controls and the balance sheet channel.²⁸ If there are any other differences between foreign and domestic exporters that foreign-year effects cannot account for, we will address these in section C.4.

The results drastically change again in columns (5) to (8) when we focus only on currency crises. All of these columns are exact replicas of columns (1) to (4) but now identification focus on firms in countries that did not experience a simultaneous banking crisis. In such cases there is no difference between foreign and domestic exporters conditional on the balance sheet channel, meaning both increase investment. These results are indicative that bank liquidity constraints during twin crises are the main financial constraint hindering investment of domestic companies during financial crises. However, this estimation strategy has the drawback of not allowing us to directly compare our groups of interest. In the sample of firms with no balance sheet mismatch, firms with no exports and no dollar-debt are treated equivalently to firms with similar amounts of exports and dollar debt. Instead, we would like to know whether among high exporting firms (those with enough export revenue in dollars to avoid a mismatch) foreign-owned firms holding dollar debt increase investment relative to domestic firms holding dollar debt. In order to do so we propose again a triple difference-in-difference estimation strategy focusing on the sample of high exporting firms.²⁹

²⁸The Argentina Renault is a case in point. In 2001, the parent firm contributed \$300 million to assure the survival of its affiliate. In January 2003 it received an additional \$160 million from parent Renault to accommodate its bank creditors. The company lost \$71 million in 2003 and ended the year with debt of about \$276 million. However, during the first half of 2004, the company made a small profit.

²⁹We need to reduce the dimensionality of our problem. We are interested in the performance of firms with export revenue, holding dollar debt, according to their foreign-ownership status and differentiating between twin and currency crises. The way we choose to proceed is by focusing on high exporters but similar results will be obtained by focusing on firms with high dollar debt ratios.

Table 8 shows the results from our second and preferred estimation strategy that will separate balance sheet and lending channels. Columns (1) to (5) show the twin crises results while (6) to (10) focus on currency crises. Column (1) shows, using a continuous definition of foreign ownership, that foreign-owned high exporting companies increase investment during twin crises. It is plausible that the reason foreign exporters increase investment during twin crises is explained by their lower holdings of dollar denominated debt. However, if this would be the case we should observe foreign-owned exporters outperforming during currency crises and this is not the case (see column (6)). Furthermore, column (2) controls for dollar debt holdings and similar results are obtained that foreigners still outperform in column (2) under twin crises but not in column (7) under currency crises.

To further substantiate this point we move to our preferred triple-interaction estimation in columns (3) to (5) and (8) to (10). In these columns, we do not only control for dollar debt holdings but we explore whether foreign-owned exporters holding dollar debt invest more than domestic exporters holding dollar debt.³⁰ Columns (3) to (5) show that this is indeed the case, whereas columns (8) to (10) show no difference in the investment behavior of two set of exporters. Column (4) is our preferred specification where we control for potential different trends between foreign and domestic companies by including foreign-year trends. In this case, foreign-owned exporters holding dollar debt increase investment (0.269) relative to domestic exporters holding dollar debt (-0.197) and foreign-owned exporters with no dollar debt (0.110) during twin crises. On the contrary, column (9) shows that foreign-owned exporters holding dollar debt (-0.053) do not behave significantly differently than domestic exporters with dollar debt (0.040) or foreign-owned exporters without dollar debt (-0.008) during currency crises. In addition, according to the F-test in column (9) the total effect from dollar debt or foreign ownership is not significant during the currency crises years.

³⁰Notice since we are estimating a triple interaction model to correctly identify the groups of interest we opt for defining foreign-owned companies according to a dummy that equals one if the company is more than fifty percent owned by a foreign investor in the three years prior to the crisis and zero otherwise (see columns (3) to (5) and (8) to (10)). Similar results are obtained when using a predetermined dummy regarding short-term dollar debt holdings.

Finally, columns (5) and (10) confirm that our main results are robust to conditioning on the level of exports of foreign-owned exporters at the time of the crisis. The results are also economically significant. Results in column (4) indicate that a one percent increase in the short-term dollar debt ratio at the time of the crisis implies a 13 percent decrease in the investment ratio of domestic exporters relative to foreign-owned exporters that increase their investment ratio by 5 percent.³¹

Our claim is not that dollar debt is irrelevant during financial crises. As we saw in table 6 non-exporters with dollar denominated debt holdings significantly decrease investment during twin crises and do worse than exporters with no dollar debt during currency crises. However, among firms that a priori have an investment opportunity (exporters) and those that should suffer less from balance sheet mismatches because of considerable dollar revenue (high exporters) domestic firms with high dollar debt holdings decrease investment relative to foreign-owned companies only during twin crises. This difference in investment patterns across crises and foreign-ownership status suggests that foreign-owned exporters have a comparative advantage over domestic exporters only during twin crises, iff the balance sheet channel is fully accounted for. This allows us to interpret the difference as access to credit. If insolvency through a worsening of the balance sheet was the dominant channel hindering investment we should observe no difference between foreign-owned and domestic exporters that hold dollar debt under any type of crisis. Clearly, foreign-owned firms do not suffer from liquidity problems during a twin crisis and do better relative to domestic exporters, regardless of their solvency issues.

C Robustness and Threats to Identification

In this section, we study in detail several caveats that could undermine our identification.

We can summarize these as follows:

³¹The mean investment rate for the sample of firms in column (4) is 0.006 and the mean short-term dollar debt ratio is 0.42.

- The effect of additional control variables and comparison of twin and currency crises.
- The choice of investment variable.
- Any other difference between foreign-owned and domestic exporters such as differences in information and anticipation of the crisis; different destination markets; different use of intermediate inputs.
- Prior differential trends in investment of foreign versus domestic exporters.
- Endogeneity and selection for liability dollarization and being a foreign-owned exporter.

C.1 Additional Controls

We conduct a series of robustness checks for our main results obtained in column (4) of table 8 and present the results in table 9. Column (1) replaces company leverage with total leverage, measured as the ratio of total liabilities to total assets confirming our main results. One of our key assumptions is that firms in countries that experienced a twin crisis cannot finance investment and/or working capital at the time of the crisis through banks. Several studies have highlighted the dependence of firms on the local banking system in Latin America, such as Demirguc-Kunt and Levine (2001). We add the variable bank debt to total liabilities to control for this effect in column (2). Statistics on this variable are such that, 20 percent of total liabilities correspond to short-term bank debt and exporters seem to exhibit only a slightly higher dependence on short-term bank debt at 22 percent. Although it seems like firms with high bank debt to total liabilities invest more during twin crises, the crucial point is that our main result is not affected.

We have emphasized the role of hard currency denominated income as the main channel to avoid balance sheet mismatches, but there are other factors that can contribute to improve firms' solvency. The potential negative effect of foreign denominated short-term liabilities on firms' balance sheets during crises can be mitigated by significant holdings of foreign currency denominated assets. Column (3) shows that results are robust to controlling for

dollar assets as a share of total assets during crises. Results in column (3) confirm that higher dollar asset holdings on the part of foreign-owned exporters is not the main channel behind their relative better performance. In column (4) we explore another channel that could explain our main results without an access to credit interpretation: cash holdings. The increase in debt service via the inflated dollar denominated debt would not translate into a balance sheet worsening if firms hold enough cash. Our main results are not affected and foreign-owned companies do not have significantly different cash holdings.

All the above specifications control for other forms of access to international markets. In column (5) we also test what happens to these other forms of international access to finance at the time of the crisis. None of these interactions is statistically significant hinting that international financial markets are indeed shut for emerging market firms during crises.

C.2 Comparison of Currency and Twin Crises

Our analysis relies on comparing the investment patterns of foreign-owned and domestic exporters during twin and currency crises implicitly assuming that their behavior should be similar under both types of crisis. If they behave differently, we interpret this difference as being result of liquidity constraints. The issue here is whether we can directly compare twin and currency crises. According to Kaminsky (2006) crises are the result of different factors that might question the suitability of comparing crises that were not originated from the same economic failure. Kaminsky (2006) identifies six different types of currency crises according to the way in which they were generated. Four of the categories are associated with domestic economic fragility, with vulnerabilities related to current account deterioration, fiscal imbalances, financial excesses, or foreign debt unsustainability. But crises can also be provoked by just adverse world market conditions, such as the reversal of international capital flows. The so-called sudden-stop phenomenon identifies the fifth variety of crises. As emphasized by the second generation models, crises also happen in economies with immaculate fundamentals. Thus, the last variety of crises is labeled self-fulfilling crises. She

classifies both Brazil 1999 and Mexico 1995 as being the result of the same cause: financial excesses.

Table 10 repeats the main specification in table 8 by country and episode in the light of Brazil 1999 and Mexico 1995 are being similar type of crises. Column (1) shows that foreign-owned exporters holding dollar debt in Mexico during the twin crises of 1995 are the ones increasing investment relative to domestic exporters with dollar debt. Columns (2) and (3) examine the case of Brazil 1999 and Brazil 2002. As expected there are no significant differences between domestic and foreign exporters holding dollar debt during these crises since these are currency crises only. Therefore, comparing column (1) to column (2) we can say that results are robust to focusing on currency crises that share the same origin and are not driven by the different nature of the depreciation but rather by the existence of a banking crisis in the preceding year. For completeness column (3) shows the case of Brazil 2002 where as expected there are no differences across foreign-owned and domestic exporters with dollar debt. Finally, column (4) focuses in our main countries of interest: Mexico, Brazil and Argentina and explores the performance of foreign-owned exporters during twin crisis (Mexico 1995 and Argentina 2002). As it is clear from column (4) in table 10 these results are similar to those obtain in column (4) of table 8. The advantage of including other control countries like Chile, Peru and Colombia is the higher number of observations.

C.3 Alternative Measurement of Investment

There are several views in the literature on how to measure investment. So far we followed the mainstream and use expenditure on property, plant and equipment as our main measure of investment. This variable is more widely available and hence provides us with a larger sample. If we are willing to go down to a smaller sample, then we can use an alternative measure of investment, that is capital expenditure. This variable is defined as expenditures in capital goods and fixed assets (additions to the stock of property, plant and equipment)

based on cash flow statement data.³²

Table 11 presents the results if we focus on the sample of firms with no balance sheet mismatch and data available on capital expenditure.³³ Results in table 11 are similar to those in table 7 in terms of significance and magnitude. In this case, foreign-owned companies increase capital expenditure ratios by 6 percent relative to domestic companies only during twin crisis, whereas it was a 5 percent increase with the previous investment variable.

C.4 Alternative Explanations

We have argued that the difference in investment patterns between foreign-owned and domestic exporters during twin crises is due to differences in access to liquidity which we corroborate by the lack of similar findings during currency crises. In this section we explore potential alternative explanations to access to credit.

Better Information/Different Markets

One possibility is that foreign-owned exporters have on average higher export to sales ratios than domestic exporters however, these aggregate trends will be absorbed by the inclusion of foreign-year fixed effects; the changes at the time of the crisis will be captured by $\text{foreign} \times \text{post}$, again an advantage of having the triple interaction specification. More problematic for our interpretation of the results would be the possibility that there are changes at the time of the crisis on the export to sale ratio by foreign-owned and domestic firms.³⁴ In particular, it could be that foreign-owned exporters manage to increase their

³²These data is available for all countries, except Colombia. However, firm coverage is very limited for the available countries.

