Corporate Dollar Debt and Depreciations: Much Ado About Nothing?*

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First version: May 31, 2001
This version: May 7, 2004

Abstract

Much has been written recently about the problems for emerging markets that might result from a mismatch between foreign-currency denominated liabilities and assets (or income flows) denominated in local currency. In particular, several models, developed in the aftermath of financial crises of the late 1990s, suggest that the expansion in the "peso" value of "dollar" liabilities resulting from a devaluation could, via a net-worth effect, offset the expansionary competitiveness effect. Assessing which effect dominates is ultimately an empirical matter. In this vein, we construct a new database with accounting information (including the currency composition of liabilities) for over 450 non-financial firms in five Latin American countries. We estimate, at the firm level, the reduced-form effect on investment of holding foreign-currency-denominated debt during an exchange-rate realignment. We consistently find that, contrary to the predicted sign of the net-worth effect, firms holding more dollar debt invest more than their counterparts in the aftermath of a depreciation. We show that this result is due to firms "matching" the currency denomination of their liabilities with the exchange rate sensitivity of their profits. Because of this matching, in equilibrium, the negative balance sheet effects of a depreciation on firms holding additional dollar debt were more than offset by the larger competitiveness gains of these firms.

Key Words: investment, financial crises, net worth, currency mismatch, Latin America
JEL Classification: E22, F41, G31

*Bleakley acknowledges the support of a NSF graduate research fellowship. We are extremely grateful to the Federal Reserve Bank of Boston for providing access to Bloomberg and to Adriana Merz of Bloomberg for her valuable help with the database. We thank Erwin Hansen, Rashmi Melgeri and Cesar Serra for able research assistance. We also thank Daron Acemoglu, Adam Ashcraft, Olivier Blanchard, Ricardo Caballero, Robert Dekle Kristin Forbes, Richard Frankel, Simon Gilchrist, Olivier Jeanne, Simon Johnson, Jonathan Kearns, Mark Lewis, Ugo Panizza, Bob Triest, Jaume Ventura and seminar participants at MIT, the Boston Fed, Darden (Virginia), the IMF, the IADB, USC, and the 2002 Summer Meetings of the Econometric Society for useful comments. The authors alone are responsible for any remaining errors. The views expressed in this paper do not necessarily reflect those the Inter-American Development Bank.

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1 Introduction

The emerging-market financial crises of the late 1990s have challenged the old view of financial crises as having purely macroeconomic causes. None of the governments in these countries was turning to the printing press to cover budget deficits, the mechanism behind "first generation" models of crises. Moreover, there were no large output gaps that might have signaled a future need to devalue, as in "second generation" models. As a result, a new view has emerged in which the emphasis has shifted away from government-level and macro variables to firm-level micro variables and to the interaction of these variables with aggregate capital flows or with the exchange rate. Proponents of this view include Radelet and Sachs (1998) who argue that excessive reliance on short-term debt left emerging-market corporations vulnerable to "financial panic" as described by Diamond and Dybvig (1983). For McKinnon and Pill (1998), on the other hand, it was excessive foreign borrowing by domestic banks that led to the crisis after the government withdrew its implicit guarantees.

A third group of studies identifies debt denominated in foreign currency as the key protagonist behind these crises. At center stage in these studies is the drop in "net worth" that results from the interaction of a depreciation and a currency mismatch between liabilities and income at the firm level. This deterioration in balance sheets, holding all else fixed, makes firms appear to be riskier investments. Accordingly, creditors require higher rates of return and/or limit the amount of new debt issued to these firms. This, in turn, causes a contraction of investment by dollar-indebted firms following a exchange rate depreciation.[1]

The key mechanism, therefore, is that a depreciation inflates the peso value of dollar debt and the resulting weakening of balance sheet positions prevents firms from investing and expanding. Consequently, the expansionary effect, which a depreciation is typically assumed to have, may be attenuated or even reversed because of the behavior of firms that are highly leveraged in dollars.

[1] As it is common usage in the literature on foreign-currency assets and liabilities, we use the term "dollar debt" to refer to any liability denominated in a foreign currency. With similar aplomb, we refer to debt denominated in the domestic currency as "peso debt."

Indeed, many of the results derived in this literature rely not only on the existence of this particular net-worth effect, but also require it to be large enough for depreciations to be contractionary. For example, in the work of both Krugman (1999a, 1999b) and Aghion, Bacchetta, and Banerjee (2001), it is the strongly *negative* relationship between investment and depreciation that generates multiple equilibria, and hence the potential for an expectations-driven crisis. Not surprisingly, the policy implications of this literature also depend crucially on the net effect of depreciations on firm investment. A tight monetary policy and dogged defense of the currency, for example, is the recommended response to a negative external shock only if a depreciation will further reduce output.

Whether the "balance sheet effects" induced by changes in the domestic value of debt are large enough to overwhelm the "competitiveness effects" conventionally believed to be at play during a depreciation is ultimately an empirical issue, one that requires evidence at the microeconomic level. Several empirical treatments of the choice of currency composition of debt by firms exist; Conesa-Labastida (1997) examines Mexican corporations, and Dwor-Frecaut, Colaco, and Hallward-Driemeier (2000) summarize various World Bank studies that investigate East Asian firms. However, little evidence addresses the effect of foreign-currency debt on investment.

The present study is an attempt to fill this gap. We construct a new database with accounting information (including currency composition of liabilities) for approximately 500 publicly traded non-financial firms in five Latin American countries: Argentina, Brazil, Chile, Colombia, and Mexico. These data cover most of the large economies of Latin America for the period 1990 to 1999, a period of substantial exchange rate volatility for many of these countries. In addition, there are firms in our sample that hold substantial amounts of foreign-currency debt. These elements constitute the two ingredients necessary for testing the proposed mechanism. Our choice of publicly listed firms is determined exclusively by the availability of data on the currency composition of debt. We concentrate on the non-financial sector of the economy, as it is here that investment decisions are ultimately carried out.[2]

[2]While currency mismatch in the banking sector and households may play a role in emerging-market crises, they

Using this data set, we examine the behavior of corporate investment (both fixed capital and inventories). We investigate the response of fixed-capital investment to better understand how the proposed mechanisms might affect the productive capacity of the firm in the medium term. On the other hand, it has also been argued that falling net worth not only affects the supply of long-term credit for investment, but it also affects the availability of short-term working capital. A shortage of working capital reduces the firm's capacity to purchase intermediate goods and pay for variable factors of production, leading to a reduction in output. To explore this channel, we also examine the behavior of inventory investment.

Our specific empirical strategy is to assess whether firms with more dollar debt invest less in the aftermath of a depreciation. We do so by estimating reduced-form equations for inventory and fixed-capital investment. The proposed mechanism centers on the interaction of dollar indebtedness with shifts in the exchange rate, and so the key variable in our analysis is

$$(\text{Dollar Debt})_{i,t-1} \times (\Delta \ln \text{Exchange Rate})_t.$$

This interaction effect can be thought of as having two components: the balance sheet channel and the competitiveness channel. The manner in which these effects combine depends on the manner in which dollar debt is distributed across firms. More specifically, the key determinant of the sign of the overall effect is how strongly related the currency-composition of debt is with the exchange rate sensitivity of profits at the firm level. If, on average, this relation is strongly positive, then we say that firms are "currency matching" their balance sheet with their income stream. If this is the case then the sign of the interaction will be ambiguous, as those firms holding higher shares of dollarized debt are also those firms that see the largest increases in current and future profits following a depreciation. If not, a depreciation leads to a (relative) reduction in investment by dollar-indebted firms.

Our main empirical result is that we estimate this interaction to be positive: firms holding dollar

differ so much from non-financial corporations in terms of both behavior and data availability as to be beyond the scope of this study. However, we do allow aggregate capital-market outcomes (such as bank credit) to enter exogenously into the analysis of firm-level investment.

debt invest more than firms holding peso debt in the period following a depreciation. This finding is exactly the opposite of what one would expect from only considering the deleterious effect of the exchange rate on the balance sheet. Furthermore, our results are robust to the inclusion of controls for both pre-existing firm differences and the interaction of these controls with macroeconomic variables.

We argue that this result is due to the degree to which firms match the currency composition of their debt with the elasticity of their income to the exchange rate. In the wake of a depreciation, the reduction of investment and output induced by the increase in indebtedness is more than offset by higher current and future earnings. Accordingly, we find that, after a depreciation, earnings are higher in those firms holding more dollar debt. Lending additional support to this hypothesis, we find that, in our sample, dollarization of liabilities is higher in firms whose income we expect *ex ante* to be more positively correlated with the real exchange rate (firms with tradable products, for example). Furthermore, our estimates of the above interaction term drop substantially when we control for factors that proxy for the firms' changing profit opportunities. Therefore, the empirical finding essentially results from omitted variables – unobserved firm level characteristics associated with a higher elasticity of income to the exchange rate. We argue that this matching does is the natural consequence of the risk aversion that firms will exhibit in the face of capital-market imperfections. By systematically matching the exchange-rate sensitivities of their income and balance sheet, firms are in effect hedging some of the exchange-rate risk to which they are exposed.

To verify the robustness of our investment result and interpretation, we explore a leading alternative explanation: that only "high quality" firms are able to issue debt in dollars, and that this subset of firms is more able to persevere and adapt when the exchange rate shifts. We fail to find evidence for this alternative hypothesis in our sample. First, we show that dollar-indebted firms do not respond differentially to aggregate changes in credit markets (e.g., capital outflows or a collapse of the banking sector). Second, we control directly for lagged performance and fail to find differences in the average investment response to a depreciation across firms with very different earnings and investment histories. In none of these cases does the inclusion of these controls mate-

rially affect our main result: dollar-indebted firms invest relatively more following a depreciation. If dollar debt were basically an indicator of strong performance or good governance we would instead expect to have observed large drops in this estimate upon the inclusion of these controls. Instead, our estimates hardly change, and we, therefore, conclude that this alternative hypothesis cannot account for our results.

What do our results imply for the debate on currency mismatches and contractionary depreciation?

First, note that we do not argue that the currency composition of debt is irrelevant, nor that the balance sheet effect is not present. On the contrary, we show that firms holding dollar debt do see their balance sheet positions deteriorate during depreciations, and, moreover, that total liabilities do appear to influence investment decisions. We find, however that this negative balance sheet effect is more than compensated for by the positive effects of a depreciation on the earnings (and marginal product of capital) of those firms that choose to issue debt in dollars. Indeed, if we could adequately control for all of those firm characteristics that explain the correlation between firm profits and the real exchange rate we would expect to obtain a negative coefficient estimate on the interaction of lagged dollar debt and the change in the exchange rate.[3]

Second, at least in our sample, firms "match" the currency composition of income and liabilities, so that those firms holding more dollarized debt are also those firms whose income is most highly correlated with the real exchange rate. If, however, firm level incentives where distorted in such a way that no "matching" took place, then depreciations could indeed turn more contractionary for dollarized firms– as firm level mismatches translate into reductions in output and investment. Understanding what drives firms in particular, and private agents in general, to choose the currency composition of their debt therefore becomes a key theoretical and empirical question.

[3]This may prove a hard task indeed. Consider, for example, the case of the Chilean electricity firm Edelnor. A the end of 1996 the dollar debt to asset ratio of Edelnor was 46%, one of the highest in the Chilean sample. At first sight this corporation would appear as severely mismatched as it produces electricity – a good most economist would consider as non-tradeable. However, electricity tariffs in Chile are indexed to the dollar/peso exchange rate, so that the actual currency mismatch of Edelnor is considerably lower than a simple tradeable/non tradeable classification of firms would suggest.

Third, our results imply that the ratio of dollarized debt is a poor measure of firm level currency mismatches. A more comprehensive measure must incorporate measures of the elasticity of firm profits to the real exchange rate. Sector controls and firm-level indicators of exposure, albeit imperfect, are a first step in this direction. Direct measurement of the idiosyncratic response of income to the exchange rate should also figure prominently in such analysis.

The rest of the study is organized as follows. Section 2 contains a description of our sample and variables. In Section 3, we discuss the impact of dollar indebtedness on investment behavior, and present our empirical strategy. In Section 4, we present the main results of the study: Relative to corporations indebted in pesos, firms holding dollar debt invested more following depreciations of the domestic currency. In the two sections that follow, we examine each of the two channels affecting firm level investment: competitiveness (Section 5) and net worth (Section 6). Finally, section 7 concludes.

2 Description of Data

This section describes our sample and variables. Our data consist of firm-level accounting information for non-financial corporations in Argentina, Brazil, Colombia, Chile, and Mexico for the period 1990 to 1999. In addition, we have data describing the firms' main products, sectors in which they operate, ownership, and a history of the main corporate events. Our main source of information is the Bloomberg database on publicly traded firms. Additionally, some data for Brazilian firms and all data for Argentine firms come from a second dataset: Economática. Our choice of sources hinges on the availability of balance sheet data that include a decomposition of liabilities by currency of denomination.

For our estimates, we use a sample restricted to the non-financial firms for which foreign-currency data are available. Table (1) shows the number of observations in the final sample per country and year as well as descriptive statistics for the main variables we use. The size of the sample changes as new firms are listed and incorporated into the Bloomberg database. Bankrupt or

de-listed firms are not removed from Bloomberg unless their ticker is adopted by another firm. To our knowledge, there are no firms that are censored from our dataset for this reason. The decline in the number of observations towards the end of the sample is due to changes in the reporting requirements for foreign-currency debt, and not a result of bankruptcies.

Our main dependent variables are two measures of investment. The first is *investment in fixed capital*, measured as net purchases of fixed assets. We opt not to use the change in net fixed assets as a measure of investment because accounting standards in most of the countries in our sample allow for revaluations of assets, making it impossible to separate investment from changes in the accounting valuation of capital goods. The second is *investment in inventories* defined as the change in inventories in a given period. Inventories include raw materials, works in progress, and finished goods. In addition to investment, we also look at the effects of dollar debt on two income variables: *net sales* from operating activities and *earnings*.

The central explanatory variable is *foreign currency debt* (D^*), the book value of foreign currency liabilities converted into the respective local currency. In all of the countries in our sample, accounting standards dictate that conversion of debt from foreign to local currency values be carried out using the exchange rate for the period in which the balance sheet is reported.[4]

To explore the relationship between investment and dollar debt we control for additional determinants of investment. Our main group of controls includes direct and indirect measures of income and sales. The first of these is *earnings*, defined as earnings before accrued interest, taxes, depreciation, and amortization (EBITDA). Cash flow measures used in the investment literature are usually net of interest expenses and taxes. However interest and tax payments are both dependent on the firm's capital structure. Since we wish to identify the effects of leverage (and, in particular, leverage in dollars) on investment, we follow Lang, Ofek and Stulz (1996) and use a measure of cash flow that does not depend on the firm's debt choice. The second income-related control is a dummy variable that indicates whether the firm has *international operations*. Inclusion of this variable will

[4]Accounting practices for Argentina, Brazil, and Mexico are described in Coopers and Lybrand (1993). Bavishi (1995) contains descriptions of accounting practices in the remaining countries.

allow us to explore the extent to which holding foreign assets affects the currency composition of debt and the subsequent response in the event of a depreciation.