³³This estimation strategy maximizes the number of available observations relative to the triple interaction specification but similar results are obtained using the latter approach as well. Due to space considerations these results are included in the appendix, table A-2.

³⁴We do not worry about change in status of being foreign owned at the time of the crisis since we find

export to sales ratio during crisis more than domestic companies because they have better connections or information about international markets or they export more than domestic companies to developed countries not affected by the crisis. In fact, in general, the data seems to be telling a different story. Table 12 shows that on average, in our sample of high exporting firms, foreign-owned companies tend to have lower export to sales ratios than domestic companies.

There is an additional concern if foreign and domestic exporters serve different markets and due to contagion effects the markets served by domestic exporters are relatively more affected by the local crisis. A priori there is no reason to believe that foreign and domestic exporters serve different markets. To get around this problem we focus on the case of the Mexican peso crisis where around 90 percent of exports are directed to the US (see figure 5). Using an auxiliary manufacturing database, the ENESTyC survey,³⁵ we test for differences in foreign-owned and domestic companies in the percentage of their exports directed to North America, Europe, Central and South America and Asia and other countries, prior to the crisis. According to this dataset, large high exporting firms direct on average 75 percent of their exports to North America. Foreign-owned firms send on average 76 percent of their exports to North America while this figure in the case of domestic high exporters is 74 percent (this difference is not statistically significant). There are no significant differences either in the percentage of exports directed to European countries by foreign-owned and domestic companies (around 7 percent) or Central and South America (11 percent). In the case of the

very few of those changes (less than 1 percent of observations) and in addition all our variables are defined prior to the crisis.

³⁵The survey Encuesta Manufacturera de Salarios, Tecnologia y Capacitacion (ENESTyC) is conducted by the Mexican national statistical office (INEGI) and it is representative of the manufacturing sector. Due to the confidentiality of the ENESTyC database it is not possible to link both datasets. However, we can try to examine very similar samples by focusing on large companies that export more than 10 percent of their sales abroad. There are 4,855 firms in the ENESTyC survey of 1991 prior to the Mexican peso crisis of which 665 are large high exporters (210 (foreign) and 455 (domestic)). Large firms are defined following INEGI classification as those with more than 100 employees.

percentage of exports directed to Asia and other countries, domestic firms export a slightly higher fraction (6 percent) compared to the 3 percent exported by foreign-owned companies however, this difference is too small and the fraction of firms exporting to Asian countries too little to explain our results. These statistics corroborate the intuition that there are no significant difference between foreign-owned and domestic companies percentage of exports directed to developed countries at least in the case of Mexico where we document our main findings.³⁶ As shown by Paravisini, Rappoport, Schnabl, and Wolfenzon (2011) the estimates based on comparing the outcomes of foreign-owned firms and domestic firms might be biased if the crisis had an heterogenous impact across exporters with multiple destinations. Our previous discussion suggests that there is no reason to believe our estimates are biased, at least in the case of Mexico where both foreign-owned and domestic exporters direct over 80 percent of their exports to developed countries prior to the crisis.

Imported Intermediates

Another alternative explanation for our main results is related to the role of imported materials. The depreciation makes export goods relatively cheaper, but at the same time firms importing materials from abroad witness an increase in the relative price of imports. Therefore, if domestic companies rely more on imported materials and cannot import during the crisis time this could explain their relatively worst performance compared to foreign firms. Again we make use of the ENESTyC database and test whether among large high exporting firms there are significant differences in the percentage of intermediate inputs imported from abroad among foreign-owned and domestic companies. According to this survey, large exporting foreign-owned companies imported 66 percent of their intermediate inputs from abroad while their domestic counterparts only imported 29 percent (the difference is

³⁶Contagion could also diminish the investment opportunity coming from a competitive devaluation if exporters in neighboring countries undergo a parallel depreciation however, this increase in competition should equally affect foreign-owned and domestic exporters serving similar markets.

statistically significant).³⁷ According to these figures if anything, foreign-owned companies should have suffered more during the crisis from higher import prices. Of course, it could still be that foreign affiliates import most of their intermediate inputs from the parent company at a lower price or through different trade credit instruments. We cannot rule out this possibility but it will be in line with our thinking that during crises parent companies provide either direct credit to foreign-owned affiliates or indirect credit through cheaper intermediate inputs or trade credit.

Anticipation

It is also possible that both foreign-owned and domestic firms reduce their dollar liabilities in anticipation to the crisis and it might be that they predict currency crisis more accurately. This can explain the no-difference result between foreign-owned and domestic exporting firms in the case of currency crises. As we show in figure 6, that there was no systematic decrease in dollarization for foreign-owned firms relative to domestic firms in the eve of crisis. The figure look similar for the other countries.

C.5 Threat to Identification I: How different are investment trends for foreign-owned firms with liability dollarization?

Given our differences-in-differences strategy we might have two main threats to identification. Foreign-owned exporters that choose to hold dollar denominated debt could be different from domestic exporters that chose 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 lessened by the firm fixed

³⁷Similar results are found if we exclude maquila-type establishments that import 100 percent of their intermediate inputs (57 percent of intermediate inputs imported by foreign-owned companies versus 28 percent imported by domestic companies).

effect estimation. As shown before our results are also robust to controlling for foreign-year fixed effects to account for different trends between foreign-owned and domestic companies.

Figure 7 shows the average investment rates for two types of firms: foreign-owned exporters holding above median dollar debt and domestic exporters holding above median dollar debt in Mexico. Graphical inspection reveals that there are no major differences in trends between foreign and domestic firms holding high levels of short-term dollar debt prior to the depreciation episode in Mexico. The figures for the other countries are similar.

Of course the key worry here are the differences between foreign-owned firms who hold dollar debt and domestic firms who hold dollar debt, especially at the time of crisis. This is exactly why we prefer a triple interaction methodology, since the triple interaction regression controls for the term $ShortDollarDebt \times Post$ which accounts for the different trends in investment between foreign and domestic exporters holding dollar debt and those not holding dollar debt, at the time of the crisis.

C.6 Threat to Identification II: Are dollar debt holdings exogenous?

Our results are based on the assumption that firms across countries freely choose the percentage of their short-term debt that is denominated in foreign currency. We do not want our results to be driven by differences across countries in dollar debt practices. As we explained before most of Brazilian companies foreign currency borrowing is obtained abroad (whether bond issuances or bank loans). Exporters can borrow from the BNDES in foreign currency though. In fact, table 4 shows that although lower than the Argentinean and Mexican levels, short-term dollar debt in Brazil represents on average 20 percent of short-term debt. Most importantly, most of the variation in short-term dollar debt takes place within the sample of exporters (i.e. non-exporting companies do not hold significant amounts of dollar debt) which is our sample of interest given that they are the ones faced with the investment opportunity. Although the median domestic exporter in Brazil holds lower levels of dollar debt than the foreign-owned counterpart, so do Argentinean domestic exporters and it does not

seem to be something specific to Brazil.

V Conclusion

An old debate in international macro and finance that became fashionable again in the light of the 2007-2008 crisis is how financial frictions operate in linking crises and recessions. Do they operate via supply of credit or do they operate via demand for credit? Put it differently, is there a way to separate the effects of the lending channel, that is studied extensively by the finance literature from the collateral channel, that is put forward as the main friction by the macro literature? And how can we think of both channels in the context of interconnected open economies and global financial crises? The answers carry utmost policy relevance since they affect the conduct of monetary policy and reforms for global financial stability.

This paper sits at the intersection of these questions. We exploit a unique quasi-natural experiment, the experience of Latin American countries with a plethora of financial crises during 1990–2005, in order to disentangle and quantify the effects of the lending channel and the balance sheet channel on corporate investment. A currency crisis constitutes a positive credit demand shock for exporting firms. These firms may want to increase investment in order to export more through a competitive devaluation, however they may not be able to do so if they are credit constrained. They might also become credit constrained due to devaluation. This is precisely because a depreciated currency is a negative shock to firms' collateral if firms have a currency mismatch on their balance sheet. A balance sheet with liability dollarization will have a currency and maturity mismatch and compromises firms' solvency. Even if firms do not become credit constrained due to devaluation, assuming they have strong balance sheets, they might still not exploit the investment opportunity resulting from a depreciated currency since there can be a simultaneous credit crunch in the economy due to a banking crisis. Emerging markets firms are dependent on their local banks for financing and given the banking crisis local banks lack the liquidity needed to continue lending.

In order to separate the lending story from the collateral story, we compare firms with similar net worth at the onset of a financial crisis that differ on their ability to overcome the liquidity crunch of local banks. This will allow us to differentiate between the frictions that work via demand for credit and frictions that work via supply of credit. We condition on the balance sheet weakness and then, we study the sensitivity of investment by foreign-owned and domestic exporters to the negative credit supply shock that occurs during a banking crisis, where we expect the former group to be less credit-constrained. We find that there is no difference in the investment behavior of foreign-owned exporters relative to domestic exporters under a currency crisis. This means they both utilize the investment opportunity regardless of their balance sheet weakness. If currency crisis occurs simultaneously with the banking crisis, on the other hand, foreign-owned exporters perform significantly better. They increase investment ratios by 5 percent and domestic exporters decrease investment by 13 percent. Notice that this result again does not depend on the balance sheet weakness. Overall, our results suggest that the key factor hindering investment in the aftermath of financial crises is illiquidity, highlighting the crucial role of the lending channel in turning financial crises into recessions.

References

- ADRIAN, T., P. COLLA, AND H. SHIN (2012): “Which Financial Frictions? Paring the Evidence from Financial Crisis of 2007-9,” *Forthcoming in NBER Macroeconomic Annual*.
- AGUIAR, M. (2005): “Investment, Devaluation, and Foreign Currency Exposure: The Case of Mexico,” *Journal of Development Economics*, 78, 95–113.
- AGUIAR, M., AND G. GOPINATH (2005): “Fire-sale FDI and Liquidity Crises,” *Review of Economics and Statistics*, 87(3), 439–452.
- ALLEN, M., C. ROSENBERG, C. KELLER, B. SETSER, AND N. ROUBINI (2002): “Non-monetary Effects of the Financial Crisis in Propagation of the Great Depression,” *IMF Working Paper*, (210).
- ALMEIDA, H., M. CAMPELLO, B. LARANJEIRA, AND S. WEISBENNER (2012): “Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis,” *Critical Finance Review*, 1(1), 3–58.
- AMITI, M., AND D. WEINSTEIN (2011): “Exports and Financial Shocks,” *Quarterly Journal of Economics*, 126(4), 1841–1877.
- ANTRAS, P. (2003): “Firms, Contracts, and Trade Structure,” *Quarterly Journal of Economics*, 118(4), 1375–1418.
- (2005): “Incomplete Contracts and the Product Cycle,” *American Economic Review*, 95(4), 1054–1073.
- ANTRAS, P., M. A. DESAI, AND F. FOLEY (2009): “Multinational Firms, FDI Flows and Imperfect Capital Markets,” *Quarterly Journal of Economics*, 124(3), 1171–1219.
- ANTRAS, P., AND E. HELPMAN (2004): “Global Sourcing,” *Journal of Political Economy*, 112(3), 552–580.

- ASHCRAFT, A. B. (2006): “New evidence on the Lending Channel,” *Journal of Money, Credit and Banking*, 38, 751–775.
- BARRO, R. J. (1976): “The Loan Market, Collateral, and Rates of Interest,” *Journal of Money, Credit and Banking*, 8, 439–456.
- BECKER, B., AND V. IVASHINA (2011): “Cyclicality of Credit Supply: Firm Level Evidence,” *NBER working paper*, (17392).
- BERNANKE, B. (1983): “Nonmonetary Effects of the Financial Crisis in Propagation of the Great Depression,” *American Economic Review*, 73(3), 257–276.
- BERNANKE, B., AND M. GERTLER (1989): “Agency Costs, Net Worth, and Economic Fluctuations,” *American Economic Review*, 79, 14–31.
- BLALOCK, G., P. J. GERTLER, AND D. I. LEVINE (2008): “Financial Constraints on Investment in an Emerging Market Crisis,” *Journal of Monetary Economics*, 55(3), 568–591.
- BLEAKLEY, H., AND K. COWAN (2008): “Corporate Dollar Debt and Depreciations: Much Ado About Nothing?,” *Review of Economics and Statistics*, 90(4), 612–626.
- CAMPELLO, M., J. R. GRAHAM, AND C. HARVEY (2010): “The Real Effects of Financial Constraints: Evidence from a Financial Crisis,” *Journal of Financial Economics*, 97, 470–487.
- CESPEDES, L., R. CHANG, AND A. VELASCO (2004): “Balance Sheets and Exchange Rate Policy,” *American Economic Review*, 94(4), 1183–1193.
- CHANEY, T., D. SRAER, AND D. THESMAR (2012): “The Collateral Channel: How Real Estate Shocks Affect Corporate Investment,” *American Economic Review*, 102(6), 2381–2409.

- CHANG, R., AND A. VELASCO (2001): “A Model of Financial Crisis in Emerging Markets,” *Quarterly Journal of Economics*, 116(2), 489–517.
- DEMIRGUC-KUNT, A., AND R. LEVINE (2001): “Bank-Based and Market-Based Financial Systems: Cross-Country Comparisons,” in *Financial Structure and Economic Growth: A Cross-Country Comparison*, ed. by A. Demirguc-Kunt, and R. Levine. Cambridge, MA: MIT Press.
- DESAI, M. A., F. C. FOLEY, AND K. J. FORBES (2008): “Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Depreciations,” *Review of Financial Studies*, 21(6), 2857–2888.
- DUCHIN, R., O. OZBAS, AND B. A. SENSOY (2010): “Costly external finance, corporate investment, and the subprime mortgage crisis,” *Journal of Financial Economics*, 97, 418–435.
- FONS-ROSEN, C., S. KALEMLI-OZCAN, B. E. SØRENSEN, C. VILLEGAS-SANCHEZ, AND V. VOLOSOVYCH (2012): “Quantifying Productivity Gains from Foreign Investment,” .
- GOPINATH, G., AND B. NEIMAN (2011): “Trade Adjustment and Productivity in Large Crises,” *NBER working paper*, (16958).
- HART, O., AND J. MOORE (1994): “A Theory of Debt Based on the Inalienability of Human Capital,” *Quarterly Journal of Economics*, 109(4), 841–879.
- HOLMSTROM, B., AND J. TIROLE (1997): “Financial Intermediation, Loanable Funds, and the Real Sector,” *Quarterly Journal of Economics*, 112, 663–691.
- IVASHINA, V., AND D. SCHARFSTEIN (2010): “Bank lending during the financial crisis of 2008,” *Journal of Financial Economics*, 97(3), 319–338.
- JIMENEZ, G., S. ONGENA, J. PEYDRO-ALCALDE, AND J. SAURINA (2012): “Credit Supply: Identifying Balance-Sheet Channels with Loan Applications and Granted Loans,” *American Economic Review*, 102(5), 2301–2326.

- KAMIL, H. (2009): “A new database on currency and maturity composition of firms’ balance sheets in Latin America: 1992-2005,” International Monetary Fund, Washington.
- KAMINSKY, G. L. (2006): “Currency Crises: Are They All the Same?,” *Journal of International Money and Finance*, 25, 503–527.
- KAMINSKY, G. L., AND C. M. REINHART (1999): “The Twin Crises: The Causes of Banking and Balance-of-Payments Problems,” *American Economic Review*, 89(3), 473–500.
- KASHYAP, A., O. LAMONT, AND J. STEIN (1994): “Credit Conditions and the Cyclical Behavior of Inventories,” *Quarterly Journal of Economics*, 109(3), 565–592.
- KASHYAP, A., AND J. STEIN (2000): “What Do A Million Observations on Banks Say About the Transmission of Monetary Policy?,” *American Economic Review*, 90(3), 407–428.
- KASHYAP, A., J. STEIN, AND D. W. WILCOX (1993): “Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance,” *American Economic Review*, 83(1), 78–98.
- KHWAJA, A. I., AND A. MIAN (2008): “Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market,” *American Economic Review*, 98(4), 1413–1442.
- KIYOTAKI, N., AND J. MOORE (1997): “Credit Cycles,” *The Journal of Political Economy*, 105(2), 211–248.
- PARAVISINI, D. (2008): “Local Bank Financial Constraints and Firm Access to External Finance,” *Journal of Finance*, 63(5), 2160–2193.
- PARAVISINI, D., V. RAPPOPORT, P. SCHNABL, AND D. WOLFENZON (2011): “Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data,” *NBER working paper*, (16975).

- PEEK, J., AND E. ROSENGREN (1997): “The International Transmission of Financial Shocks: The Case of Japan,” *American Economic Review*, 87(4), 495–505.
- (2000): “Collateral damage: Effects of the Japanese Bank Crisis on Real Activity in the United States,” *American Economic Review*, 90(1), 30–45.
- REINHART, C. M., AND V. R. REINHART (2010): “Capital Flow Bonanzas,” *NBER ISOM*.
- REINHART, C. M., AND K. S. ROGOFF (2008): “Banking Crises: An Equal Opportunity Menace,” *NBER Working Paper*, (14587).
- (2010): “Growth in a Time of Debt,” *American Economic Review*, 100(2), 573–578.
- SCHNABL, P. (2012): “Financial Globalization and the Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market,” *Journal of Finance*, 67(3), 897–932.
- STIGLITZ, J. E., AND A. WEISS (1981): “Credit Rationing in Markets with Imperfect Information,” *American Economic Review*, 71(3), 393–410.

VI Tables

Table 1: Macroeconomic Outcomes: Twin and Currency Crises

Outcome	Period	Argentina	Mexico	Brazil	Brazil
		2002	1995	1999	2002
GDP per capita growth	prior crisis	-3.7%	1.3%	0.2%	1.3%
	crisis	-2.5%	-2.4%	0.8%	0.5%
	post crisis	7.8%	4.2%	1.3%	3.1%
GFKF to GDP	prior crisis	-12.0%	2.7%	4.0%	2.7%
	crisis	-6.5%	-9.5%	-1.8%	-5.0%
	post crisis	25.0%	14.4%	2.7%	6.1%
Trade Balance to GDP	prior crisis	1.0%	3.9%	3.1%	11.9%
	crisis	29.4%	24.0%	15.7%	2.6%
	post crisis	6.1%	1.1%	11.9%	-0.8%

Notes: Using data on CPI, the real exchange rates were obtained as the deflated end-of period exchange rates. A currency crisis is defined as a 25 percent increase in the real exchange rate relative to the previous year. We identify four depreciation episodes in our sample: Argentina (2002), Mexico (1995), Brazil (1999) and Brazil (2002). Note that Mexico abandoned the peg in December 1994, Brazil in January 1999 and finally, Argentina in January 2002. In addition, following Reinhart and Rogoff (2008) we identify the following banking crises that predated a currency crisis: Argentina (2001) and Mexico (1994). Therefore, there are two twin crises episodes (simultaneous currency and banking crisis) in our sample: Argentina (2002) and Mexico (1995). The figures in the table refer to percentage changes defined over two year. GDP stands for Gross Domestic Product. GFKF to GDP stands for the ratio of Gross Fixed Capital Formation to GDP. Trade Balance to GDP stands for the ratio of Exports minus Import to GDP.

Table 2: Percentage of Observations: By Firm and Country

	<u>Argentina</u>	<u>Brazil</u>	<u>Chile</u>	<u>Colombia</u>	<u>Mexico</u>	<u>Peru</u>	<u>Total</u>
<i>Foreign</i>	40.00	18.41	14.24	7.14	9.62	29.05	14.45
<i>Exporter</i>	50.29	42.69	39.88	54.26	66.24	81.28	53.58
<i>HighExporter</i>	20.57	28.88	17.72	28.88	34.00	32.12	27.14
<i>TotalDollarDebt</i>	93.71	74.91	66.17	59.42	88.99	100.00	77.15
<i>ShortDollarDebt</i>	93.71	64.44	65.46	58.81	88.20	100.00	74.89
<i>DollarAssets</i>	87.43	21.06	57.17	43.83	94.44	98.60	58.83
Observations	175	869	1552	658	1653	358	5265

Notes: The number of observations and percentages refer to the sample of firms left after the cleaning procedure and for which we have data on investment. *Foreign* is a dummy that takes the value of one if foreigners own more than 50% of the company's capital. *Exporter* is a dummy that takes the value of one if the firm reports export revenue and zero otherwise. *HighExporter* is a dummy that takes the value of one if the firm reports export revenue greater than 10% of sales. *TotalDollarDebt* is a dummy that takes the value of one if the firm reports positive total dollar denominated liabilities. *ShortDollarDebt* is a dummy that takes the value of one if the firm reports positive short-term dollar denominated liabilities. *DollarAssets* is a dummy that takes the value of one if the firm reports positive total dollar denominated assets.