Finally, we control for differences in firm ownership. *Parent* is a dummy variable that indicates whether the firm's controlling interest is another firm. This variable is motivated by studies of internal capital markets, in which ownership by a conglomerate affects the availability of internal funds for investment.[5]

We modify the original accounting data in four ways:

1. We inflate all data to 1999 values using December-to-December changes in the consumer price index (CPI), and convert them to U.S. dollars using the market exchange rate for December of 1999.[6]

2. In the event of a merger, spin-off, or split, we construct an artificial firm that contains all of the component firms for the entire sample period. When information on a component firm is not available, we drop the firm from the sample. Ownership changes are reported under corporate news in the Bloomberg database.

3. We drop all firm/year observations if the accounting data are not self-consistent. In particular, we drop observations if dollar liabilities exceed total liabilities or if accounting variables do not accord with sign conventions. This results in the deletion of 10 observations.

4. We compute the change in total assets and construct a z-score using the sample mean and standard deviation. We drop firm/year observations that have $|z| > 5$. Twelve observations are dropped because of this rule. Our results are not sensitive to this particular choice of the threshold.

Because we are interested in the effects of a devaluation on firms holding dollar debt, in the analysis below, we interact D^* with changes in real exchange rate, Δe. Our definition of e (nominal

[5] We discuss coding of this variable in Section 4.2.4.

[6] We use consumer-price and exchange-rate data from the *International Financial Statistics* of the International Monetary Fund.

exchange rate against the U.S. dollar scaled by the local CPI) is consistent with the inflation adjustments described above.[7] It is straightforward to show that using e on inflation-adjusted values of debt is equivalent to using the nominal exchange rate on current values. Note that according to this definition, a devaluation leads to a higher value of e. Also note, that because we do not have information on the exact currency composition of foreign debt, our assumption throughout is that all foreign currency debt is denominated in U.S. dollars. We believe this to be a reasonable approximation, as the volatility of the currencies in our sample usually dominates any exchange-rate movements among creditor currencies.[8]

3 Framework

3.1 Motivation

At about the same time as Robert Mundell was receiving the Nobel prize for economics, a series of studies—inspired by the emerging-market crises of the late 1990s—seemed to be undercutting the central assumption of the Mundell-Fleming model: that a depreciation of the exchange rate has an expansionary effect for the macro-economy. This "new" view of depreciations is centered on the micro level and pays particular attention to the (changing) credit constraints facing firms during financial crises. The key assumption of this literature is that the cost of external funds is decreasing in firm net worth. The second ingredient in these models is that some fraction of debt be denominated in foreign currency. A depreciation, therefore, not only has the usual effects on aggregate demand but also deteriorates net worth by inflating the domestic-currency value of debt. Holding all else fixed, we expect that the higher indebtedness leads to an increase in the cost of external finance and to a reduction in investment. Krugman (1999a) presents a stylized version of this effect, while Aghion, Bacchetta, and Banerjee (2001) and Céspedes, Chang, and Velasco (2000)

[7] In all the specifications we report, we measure Δe as the log change in the real exchange rate between Decembers of successive years. Although we do not report them, we obtain similar results if Δe is measured as the log difference between the exchange rate in December of the previous year and the average exchange rate in the current year, or as the average-average change.

[8] In addition, Hawkins and Turner (2000) report that, at the end of 1999, 87% of long term debt in Latin American countries was denominated in U.S. dollars.

incorporate this mechanism into more fully articulated models.

The link described above between investment and net worth has been widely treated in a variety of venues, including macroeconomics and corporate finance. On the macro side of things, Bernanke and Gertler (1989) and later Bernanke, Gertler and Gilchrist (1998) develop closed economy "financial accelerator" models in which the premium on external credit is decreasing in net worth. In their models, shocks to firm productivity affect both marginal conditions (i.e., the first order conditions for investment) and firm net worth, and, therefore, bring about changes in output that are larger than those implied by the neoclassical benchmark. Additionally, an extensive empirical literature documents the effect on investment of net worth, be it cash flows or leverage. Fazzari, Hubbard, and Petersen (1988), Hoshi, Kashyap, and Scharfstein (1991), and many others provide evidence that investment is related to the availability of internal funds.[9] Lang, Ofek, and Stulz (1996) show that there is a negative relation between investment and firm leverage.[10]

Explanations of why firms choose to hold dollar debt in the first place typically include a failure of uncovered interest rate parity (UIP). Several explanations has been put forward that, in particular, result in a lower *ex ante* dollar rate. One set of models posits that dollarized debt entitles the creditor to larger payments in periods of default, lowering the required interest rate on dollar loans.[11] In another set of models (Jeanne 1999a, 1999b), foreign-currency debt lowers interest rates by reducing moral hazard and signaling problems. In Calvo (1999, 2001), the failure of uncovered interest parity can be attributed to the interaction of information asymmetries and regulatory restrictions on the banking sector and to the costs of forming devaluation expectations, which are then included in the price of peso debt.[12] Finally, Eichengreen and Haussman (1999)

[9]Hubbard (1997) carries out an exhaustive survey of the literature on capital market imperfections and investment.

[10]There is also substantial evidence for the role of net worth on firm-level investment in developing countries. Individual country studies include Gelos and Werner (1998) who look at the effect of cash flow and collateral (proxied by land values) on investment in Mexican manufacturing firms; Gallego and Loayza (2000) who look at the role of cash flows and debt overhang on publicly traded Chilean firms; and Harris, Schiantarelli, and Siregar (1994) who look at a sample of Indonesian firms. Laeven (2000) and Love (2001) carry out similar exercises on a panel of data from emerging economies.

[11]For Schneider and Tornell (2000), this takes place within the banking sector, where bailouts to dollar-indebted banks accompany devaluations. Chamon (2001), on the other hand, argues that when defaults are correlated with depreciations, holders of dollar debt benefit from the fact that they are entitled to a larger share of the liquidated assets.

[12]Regulatory constraints on currency mismatch encourage foreign banks to lend in their own currency, and, as

suggest that the history of bad monetary policy in emerging markets cause investors to place a premium on peso debt, regardless of contemporary policy.

The supposed failure of UIP implies that a risk-neutral firm will in fact want to denominate *all* of its debt in dollars. But such a corner solution is unlikely if the firm behaves in a risk-averse way, and risk aversion arises naturally from capital-market frictions.[13] The extent to which firms will take advantage of "cheaper" foreign–currency credit will be weighed against an aversion to income volatility. Indeed, matching is likely to take place if firms are concerned about the variance of their income or balance sheets. That risk-averse firms choose debt composition to hedge exchange rate shocks is discussed for the banking sector by Arteta (2002), and for firms by Conesa-Labastida (1997), Calvo (2001), Martinez and Werner (2001), and Cowan (2002)[14]. The incentive for matching might also be external, with creditors charging higher rates to firms exposed to larger exchange rate risks. In either case, firms with higher levels of dollar debt should also be those firms whose earnings are most responsive to the changes in the real exchange rate.

Following a movement in the exchange rate, three main mechanisms will affect a firm's choice of capital:

1. The peso value of dollar debt will change, altering the value of total debt,
2. internal funds available for investment will be affected because of changes in current profits and
3. shifts in relative prices will change the marginal product of capital.

The first two mechanisms will immediately affect the firm's net worth, and, in the presence of financial frictions, will affect investment by altering the cost of capital. The third mechanism will

a result, they charge a premium on peso rates. Similar regulatory constraints force domestic banks to match dollar deposits with dollar loans. Because of information advantages, these banks have incentives to place this debt domestically, leading to a lower equilibrium rate on dollar loans.

[13]For a review of reasons why corporations might behave in a risk averse way, see Santomero (1995).

[14]Ize and Levy-Yeyati (1998) develop a model in which both risk averse firms and consumers choose the optimal currency denomination of financial contracts based on their priors ragarding price and real exchange rate stability.

affect demand for capital by altering current and future marginal returns on investment. The net result of these three effects on investment is ambiguous and will depend on the size of inherited dollar debt, the sensitivity of the risk premium on external funds to changes in firm leverage and the impact of the real exchange rate on current and future profits.[15] To simplify the discussion, we will refer to the effect of the exchange rate on dollar debt (the first mechanism mentioned above) as the *balance sheet effect*[16]. The next two mechanisms mentioned above are both part of what we will call the *competitiveness effect*, i.e., the effect of the exchange rate on current and future profits. Therefore, firm *net worth* will be affected by both the balance sheet effect and, via current profits, by the competitiveness effect.

If dollar debt is distributed randomly across the economy, then we would expect firms with higher levels of inherited dollar debt to have a lower (and possibly negative) elasticity of investment to movements in the exchange rate. If, on the other hand, firms match income streams with the currency composition of liabilities, then those firms that we observe holding higher levels of dollarized liabilities will also be those firms whose profits respond most favorably to a depreciation. This being the case, it is uncertain whether firms holding dollar debt will invest relatively less than their counterparts following a depreciation, as the negative impact of increasing indebtedness will be offset by rising current and future profits.

3.2 Law of Motion for Debt

The central empirical question of the present study is how the changing exchange rate interacts with inherited dollar-denominated liabilities on the firm's balance sheet to alter the firm's investment behavior. Therefore, the key explanatory variable in our analysis is the interaction of lagged dollar debt, $D^*_{i,t-1}$, with the log change in the real exchange rate, Δe_t.

A simple way to motivate this interaction term is to write down the law of motion for total debt,

[15] For a formal articulation of this investment problem, see Bleakley and Cowan (2002).

[16] Strictly speaking the firm's balance sheet will be affected by both the changing value of liabilities and the effect of current earnings on assets. We choose to ignore this second mechanism simply for expositional reasons, as most of the literature emphasizes the interaction between liabilities and the exchange rate.

expressed in terms of inflation-adjusted pesos. We start by considering the movement of nominal balance sheet variables over time. Dollar debt, D_t^*, follows a simple law of motion:

$$D_t^* = D_{t-1}^*(1 + r_{t-1}^*) - DS_t^* + DN_t^* \tag{1}$$

where DS_t^* is the period-t debt service paid on dollar debt and DN_t^* is the net issuance of new debt in period t. We multiply by $S_t \frac{CPI_T}{CPI_t}$,where S_t is the nominal exchange rate, to obtain an equation in period-T pesos. If we assume that debt service exactly covers accrued interest charges each period, so that $DS_t^* = D_{t-1}^* r_{t-1}^*$, then the law of motion for dollar debt becomes

$$\tilde{D}_t^* = \tilde{D}_{t-1}^* \left(\frac{S_t}{S_{t-1}}\right)\left(\frac{CPI_{t-1}}{CPI_t}\right) + \tilde{DN}_t^*, \tag{2}$$

where for notation purposes we define $\tilde{X}_t$ as the period-t value of variable X expressed in period-T pesos. Similarly, for peso-denominated debt we have

$$D_t = D_{t-1}\theta_t(1 + r_{t-1}) - DS_t + DN_t, \tag{3}$$

where θ_t is a factor that allows for the indexation of domestic-currency debt. As before, we transform the equation into period-T units, and maintain the assumption that interest is paid completely each period[17]:

$$\tilde{D}_t = \tilde{D}_{t-1}\theta_t \left(\frac{CPI_{t-1}}{CPI_t}\right) + \tilde{DN}_t. \tag{4}$$

We parameterize the indexation of debt as follows: $\theta_t = \left(\frac{CPI_t}{CPI_{t-1}}\right)^{\alpha}$, $\alpha \epsilon [0, 1]$. This allows for the special cases of full indexation ($\alpha = 1$), and no indexation ($\alpha = 0$), as well as for intermediate values.

Defining total debt $\tilde{P}_t$ as $\tilde{P}_t = \tilde{D}_t + \tilde{D}_t^*$, and the real exchange rate E_t as $E_t = (S_t/CPI_t)$ we find that

$$\Delta\tilde{P}_t \approx \tilde{D}_{t-1}^* \Delta e_t + (\alpha - 1)\tilde{D}_{t-1}\Delta cpi_t + \left(\tilde{DN}_t + \tilde{DN}_t^*\right). \tag{5}$$

[17]We lift the assumption of full debt servicing in later sections.

where all lowercase variables correspond to logs. The first term on the right-hand side is the one of interest. The real value of the firm's debt rises if it holds foreign-currency debt and the exchange rate goes up faster than the domestic-price level. This is, of course, a purely mechanical effect. The second term indicates that domestic-currency debt can be "inflated away," albeit at a slower pace if the debt is indexed to the local-price level. Moreover, by interacting $(\alpha - 1)\tilde{D}_{t-1}\Delta cpi_t$ with country dummies, we allow the average degree of debt indexation to vary across countries. Finally, it is clear that net issues of new debt will also change the firm's level of debt holdings. This latter term is endogenous, so we focus only on the autonomous component in our empirical work.

3.3 Empirical Methodology

As argued above, the key explanatory variable in our analysis is the interaction of lagged dollar debt, $D^*_{i,t-1}$, with the change in the real exchange rate, Δe_t. This interaction corresponds to the differential effect of a depreciation on firms with varying levels of dollarized debt. We also argued above that predictions for the sign of this derivative are ambiguous, and will depend on the extent to which firms match the currency composition of their income with that of their liabilities. The estimated sign of this coefficient should indicate whether the large (negative) balance sheet effects of a depreciation on firms holding high levels of dollarized debt are offset by a larger (positive) competitiveness effect in these firms.

In addition to interaction effects, we also include both main effects: lagged foreign-currency-denominated debt and the change in the real exchange rate. Including the main effect of dollar debt absorbs any pre-existing differences among firms with different levels of dollar indebtedness. Such differences might have prevailed in the absence of movements in the real exchange rate, e.g., if expanding firms were more likely to issue dollar debt than stagnant ones. The main effect for the change in the exchange rate captures the variation in relative prices that may affect all firms in the economy regardless of the currency composition of their debt.

The basic specification (for firm i in country j at year t) that results is

$$Y_{ijt} = \gamma(D^*_{i,j,t-1} \times \Delta e_{jt}) + \delta D^*_{i,j,t-1} + \alpha \Delta e_{jt} + \varepsilon_{ijt} \tag{6}$$

where Y_{ijt} is the firm-level outcome, typically investment. This empirical framework allows us to estimate the result of holding dollar debt during an exchange rate realignment. It bears mentioning that this is not measuring a *causal* effect, but instead the result of a combination of one causal factor—the effect from increases in the peso value of debt—and other changes in financial and capital-demand factors that happen to be correlated with the currency composition of the firm's debt. To equation (6), we also add additional firm and macroeconomic control variables. These are detailed below.

We employ several estimators for this equation, but principally ordinary least squares (OLS). All of the firm-level variables are predetermined, and the exchange rate is exogenous to any particular firm. Therefore, OLS can consistently estimate this reduced-form equation. For some specifications, we include corporation fixed effects and/or a lagged dependent variable. Because OLS is inconsistent when both fixed effects and lagged dependent variables are included, we employ the Arellano-Bond estimator in these cases. When doing so, we report the p-value of the test of second-order serial correlation of the residuals.