Table 3: Descriptive Statistics

	Total Sample			Exporter Sample		
	Mean	sd	Obs	Mean	sd	Obs
<i>Investment</i>	0.012	0.110	5265	0.011	0.113	3031
<i>Capital Expenditure</i>	0.139	0.199	1887	0.147	0.203	1090
<i>Total Assets</i>	18.71	2.00	5265	19.00	1.79	3031
<i>Short Dollar Debt</i>	0.262	0.284	5265	0.348	0.289	3031
<i>Export Share</i>	0.111	0.209	5265	0.171	0.238	3031
<i>High Exporter</i>	0.283	0.450	5265	0.491	0.500	3031
<i>Foreign Ownership</i>	14.19	30.99	5265	16.37	32.58	3031
<i>Foreign</i>	0.154	0.361	5265	0.183	0.387	3031
<i>Foreign Exporter</i>	0.027	0.162	5265	0.047	0.211	3031
<i>Leverage</i>	1.063	2.232	5265	0.885	0.846	3031
<i>Bond Abroad</i>	0.019	0.137	5265	0.024	0.152	3031
<i>International Loan</i>	0.047	0.211	5265	0.062	0.241	3031
<i>Equity</i>	0.024	0.154	5265	0.024	0.154	3031

Notes: Statistics refer to the final sample of firms used in the estimation. The exporter sample is based on a predetermined export dummy that equals one if the firm reported export revenue during the three years prior to the crisis and zero otherwise. *Investment* is physical stock of capital (property, plant and equipment) at time t minus physical stock of capital at time $t - 1$ net of depreciation normalized by lagged total assets. *Capital Expenditure* refers to expenditures in capital goods and fixed assets (expenditure on the stock of property, plant and equipment) based on cash flow statement data, normalized by lagged total assets. *Total Assets* is the log of lagged total assets. *Short Dollar Debt* is the ratio of short-term dollar denominated liabilities to short-term debt (lagged). *Export Share* is the ratio of export revenue to total sales (lagged). *High Exporter* is a dummy that takes value of one if the ratio of exports to sales is higher than 10% (based on lagged *Export Share*) at any time during the three years prior to the crisis. *Foreign Ownership* is the percentage of capital owned by foreign investors (lagged). *Foreign* is a dummy that takes the value of one if the share of foreign ownership is more than 50% at any time during the three years prior to the crisis. *Foreign Exporter* is a dummy that takes the value of one if the firm is foreign and high exporter at any time during the three years prior to the crisis. *Leverage* is the ratio of short-term liabilities to short-term assets (lagged). *Bond Abroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad (lagged). *International Loan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad.

Table 4: Dollar Debt by Firm Type

	Exporter			Non-Exporter		
	<u>Mean</u>	<u>Median</u>	<u>Observations</u>	<u>Mean</u>	<u>Median</u>	<u>Observations</u>
Argentina	53.40	59.06	117	38.11	33.20	58
Brazil	29.07	25.08	346	11.33	0.71	523
Chile	27.73	20.26	946	7.05	0.00	606
Colombia	10.58	3.97	337	6.96	0.00	321
Mexico	43.62	42.97	948	23.62	13.01	705
Peru	53.30	53.68	337	56.09	59.15	21
Total	34.78	30.74	3031	14.54	1.34	2234
Test Mean Diff (p-value)	0.000					

	Foreign			Domestic		
	<u>Mean</u>	<u>Median</u>	<u>Observations</u>	<u>Mean</u>	<u>Median</u>	<u>Observations</u>
Argentina	55.64	60.03	75	42.85	42.14	100
Brazil	12.85	2.04	115	19.24	9.94	754
Chile	16.65	4.04	361	20.57	6.60	1191
Colombia	8.21	5.68	20	8.83	0.76	638
Mexico	31.03	32.60	120	35.41	31.35	1533
Peru	49.81	48.84	122	55.35	57.09	236
Total	26.60	17.34	813	26.12	15.30	4452
Test Mean Diff (p-value)	0.6539					

	Foreign Exporter			Domestic Exporter		
	<u>Mean</u>	<u>Median</u>	<u>Observations</u>	<u>Mean</u>	<u>Median</u>	<u>Observations</u>
Argentina	59.16	61.13	51	48.96	54.66	66
Brazil	27.42	30.13	33	29.24	24.46	313
Chile	21.08	10.54	227	29.83	22.75	719
Colombia	8.21	5.68	20	10.73	3.86	317
Mexico	33.35	34.81	108	44.94	44.45	840
Peru	47.98	45.60	116	56.10	57.20	221
Total	32.50	28.82	555	35.29	31.06	2476
Test Mean Diff (p-value)	0.0401					

Notes: The table reports the mean, median and number of observations of the variable *ShortDollarDebt* lagged one period used in the analysis. This variable is the ratio of short-term (less than 12 months) dollar denominated liabilities to short-term debt. *Exporter* is a dummy variable that takes the value of 1 if the firm reports any export revenue at any time during the three years prior to the crisis and 0 otherwise. *Foreign* is a dummy variable that takes the value of 1 if the firm is more than 50% owned at any time during the three years prior to the crisis and 0 otherwise.

Table 5: Exporters and Financial Crises: Balance Sheet Channel

DEPENDENT VARIABLE: INVESTMENT					
<u>Crisis</u>	All Types of Crises				
	<u>Exporter Definition</u>	Continuous	Continuous	Predetermined Dummy	Continuous
<u>Dollar Debt Definition</u>		Continuous	Continuous	Predetermined Dummy	
	(1)	(2)	(3)	(4)	
<i>Exports</i> × <i>Post</i>	-0.004 (0.03)	0.029 (0.02)	0.003 (0.01)	0.002 (0.03)	
<i>Exports</i>	-0.048** (0.02)	-0.052** (0.02)		-0.049** (0.02)	
<i>ShortDollarDebt</i> × <i>Post</i>		-0.066* (0.03)	-0.060 (0.04)	-0.012 (0.01)	
<i>ShortDollarDebt</i>		0.006 (0.01)	0.003 (0.01)		
Observations	5,265	5,265	5,265	5,265	
Firms	906	906	906	906	
Firm Fixed-Effects	yes	yes	yes	yes	
Sector × Year Fixed-Effects	yes	yes	yes	yes	
Country × Year Fixed-Effects	yes	yes	yes	yes	

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. *Investment* is normalized by total assets lagged one period. *Post* is a dummy variable that takes the value of one in the year of the crisis and one year after, so that the starting depreciation year is 2002 for Argentina and 1995 for Mexico and the starting depreciation year is 1999 and 2002 in Brazil. *Continuous exports* refers to the lag value of export revenue to total sales. Predetermined Export Dummy is based on whether the firm reported export revenue greater than 10 percent of sales at any time during the three years prior to the crisis. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities (lagged one period). Predetermined Dollar Debt Dummy is based on whether the firm had a ratio of short-term dollar debt to short-term debt greater than 39 percent (75th percentile) at any time during the three years prior to the crisis. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 6: Exporters, Currency and Twin Crises: Balance Sheet Channel

DEPENDENT VARIABLE: INVESTMENT				
<u>Crisis</u>	Twin Crises		Currency Crises	
<u>Exporter Definition</u>	Continuous	Predetermined Dummy	Continuous	Predetermined Dummy
<u>Dollar Debt Definition</u>	Continuous	Continuous	Continuous	Continuous
	(1)	(2)	(3)	(4)
<i>Exports</i> × <i>Post</i>	0.013 (0.03)	-0.034 (0.02)	0.049** (0.02)	0.038** (0.02)
<i>Exports</i>	-0.046** (0.02)		-0.051** (0.02)	
<i>ShortDollarDebt</i> × <i>Post</i>	-0.090** (0.04)	-0.055* (0.03)	-0.025 (0.04)	-0.057 (0.05)
<i>ShortDollarDebt</i>	0.002 (0.01)	-0.005 (0.02)	-0.002 (0.01)	-0.006 (0.02)
<i>Exports</i> × <i>ShortDollarDebt</i> × <i>Post</i>		-0.129 (0.09)		0.095 (0.09)
<i>Exports</i> × <i>ShortDollarDebt</i>		0.009 (0.03)		0.003 (0.03)
Observations	5,265	5,265	5,265	5,265
Firms	906	906	906	906
Firm Fixed-Effects	yes	yes	yes	yes
Sector × Year Fixed-Effects	yes	yes	yes	yes
Country × Year Fixed-Effects	yes	yes	yes	yes
<u>F-test</u>				
<i>ShortDollarDebt</i>		0.0464		0.788
<i>ShortDollarDebt</i> × <i>Post</i>		0.145		0.497
<i>Exports</i>		0.300		0.151
<i>Exports</i> × <i>Post</i>		0.250		0.0921

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. Notice *Investment* is normalized by total assets. In columns (1) and (2) *Post* is a dummy variable that takes the value of one in the year of the twin crisis and one year after, so that the starting depreciation year is 2002 for Argentina and 1995 for Mexico. Columns (3) and (4) refer to currency crises and the starting depreciation year is 1999 and 2002 in Brazil. *Continuous* exports refers to the lag value of export revenue to total sales. Predetermined Export Dummy is based on whether the firm reported export revenue greater than 10 percent of sales at any time during the three years prior to the crisis. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities (lagged one period). *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 7: Foreigners During Crises: Lending Channel in a Sample of Firms with NO Balance Sheet Mismatch

Sample of Firms	Twin Crises				Currency Crises			
	No-Mismatch Continuous	No-Mismatch Dummy	No-Mismatch Predetermined Dummy	No-Mismatch and Exporter Predetermined Dummy	No-Mismatch Continuous	No-Mismatch Dummy	No-Mismatch Predetermined Dummy	No-Mismatch and Exporter Predetermined Dummy
Foreign Definition	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Foreign × Post</i>	0.023** (0.01)	0.085** (0.04)	0.096** (0.04)	0.094** (0.04)	-0.000 (0.00)	-0.009 (0.03)	-0.021 (0.02)	-0.002 (0.02)
<i>Foreign</i>	0.004 (0.00)	0.010 (0.01)			0.005 (0.00)	0.016 (0.01)		
<i>BondAbroad</i>	0.061 (0.04)	0.061 (0.04)	0.061 (0.04)	0.065 (0.04)	0.063 (0.04)	0.063 (0.04)	0.063 (0.04)	0.067 (0.05)
<i>InternationalLoan</i>	-0.002 (0.02)	-0.002 (0.02)	-0.002 (0.02)	0.000 (0.03)	-0.002 (0.02)	-0.002 (0.02)	-0.003 (0.02)	-0.001 (0.03)
<i>Equity</i>	-0.019 (0.02)	-0.018 (0.02)	-0.018 (0.02)	-0.035 (0.02)	-0.019 (0.02)	-0.019 (0.02)	-0.018 (0.02)	-0.035 (0.02)
<i>Leverage</i>	-0.011** (0.00)	-0.011** (0.00)	-0.011** (0.00)	-0.011** (0.01)	-0.011** (0.00)	-0.011** (0.00)	-0.011** (0.00)	-0.011 (0.01)
Observations	1,855	1,855	1,855	1,200	1,855	1,855	1,855	1,200
Firms	277	277	277	175	277	277	277	175
Firm Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes
Sector × Year Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes
Country × Year Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes
Foreign × Year Fixed-Effects	no	no	yes	yes	no	no	yes	yes

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. *Investment* is normalized by total assets. In columns (1) to (4) *Post* is a dummy variable that takes the value of one in the year of the twin crisis and one year after in Argentina (2002) and Mexico (1995). Columns (5) to (8) refer to currency crises and the starting depreciation year is 1999 and 2002 in Brazil. The sample of firms with no mismatch is defined based on whether $\frac{Exports-ShortTermLiab}{Assets} \geq 0$ at any time during the three years prior to the crisis. In columns (4) and (8) the subsample of exporters is based on predetermined values and it refers to those firms with positive export to sales ratios at any time during the three years prior to the crisis. In columns (1) and (5) *Continuous* Foreign is zero for foreign ownership values less than 50 percent and *ln(Foreign)* for values greater than 50 percent. In columns (2) and (6) Foreign is defined as a dummy variable that equals one if the firm is more than 50 percent foreign-owned and zero otherwise. Finally, in the rest of the columns Foreign is defined in terms of predetermined values and takes the value of one if foreign investors own more than 50 percent of the company at any time during the three years prior to the crisis and zero otherwise. *Leverage* is the ratio of short-term liabilities to short-term assets. *BondAbroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad. *InternationalLoan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad. All variables are lagged one period. *, **, and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 8: The Differential Response of Foreigners Holding Dollar Debt: Balance Sheet Channel and Lending Channel

DEPENDENT VARIABLE: INVESTMENT													
SUBSAMPLE OF HIGH EXPORTERS		Twin Crises					Currency Crises						
Foreign Definition	Crisis	Continuous		Predetermined Dummy		Continuous		Predetermined Dummy		Continuous		Predetermined Dummy	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
Dollar Debt Definition		Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
<i>Foreign × Post</i>		0.014** (0.01)	0.010* (0.01)	0.171*** (0.05)	0.110** (0.04)	0.108** (0.05)	0.001 (0.00)	0.001 (0.00)	-0.029 (0.04)	-0.008 (0.04)	0.010 (0.04)		
<i>Foreign</i>		0.003 (0.01)	0.004 (0.01)				0.003 (0.01)	0.004 (0.01)					
<i>ShortDollarDebt × Post</i>			-0.168 (0.10)	-0.198* (0.10)	-0.197* (0.10)	-0.194* (0.10)		0.037 (0.07)	0.040 (0.08)	0.040 (0.08)	0.028 (0.08)		
<i>ShortDollarDebt</i>			0.020 (0.02)	0.021 (0.03)	0.021 (0.03)	0.023 (0.03)	0.012 (0.02)	0.011 (0.02)	0.011 (0.02)	0.011 (0.03)	0.015 (0.03)		
<i>Foreign × ShortDollarDebt × Post</i>				0.249** (0.09)	0.269*** (0.07)	0.288*** (0.08)			-0.082 (0.09)	-0.053 (0.09)	-0.039 (0.09)		
<i>Foreign × ShortDollarDebt</i>			-0.012 (0.03)		-0.002 (0.04)	0.000 (0.04)			0.005 (0.03)	0.009 (0.03)	0.008 (0.03)		

Continued in the next page

Continued from previous page

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Foreign</i> × <i>Exports</i> × <i>Post</i>					-0.036 (0.12)					0.010 (0.09)
<i>Foreign</i> × <i>Exports</i>					-0.047 (0.04)					-0.044 (0.04)
<i>Exports</i>					-0.020 (0.03)					-0.028 (0.03)
<i>Exports</i> × <i>Post</i>					-0.002 (0.06)					0.049* (0.03)
<i>BondAbroad</i>	0.041 (0.03)	0.038 (0.03)	0.036 (0.03)	0.031 (0.03)	0.031 (0.03)	0.041 (0.03)	0.041 (0.03)	0.041 (0.03)	0.036 (0.03)	0.035 (0.03)
<i>InternationalLoan</i>	0.009 (0.02)	0.009 (0.02)	0.009 (0.02)	0.008 (0.02)	0.008 (0.02)	0.008 (0.02)	0.008 (0.02)	0.008 (0.02)	0.008 (0.02)	0.009 (0.02)
<i>Equity</i>	-0.021 (0.02)	-0.019 (0.02)	-0.017 (0.02)	-0.016 (0.02)	-0.016 (0.02)	-0.023 (0.02)	-0.023 (0.02)	-0.022 (0.02)	-0.020 (0.02)	-0.020 (0.02)
<i>Leverage</i>	-0.011* (0.01)	-0.010 (0.01)	-0.011 (0.01)	-0.011 (0.01)	-0.011 (0.01)	-0.011* (0.01)	-0.011* (0.01)	-0.011* (0.01)	-0.011 (0.01)	-0.012* (0.01)
Observations	1,488	1,488	1,488	1,488	1,488	1,488	1,488	1,488	1,488	1,488
Firms	242	242	242	242	242	242	242	242	242	242
Firm Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Sector × Year Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country × Year Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Foreign × Year Fixed-Effects	no	no	no	yes	yes	no	no	no	yes	yes
<u>F-test</u>										
<i>ShortDollarDebt</i>			0.0814	0.0100	0.0117			0.899	0.919	0.907
<i>Foreign</i>			0.00356	0.00229	0.00141			0.816	0.631	0.568
<i>ShortDollarDebt</i> × <i>Post</i>			0.0171	0.00357	0.00157			0.650	0.835	0.915
<i>Foreign</i> × <i>Post</i>			0.00128	0.00107	0.00126			0.639	0.426	0.354
<i>Exports</i>					0.236					0.0490
<i>Exports</i> × <i>Post</i>					0.860					0.0713

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. Notice *Investment* is normalized by total assets. In columns (1) to (5) *Post* is a dummy variable that takes the value of one in the year of the twin crisis and one year after, so that the starting depreciation year is 2002 for Argentina and 1995 for Mexico. Columns (6) to (12) refer to currency crises and the starting depreciation year is 1999 and 2002 in Brazil. The subsample of exporters is based on whether the firm reported export revenue greater than 10% of sales at any time during the three years prior to the crisis. In columns (1), (2), (6) and (7), *Continuous Foreign* is zero for foreign ownership values less than 50 percent and ln(Foreign) for values greater than 50 percent. In the rest of the columns *Foreign* is defined in terms of predetermined values and takes the value of one if foreign investors own more than 50 percent of the company at any time during the three years prior to the crisis and zero otherwise. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities. *Exports* refer to the ratio of exports to sales. *Leverage* is the ratio of short-term liabilities to short-term assets. *BondAbroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad. *InternationalLoan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad. All variables are lagged one period. 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 I: Additional Controls

DEPENDENT VARIABLE: INVESTMENT					
SUBSAMPLE OF HIGH EXPORTERS					
Robustness Check	Leverage	Bank Debt	Dollar Assets	Cash	Post Crisis
	(1)	(2)	(3)	(4)	(5)
<i>Foreign</i> × <i>ShortDollarDebt</i> × <i>Post</i>	0.145** (0.07)	0.179** (0.09)	0.277* (0.15)	0.260*** (0.07)	0.270*** (0.07)
<i>Foreign</i> × <i>ShortDollarDebt</i>	0.007 (0.03)	0.004 (0.03)	-0.032 (0.04)	0.010 (0.04)	-0.000 (0.03)
<i>ShortDollarDebt</i>	0.028 (0.03)	0.035 (0.03)	0.018 (0.03)	0.014 (0.03)	0.020 (0.03)
<i>ShortDollarDebt</i> × <i>Post</i>	-0.233* (0.12)	-0.236** (0.11)	-0.210 (0.15)	-0.181* (0.09)	-0.174* (0.10)
<i>Foreign</i>					
<i>Foreign</i> × <i>Post</i>	0.081** (0.04)	0.029 (0.04)	0.166** (0.06)	0.098** (0.04)	0.102** (0.04)
<i>TotalLeverage</i> × <i>Post</i>	0.108 (0.07)				
<i>TotalLeverage</i>	-0.025** (0.01)				
<i>BankDebt</i> × <i>Post</i>		0.124*** (0.03)			
<i>BankDebt</i>		-0.062*** (0.01)			
<i>Foreign</i> × <i>DollarAssets</i> × <i>Post</i>			0.659 (0.44)		
<i>Foreign</i> × <i>DollarAssets</i>			0.321** (0.12)		
<i>DollarAssets</i>			-0.034 (0.05)		
<i>DollarAssets</i> × <i>Post</i>			-0.634** (0.23)		
<i>Foreign</i> × <i>Cash</i> × <i>Post</i>				0.139 (0.45)	
<i>Foreign</i> × <i>Cash</i>				-0.024 (0.09)	
<i>Cash</i>				0.222*** (0.05)	
<i>Cash</i> × <i>Post</i>				-0.746* (0.38)	

Continued in the next page

Continued from previous page

	(1)	(2)	(3)	(4)	(5)
<i>BondAbroad</i> × <i>Post</i>					-0.056 (0.08)
<i>InternationalLoan</i> × <i>Post</i>					-0.094 (0.07)
<i>Equity</i> × <i>Post</i>					0.024 (0.02)
<i>BondAbroad</i>	0.036 (0.03)	0.029 (0.03)	0.007 (0.03)	0.011 (0.03)	0.031 (0.03)
<i>InternationalLoan</i>	0.009 (0.02)	0.007 (0.02)	0.015 (0.02)	0.014 (0.02)	0.017 (0.02)
<i>Equity</i>	-0.013 (0.02)	-0.016 (0.02)	-0.020 (0.02)	-0.025 (0.02)	-0.018 (0.02)
<i>Leverage</i>			-0.035** (0.01)	-0.027** (0.01)	-0.011 (0.01)
Observations	1488	1488	1226	1423	1488
Firms	242	242	209	233	242
Firm Fixed-Effects	yes	yes	yes	yes	yes
Country × Year Fixed-Effects	yes	yes	yes	yes	yes
Sector × Year Fixed-Effects	yes	yes	yes	yes	yes
Foreign × Year Fixed-Effects	yes	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. Notice *Investment* is normalized by total assets. *Post* is a dummy variable that takes the value of one in the year of the twin crisis and one year after, so that the starting depreciation year is 2002 for Argentina and 1995 for Mexico. The subsample of exporters is based on whether the firm reported export revenue greater than 10% of sales at any time during the three years prior to the crisis. *Foreign* is defined in terms of predetermined values and takes the value of one if foreign investors own more than 50 percent of the company at any time during the three years prior to the crisis and zero otherwise. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities. *TotalLeverage* is the ratio of total liabilities to total assets. *ShortBankDebt* is the ratio of short-term debt from banks to short-term liabilities. *DollarAssets* is the ratio of dollar assets to total assets. *Cash* is the ratio of cash holdings to total assets. *Leverage* is the ratio of short-term liabilities to short-term assets. *BondAbroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad. *InternationalLoan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad. All variables are lagged one period. 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 10: Robustness II: Comparing Crises