4 Investment

4.1 Main Results

Firms in our sample that hold dollar debt actually invest more than peso-indebted firms in the period following a depreciation. To show this, we employ the empirical methodology detailed above, and pay particular attention to the estimated coefficient on the interaction of lagged dollar debt and the change in the exchange rate, $(D^* \times \Delta e)$. We consistently find this coefficient to be positive: dollar-indebted firms invest relatively *more* following a depreciation.

We focus on two types of investment: investment in fixed capital and investment in inventories. These are both important components of business-cycle fluctuations, but reflect very different types of investment activity and are likely to respond differently to crisis-induced shifts in credit and demand conditions. Investment in inventories is a relatively short-term affair. The ratio of inventory to sales in our sample is such that a product in the pipeline will typically be gone in under two months. Investing in the accumulation of inventories is likely to be sensitive to the availability of working capital, short-term financing that is often secured internally or through trade credit offered by input suppliers. On the other hand, investment in fixed capital plays out over a much longer horizon, and has to do with the long-term expansion of the productive capacity of the firm.

Table (2) presents estimates of the reduced-form effect on investment of holding dollar debt during a depreciation. Columns A-G contain the results for fixed-capital investment, whereas in Columns H-N, we present estimates for inventory investment. Results in Panel A are from variants of equation (6), and these specifications are repeated with corporation fixed effects in Panel B.

The regression summarized in column A includes only the principal first-order effects and, of course, the interaction term: dollar debt times the change in the exchange rate. The coefficient on $(D^* \times \Delta e)$ on fixed-capital investment is estimated to be 0.444 in Panel A and 0.264 in Panel B. The same effect on inventory investment is estimated to be 0.244 (and 0.209 when estimated using firm fixed effects). These point estimates are significantly different from zero at conventional confidence intervals. In the case of fixed capital, this coefficient implies that, for example, a firm with a one-standard-deviation higher dollar indebtedness will, after a depreciation of fifty (log) percent, invest an additional amount equivalent to approximately seven percent of its prior year's assets. This increment in the ratio of investment to lagged assets compares with a sample mean of 7.1% and a sample standard deviation of 9.9%.

The sign and significance of this result is robust to the inclusion of a variety of additional controls. First, we add total debt to the specification, which results in insignificant changes in the point estimates of $(D^* \times \Delta e)$. Next, in columns C and H, we control for possible indexation of peso debt. Based on the law of motion of debt (equation 5) we add $\sum_j (1-\alpha)_j D_{i,t-1} \Delta cpi_{j,t}$ to

the specification, in which $D_{i,t-1}$is lagged peso debt (as before) and $cpi_{j,t}$ is the log of the local price level. Using country-specific $\alpha's$ allows the specification to accommodate different countries' use of indexed debt. Next, we add the interaction of total debt with the change in the exchange rate in columns D and K to control for the differences in investment behavior of more highly leveraged firms in periods following a currency depreciation. In columns E and L we control for the possible effects of changes in the accounting value of capital stocks, by including an interaction between lagged fixed capital (or lagged inventories) and the log change in the consumer price index: $\sum_j \kappa_j K_{i,t-1} \Delta cpi_{j,t}$. We allow this effect to vary across countries by including country specific $\kappa's$. Changes in the accounting value of capital can influence measured investment in two ways. On the one hand, rising asset values will reduce leverage ratios and the cost of external funds. On the other, a part of measured inventory investment may simply be capturing changing prices rather than changing quantities[18]. In columns F and M we add interactions between lagged capital stock and real depreciation, $\sum_j \tau_j K_{i,t-1} \Delta e_{j,t}$, to control for the valuation effects of real exchange rate changes on capital stocks. In all cases, and in both panels, the inclusion of these controls hardly changes the estimated coefficient on $(D^* \times \Delta e)$.

Finally, recognizing that firms may face substantial adjustment costs when changing their levels of fixed capital, column G includes the lagged dependent variable as an additional regressor. Panel A reports OLS estimates of this final specification, while Panel B reports the Arellano-Bond dynamic panel data estimator (Arellano-Bond 1991). In both cases the estimated coefficient on $(D^* \times \Delta e)$ is positive and significant at conventional confidence levels, although we fail to reject second order serial correlation in the Arellano-Bond specification[19].

The findings reported in Table (2) are exactly the opposite of what one would expect from the *naive* approach to balance sheet effects – the "no matching" case discussed above. In such a model, dollar-indebted firms should, as a result of increased debt and tightened financial constraints, invest

[18]This mechanical effect will not affect our measure of fixed capital investment which is based on cash flow data not on changes in capital stocks.

[19]Estimating this same specification including the twice lagged dependent variable results in a coefficient estimate of 0.19 on $(D^* \times \Delta e)$, significant at the 10% confidence level. The p-value on this alternative specification drops to 0.13.

less (relative to peso-indebted firms) after a depreciation. Instead, in our sample, firms with higher levels of dollar debt invest more following a depreciation.

4.2 Sensitivity Analysis

In this subsection we consider (and discard) several alternative hypotheses for why we might estimate a positive coefficient of $(D^* \times \Delta e)$ on investment. The concern is that dollar-indebted firms might differ from their peso-indebted counterparts along other dimensions than the currency composition of debt. For example, the firms that are able to issue debt in dollars may have better access to international or domestic capital markets or have a different maturity structure of debt, and as such can better cope with the credit crunches that tend to figure in the emerging-market crises. We also concern ourselves with the possibility that firms holding dollar debt have operations in other countries. For those firms it is possible that we are either omitting some of the effects of a depreciation on earnings, or capturing a "mechanical" revaluation of investment absent any actual change in firm behavior. Each of these possibilities suggest possible omitted-variables biases. To address this, we start with the investment regressions presented in the previous section and add plausible proxies for the supposed omitted variables. In each case, the inclusion of these proxies results in negligible changes in our estimates of the relationship between investment and $(D^* \times \Delta e)$[20].

4.2.1 Credit-Market Conditions

If firms holding dollar debt have differential access to international capital, and changes in the relative supply of domestic and foreign credit occur simultaneously with changes in the exchange rate, then our results may come from having omitted credit-market conditions in our estimates of investment. For example, in 1995, during the *tequila* crisis, Mexico suffered more-or-less simultaneous depreciation, capital flight, and collapse of the domestic banking system. In such an episode, the

[20] In addition , we also run (but do not report) regressions in which we control for *ex-post* real interest rates and their respective interactions, other measures of aggregate capital flows (plus interactions), and a cubic in lagged assets (again, plus interactions). In all of these regressions, the coefficient on $(D^* \times \Delta e)$ is positive.

coefficient on $(D^* \times \Delta e)$ could well be capturing the asymmetric effects of contractions in domestic credit and international capital inflows.

To control for changing credit conditions, we estimate the investment regressions including an indicator of domestic credit (the change in the stock of private credit issued by domestic banks) and a measure of foreign credit inflows. In each case, we interact the macroeconomic variable with total leverage and the fraction of debt in foreign currency to allow for the differential effects of local and international credit supply on firms.

Note that we do not promote these variables as the definitive measure of shifting access to credit. Instead, we argue that they serve to determine whether the earlier estimates are contaminated by omitted-variable bias. If D^* is correlated with credit access, then including its interaction with aggregate credit variables absorbs the relevant part of the omitted variable. If D^* is not correlated with the omitted access variable, then there is no omitted variable bias to be concerned with. Consequently, this test is informative in either case.

Table (3) shows the investment results obtained after including aggregate credit variables. Columns A and E report our basic specification, B and F allow for variation across firm size and indebtedness[21]. In columns C and G, we introduce a measure of capital inflows, and, in columns D and H, a measure of domestic credit. We find that firm-level investment in fixed capital and inventories responds positively to domestic and international credit conditions so that a higher volume of domestic loans and credit inflows leads to higher investment.[22] On the other hand, we find that the coefficients on the interaction of currency composition of debt with the aggregate credit variables are in most cases not significantly different from zero. More to the point, the $(D^* \times \Delta e)$ interaction is significant and positive even after including this additional set of controls. Additionally, the point estimates are change only slightly.

[21] We control for firm size by using total assets. We obtain similar results (not reported) when firms are classified according to current assets (*i.e.* liquidity).

[22] Demigurk-Kunt, Detragiache and Gupta (2000) indicate that aggregate bank credit (relative to output) tends not to fall dramatically following a crisis. This would seem to place doubt on the generality of our use of aggregate bank credit in the sensitivity analysis. However, we obtain similar results using capital flows. Moreover, we obtain similar results when using the capital account as our measure of foreign capital.

4.2.2 Currency Mismatch versus Maturity Mismatch

The impact of changing credit conditions will likely depend on the maturity structure of firm debt. Therefore, another credit-related hypothesis is that our results might be driven by having omitted the maturity structure of debt and its interaction with aggregate credit conditions. For example, if firms are frequently rolling over their debt, they will suffer more from a negative shock to the supply of credit. To control for possible differences in the maturity structure of debt between dollar and peso-indebted firms, we directly include measures of short-term debt in our investment regressions. Furthermore, paralleling the treatment of dollar debt, we interact short-term debt with a set of macroeconomic variables.

The results of including these interactions are displayed in Table (4). The additional interactions are either insignificant or, in one case, marginally significant. On the other hand, for both types of investment, we continue to obtain significant and positive estimates of the coefficient on the interaction of dollar debt and the change in the exchange rate. Moreover, the point estimates on $(D^* \times \Delta e)$ hardly change. Overall, the evidence of an omitted-variable bias stemming from the maturity structure of debt is not compelling.

4.2.3 Lagged Performance

In this subsection, we argue that the observed investment response to $(D^* \times \Delta e)$ is not due to dollar-indebted firms being "high performing" and, therefore, being able to better adapt to the changing exchange rate. Specifically, we condition on lagged firm performance, as proxied by lags of earnings and investment, and interact these proxies with the change in the exchange rate. These results are displayed in Table (5). The coefficients on lagged performance come out positive and significant in statistical and economic terms. The interactions of these performance proxies with Δe have positive estimated coefficients, indicating that high-performing firms exhibit differentially positive responses to depreciation. Interestingly, their inclusion in the specifications results in negligible changes (one standard error or less) in our estimate of the effect of $(D^* \times \Delta e)$.

4.2.4 Cross-Border Ownership and Information Disclosure

In this subsection, we examine the confounding effect that may arise from firms that hold dollar debt and either own or are owned by corporations in a foreign country.

We start by looking at ownership of a foreign subsidiary. For those firms in which financial statements are consolidated, our estimates may be capturing the "mechanical" effect of the exchange rate on the domestic currency value of off-shore investment. For firms with non-consolidated balance sheets, our existing set of controls will not be fully measuring the effect of the exchange rate on net worth. On the other hand, firms with international operations may be in a poorer position to further expand abroad when the domestic currency is weak, and, therefore, may invest less as a result of a depreciation. Whether the final effect is positive or negative on net is not critical to our conclusion; what matters is the possible omitted-variable bias on the $(D^* \times \Delta e)$ interaction coefficient.

To address this possible omitted-variable bias, we construct a set of proxies for ownership of foreign assets. We do not have data on the fraction of the firm's operations located abroad, nor do we have reliable information on whether or not the accounting data we employed represents a "consolidated" view of both the firm's activities and those of its subsidiaries. The proxy variables we construct are instead simple dummy variables that indicate whether the firm has international operations or not. We created these variables by searching the Bloomberg database for either a reference to the ticker of a foreign subsidiary or for explicit mention of international operations in the company description.

As shown in Table (6), inclusion of these indicator variables for ownership relationships does not affect the main conclusion: following a depreciation, investment continues to be significantly higher among firms with more dollar debt relative to firms with lower levels of dollar indebtedness. The changes in the estimated $(D^* \times \Delta e)$ coefficient are quite small. We conclude that the omitted-variable bias attributable to international operations is likely minimal.

Alternatively, it may be the case that the differences in the ownership of the firm itself bias our

estimate of the $(D^* \times \Delta e)$ coefficient. To address this issue we construct two variables that proxy for foreign ownership. The first of these variables indicates whether the firm has a parent company. The initial coding is drawn directly from the Bloomberg database using their coding scheme. In all cases, we review the online archives of company news to verify that these ownership relationships predate the firm's first appearance in our sample. This ensures that these indicators are predetermined variables rather than endogenous outcomes. The second measure of foreign ownership is a dummy variable that indicates whether, in the previous period, the firm's shares were listed in a foreign stock exchange in the form of American Depositary Receipts (ADRs). In addition to being a proxy for foreign ownership, a foreign listing may also have effects on information disclosure and liquidity of firm equity that may bias our results. This variable is constructed matching the firms in the Bank of New York database on ADRs with those in our sample. Finally, we code whether the firm's accountant is one of the American "Big Six" firms, which might improve a corporation's access to international capital markets.

The results of estimating our baseline equation with the ownership controls are reported in Table (6). Once again, the effect of the additional control variables on our estimated coefficient on the $(D^* \times \Delta e)$ interaction is minimal (i.e., the coefficient moves by less than a standard error across specifications).

4.2.5 Relaxing the Assumption of Linearity

A plausible hypothesis is that the response of investment to leverage is nonlinear, so that a given change in debt causes a larger change in investment in highly leveraged firms.[23] To evaluate the effect of nonlinearity on our results, we estimate our basic investment specification allowing the response of investment to total debt and allowing the $(D^* \times \Delta e)$ interaction term to vary across indebtedness. The results of this exercise are reported in Table (7). As can be seen in columns A through C for fixed capital investment and E through G for inventory accumulation, the changes in the estimated $(D^* \times \Delta e)$ coefficient are quite small, and our main result remains unaffected by

[23]The most extreme case of this nonlinearity would be bankruptcy.

the additional terms.

Above, we treat depreciations and appreciations as having symmetrical, linear effects. To evaluate the validity of the symmetry assumption, we generate a dummy variable that takes on the value of one if the currency has appreciated, and interact it with the exchange rate and with our $(D^* \times \Delta e)$ interaction coefficient. We are thus allowing both for the main effect and the interaction to be different in depreciations and appreciations. We report the results of this specification in Table (7) columns D and H. Allowing for a depreciation to impact firm level investment differently from an appreciation does not affect our main conclusion; the coefficient on $(D^* \times \Delta e)$ is still positive and significant for both fixed capital and inventory investment. Furthermore, (although not significant) the negative coefficient on $I(\Delta e < 0) \times (D^* \times \Delta e)$ suggests that the differential response of investment in firms holding dollar debt is larger in depreciations. We offer one possible interpretation of this differential response: if depreciations generate more persistent changes in relative prices, then the investment response will be larger following a depreciation.

4.2.6 Unexpected Depreciations

Could our results be driven by the fact that many of the devaluation episodes in our sample were anticipated by firms and the financial market? If uncovered interest parity holds, then the expected component of a depreciation will be factored in to the domestic interest rates in the period running up to the exchange rate realignment. This being the case, firms will only find dollar debt to be more "expensive" *ex-post* if the realized depreciation exceeds the expected depreciation.

To see this more clearly, recall the expression for the law of motion of debt derived in section (3). Abstracting from new debt issued in the current period, and assuming that accrued interest is not paid off ($DS_t = DN_t = 0$) the current value of previous period dollar debt will be given by

$$\tilde{D}^*_t = \tilde{D}^*_{t-1} \left(\frac{S_t}{S_{t-1}} \right) \left(\frac{CPI_{t-1}}{CPI_t} \right) (1 + r^*_{t-1})$$

(where the notation is as above). If, in addition, if we assume that all domestic debt is issued in

nominal terms, then the current value of peso denominated debt will be given by[24]

$$\tilde{D}_t = \tilde{D}_{t-1}\left(\frac{CPI_{t-1}}{CPI_t}\right)(1 + r_{t-1}).$$

Combining the previous two expressions, the exogenous component of total debt in period t can be approximated to

$$\tilde{P}_t \approx \tilde{D}_{t-1}(1 + r_{t-1} - \Delta cpi_t) + \tilde{D}^*_{t-1}(1 + r^*_{t-1} + \Delta s_t - \Delta cpi_t)$$

where $(r_{t-1} - \Delta cpi_t)$ is the real *ex-post* interest rate on domestic currency debt and $(r^*_{t-1} + \Delta e_t - \Delta cpi_t)$ is the real *ex-post* rate on dollar denominated loans.

Finally, if uncovered interest parity holds, such that

$$r_{t-1} = \mathrm{E}_{t-1}\{\Delta s_t\} + r^*_{t-1}$$

the law-of-motion becomes

$$\tilde{P}_t \approx \tilde{D}_{t-1}(1 + \mathrm{E}_{t-1}\{\Delta s_t\} + r^*_{t-1} - \Delta cpi_t) + \tilde{D}^*_{t-1}(1 + \Delta s_t + r^*_{t-1} - \Delta cpi_t). \tag{7}$$

From equation (7) is is clear that a unit of dollar debt will be more expensive than a unit of peso debt *ex-post* only if the realized nominal depreciation exceeds the unexpected nominal depreciation, i.e. if $\mathrm{E}_{t-1}\{\Delta s_t\} < \Delta s_t$.

We carry out two exercises in this subsection to address this concern. First, we repeat our estimations of investment for a specific devaluation episode that we believe had a large unexpected component: the *tequila* crisis in Mexico during 1994 and 1995. Second, we use peso and dollar interest rates to construct a measure of unexpected depreciation, interact it with the lagged dollar debt ratio, and include it as an additional control variable in our investment equations.

[24] Assuming that all debt is issued in pesos is equivalent to assuming that arbitrage exists between the local nominal and indexed debt markets.

The estimation results for the *tequila* crisis are reported in Table (8). Column A of Table (8) includes Mexican firms for all years in our sample (1990 to 1999); column B is restricted to 1994 and 1995. In line with our full sample results, the estimated coefficient on the $(D^* \times \Delta e)$ interaction term is positive and significant in both sub-samples. Columns C and D report an alternative exercise for 1994 and 1995, respectively. Controlling for current earnings and lagged dollar debt, we find that investment is higher in firms holding dollar debt in 1994 and 1995 and that this difference was significantly different during 1994. Overall, the results presented in Table (8) suggest that our results are not driven by a series of expected depreciation episodes.

A straight-forward transformation of equation (7) allows us to evaluate the effects on investment of unexpected depreciations. Rearranging equation (7), and bearing in mind that total debt $\tilde{P}_{t-1}$ is defined as $\tilde{P}_{t-1} = \tilde{D}_{t-1} + \tilde{D}^*_{t-1}$ and that the ex-post peso rate $\tilde{r}_{t-1}$ is defined as $\tilde{r}_{t-1} = r_{t-1} - \Delta cpi_t$, we find the following expression for total debt

$$\tilde{P}^T_t \approx \tilde{P}_{t-1}(1 + \tilde{r}_{t-1}) + \tilde{D}^*_{t-1}\Delta s^u_t.$$

where Δs^u_t is the unexpected depreciation: $\Delta s^u_t = \Delta s_t - \mathrm{E}_{t-1}\{\Delta s_t\}$. The intuition behind this expression is straightforward, controlling for the ex-post real interest rate on peso loans, dollar debt will lead to higher total liabilities if realized depreciation exceeds the expected depreciation.

The basic empirical specification that results is

$$Y_{ijt} = \lambda(\tilde{P}_{t-1} \times \tilde{r}_{t-1}) + \alpha\tilde{P}_{t-1} + \kappa\tilde{r}_{t-1} + \gamma\left(\tilde{D}^*_{t-1} \times \Delta s^u_t\right) + \beta\tilde{D}^*_{t-1} + \tau\Delta s^u_t + \delta_j + \varepsilon_{ijt} \qquad (8)$$

where once again Y_{ijt} is firm level investment, Δs^u_t is calculated as the difference between the expected depreciation rate implicit in dollar and peso rates and realized depreciation and δ_j are country fixed effects. To equation (8) we also add additional variables, the most important of which is the interaction between dollar debt and the realized change in the exchange rate $(D^* \times \Delta e)$ Including this additional variable allows us to separate the effects of expected and unexpected

changes in e[25].

Table (9) presents the results of estimating variants of equation (8) for fixed capital and inventory investment. As in previous specifications panel A reports OLS estimates, while panel B repeats these estimates with corporation fixed effects. The regression summarized in column A follows directly from equation (8) while column B includes the $(D^* \times \Delta e)$ interaction, and, of course, the corresponding main effects. In turn column C includes an interaction between total leverage and the real exchange rate. Columns D through F repeat these specifications for inventory investment.

What are the main results that emerge from table (9)? First, in all specifications the estimated coefficient on $(D^* \times \Delta e)$ is positive, and in most specifications significant at conventional confidence levels. As in previous specifications, firms choosing to hold dollar debt invest relatively more in fixed capital and inventories following a depreciation. Second, for fixed capital investment, the estimated coefficient on the interaction between dollar debt and our measure of unexpected depreciation $\left(\tilde{D}^* \times \Delta s^u\right)$ is negative. In all of the OLS specifications this coefficient is significant. We obtain mixed results for the estimated coefficients on $\left(\tilde{D}^* \times \Delta s^u\right)$ in the regressions of inventory investment.

The findings reported in table (9) suggest that, at least for fixed capital investment, the unexpected component of a depreciation reduces the positive effect of a depreciation on investment amongst firms holding dollar debt. This reduction, however, is very small. To see the magnitude of these effects, consider the estimated parameters from column B (panel A). For a 10% fully expected depreciation, investment in a firm holding a 50% dollar debt to asset ratio will be 3.4 percentage points higher than a firm with no dollar debt. If the depreciation is fully unexpected, then the

[25] A brief comment on the data is merited here before we move on to discussing the empirical results. For Argentina, Brazil and Mexico $r^*_{j,t-1}$ is the total return on the portfolio of dollar-denominated bonds included in each country's EMBI index. For Colombia and Chile this index is not available for most of the sample so we use alternative measures. In the case of Chile we use the interest rate on 30-89 day dollar-denominated loans, published by the Central Bank of Chile. For Colombia, as dollar contracts are prohibited in the domestic financial system, and no series of returns on dollar denominated bonds placed in international capital markets where available, we use the average cross country EMBI index. In turn, r_{t-1} is the deposit rate in domestic currency. We use the deposit rate because series of lending rates where not available over the full sample period for most countries, however changes in deposit rates closely mirror changes in lending rates. A regresion of changes in the deposit rate against changes in the lending rate over the subset of our sample where both data where available has a R^2 of 0.85. The exact rates used are detailed in the appendix.

difference in investment between these two firms will drop to 3.3 percentage points - a marginal change. This being said, our measure of expected depreciation is crude, so that analysis of the actual coefficients is tentative at best.

All in all, both sets of results presented in this section suggest that even when depreciations are unexpected, the competitiveness effect dominates the balance sheet effect in our sample so that our results are not driven by a series of expected depreciation episodes. The results presented in Table (9) also suggest that, as expected, the net effect of a depreciation is smaller when the depreciation is unexpected.

4.3 Decompositions

The sample-average effect presented above was strongly positive, but this might have masked negative effects in some countries or subsets of firms. To explore whether this is indeed the case, we decompose the effect of $(D^* \times \Delta e)$ by country, by sector, and by firm size and liquidity. We find no robust evidence to support this hypothesis, however. Generally, we estimate significantly positive effects. In no case do we find a statistically significant negative relationship between investment and the interaction between dollar liabilities and the rate of depreciation.

4.3.1 By Country

Results by country are found in Table 10. The sequence of Panels recapitulates some of the sensitivity analysis above, but on a country-by-country basis. Each cell contains estimates of the effect of $(D^* \times \Delta e)$ for the denoted country and specification.

In no instance do we find a significantly negative relationship between investment and $(D^* \times \Delta e)$ in a series of decompositions by country. In the Argentine sample, we obtain a significant, positive result in one panel, and mixed, insignificant results in the other panels. For Brazil, the coefficients on $(D^* \times \Delta e)$ are significant and positive without exception. Among the Chilean firms, results are insignificantly different from zero, though generally positive. For Colombia and Mexico, the

coefficient estimates are uniformly positive, and significantly different from zero in three of seven specifications.

4.3.2 By Predetermined Firm Characteristics

We partition the sample by predetermined firm characteristics in Table (11). Panel A repeats the sample-average results from above (*i.e.*, from Table 2). For Panel B-E, we interact $(D^* \times \Delta e)$ with an indicator variable. We also include the indicator variable in the specification, and its interaction with Δe, although only the coefficients on $(D^* \times \Delta e)$ and the triple interaction are reported. The indicator variables partition the sample as described below. Structuring the specification in this manner allows us to estimate how the effect of $(D^* \times \Delta e)$ among the indicated set of firms differs from the rest of the sample. The first two columns treat fixed-capital investment, while the second two contain the results for inventory investment. Results from baseline specifications are reported in Columns A and C; fixed-effect specifications are reported in Columns B and D.

In most cases, we fail to reject the null hypothesis that the effect of $(D^* \times \Delta e)$ is the same across groups. The exception is for decompositions by firm size (shown in Panel D), which yielded significant differences when fixed-effect estimators are employed. Those results indicate that smaller firms in our sample exhibit a more positive investment response to $(D^* \times \Delta e)$. Relatively illiquid firms respond to $(D^* \times \Delta e)$ in a statistically indistinguishable way from their more liquid counterparts. Liquidity was measured by the fraction of previous-year assets that were current, and the illiquidity dummy indicates that a firm-year observation was below the sample median.

On the other hand, non-tradeable and non manufacturing sectors (Panels B and C, respectively) do not differ significantly from tradeable and manufacturing sectors in the effect of $(D^* \times \Delta e)$. These results are inconsistent with the hypothesis of Tornell and Westermann (2002), who ascribe the asymmetric responses to tradeable and nontradeable sectors to currency mismatch within the nontradeable sector. Our evidence is that currency matching takes place even within sectors. Moreover, concentrating investment in the tradeable sector following large depreciation is a standard

open-economy-macro result, driven by changing relative prices. Currency mismatches in the NT sector might amplify this effect, but demonstrating so is a micro-empirical matter.

5 The Competitiveness Effect

In this section, we argue that the differential investment behavior of dollar-indebted firms following a depreciation that we find in the preceding sections is largely attributable to the differences across firms in the response of current and future profits (the competitiveness effect). We document three facts that provide evidence for this claim:

1. When contemporaneous profits and detailed sectorial conditions are taken into account, we find that the estimated coefficient on $(D^* \times \Delta e)$ is substantially smaller than what was estimated above. Indeed, in some cases the estimates of $(D^* \times \Delta e)$ are reduced to either statistical insignificance or marginal significance

2. Firms that could be expected to benefit from a depreciation—firms that have tradable products, for example—are more likely to hold debt that is denominated in foreign currency.

3. Dollar-indebted firms experience a relative surge in profits following a depreciation (*i.e.*, both in the year of and in the year after).

All three facts indicate positive currency matching of debt and income flows.

5.1 Controls for Competitiveness

Exchange rate movements change relative prices, often rather markedly. If firms are matching the currency composition of their debt and income, the surge in their liabilities may be accompanied by an increase in their profit opportunities and current earnings. We argue that this effect is largely responsible for the observed rise in investment by the firms that hold dollar debt.

When contemporaneous profits and detailed sectorial conditions are taken into account, we find that the estimated coefficient on $(D^* \times \Delta e)$ is substantially smaller than what was estimated above. This can be seen in Table (12), in which we augment the baseline regressions with contemporaneous measures of the demand conditions facing firms.

These measures include country-specific interactions of one-digit industry (SIC1) dummies with Δe, country $\times$ SIC1 $\times$ year effects, as well as the firm's contemporaneous sales, costs, and earnings. The first two variables represent the influence of sectorial conditions, whereas the latter three control for immediate, idiosyncratic shocks to the firm's income.[26] The inclusion of variables from either set reduces the estimated response of investment to $(D^* \times \Delta e)$, and controlling for variables from both sets reduces the estimates even more so. Interestingly, the sectorial controls have the greater impact, reducing the estimates of $(D^* \times \Delta e)$ to either statistical insignificance or marginal significance. (We show below that $(D^* \times \Delta e)$ has strong predictive power of future earnings, even controlling for contemporary earnings. The sectorial factors appears to account for the bulk of this. See Section 5.3.)

5.2 Determinants of the Currency Composition of Debt

In this subsection we examine the determinants of liability dollarization. To do so, we estimate the following equation on the full sample

$$\beta_{ijt} = v_j + \delta\alpha_{ijt} + X_{ijt}\Gamma + u_{_{ijt}} : \tag{9}$$

in which β_{ijt} is the ratio of dollar debt to total liabilities; v_j are country-specific intercepts; $X_{ijt}\Gamma$ are controls, including the natural logarithm of firm assets and a dummy variable indicating whether the firm is a subsidiary of a larger company; and α_{ijt} corresponds to one of several proxies for the sensitivity of profits to the real exchange rate:

[26] The idiosyncratic measures of income are endogenous, so we cannot be assured of consistent estimates of the effect of income on investment. However, as is evident from Table (12), the use of contemporaneous income is not crucial to our story.

1. a dummy variable that takes on a value of one if the firm is in a tradable sector (agriculture, mining, or manufacturing);

2. the average elasticity of each sector's output to the real exchange rate;[27]

3. a dummy variable if the firm has foreign subsidiaries.