DEPENDENT VARIABLE: INVESTMENT
SUBSAMPLE OF EXPORTERS

Exporter Definition	Predetermined			
Foreign Definition	Predetermined			
Sample	Mexico	Brazil	Brazil	Mexico, Brazil and Argentina
Crisis	1995	2002	1999	Mex95 and Arg02
	(1)	(2)	(3)	(4)
<i>Foreign</i> × <i>ShortDollarDebt</i> × <i>Post</i>	0.326*** (0.08)	0.011 (0.10)	0.027 (0.05)	0.300*** (0.07)
<i>Foreign</i> × <i>ShortDollarDebt</i>	-0.102 (0.15)	0.047 (0.06)	0.064 (0.05)	-0.013 (0.08)
<i>ShortDollarDebt</i>	0.068 (0.09)	0.030 (0.04)	-0.005 (0.04)	0.040 (0.05)
<i>ShortDollarDebt</i> × <i>Post</i>	-0.283** (0.11)	-0.040 (0.09)	0.144 (0.10)	-0.275** (0.10)
<i>Foreign</i> × <i>Post</i>				0.173* (0.09)
<i>Foreign</i>				
<i>BondAbroad</i>	0.055 (0.05)	-0.056 (0.06)	-0.059 (0.07)	0.037 (0.04)
<i>InternationalLoan</i>	-0.017 (0.04)	-0.005 (0.05)	-0.003 (0.04)	-0.006 (0.03)
<i>Equity</i>	-0.015 (0.03)	-0.014 (0.04)	-0.012 (0.03)	-0.015 (0.02)
<i>Leverage</i>	-0.005 (0.01)	-0.088** (0.02)	-0.095*** (0.02)	-0.008 (0.01)
Observations	468	273	273	741
Firms	76	53	53	129
Firm Fixed-Effects	yes	yes	yes	yes
Year Fixed-Effects	yes	yes	yes	yes
Sector × Year Fixed-Effects	yes	yes	yes	yes
Foreign × Year Fixed-Effects	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. *Investment* is normalized by total assets. In column (1) *Post* is a dummy variable that takes the value of one in the year of the twin crisis in Mexico (1995) and one year after. In column (2) *Post* is a dummy that takes the value of one in the year of the 2002 currency crisis and one year after in Brazil. In column (3) *Post* is a dummy that takes the value of one in the year of the 1999 currency crisis and one year after in Brazil. Column (4) only includes the crises countries: Argentina, Mexico and Brazil and the post dummy refers to both Argentina and Mexico. The subsample of exporters is based on predetermined values and it refers to those firms with export to sales ratios greater than 10 percent at any time during the three years prior to the crisis. *Foreign* is similarly defined in terms of predetermined values and takes the value of one if foreign investors own more than 50 percent of the company at any time during the three years prior to the crisis and zero otherwise. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities. *Leverage* is the ratio of short-term liabilities to short-term assets. *BondAbroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad. *InternationalLoan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad. All variables are lagged one period. 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 11: Robustness III: Alternative Investment Measure–Capital Expenditure

DEPENDENT VARIABLE: CAPITAL EXPENDITURE						
Crisis	Twin Crises			Currency Crises		
Sample of Firms	No-Mismatch	No-Mismatch	No-Mismatch and Exporter	No-Mismatch	No-Mismatch	No-Mismatch and Exporter
Foreign Definition	Dummy	Predetermined Dummy	Predetermined Dummy	Dummy	Predetermined Dummy	Predetermined Dummy
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Foreign × Post</i>	0.641*** (0.06)	0.594*** (0.04)	0.554*** (0.06)	0.030 (0.05)	-0.009 (0.04)	0.001 (0.03)
<i>Foreign</i>	-0.049 (0.06)			-0.009 (0.10)		
<i>BondAbroad</i>	-0.080 (0.08)	-0.076 (0.08)	0.021 (0.06)	-0.079 (0.08)	-0.076 (0.08)	0.035 (0.07)
<i>InternationalLoan</i>	-0.031 (0.03)	-0.029 (0.03)	0.023 (0.05)	-0.018 (0.03)	-0.015 (0.03)	0.042 (0.05)
<i>Equity</i>	-0.015 (0.04)	-0.017 (0.04)	-0.031 (0.06)	-0.029 (0.04)	-0.030 (0.04)	-0.068 (0.05)
<i>Leverage</i>	-0.032*** (0.01)	-0.033*** (0.01)	-0.091** (0.03)	-0.033*** (0.01)	-0.032*** (0.01)	-0.090** (0.02)
Observations	748	748	523	748	748	523
Firms	129	129	90	129	129	90
Firm Fixed-Effects	yes	yes	yes	yes	yes	yes
Country × Year Fixed-Effects	yes	yes	yes	yes	yes	yes
Sector × Year Fixed-Effects	yes	yes	yes	yes	yes	yes
Foreign × Year Fixed-Effects	yes	yes	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. *CapitalExpenditure* is normalized by the lagged value of property, plant and equipment. In columns (1) to (3) *Post* is a dummy variable that takes the value of one in the year of the twin crisis and one year after in Argentina (2002) and Mexico (1995). Columns (4) to (6) refer to currency crises and the starting depreciation year is 1999 and 2002 in Brazil. The sample of firms with no mismatch is defined based on whether $\frac{Exports-ShortDollarLiab}{Assets} \geq 0$ at any time during the three years prior to the crisis. In columns (3) and (6) the subsample of exporters is based on predetermined values and it refers to those firms with positive export to sales ratios at any time during the three years prior to the crisis. In columns (1) and (4) *Foreign* is defined as a dummy variable that equals one if the firm is more than 50 percent foreign-owned and zero otherwise. In the rest of the columns *Foreign* is defined in terms of predetermined values and takes the value of one if foreign investors own more than 50 percent of the company at any time during the three years prior to the crisis and zero otherwise. *Leverage* is the ratio of short-term liabilities to short-term assets. *BondAbroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad. *InternationalLoan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad. All variables are lagged one period. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 12: Robustness IV: Export to Sales Ratio by Foreign Ownership and Country (percentage)

SAMPLE OF HIGH EXPORTERS						
Country	FOREIGN			DOMESTIC		
	Mean	Median	Observations	Mean	Median	Observations
Argentina	25.57	20.39	25	25.56	14.94	23
Brazil	22.99	31.16	19	33.76	25.75	254
Chile	20.08	9.58	62	32.24	23.03	353
Colombia	12.19	12.19	1	34.30	27.26	114
Mexico	25.36	22.11	38	31.24	24.82	430
Peru	37.78	30.73	50	36.78	17.97	119
Total	26.59	19.06	195	32.69	24.66	1293
Test Mean Difference (p-value)	0.0028					

Figures

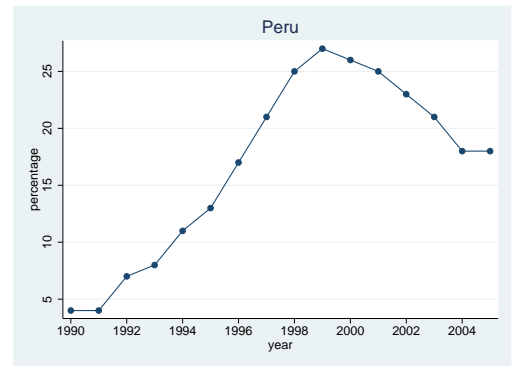
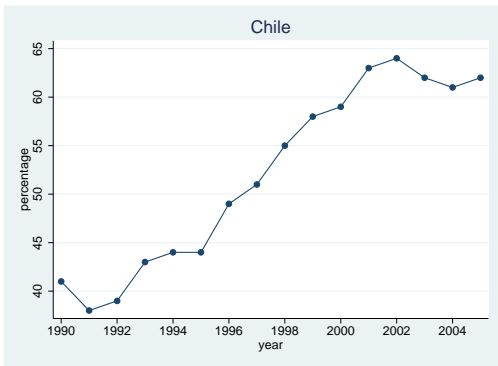
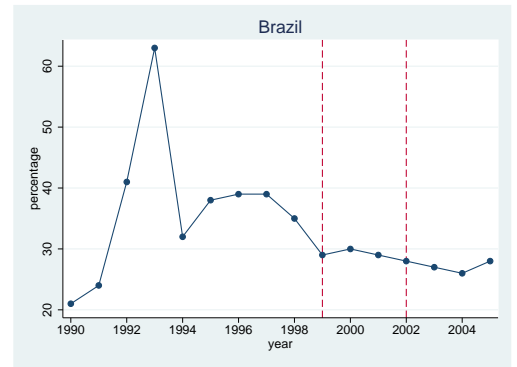
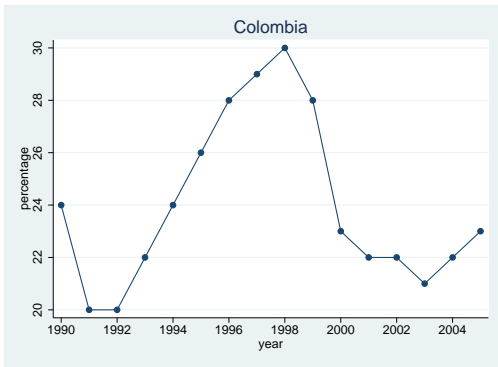
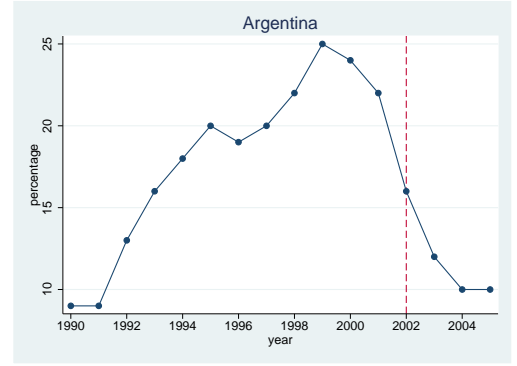
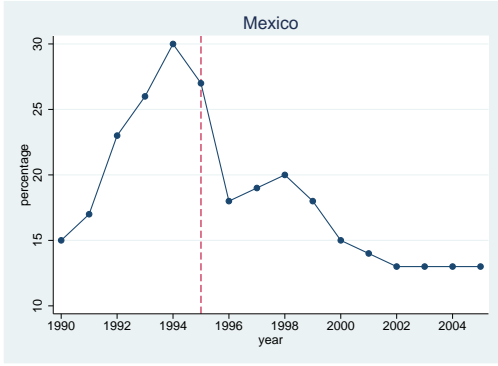


Figure 1: Local Banks' Credit to the Private sector, as a share of GDP.

Source: IFS Database, IMF.