In each specification, proxies of exchange-rate sensitivity show a positive correlation with the fraction of debt issued in foreign currency. Columns A through C of table (13) show the main results for the full sample estimation. In all specifications, the estimates of δ are positive and significant: Firms whose income we expect to be positively correlated with the exchange rate have a higher fraction of foreign-currency-denominated liabilities. The fraction of dollar-denominated liabilities is 5% higher in firms that belong to the tradable sectors (the average value of β_{ijt} is 24%). The sectorial elasticity of value added to the real exchange rate is also a significant predictor of the currency denomination of debt, and these two variables enter significantly when included jointly. Additionally, firm size is positive and significant in all specifications; larger firms hold a higher fraction of dollar debt. Although we do not report them individually, country dummies are also highly significant (at the 99% level of confidence) with firms in Argentina and Mexico holding the highest fractions of dollar debt. All in all, size and tradability (or sectorial elasticity of output to the real exchange rate) explain close to 45% of variance in β_{ijt}.[28]

Firms with international operations were also much more likely to issue their debt in dollars. The last column of Table (13) shows the results of estimating equation (9) for the remaining proxy of α_{ijt} on a sub-sample of firms.[29] As in the previous specifications, both the size variable and the tradable dummy are always positive and significant at the 99% confidence level. Column E includes the dummy variable for firms that have a parent company and the dummy variable for

[27]To construct this measure, we estimate $\Delta(\ln y_{jkt}) = \delta_0 + \delta_1 \Delta \ln(e_{jt}) + \delta_3 x_{jt} + \varepsilon_{jkt}$ for the period for each sector k in each country j. $\Delta(\ln y_{jkt})$ is the first difference of the log of sector k value added, $\Delta \ln(e_{jt})$ the first difference of the log of the real exchange rate and x_{jt} a vector of country-level controls that includes capital inflows and growth in private-sector bank credit.

[28]We obtain similar results when we estimate β using a tobit regression.

[29]Because of data availability, the sample used in specification E is smaller and excludes firms from Argentina and some of the firms from Brazil. To isolate the effects of changing the sample versus adding controls, we add column D which presents the results of our baseline estimation using an identical sample to E.

firms that own subsidiaries in foreign countries. Both of these variables are significant. The positive coefficient on the subsidiary variable is in line with the results discussed above. Income from the foreign subsidiary, in terms of domestic currency, is positively correlated with movements in the real exchange rate.

Our results in this section suggest that matching does take place among firms included in our sample. Firms with higher dollar debt are those firms whose earnings we expect to increase in the event of a depreciation.

5.3 Relative Change in Profitability

In this subsection, we show that, after a depreciation, dollar-indebted firms see their sales and earnings rise substantially relative to their peso-indebted counterparts. These findings provide additional support for our proposition that firms holding more dollar debt are better poised to take profitable advantage of the depreciation and that this factor explains their increased investment.

To analyze sales and earnings, we employ the same empirical framework used above for investment. Table (14) presents estimates of the differential effect of exchange rate movements across firms with varying degrees of dollar indebtedness. The specification of these regressions parallel those of Table (2), column D. We include our principal interaction effect ($D^* \times \Delta e$), all main effects, and dummies for each country/year cell. Columns A and B of Table (14) show that in periods in which the local currency depreciated, sales were higher in firms holding dollar than they were in firms holding peso debt.

Dollar-indebted firms also saw significantly higher earnings in the year *following* a depreciation. These results are displayed in Table (14), columns C through F. For example, column C of Panel A indicates that a firm holding one additional dollar of foreign-currency debt received 36 cents in extra earnings in a year following a one-unit logarithmic change in the real exchange rate. Of course, as we document above, such a firm was likely to be investing more as well. Therefore, we see in columns D and E that a fraction of these higher profits is due to the differential investment

behavior of the firms. Nevertheless, even after controlling for investment behavior, the rise in earnings in the subsequent year is still positive and significant.

Finally, as further support of the varying degree of competitiveness effects across levels of dollar debt, we demonstrate that this relative increase in future profitability occurs even after controlling for contemporaneous earnings. The positive *investment* responses observed above were also robust to the inclusion of contemporaneous profitability. Therefore, some aspect of the change in competitiveness must have been uncorrelated with period-t earnings. In column F of Table (14), we add contemporaneous earnings to the regression. The predictive power of our interaction term remains positive and statistically significant.

These results serve as further evidence that firms that choose to hold higher dollar debt experience relative increases in current profits (and therefore internal funds for investment) and in their marginal product of capital (MPK) following a depreciation. This bolsters our hypothesis that the positive coefficient on $(D^* \times \Delta e)$ contains a large, differential competitiveness component.

5.4 Alternative Exchange-Rate Measures

One could argue that the "balance sheet" and "competitiveness" effects of a devaluation pertain to different measures of the real exchange rate. In the case of the balance sheet effect, it is the change of the domestic currency vis-a-vis the price level that will render dollar debt more expensive (*ex-post*) than its peso equivalent. For the competitiveness effect, standard open economy macro models suggest that it is the change of foreign prices vis-a-vis the domestic price level that is important for firm profits and investment decisions. With this in mind, we augment the results presented in table (12) to control for an alternative measure of the real exchange rate that incorporates a weighted average of the consumer price indices of each country's 5 main trading partners during 1995 (the mid-point of our sample). The results are reported in table (15). Columns A and C report our baseline estimates, while columns B and D include , in addition to the main $(D^* \times \Delta e)$ interaction, the interactions between dollar debt ratios and the international price-indices implicit

in the alternative real exchange rate measure. This decomposition allows us to disentangle the direct impact of changing international prices from that of changes in the domestic currency.

In the inventory investment regressions (column D) the additional interaction is not significantly different from zero. In the fixed capital regressions the estimated coefficient on the interaction between dollar debt and the international price-index is negative, although not always significant. This is surprising, as we would expect the coefficient to be positive: a devaluation vis-a-vis the peso should have a larger positive effect if it also implies a devaluation vis-a-vis international prices. A possible explanation lies in the construction of the international price indices. The relevant international prices are built using total trade weights (exports & imports) for the whole economy. These prices may very well not reflect the relevant international prices for the firms in our sample. This explanation receives support from the results shown in columns E through F. The response of earnings and sales to the international price-index are also negative – confirming that the simple $(D^* \times \Delta e)$ may indeed be a better measure of competitiveness for the firms included in our sample.

6 The Net-Worth Effect

In this section, we evaluate the key ingredients required for a depreciation to be contractionary in the models discussed in section 3: namely, the negative effect of a depreciation on the accounting net-worth of firms holding dollar debt and the reduction of investment that this causes. In particular, we address the following questions:

1. Did overall debt actually increase in those firms holding dollar debt during a depreciation? (Yes.)

2. Was this rise in debt fully offset by higher current earnings so that the balance sheets of firms holding dollar debt did not deteriorate? (Not likely.)

3. What is a plausible magnitude for the effect of falling net worth on investment? (At least an

order of magnitude smaller than the estimated overall effect.)

6.1 Changes in Firm Liabilities

Holding dollar debt during a depreciation leads to an increased indebtedness of the firm (in domestic currency) that was not entirely offset by higher current earnings.[30] This discards one possible explanation for the apparent absence of a net-worth effect on investment: that there was a limited effect on the balance sheet itself.

We estimate an equation for the predicted total debt and debt service of firm i in country j in year t. The interaction of $(D^* \times \Delta e)$ continues to be the term of interest. The theoretical prediction is that the real value of the firm's debt rises if it holds foreign-currency debt and the exchange rate goes up faster than the domestic-price level. To equation (6) above, we add $DN_{i,t}^T$, firm i's net issuance of new debt in period t. This simple framework provides a basis for predicting autonomous changes—i.e., those caused by the mechanical increase of dollar debt in local currency—in the financial obligations of a firm. We present estimates of this augmented specification in Table (16).

Firms holding foreign-currency denominated debt saw the value of their debt rise in the aftermath of a depreciation. As before, we focus on the estimated effect of the interaction of lagged dollar debt and the change in the real exchange rate. Columns A and B contain results for the regressions of total t-period debt on $(D^* \times \Delta e)$. In column C and D, we present results for the effect on the change in debt. In all cases, holding dollar debt during a depreciation causes a near one-for-one rise in the real peso value of debt.

Comparing the first four columns of Table (16) suggests that excluding new debt from the analysis has no appreciable change on our estimates of the effect of the dollar debt/exchange

[30] As seen above, the dollar-indebted firms tended to be larger and produce relatively tradable output. It seems possible, therefore, that they might have been savvy about anticipating exchange rate movements and perhaps experienced with the use of financial derivatives. Such instruments could have been used to "hedge" away balance-sheet risk. Nevertheless, we show that exchange rate realignments did indeed have the supposed effect on firms' balance sheets: Firms holding dollar debt saw the real (peso) value of their debt rise substantially. If firms do in fact buy derivatives or substitute debt to offset the mechanical revaluation of their debt, they appear to do so to a limited degree.

rate interaction term. This is fortunate because data on issues of new debt are not available for many firms, especially for those from countries already poorly represented in the sample. To take maximal advantage of the cross-country nature of our data set, we exclude new-debt issues from the remainder of the analysis.

Holding foreign-currency debt during an exchange rate depreciation also increases the interest charges incurred by the firm. This result is displayed in column E of Table (16), in which the dependent variable is accrued interest charges. The $(D^* \times \Delta e)$ term is associated with a increase in interest charges, although this effect is not precisely determined. Reassuringly, the three debt variables displayed all have coefficients that are of the order of interest rates, and debt in local currency is associated with substantially higher interest payments on average.

Finally, in column F, we sum the values for the change in debt and the accrued interest charges to produce a single statistic that describes how the firm's overall financial obligations have changed because of the interaction of dollar debt and the change in the exchange rate. Not surprisingly, the coefficient on the interaction is approximately equal to the sum on the individually estimated effects. Thus, for every extra dollar of debt held during a depreciation, firms experience a proportional increase in their financial obligations of about \$1.28 per unit of log change in the real exchange rate.

6.2 Effects of Net Worth on Investment

The next stage, which incorporates the effect of a change in the exchange rate on current earnings, is relatively uncomplicated. Using the estimated coefficients from previous sections, we sum up the effects of a depreciation on debt and on earnings to find the impact of a depreciation on the firm's balance sheet. The components of this sum are displayed in Panel A of Table (17). Departing slightly from the discussion so far, we also allow for collateralizability of future profits. To do this, we calculate the present discounted value of the rise in future earnings caused by a depreciation under different assumptions about the persistence of the exchange rate shock. Column 1 of Panel

B combines the balance sheet effects and future-earnings effects under various assumptions of collateralizability of future earnings. We find that holding dollar debt during a depreciation causes a decline in firm net worth, but that this decline is partly offset by higher current and future profits.

Finally, we combine the estimates of the decline in net worth with an assumption about the depressing effect of accounting net worth on investment. In the present study, our regressions of fixed-capital investment on financial factors typically indicate that one additional dollar of lagged *leverage* was associated with three cents less investment.[31]

Under this assumption, the net-worth component of the change in investment is estimated to be very small relative to the overall effect of holding dollar debt during an exchange rate realignment. These estimates are displayed in Panel B, column 2 of Table (17), and the net-worth component expressed as a fraction of the overall effect is presented in column 3 of the same panel. Focusing on column 3, we see that the net-worth component is smaller than the overall effect of $(D^* \times \Delta e)$ by between one and two orders of magnitude. In particular, note that even when the effects of current and future earnings are completely excluded (last row of Table 17), the impact of the balance sheet effect on investment is relatively small compared to the total impact estimated in previous sections.

Overall, the results presented in Table 17 suggest that in our sample the net-worth effect was a relatively unimportant channel. They also suggest that it would take for very large changes in leverage or the severity of financial constraints to offset the positive effect of devaluations via current and future profits. To get a feeling of plausible variations in average leverage across countries, we turn to data from Claessens and Djankov (2000), who report measures of leverage for firms in East Asia. Within their sample, the highest leverage ratios (those of Korea) exceeded those in our sample by a factor of two, considerably less that the factor of ten required for negative net-worth effects to offset our estimated changes in competitiveness across.

Our sample contains large, publicly listed firms. For firms that are not listed, the effects of net

[31] Of course, such an estimate does not imply a causal effect. However, the typically proposed biases on the coefficient result in a more negative estimate. For example, a firm with relatively strong growth prospects will invest more and pay down its debt faster, generating a negative correlation between leverage and investment in the data. Therefore, our use of this parameter estimate likely gives an *overestimate* of the effect of net worth on investment.

worth on investment are likely to be stronger. If, however, the only difference between the firms in our sample and non-listed firms is the severity of financial constraints, then these differences would have to be substantial—again by a factor of ten—to generate a negative effect. Furthermore, as we discussed in the section on debt composition, smaller firms hold smaller fractions of dollar debt. The net effect is unclear: among non-listed firms, the larger effect of net worth on investment may be offset by a smaller currency mismatch.

To corroborate our conclusion on the relative importance of the net-worth channel, we compare our estimate of the effect of leverage with those from other studies that have estimated firm level investment in developing countries. Harris, Schiantarelli, and Siregar (1994) look at a sample of 520 listed and non-listed manufacturing firms in Indonesia for the period 1981 to 1988. For 1985 to 1988, the period in which the authors argue administrative control of credit was replaced by market assignment, they find that the coefficient on debt is between -0.025 and -0.018 for small firms (depending on the estimation technique) and actually positive for large firms. Gallego and Loayza (2000) carry out a similar exercise using 79 listed firms in Chile over the period 1985 to 1995. For the full sample, they find a coefficient on leverage of -0.038. Finally, Laeven (2000) using a panel of (mostly) listed firms in 13 developing countries for 1988 to 1998 finds a coefficient for debt that ranges between -0.014 and -0.057 for the full sample and between -0.03 and -0.13 for firms in countries in which financial liberalization has not take place. Hence, in most cases, existing studies have found coefficients similar in magnitude to our estimates. Larger coefficients have been found only in cases of severely regulated financial markets or administrative control of credit.

In conclusion, we verify that, under plausible assumptions, dollar-indebted firms do, on average, experience a decline in their net worth after a depreciation, even after considering the effects of both current and future earnings. However, we find that this reduction probably translates into a very small effect on fixed-capital investment. The first result is a question of accounting. The second result depends on our assumption about how much net worth affects investment. Although we have no satisfactory estimate of this causal effect, most of the typically proposed biased would

lead us to overestimate the effect of net worth.[32]

Combining this evidence with the results in the previous section, we argue that positive investment responses associated with holding dollar debt during a depreciation reflect a competitiveness effect that arises from firms' matching the currency composition of the balance sheet to that of their income flows. In contrast, nowhere in our evidence is the large, negative net-worth effect on investment that has been presumed to be present during emerging-market depreciations. We do observe a decline in net worth but argue that its impact on investment is comparatively small.

7 Conclusions

The present study provides evidence on the effect of foreign-currency liabilities on firm-level investment in periods of exchange rate volatility. Our starting point is a concern—advanced recently by several authors—about problems stemming from the currency mismatch of debt among emerging-market corporations. A consequence of this mismatch is that a depreciation may lead to a deterioration of firm balance sheets (as a result of inflated domestic-currency values of debt) that could attenuate or even reverse the usual expansionary effects of the depreciation.

Assessing which effect dominates, however, is an empirical question, and one for which little evidence has been presented so far. To attempt to fill this gap, we construct a new database of firm-level accounting information (including the currency composition of liabilities) for over 500 firms in five Latin American countries, and use it to estimate the reduced-form effect on investment of holding foreign-currency-denominated debt during an exchange rate realignment. In doing so, we believe that this study addresses a specific channel through which dollarized liabilities interact with exchange rate movements to affect investment by publicly traded firms.

[32]Some have argued that the biases operate in the opposite direction. If this is the case, however, we believe that the sheer magnitude of the differences between the size of the net-worth effect and the total effect of dollar debt is informative. Even in the most conservative scenario discussed in Table (17) (zero collaterizability of future earnings), the coefficient on lagged leverage would have to be approximately seven times our estimated value, for the net-worth effect to have dominated the competitiveness effect.

We consistently find that firms holding dollar debt invest more than firms holding peso debt in the period following a depreciation. This finding is exactly the opposite of what one would expect from a naive model that only considers the detrimental effect of the exchange rate on liabilities. This result is robust to the inclusion of controls for both pre-existing firm differences and the interaction of these controls with aggregate macroeconomic variables.

We argue that this result is due to the degree to which firms match the currency composition of their debt with the elasticity of their income to the exchange rate. In the wake of a depreciation, the inflated peso value of dollar debt causes a deterioration in firm balance sheets that in turns induces a reduction in output and investment. However, in our sample, for firms holding higher levels of dollar debt this negative balance sheet effect is more than offset by higher current and future earnings caused by the competitiveness effect of the depreciation.

Providing support for this hypothesis we find that, after a depreciation, earnings are higher in those firms holding more dollar debt. In addition, in our sample, dollarization of liabilities is higher in firms whose income we expect *ex ante* to be more positively correlated with the real exchange rate (firms with tradable products, for example).

What do our results imply for the literature on currency mismatches and contractionary depreciations? First, we show that firms holding dollar debt do see their balance sheet positions deteriorate during depreciations, and, moreover, that total liabilities do appear to influence investment decisions. Second, in our sample firms "match" the currency composition of income and liabilities, so that those firms holding more dollarized debt are also those firms whose income is most highly correlated with the real exchange rate. If, however, firm level incentives where distorted in such a way that no "matching" took place, then depreciations could indeed turn more contractionary for dollarized firms– as firm level mismatches translate into reductions in output and investment. Understanding what drives firms in particular, and private agents in general, to choose the currency composition of their debt therefore becomes a key theoretical and empirical question. Third,the ratio of dollarized debt is a poor measure of firm level currency mismatches. A more comprehensive measure must incorporate measures of the elasticity of firm profits to the real

exchange rate. Sector controls and firm-level indicators of exposure, albeit imperfect, are a first step in this direction. Direct measurement of the idiosyncratic response of income to the exchange rate should also figure prominently in such analysis.

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Appendix. Variables

Microeconomic Variables

The following is a description of the main firm-level variables used in the paper.

1. **D*, Foreign debt:** debt denominated in a foreign currency converted into local currency. In all countries, accounting standards dictate that conversion of debt from foreign to local currency values be carried out using the exchange rate for the period in which the balance sheet is reported—in this case December. (Balance Sheet)

2. **Investment in fixed capital:** We combine purchases of fixed assets with disposal of fixed assets to construct our measure of fixed capital investment. Both of these variables are detailed in the cash flow statement. We opt not to use the change in net fixed assets as a measure of investment because accounting norms in most of the countries in our sample allow for revaluations of assets (Cash Statement)

3. We define **Investment in inventories** as the change in inventories in a given period. Inventories include raw materials, work in progress, and finished goods. (Balance Sheet)

4. **Net sales:** revenues from main operating activities. (Income Statement)

5. **Interest expense**: accrued interest on liabilities. (Income Statement)

6. **Earnings:** earnings before accrued interest, taxes, depreciation, and amortization (EBITDA). EBITDA = Operating Income + Depreciation and Amortization. (Cash Flow Statement)

7. **New debt:** measure of new debt issued, net of repayments on outstanding principal. This variable does not include changes in debt coming from accrued interest payments. (Cash Flow Statement)

8. **Sector** is the industry in which the firm has its main operations. We code firms according to the two-digit ISIC 2 classification. (Company Notes)

9. **Parent** is a dummy variable that indicates whether the firm's controlling interest is another firm. See text for coding. (Company Notes and Historical News)

10. **International Operations** is a dummy variable that indicates whether the firm has subsidiaries or direct operations in other countries. See text for coding. (Company Notes)

11. **ADR** is a dummy variable that takes on a value of one if the firm's shares were listed in a foreign stock exchange in the form of American Depositary Reciepts (ADRs) in the previous period. (Bank of New York (2002))

Macroeconomic Variables

This subsection contains a description of the macroeconomic variables used throughout the paper. The source of most data is the IMF International Financial Statistics. IFS codes are in **(bold)**, series names are in *italics*. The rest of the data are from the IADB's web site, www.iadb.org.

IFS Data

1. **Bank Credit** (as a percentage of nominal GDP). A measure of financial sector credit to the private sector, specifically *claims on the private sector held by deposit banks*, end of period. While a more comprehensive measure of private credit that includes other financial institutions exists in the IFS, fewer observations are available. In any case correlation between both series over the 1980-99 period is extremely high (>.99). Dollar values were converted to domestic currency using period average exchange rates as described below.

2. **Inflow of Credit** (as a percentage of nominal GDP). A measure of inflows of credit to private companies. It is the sum of two components of the capital account: *debt securities liabilities* **(78bnd)** and *other investment liabilities to other sectors* **(78bvd).** Dollar values were converted to domestic currency using period average exchange rates as described below.

3. **Capital Inflows** (as a percentage of nominal GDP). An aggregate measure of total net capital inflows, *Financial Account* **(78bjd).**

4. **Peso interest rate** (annual percentage). nominal interest rates on deposits in the financial sector. Deposit rates (**60l**) where used instead of lending rates as the latter was only available for a limited sample.

   (a) Argentina - *deposit rate* : rate on 30 to 59 day deposits in national currency.

   (b) Brazil - *deposit rate* : average rate offered by banks on certificates of deposits of 30 days or longer.

(c) Chile - *deposit rate* : 30-89-day loans by financial institutions.

(d) Colombia - *deposit rate:* weighted average rate paid on 90 day certificates of deposit.

(e) Mexico - *deposit rate:* Weighted average payable to individuals on 60 day time deposits.

5. **Exchange rate** (e_t): Nominal exchange rate / CPI, end of period and period average.

Other sources

1. **Aggregate Output**. Real value added by sector and total nominal and real GDP. Sectors are defined according to the ISIC Revision 2. For Brazil, data for 1997 to 1998 are from the Brazilian Central Bank. Source: IADB and Brazilian Central Bank.

2. **Dollar interest rate.**

   (a) For Argentina, Brazil and Mexico the dollar interest rate ($r^*_{j,t}$) is the total return on the portfolio of dollar-denominated bonds included in each country's EMBI index. Source: JP Morgan.

   (b) Chile: annualized interest rate on 30-89 day dollar-denominated loans. Source: Central Bank of Chile.

   (c) Colombia: as dollar contracts are prohibited in the domestic financial system, and no series of returns on dollar denominated bonds placed in international capital markets where available, we use the average cross country EMBI index. Source: JP Morgan

3. **The multilateral real exchange rate** used in section 5.1 was built using the consumer price indices of each country's 5 main trading partners during 1995 (the mid-point of our sample), weigthed by trade. Trade weights are from the DOTS database (IMF) and correspond to the share of imports and exports of each partner in total exports and imports. Nominal exchange rate and cpi data are from the *IFS.*

Table 1. Sample Statistics

Panel A: Number of Firms in Sample Per Country and Year

	Year									
Country	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**Total**
Argentina		3	12	21	25	27	29	51	47	215
Brazil	54	87	101	116	153	237	243	242	256	1,489
Chile		11	18	56	73	86	95	69	2	410
Colombia				1	6	11	17	19	19	73
Mexico	26	35	43	66	73	85	96	105	108	637
Total	80	136	174	260	330	446	480	486	432	2,824

Panel B: Descriptive Statisitics

	Mean	Std. Dev.	N
Firm-Level Variables			
Lagged Dollar Debt	.104	(.152)	2824
Lagged Total Debt	.440	(.274)	2824
Lagged Short-Term Debt	.264	(.217)	2812
Fixed-Capital Investment	.071	(.099)	2824
Inventory Investment	.009	(.051)	2810
Earnings (EBITDA)	.106	(.101)	2802
Change in Total Debt	.065	(.197)	2824
Interest Accrued	.057	(.079)	2789
Macro Variables			
Δ Log Real Exchange Rate	.000	(.155)	2824
Inflow of Credit (% nominal GDP)	.024	(.026)	2749
Δ Log Bank Credit	.054	(.172)	2824
Δ Log Sectoral Value Added	.031	(.049)	2808
Micro/Macro Interactions			
Dollar Debt x (Δ Log Real Exchange Rate)	-.001	(.022)	2824
Total Debt x (Δ Log Real Exchange Rate)	.005	(.059)	2824
Dollar Debt x (Inflow of Credit)	.000	(.004)	2749
Total Debt x (Inflow of Credit)	-.001	(.007)	2749
Dollar Debt x (Δ Log Bank Credit)	-.005	(.034)	2824
Total Debt x (Δ Log Bank Credit)	-.004	(.041)	2824

Panel C: Comparisons

Lagged Dollar Indebtedness:	**Below Median**		**Above Median**	
Exchange-Rate Movement:	**Appr.**	**Depr.**	**Appr.**	**Depr.**
Variables:				
Change in Total Debt	.082 (.171) [778]	.064 (.215) [634]	.048 (.186) [807]	.068 (.218) [605]
Interest Accrued	.047 (.071) [766]	.075 (.116) [627]	.044 (.045) [794]	.067 (.071) [602]
Earnings (EBITDA)	.118 (.112) [774]	.083 (.103) [624]	.114 (.096) [807]	.102 (.085) [597]
Fixed-Capital Investment	.075 (.092) [778]	.058 (.082) [634]	.072 (.084) [807]	.078 (.135) [605]
Inventory Investment	.016 (.067) [770]	.005 (.043) [630]	.006 (.041) [805]	.007 (.046) [605]

Note:
Panel A displays, per country and year, the number of firms in the sample that have nonmissing data on lagged foreign-currency debt. In Panel B, "Firm-level" variables are contemporaneous unless otherwise indicated. All accounting variables are converted to real (constant-peso) values and scaled by the lagged real value of total firm assets. Macroeconomic variables are from the current period (i.e., concurrent with the investment variables). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. Panel C displays the mean, the standard deviation (in parentheses), and number of observations (in brackets). The accounting data are the pooled Bloomberg / Economatica sample, as described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2 and Appendix A.

Table 2. Effect of Dollar Debt And Exchange-Rate Movements On Investment

	Dependent Variable: Investment in Fixed Capital						Dependent Variable: Investment in Inventories					
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
						Panel A: Regression-Adjusted Double Difference						
Interaction Effect												
Dollar Debt x (Δ Log Real Exchange Rate)	0.444 ***	0.407 ***	0.422 ***	0.415 ***	0.478 ***	0.375 ***	0.244 ***	0.260 ***	0.249 ***	0.229 ***	0.172 ***	0.153 ***
	(0.124)	(0.123)	(0.136)	(0.111)	(0.098)	(0.103)	(0.051)	(0.058)	(0.055)	(0.055)	(0.039)	(0.047)
Main Effects												
Total Debt		-0.030 ***	-0.022 ***	-0.024 **	-0.016	-0.008		-0.006	-0.009 ***	-0.015 ***	-0.017 ***	-0.020 ***
		(0.011)	(0.008)	(0.010)	(0.012)	(0.013)		(0.004)	(0.003)	(0.004)	(0.005)	(0.005)
Dollar Debt	0.000	0.019	0.000	0.002	-0.014	-0.011	-0.020 ***	-0.028 **	-0.018 *	-0.013	-0.010	-0.010
	(0.000)	(0.017)	(0.020)	(0.026)	(0.029)	(0.026)	(0.007)	(0.014)	(0.010)	(0.011)	(0.008)	(0.009)
Δ Log Real Exchange Rate	-0.001	0.018	0.016	0.017	0.020	0.015	-0.004	0.001	0.005	0.006	0.007	0.004
	(0.030)	(0.032)	(0.030)	(0.028)	(0.031)	(0.034)	(0.018)	(0.018)	(0.016)	(0.017)	(0.017)	(0.017)
Controls												
Country Dummies x Peso Debt x (Δ Log CPI)			Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes
Total Debt x (Δ Log Real Exchange Rate)				0.014	-0.014	-0.013				0.038 **	0.049 ***	0.050 ***
				(0.071)	(0.081)	(0.080)				(0.016)	(0.017)	(0.019)
Lag Capital Stock x Country Dummies x (Δ Log CPI)					Yes						Yes	
Lagged Dependent Variable						0.490 ***						0.028 *
						(0.055)						(0.014)
Regression Information												
N	2824	2824	2824	2824	2786	2786	2988	2988	2988	2988	2461	2461
R^2	0.009	0.029	0.035	0.036	0.113	0.099	0.014	0.023	0.028	0.029	0.043	0.033
Estimator	OLS	OLS	OLS	OLS	OLS	OLS/LDV	OLS	OLS	OLS	OLS	OLS	OLS/LDV
						Panel B: Regression-Adjusted Double Difference with Corporation Fixed Effects						
Interaction Effect												
Dollar Debt x (Δ Log Real Exchange Rate)	0.264 ***	0.241 ***	0.247 ***	0.254 ***	0.258 ***	0.275 ***	0.209 ***	0.205 ***	0.199 ***	0.168 ***	0.154 ***	0.173 ***
	(0.083)	(0.083)	(0.083)	(0.087)	(0.093)	(0.126)	(0.046)	(0.046)	(0.046)	(0.047)	(0.041)	(0.056)
Main Effects												
Total Debt		-0.045 ***	-0.031 ***	-0.027	-0.030	0.005		-0.006	-0.009	-0.025 **	-0.029 ***	-0.049 ***
		(0.014)	(0.016)	(0.020)	(0.023)	(0.051)		(0.006)	(0.007)	(0.010)	(0.009)	(0.021)
Dollar Debt	-0.086 ***	-0.058 **	-0.086 **	-0.089 ***	-0.100 ***	-0.130 *	-0.058 ***	-0.054 ***	-0.050 ***	-0.037 **	-0.034 **	-0.003
	(0.021)	(0.023)	(0.026)	(0.028)	(0.032)	(0.069)	(0.011)	(0.012)	(0.013)	(0.014)	(0.013)	(0.028)
Δ Log Real Exchange Rate	0.015	0.022	0.018	0.017	0.021	0.013	0.003	0.004	0.006	0.009	0.008	0.016 **
	(0.011)	(0.012)	(0.012)	(0.012)	(0.014)	(0.016)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)
Controls												
Country Dummies x Peso Debt x (Δ Log CPI)			Yes	Yes	Yes				Yes	Yes	Yes	Yes
Total Debt x (Δ Log Real Exchange Rate)				-0.013	-0.027	-0.077				0.059 **	0.051 **	0.073 ***
				(0.047)	(0.050)	(0.066)				(0.024)	(0.021)	(0.028)
Lag Capital Stock x Country Dummies x (Δ Log CPI)					Yes						Yes	
Lagged Dependent Variable						0.135 ***						-0.111 ***
						(0.034)						(0.021)
Regression Information												
N	2824	2824	2824	2824	2349	2349	2988	2988	2988	2988	2461	1891
R^2	0.012	0.017	0.021	0.021	0.036	n/a	0.02	0.02	0.028	0.031	0.201	n/a
Estimator	OLS/FE	OLS/FE	OLS/FE	OLS/FE	OLS/FE	Arellano-Bond {0.625}	OLS/FE	OLS/FE	OLS/FE	OLS/FE	OLS/FE	Arellano-Bond {0.002}

Note:
This table reports the OLS estimates of equation (6) in the text. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. P-values of the test of second-order serial correlation for the Arellano-Bond estimator are reported in brackets. The number of observations varies because of data availability. The dependent variable is an indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables (real exchange rate, sectorial value added, and CPI) are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg / Economatica sample, as described in the text. Macro data are drawn from various sources. For detailed sources and descriptions, see Section 2.