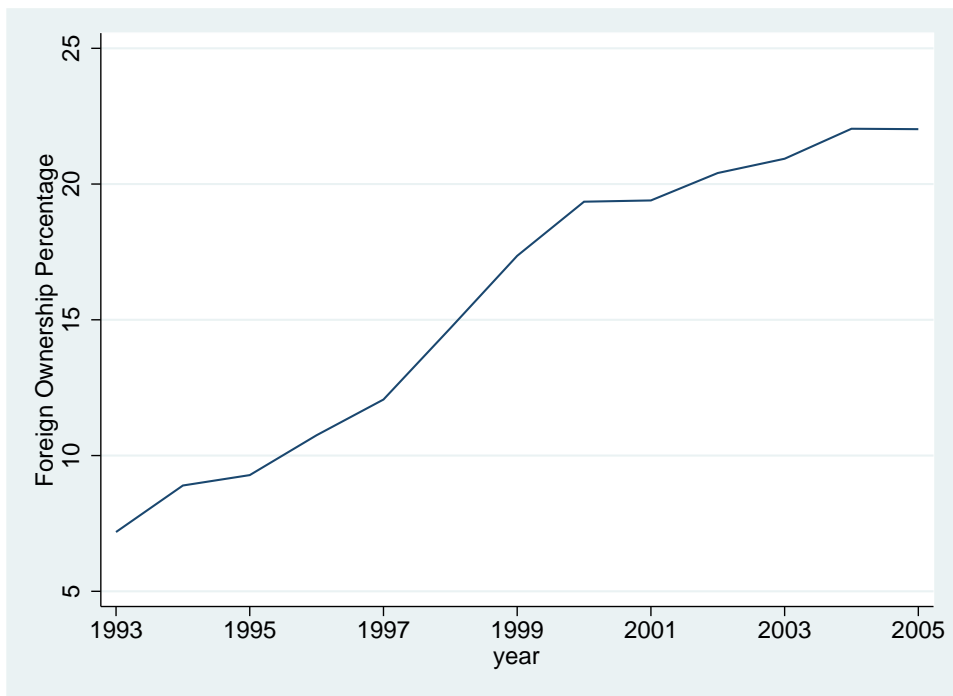


Figure 2: Foreign Ownership Over Time

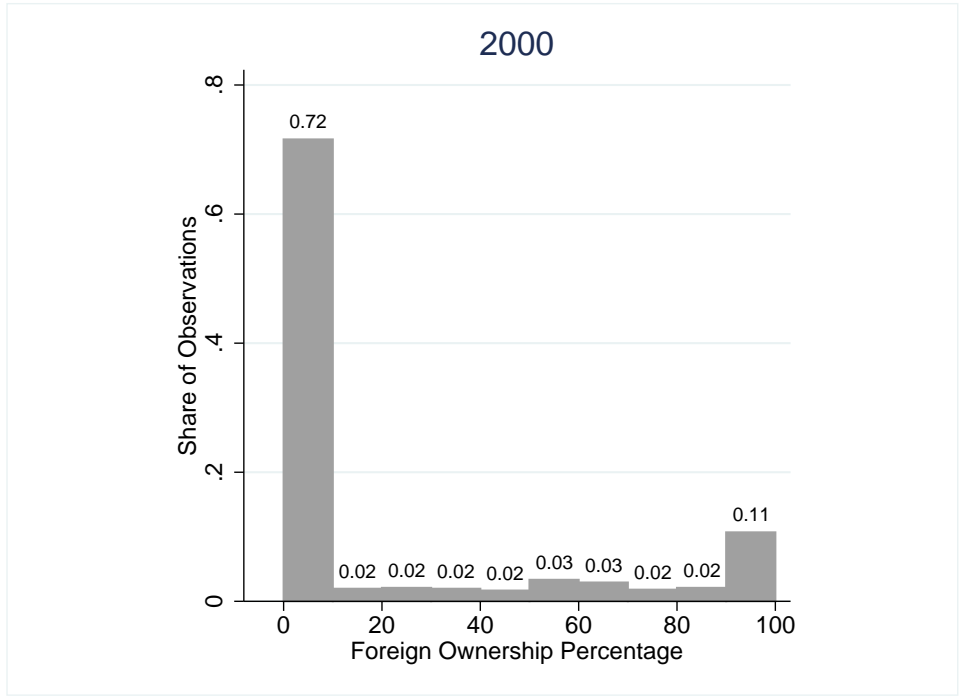


Figure 3: Cross-sectional Distribution of Foreign Ownership

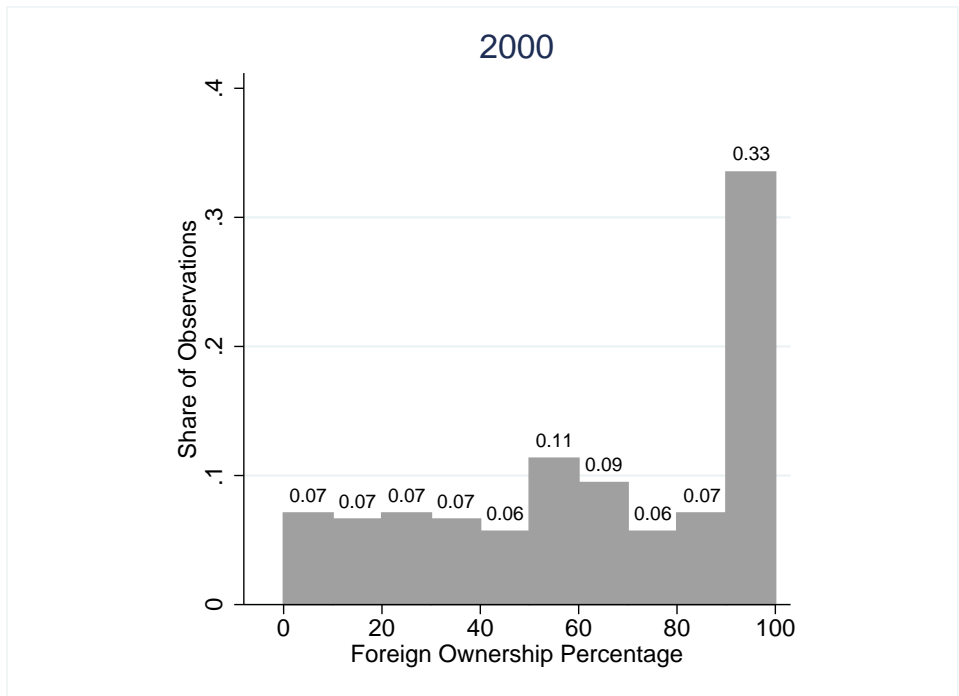


Figure 4: Cross-sectional Distribution of Foreign Ownership among foreign firms

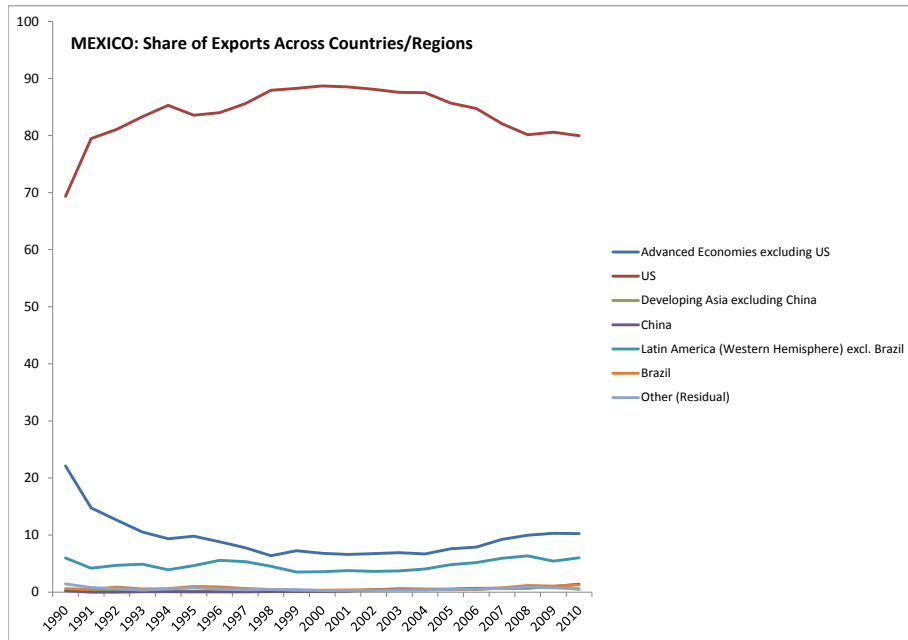


Figure 5: MEXICO: Share of Exports Across Countries/Regions

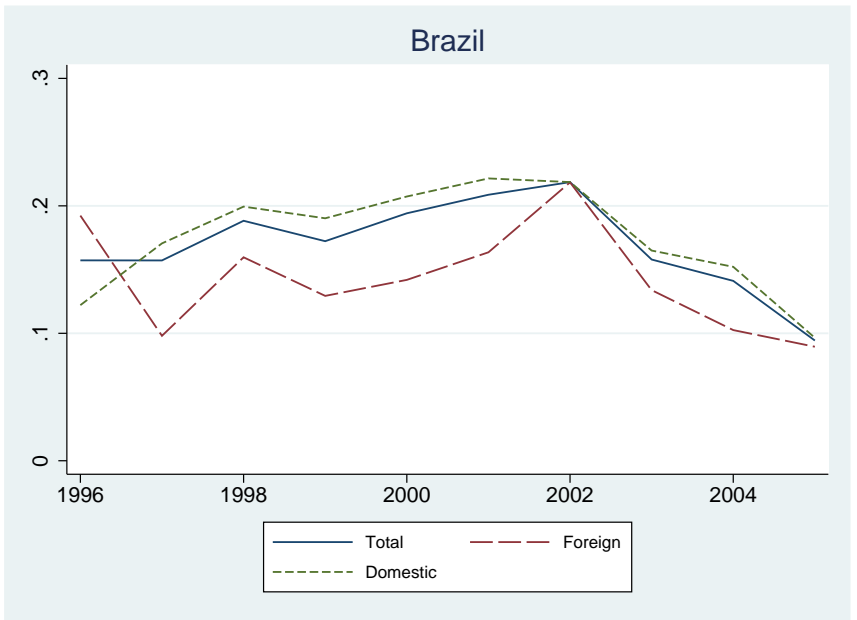


Figure 6: Short Dollar Debt over Time

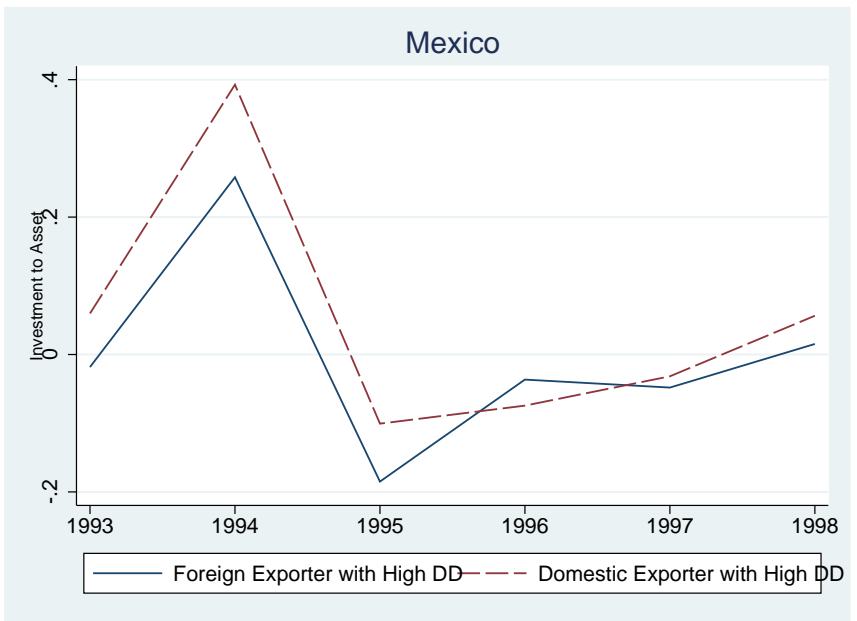


Figure 7: Trends in Investment according to Foreign Currency Denominated Debt

A Tables appendix

Table A-1: Correlations

Panel A: Total Sample											
	<u>Investment</u>	<u>Expenditure</u>	<u>Assets</u>	<u>DollarDebt</u>	<u>ExportShare</u>	<u>Exporter</u>	<u>Foreign</u>	<u>Leverage</u>	<u>Bond</u>	<u>Loan</u>	<u>Equity</u>
Investment	1										
Expenditure	0.3896*	1									
Assets	0.025	0.0358	1								
DollarDebt	0.0233	0.0385	0.2670*	1							
ExportShare	-0.0525*	0.0105	0.1205*	0.3903*	1						
Exporter	-0.0285*	0.017	0.1141*	0.3649*	0.6013*	1					
Foreign	0.025	0.0219	0.0587*	0.0062	-0.0896*	-0.0406*	1				
Leverage	-0.0398*	-0.0561*	-0.0667*	-0.0474*	-0.0531*	-0.0589*	-0.0337*	1			
Bond	0.1066*	-0.0148	0.2002*	0.0888*	0.0165	0.0229	0.0475*	-0.0108	1		
Loan	0.0298*	-0.0095	0.3030*	0.1618*	0.0451*	0.0449*	0.0623*	-0.0129	0.2577*	1	
Equity	0.0273*	0.0176	0.1744*	0.0569*	0.0158	0.0077	-0.006	-0.0211	0.1308*	0.1053*	1