Table 3. Controls for Competitiveness

	Dependent Variable: Investment in Fixed Capital						Dependent Variable: Investment in Inventories					
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Panel A: Regression-Adjusted Double Difference												
Interaction Effect												
Dollar Debt	0.410 ***	0.326 *	0.326 *	0.357 ***	0.349 ***	0.272 *	0.226 ***	0.163 ***	0.141 **	0.209 ***	0.168 ***	0.100 *
x (Δ Log Real Exchange Rate)	(0.113)	(0.180)	(0.182)	(0.102)	(0.101)	(0.166)	(0.050)	(0.058)	(0.061)	(0.053)	(0.052)	(0.056)
Main Effects												
Total Debt	-0.026 **	-0.038 ***	-0.040 ***	-0.013	-0.028 ***	-0.047 ***	-0.015 ***	-0.019 ***	-0.019 ***	-0.009 **	-0.017 ***	-0.018 ***
	(0.010)	(0.009)	(0.008)	(0.011)	(0.010)	(0.009)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.006)
Dollar Debt	0.005	0.023	0.027	0.001	0.020	0.047	-0.012	-0.003	0.001	-0.013	0.002	0.013
	(0.025)	(0.024)	(0.025)	(0.023)	(0.025)	(0.025)	(0.010)	(0.012)	(0.012)	(0.010)	(0.010)	(0.011)
Δ Log Real Exchange Rate	0.027			0.023	0.025		0.012			0.006	0.012	
	(0.026)			(0.025)	(0.026)		(0.015)			(0.014)	(0.013)	
Controls												
Total Debt	0.019	0.071	0.066	-0.007	0.020	0.080	0.039 **	0.067 ***	0.049 **	0.024	0.044 ***	0.051 **
x (Δ Log Real Exchange Rate)	(0.069)	(0.049)	(0.054)	(0.070)	(0.073)	(0.058)	(0.016)	(0.022)	(0.022)	(0.017)	(0.017)	(0.024)
Δ Log Sectorial Value Added	0.172 ***						0.097 ***					
	(0.040)						(0.033)					
Aggregate Effects?	Country	Country x SIC1 x Δ ln RER	Country x SIC1 x Year	Country	Country	Country x SIC1 x Year	Country	Country x SIC1 x Δ ln RER	Country x SIC1 x Year	Country	Country	Country x SIC1 x Year
Contemporaneous Earnings				0.251 ***						0.133 ***		
				(0.027)						(0.025)		
Contemporaneous Sales					0.132 ***	0.100 ***					0.116 ***	0.126 ***
					(0.038)	(0.032)					(0.027)	(0.034)
Contemporaneous Costs					-0.114 ***	-0.077 **					-0.100 ***	-0.111 ***
					(0.041)	(0.035)					(0.027)	(0.033)
Regression Information												
N	2808	2824	2824	2802	2824	2824	2972	2988	2988	2918	2987	2987
R^2	0.042	0.113	0.152	0.095	0.068	0.181	0.036	0.064	0.154	0.093	0.125	0.237
Panel B: Regression-Adjusted Double Difference with Corporation Fixed Effects												
Interaction Effect												
Dollar Debt	0.257 ***	0.116	0.096	0.216 **	0.145 *	0.051	0.161 ***	0.085	0.058	0.143 ***	0.059	0.010
x (Δ Log Real Exchange Rate)	(0.087)	(0.098)	(0.102)	(0.087)	(0.086)	(0.100)	(0.047)	(0.053)	(0.054)	(0.046)	(0.044)	(0.050)
Main Effects												
Total Debt	-0.027	-0.034	-0.048 **	-0.037	-0.043 **	-0.057 ***	-0.027 ***	-0.033 ***	-0.039 ***	-0.038 ***	-0.043 ***	-0.052 ***
	(0.020)	(0.020)	(0.022)	(0.020)	(0.020)	(0.022)	(0.010)	(0.010)	(0.011)	(0.010)	(0.009)	(0.010)
Dollar Debt	-0.082 ***	-0.058 **	-0.058	-0.075 ***	-0.052	-0.041	-0.032 **	-0.020	0.000	-0.019	0.003	0.023
	(0.028)	(0.029)	(0.031)	(0.028)	(0.028)	(0.031)	(0.014)	(0.015)	(0.016)	(0.014)	(0.013)	(0.015)
Δ Log Real Exchange Rate	0.021			0.024	0.040 ***		0.016 **			0.011	0.030 ***	
	(0.013)			(0.012)	(0.012)		(0.007)			(0.007)	(0.006)	
Controls												
Total Debt	-0.013	0.047	0.045	-0.002	0.011	0.061	0.063 ***	0.097 ***	0.086 ***	0.064 ***	0.084 ***	0.106 ***
x (Δ Log Real Exchange Rate)	(0.047)	(0.049)	(0.052)	(0.047)	(0.046)	(0.052)	(0.024)	(0.025)	(0.026)	(0.025)	(0.022)	(0.025)
Δ Log Sectorial Value Added	0.051						0.103 ***					
	(0.040)						(0.021)					
Aggregate Effects?	Country	Country x SIC1 x Δ ln RER	Country x SIC1 x Year	Country	Country	Country x SIC1 x Year	Country	Country x SIC1 x Δ ln RER	Country x SIC1 x Year	Country	Country	Country x SIC1 x Year
Contemporaneous Earnings				0.148 ***						0.174 ***		
				(0.024)						(0.013)		
Contemporaneous Sales					0.027	0.018					0.102 ***	0.113 ***
					(0.026)	(0.028)					(0.014)	(0.014)
Contemporaneous Costs					0.040	0.046					-0.040 ***	-0.052 ***
					(0.029)	(0.032)					(0.015)	(0.016)
Regression Information												
N	2808	2824	2824	2802	2824	2824	2972	2988	2988	2918	2987	2987
R^2	0.021	0.053	0.117	0.037	0.059	0.144	0.04	0.056	0.168	0.102	0.173	0.288

Note:

This table reports the OLS estimates of equation (6) in the text. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The number of observations varies because of data availability. The dependent variable is as indicated above. Firm-level independent variables are once-lagged values, except for contemporaneous earnings. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables (real exchange rate, sectorial value added, and CPI) are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg / Economatica sample, as described in the text. Macro data are drawn from various sources. For detailed sources and descriptions, see Section 2.

Table 4. Importance of Changes in Aggregate Credit Conditions

	Dependent Variables: Investment in…							
	Fixed Capital				Inventories			
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
	Panel A: Regression-Adjusted Double Difference							
Interaction Effect								
Dollar Debt x	0.422 ***	0.413 ***	0.382 **	0.403 ***	0.249 ***	0.217 ***	0.248 ***	0.228 ***
(Δ Log Real Exchange Rate)	(0.136)	(0.130)	(0.153)	(0.126)	(0.055)	(0.055)	(0.057)	(0.047)
Main Effects								
Total Debt	-0.022 ***	-0.023 **	-0.030 ***	-0.026 ***	-0.009 ***	-0.017 ***	-0.016 ***	-0.007
	(0.008)	(0.010)	(0.007)	(0.008)	(0.003)	(0.004)	(0.004)	(0.005)
Dollar Debt	0.000	-0.002	0.015	0.000	-0.018	-0.005	-0.009	-0.020
	(0.020)	(0.026)	(0.021)	(0.019)	(0.010)	(0.009)	(0.010)	(0.010)
Δ Log Real Exchange Rate	0.016	0.017	0.058 **	0.013	0.005	0.007	0.020	0.005
	(0.030)	(0.028)	(0.027)	(0.024)	(0.016)	(0.017)	(0.016)	(0.014)
Controls								
Total Debt x		0.012				0.044 ***		
(Δ Log Real Exchange Rate)		(0.072)				(0.017)		
Log (Lagged Total Assets)		0.001				-0.002 **		
		(0.001)				(0.001)		
Log (Lagged Total Assets) x		0.000				0.004		
(Δ Log Real Exchange Rate)		(0.010)				(0.005)		
Inflow of Credit to Country			0.489 ***				0.187	
			(0.146)				(0.120)	
Total Debt x			-0.371				-0.334 *	
Inflow of Credit			(0.344)				(0.183)	
Dollar Debt x			0.415				0.428	
Inflow of Credit			(0.508)				(0.406)	
Δ Log Bank Credit (of Country)				0.037 ***				0.040 **
				(0.011)				(0.016)
Total Debt x				-0.074				0.058
Δ Log Bank Credit				(0.054)				(0.053)
Dollar Debt x				-0.043				-0.095
Δ Log Bank Credit				(0.072)				(0.073)
Regression Statistics								
N	2824	2824	2749	2824	2988	2988	2909	2988
R^2	0.035	0.036	0.04	0.039	0.028	0.033	0.035	0.038
	Panel B: Regression-Adjusted Double Difference with Corporation Fixed Effects							
Interaction Effect								
Dollar Debt x	0.247 ***	0.252 ***	0.212 **	0.215 **	0.199 ***	0.150 ***	0.175 ***	0.180 ***
(Δ Log Real Exchange Rate)	(0.083)	(0.092)	(0.095)	(0.087)	(0.046)	(0.050)	(0.052)	(0.047)
Main Effects								
Total Debt	-0.031	-0.038	-0.043 **	-0.035 **	-0.009	-0.030 ***	-0.027 ***	-0.008
	(0.016)	(0.020)	(0.020)	(0.016)	(0.007)	(0.010)	(0.010)	(0.008)
Dollar Debt	-0.086 ***	-0.060 **	-0.058 **	-0.072 **	-0.050 ***	-0.021	-0.027	-0.044 ***
	(0.026)	(0.028)	(0.029)	(0.029)	(0.013)	(0.015)	(0.015)	(0.015)
Δ Log Real Exchange Rate	0.018	0.022	0.057 ***	0.015	0.006	0.011	0.024 ***	0.005
	(0.012)	(0.012)	(0.015)	(0.012)	(0.007)	(0.007)	(0.008)	(0.007)
Controls								
Total Debt x		-0.007				0.065 ***		
(Δ Log Real Exchange Rate)		(0.047)				(0.024)		
Log (Lagged Total Assets)		-0.030 ***				-0.015 ***		
		(0.006)				(0.003)		
Log (Lagged Total Assets) x		-0.008				0.001		
(Δ Log Real Exchange Rate)		(0.008)				(0.004)		
Inflow of Credit to Country			0.434 ***				0.191 ***	
			(0.114)				(0.057)	
Total Debt x			-0.272				-0.571 ***	
Inflow of Credit			(0.434)				(0.221)	
Dollar Debt x			0.482				0.315	
Inflow of Credit			(0.726)				(0.372)	
Δ Log Bank Credit (of Country)				0.034 **				0.037 ***
				(0.013)				(0.007)
Total Debt x				-0.038				0.018
Δ Log Bank Credit				(0.066)				(0.033)
Dollar Debt x				-0.016				-0.080 **
Δ Log Bank Credit				(0.076)				(0.040)
Regression Statistics								
N	2824	2824	2749	2824	2988	2988	2909	2988
R^2	0.021	0.033	0.029	0.025	0.028	0.04	0.041	0.04

Note:
This table reports the OLS estimates of equation (6) in the text, plus the indicated main effects and interactions of firm-level and macro variables in Columns B through D and F through H. Specification includes country fixed effects, Δ Log CPI, and the interaction of the two with peso debt, as in Table 2, Column B. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The number of observations varies because of data availability. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables (real exchange rate, credit-market indicators, and CPI) are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. "Inflow of Credit to Country" is a measure of aggregate credit inflows to the private sector. "Bank Credit" is the measure of aggregate claims on the private sector by deposit banks. Both credit-market macro variables are scaled by GDP. The accounting data are the pooled Bloomberg / Economatica sample, as described in the text. Macro data are drawn from various sources. For detailed sources and descriptions, see Section 2.

Table 5. Conditioning on Lagged Performance

	Dependent Variables: Investment in…					
	Fixed Capital			Inventories		
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)
	Panel A: Regression-Adjusted Double Difference					
Interaction Effect						
Dollar Debt x	0.423 ***	0.423 ***	0.314 ***	0.171 ***	0.164 ***	0.189 ***
(Δ Log Real Exchange Rate)	(0.113)	(0.102)	(0.114)	(0.048)	(0.049)	(0.044)
Controls						
Total Debt x	0.016	0.005	0.036	0.056 ***	0.058 ***	0.056 ***
(Δ Log Real Exchange Rate)	(0.072)	(0.075)	(0.074)	(0.018)	(0.017)	(0.018)
(Lagged) Earnings		0.222 ***			0.084 ***	
		(0.029)			(0.015)	
(Lagged) Earnings x		0.159			0.168 ***	
(Δ Log Real Exchange Rate)		(0.225)			(0.049)	
(Lagged) LHS Variable			0.299 ***			-0.045 *
			(0.089)			(0.026)
(Lagged) LHS Variable x			1.140 **			0.842 ***
(Δ Log Real Exchange Rate)			(0.529)			(0.148)
	Panel B: Regression-Adjusted Double Difference with Corporation Fixed Effects					
Interaction Effect						
Dollar Debt x	0.249 ***	0.258 ***	0.227 *	0.099 **	0.108 **	0.213 ***
(Δ Log Real Exchange Rate)	(0.092)	(0.092)	(0.131)	(0.045)	(0.045)	(0.057)
Controls						
Total Debt x	0.016	0.005	-0.007	0.095 ***	0.088 ***	0.074 ***
(Δ Log Real Exchange Rate)	(0.072)	(0.075)	(0.070)	(0.024)	(0.024)	(0.030)
(Lagged) Earnings		0.222 ***			0.114 ***	
		(0.029)			(0.016)	
(Lagged) Earnings x		0.159			0.076	
(Δ Log Real Exchange Rate)		(0.225)			(0.071)	
(Lagged) LHS Variable			0.161 ***			-0.117 ***
			(0.035)			(0.021)
(Lagged) LHS Variable x			1.923 ***			0.881 ***
(Δ Log Real Exchange Rate)			(0.451)			(0.229)

Note:
This table reports the estimates of equation (6) in the text, plus the indicated interactions of firm-level and macro variables. Panel B, Columnss C and F report Arellano-Bond estimates; all other estimates are OLS. Specification also includes country fixed effects, Δ Log CPI, and the interaction of the two with peso debt, and all relevent main effects. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. "Earnings" are the firm's earnings before interest, depreciation, and taxes (EBITDA). The lagged LHS variable is one lag of the dependent variable. Macroeconomic variables are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg/Economatica sample described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2.