Panel B: Exporter Sample											
	<u>Investment</u>	<u>Expenditure</u>	<u>Assets</u>	<u>DollarDebt</u>	<u>ExportShare</u>	<u>Exporter</u>	<u>Foreign</u>	<u>Leverage</u>	<u>Bond</u>	<u>Loan</u>	<u>Equity</u>
Investment	1										
Expenditure	0.4596*	1									
Assets	0.0288	-0.0403	1								
DollarDebt	0.0181	0.0426	0.2414*	1							
ExportShare	-0.0630*	-0.0158	0.0882*	0.3319*	1						
Exporter	-0.0336	-0.0178	0.0381*	0.2684*	0.5763*	1					
Foreign	0.015	-0.0039	-0.0036	-0.0373*	-0.1445*	-0.1322*	1				
Leverage	-0.0504*	-0.0631*	-0.0084	-0.012	-0.0424*	-0.0359*	-0.0375*	1			
Bond	0.1232*	-0.0152	0.2282*	0.0739*	0.0083	0.0028	0.0214	-0.0024	1		
Loan	0.0418*	0.0076	0.3655*	0.1428*	0.0295	0.0005	0.0346	0.0059	0.2662*	1	
Equity	0.0517*	0.034	0.2098*	0.0486*	0.0171	0.0114	-0.0196	-0.0248	0.1157*	0.1283*	1

Investment is physical stock of capital at time t minus physical stock of capital at time $t - 1$ normalized by lagged total assets. *Expenditure* refers to expenditures in capital goods and fixed assets (additions to the stock of property, plant and equipment) based on cash flow statement data, normalized by lagged total assets. *Assets* is the log of lagged total assets. *Dollar Debt* is the ratio of short-term dollar denominated liabilities to short-term debt (lagged). *ExportShare* is the ratio of export revenue to total sales (lagged). *Exporter* is a dummy that takes value of one if the ratio of exports to sales is higher than 10% (based on lagged *ExportShare*) at any time during the three years prior to the crisis. *Foreign* is a dummy that takes the value of one if the share of foreign ownership is more than 50% at any time during the three years prior to the crisis. *Leverage* is the ratio of short-term liabilities to short-term assets (lagged). *Bond* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad (lagged). *Loan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad.

Table A-2: Alternative Estimation for Robustness III

DEPENDENT VARIABLE: CAPITAL EXPENDITURE		
Sample of Firms	<u>Twin Crises</u>	<u>Currency Crises</u>
Foreign Definition	Predetermined Exporter	Predetermined Exporter
	Predetermined	Predetermined
	(1)	(2)
<i>Foreign</i> × <i>ShortDollarDebt</i> × <i>Post</i>	3.020*** (0.78)	-0.257 (0.17)
<i>Foreign</i> × <i>ShortDollarDebt</i>	0.144** (0.07)	0.177** (0.06)
<i>ShortDollarDebt</i>	-0.071* (0.04)	-0.060 (0.04)
<i>ShortDollarDebt</i> × <i>Post</i>	-0.658** (0.23)	-0.056 (0.08)
<i>Foreign</i>		
<i>Foreign</i> × <i>Post</i>	-2.077*** (0.54)	0.063 (0.05)
<i>BondAbroad</i>	-0.003 (0.07)	0.022 (0.06)
<i>InternationalLoan</i>	0.079* (0.05)	0.084* (0.04)
<i>Equity</i>	0.000 (0.06)	-0.027 (0.04)
<i>Leverage</i>	-0.097*** (0.02)	-0.091*** (0.02)
Observations	612	612
Firms	117	117
Firm Fixed-Effects	yes	yes
Country × Year Fixed-Effects	yes	yes
Sector × Year Fixed-Effects	yes	yes
Foreign × Year Fixed-Effects	yes	yes
<u>F-Test</u>		
<i>ShortDollarDebt</i>	0.000172	0.0372
<i>Foreign</i>	0.00364	0.0460
<i>ShortDollarDebt</i> × <i>Post</i>	0.000449	0.333
<i>Foreign</i> × <i>Post</i>	0.00174	0.331

Notes: Standard errors corrected for clustering at the year level are reported in parenthesis. *CapitalExpenditure* is normalized by the lagged value of property, plant and equipment. In column (1) *Post* is a dummy variable that takes the value of one in the year of the twin crisis and one year after in Argentina (2002) and Mexico (1995). Column (2) refers to currency crises and the starting depreciation year is 1999 and 2002 in Brazil. The sample of high exporters is based on predetermined values and it refers to those firms with export to sales ratio greater than 10 percent at any time during the three years prior to the crisis. *Foreign* is defined in terms of predetermined values and takes the value of one if foreign investors own more than 50 percent of the company at any time during the three years prior to the crisis and zero otherwise. *Leverage* is the ratio of short-term liabilities to short-term assets. *BondAbroad* is a dummy that takes the value of one in the year the firm issues a corporate bond abroad. *InternationalLoan* is a dummy that takes the value of one in the year the firm issues syndicated loans abroad. *Equity* is a dummy that takes the value of one in the year the firm issues equity abroad. All variables are lagged one period. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

B Variable explanations and sources

Financial statement data was obtained from annual balance sheet reports drawn from local stock markets and 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 and includes several maturities. These are all assets or liabilities outstanding which are denominated in -or indexed to- foreign currency, issued domestically or abroad. In the case of liabilities, these include bank loans, commercial debt, trade credit and foreign securities. Foreign currency assets include cash, government securities indexed to the dollar, bank deposits abroad and overseas client credits.

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 tax code identifier and/or name.

The issuance data is at transaction-level and obtained from Dealogic database and includes firms' bond and syndicated loan issuance.

Investment is measured as the stock of physical capital. The stock of physical capital, in turn, is defined as the sum of expenditures on property, plant, equipment, plus technical reappraisal (valuation change), minus cumulated depreciation.

As an alternative we also used investment data defined as expenditures in capital goods and fixed assets (additions to the stock of property, plant and equipment) based on cash flow statement data.

C Foreign Ownership Variable

To identify the ownership structure of each firm in our sample and track their changes over time, we proceed in two steps. First, we gathered data on all cross-border Mergers and Acquisitions (M&A) of Latin-American firms between 1981 to 2005 using the SDC Platinum database from Thompson (for the period 1981 to 2001) and Zephyr from Bureau Van Dijk (from 1997 to 2005). We then identified all transactions where the target involved a firm in our sample. Examining M&As from the 1980s onwards ensures that we capture any change in ownership relationship that predates the firm’s first appearance in our sample, that is 1990. For each deal, we obtained 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 a target firm in our sample as well as acquisitions of minority stakes (some of which involve multiple acquisitions of the same target). Of the firms in our sample, 28 percent were involved in at least one M&A during the period. For each firm involved in an M&A, we constructed a continuous, time-varying measure of foreign ownership based on the percentage fraction of shares held by foreign and domestic investors in each year.

Second, there might be ways other than M&As for foreign investors to invest in firms. 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. In some cases, foreign-owned firms could have been established before 1980, and not involved in a M&A since then. To remedy this, we used the *Corporations Affiliations* database to identify Latin American firms in our sample that are affiliates, subsidiaries and/or divisions of global multinational firms. This database contains international public and private business profiles and corporate linkage (“who owns whom”) for approximately 184,000 public and private companies

worldwide.

Finally, notice that in addition to the “formal” sources of foreign ownership data we checked firm by firm company’s history.³⁸ After this extensive search of all these alternative sources, if we find no evidence of foreign ownership we assume the company is domestic.

We construct a continuous, time-varying measure of foreign ownership based on the percentage fraction of shares held by foreign and domestic investors in each year. 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, from other domestic investors, 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. We then merged this information with annual balance sheet data. 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.

D Cleaning Procedure

We drop all firm/year observations in which the accounting data are not self-consistent. 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

³⁸We doubled checked with various internet resources, including the information provided by the company on its own web page and that of the Funding Universe website (www.fundinguniverse.com/company-histories/) that provides information on companies’ history as well as press articles of the time.

distribution of the ratio of sales to total assets and total liabilities to total assets. These adjustments led to dropping 16 percent of the remaining firm-year observations. To ensure that results are not driven by outliers, we then dropped all firm/year observations for explanatory variables that exceeded the sample mean by more than five standard deviations. 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 19 percent of the remaining firm-year observations. These exclusions leave us with complete information for an unbalanced panel of 6,496 firm-year observations, which consist of 969 firms with an average of around 7 years each. Notice through out the analysis we use lagged values of the main variables and therefore, we loose one year. Finally, data on additional controls included later on in the estimation leaves us with a sample of 5,265 observations or 906 firms.

E Sample Selection

All firms in the sample are publicly-traded companies. Following previous research, we excluded financial firms. 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 being more accurate and comprehensive. Moreover, relative to other available databases the coverage of small and medium-sized publicly traded firms is better since we have the whole universe of listed firms. 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 data sets used widely in cross-country studies such as Worldscope.

Most of our variables are expressed as ratios; where this is not the case, we deflate the nominal magnitudes with 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. Since we identify off time variation we exclude all firms with non-consecutive yearly observations (i.e, which appear disappear and reappear in the sample), which constitute 10 percent of the sampled firms. The size of the sample changes as new firms enter and exit the sample. Only less than 10 percent of the firms delisted and hence we believe the survivorship bias is negligible.³⁹

³⁹In order to explore sample bias due to delisting/bankruptcy we look at the original sample that included all firms that were listed at some point in any of these Latin American countries. In Mexico 1995 and Brazil 1999 none of the firms delisted due to a change in ownership. In Argentina 2002 and Brazil 2002 only one of the delisting firms actually changed ownership status the first year of the crisis.