Table 6. Composition of Debt: Maturity versus Currency

	Dependent Variables: Investment in...									
	Fixed Capital					Inventories				
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
	Panel A: Regression-Adjusted Double Difference									
Dollar Debt x	0.406 ***	0.415 ***	0.422 ***	0.392 ***	0.427 ***	0.204 ***	0.195 ***	0.186 ***	0.189 ***	0.209 ***
(Δ Log Real Exchange Rate)	(0.094)	(0.100)	(0.099)	(0.093)	(0.097)	(0.058)	(0.055)	(0.053)	(0.048)	(0.050)
Dollar Debt x			0.532		0.608			-0.018		0.244
Inflow of Credit			(0.389)		(0.469)			(0.481)		(0.492)
Dollar Debt x				-0.067	-0.093				-0.106	-0.122 **
Δ Log Bank Credit				(0.082)	(0.067)				(0.063)	(0.059)
Short-Term Debt x		0.087	0.172 *	0.072	0.182 **		-0.064	-0.010	-0.055	-0.032
(Δ Log Real Exchange Rate)		(0.097)	(0.091)	(0.090)	(0.083)		(0.056)	(0.086)	(0.047)	(0.084)
Short-Term Debt x			0.788		1.031			0.671		0.308
Inflow of Credit			(0.735)		(0.746)			(0.514)		(0.634)
Short-Term Debt x				-0.115	-0.149				0.129	0.130
Δ Log Bank Credit				(0.099)	(0.088)				(0.077)	(0.093)
	Panel B: Regression-Adjusted Double Difference with Corporation Fixed Effects									
Dollar Debt x	0.252 ***	0.273 ***	0.281 ***	0.228 **	0.263 **	0.169 ***	0.169 ***	0.153 ***	0.137 ***	0.145 **
(Δ Log Real Exchange Rate)	(0.087)	(0.089)	(0.105)	(0.093)	(0.113)	(0.047)	(0.048)	(0.056)	(0.050)	(0.060)
Dollar Debt x			0.814		0.822			0.181		0.309
Inflow of Credit			(0.788)		(0.815)			(0.398)		(0.410)
Dollar Debt x				-0.046	-0.064				-0.069	-0.083
Δ Log Bank Credit				(0.078)	(0.081)				(0.041)	(0.043)
Short-Term Debt x		0.085	0.205	0.084	0.238		0.010	0.020	0.022	0.000
(Δ Log Real Exchange Rate)		(0.102)	(0.132)	(0.102)	(0.135)		(0.048)	(0.064)	(0.048)	(0.064)
Short-Term Debt x			1.037		1.470			0.108		-0.290
Inflow of Credit			(1.017)		(1.065)			(0.499)		(0.517)
Short-Term Debt x				-0.148	-0.184				0.101	0.125 **
Δ Log Bank Credit				(0.101)	(0.106)				(0.053)	(0.056)

Note:
This table reports the OLS estimates of equation (6) in the text, plus the indicated interactions of firm-level and macro variables in Columns B through E and G through J. Specification includes country fixed effects, Δ Log CPI, and the interaction of the two with peso debt. Also includes the interactions of total debt with the real exchange rate, Δ Log Bank Credit, and Inflow of Credit; and all relevent main effects. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The number of observations varies because of data availability. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. Short-term debt is all firm debt coming due within one year (i.e., in the previous year since this variable is lagged). Macroeconomic variables (real exchange rate, sectorial value added, and CPI) are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. "Inflow of Credit to Country" is a measure of aggregate credit inflows to the private sector. "Bank Credit" is the measure of aggregate claims on the private sector by deposit banks. Both credit-market macro variables are scaled by GDP. The accounting data are the pooled Bloomberg / Economatica sample, as described in the text. Macro data are drawn from various sources. For detailed sources and descriptions, see Section 2.

Table 7. Cross-Border Ownership

	Dependent Variables: Investment in...											
	Fixed Capital						Inventories					
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
Interaction Effect												
Dollar Debt x	0.427 ***	0.455 ***	0.430 ***	0.422 ***	0.424 ***	0.449 ***	0.230 ***	0.224 ***	0.228 ***	0.219 ***	0.230 ***	0.211 ***
(Δ Log Real Exchange Rate)	(0.113)	(0.125)	(0.127)	(0.117)	(0.108)	(0.130)	(0.057)	(0.059)	(0.056)	(0.057)	(0.057)	(0.060)
Controls												
Dummy if Has International Operations		0.013 ***				0.015 ***		0.000				0.000
		(0.004)				(0.004)		(0.002)				(0.002)
I (International Operations) x (Δ Log Real Exchange Rate)		-0.042				-0.041		0.011				0.009
		(0.030)				(0.023)		(0.006)				(0.008)
Dummy if Has Parent Company			0.024 ***			0.027 ***			0.000			0.000
			(0.006)			(0.006)			(0.002)			(0.002)
I(Has Parent) x (Δ Log Real Exchange Rate)			0.008			0.015			-0.007			-0.009
			(0.057)			(0.054)			(0.024)			(0.018)
Dummy if Has ADR				-0.003		-0.004				-0.001		-0.002
				(0.006)		(0.006)				(0.003)		(0.003)
I(Has ADR) x (Δ Log Real Exchange Rate)				0.017		0.021				0.032		0.033
				(0.027)		(0.024)				(0.022)		(0.021)
Auditor is a Big Six firm					0.007	0.005					0.005	0.005
					(0.005)	(0.005)					(0.003)	(0.003)
Auditor is a Big Six firm x (Δ Log Real Exchange Rate)					-0.022	-0.024					-0.021	-0.021
					(0.023)	(0.018)					(0.025)	(0.025)
Regression Statistics												
N	2608	2608	2608	2608	2532	2532	2699	2699	2699	2699	2613	2613
R2	0.036	0.038	0.043	0.036	0.039	0.05	0.029	0.03	0.03	0.031	0.031	0.033

Note:

This table reports the OLS estimates of equation (6) in the text, plus the indicated interactions of firm-level and macro variables. Specification includes country dummies, Δ log CPI, and the interaction of the two with peso debt, and all relevant main effects. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables are from the current period (i.e. concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are a Bloomberg subsample with nonmissing ownership data. The variable on international operations is an indicator constructed by searching in the Bloomberg company profile for references to foreign subsidiaries or other activities abroad. The indicator variable for whether the firm has a parent company was constructed by examining current ownership and the history of large share transactions. This variables is coded as one if firms had a parent company prior to their first appearance in the sample. The indicator variable for whether the firm has American Depositary Receipts (ADRs) is constructed from the Bank of New York ADR database. This variable is coded as one if the firm's shares were listed as ADRs in a foreign stock exchange in the previous period. For detailed sources and descriptions, see Section 2.

Table 8. Relaxing the Assumption of Linearity

	Dependent Variables: Investment in…							
	Fixed Capital				Inventories			
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Interaction Effect								
Dollar Debt x	0.407 ***	0.406 ***	0.429 ***	0.497 **	0.260 ***	0.260 ***	0.259 ***	0.242 ***
(Δ Log Real Exchange Rate)	(0.123)	(0.121)	(0.065)	(0.223)	(0.058)	(0.058)	(0.071)	(0.031)
Controls								
Total Debt	-0.030 ***	-0.046 ***	-0.026 ***	-0.030 ***	-0.006	-0.005	-0.009	-0.006
	(0.011)	(0.011)	(0.007)	(0.010)	(0.004)	(0.007)	(0.006)	(0.004)
(Total Debt)2		0.006 ***				0.000		
		(0.002)				(0.001)		
Total Debt x (Dollar Debt x			-0.158				-0.021	
(Δ Log Real Exchange Rate)			(0.365)				(0.130)	
Appreciation Dummy x Dollar Debt				-0.283				-0.002
x (Δ Log Real Exchange Rate)				(0.296)				(0.103)
Regression Statistics								
N	2824	2824	2824	2824	2988	2988	2988	2988
R2	0.029	0.031	0.032	0.034	0.023	0.023	0.024	0.03

Note:
This table reports the OLS estimates of equation (6) in the text, plus the indicated interactions and all relevant main and second-order effects. Specification includes country fixed effects, Δ log CPI, and the interaction of the two with peso debt. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg / Economatica sample, as described in the text. Macro data are drawn from various sources. For detailed sources and descriptions, see Section 2.

Table 9. Tequilazo: Results for Mexico

	Dependent Variable: Investment in Fixed Capital			
Independent Variables	(A) **1990-99**	(B) **1994-95**	(C) **1994**	(D) **1995**
Interactions				
Dollar Debt x	0.337 **	0.546 **		
(Δ Log Real Exchange Rate)	(0.166)	(0.243)		
Total Debt x	-0.546 **	-0.615		
(Δ Log Real Exchange Rate)	(0.271)	(0.394)		
Main Effects and Controls				
Δ Log Real Exchange Rate	0.109 ***	0.151 ***		
	(0.032)	(0.041)		
Dollar Debt	0.074 ***	0.029	0.324 **	0.026
	(0.022)	(0.033)	(0.126)	(0.034)
Total Debt	-0.108 ***	-0.113 **	-0.439 **	-0.104 **
	(0.026)	(0.046)	(0.204)	(0.049)
Regresion Statisitics				
N	635	139	66	73
R2	0.161	0.169	0.096	0.088

Note:
This table reports the OLS estimates for the sub-sample of Mexican firms. Columns A and B contain estimates of equation (6) in the text. Columns C and D report estimates of the indicated debt variables. Robust standard errors are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variable is investment in fixed capital. Firm-level independent variables are once-lagged values, except for contemporaneous earnings. All accounting variables are scaled by the lag of total firm assets. The real exchange rate is from the current period (i.e., concurrent with the LHS investment variable) and is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are from the Bloomberg sample, as described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2.

Table 10. Results by Country

Estimated Coefficient on Dollar Debt x (Δ Log Real Exchange Rate)

Argentina	Brazil	Chile	Colombia	Mexico
Panel A: Basic Specification				
0.412	0.720 ***	0.660	1.076	0.347
(0.878)	(0.110)	(0.714)	(0.598)	(0.225)
[215]	[1481]	[406]	[73]	[635]
Panel B: Interactions with Credit Market Variables				
3.349 ***	0.617 ***	0.285	0.339	0.548 ***
(0.802)	(0.127)	(1.233)	(0.437)	(0.182)
[215]	[1481]	[406]	[73]	[635]
Panel C: Control for Lagged Earnings				
0.144	0.649 ***	0.196	5.777 ***	0.282 ***
(0.839)	(0.142)	(0.889)	(0.819)	(0.094)
[200]	[1210]	[313]	[55]	[547]
Panel D: Control for Firm Size				
-0.501	0.658 ***	0.491	1.317 **	0.384
(1.050)	(0.214)	(0.814)	(0.599)	(0.225)
[215]	[1481]	[406]	[73]	[635]
Panel E: Include Lagged Dependent Variable				
1.890	0.664 ***	-0.296	2.856 ***	0.199 **
(2.394)	(0.150)	(0.911)	(0.970)	(0.101)
[180]	[1205]	[310]	[51]	[525]
Panel F: Include Firm Fixed Effects				
-2.076	0.576 ***	0.942	0.922	0.104
(1.876)	(0.203)	(1.905)	(1.255)	(0.188)
[215]	[1481]	[406]	[73]	[635]
Panel G: Include Both Fixed Effects and Lagged Dependent Variable				
-2.543	0.418 ***	1.377	0.472	0.149
(3.278)	(0.291)	(2.673)	(1.838)	(0.245)
[128]	[941]	[216]	[31]	[405]
{.747}	{.055}	{.409}	{.789}	{.021}

Note:
This table reports the OLS estimates of equation (6) in the text. Specification also includes country fixed effects, Δ Log CPI, and the interaction of the two with peso debt, all relevent main effects and the indicated controls. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variable is the sum of investment in fixed capital and inventories. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. "Earnings" are the firm's earnings before interest, depreciation, and taxes (EBITDA). Macroeconomic variables are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. "Credit Market Variables" are aggregate credit inflows to the private sector and aggregate claims on the private sector by deposit banks. Both credit-market macro variables are scaled by GDP. The accounting data are the pooled Bloomberg/Economatica sample described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2.

Table 11. Decompositions by Predetermined Firm Characteristics

	Dependent Variables: Investment in…			
	Fixed Capital		Inventories	
Independent Variables	(A)	(B)	(C)	(D)
	Panel A: Sample-Average Effect			
Dollar Debt x (Δ Log Real Exchange Rate)	0.422 *** (0.136)	0.247 *** (0.083)	0.249 *** (0.055)	0.199 *** (0.046)
	Panel B: Tradeable versus Nontradeable sectors			
Dollar Debt x (Δ Log Real Exchange Rate)	0.505 *** (0.097)	0.246 *** (0.070)	0.330 *** (0.104)	0.202 *** (0.057)
Nontradeable Sector x Dollar Debt x (Δ Log Real Exchange Rate)	-0.189 (0.161)	-0.061 (0.095)	-0.124 (0.183)	-0.113 (0.101)
	Panel C: Manufacturing versus Nonmanufacturing			
Dollar Debt x (Δ Log Real Exchange Rate)	0.527 *** (0.105)	0.248 *** (0.070)	0.350 *** (0.107)	0.201 *** (0.058)
Nonmanufacturing Sector x Dollar Debt x (Δ Log Real Exchange Rate)	-0.231 (0.156)	-0.062 (0.088)	-0.174 (0.178)	-0.094 (0.098)
	Panel D: Firm Size			
Dollar Debt x (Δ Log Real Exchange Rate)	0.314 *** (0.069)	0.115 *** (0.041)	0.276 ** (0.111)	0.062 (0.061)
Assets Below Sample Median x Dollar Debt x (Δ Log Real Exchange Rate)	0.363 (0.328)	0.272 ** (0.135)	0.103 (0.182)	0.290 *** (0.100)
	Panel E: Liquidity			
Dollar Debt x (Δ Log Real Exchange Rate)	0.464 ** (0.222)	0.284 *** (0.082)	0.250 ** (0.112)	0.223 *** (0.062)
Current Assets (Fraction of Total) Below Sample Median x Dollar Debt x (Δ Log Real Exchange Rate)	-0.056 (0.243)	-0.161 (0.091)	0.053 (0.176)	-0.127 (0.096)
Estimator:	OLS	OLS/FE	OLS	OLS/FE

Note:
This table reports the OLS estimates of equation (6) in the text, plus the indicated interactions of firm-level and macro variables. Specification also includes country fixed effects, Δ Log CPI, and the interaction of the two with peso debt, and all relevent main effects. Columns B and D contain estimates using corporation fixed effects. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables are from the current period (i.e., concurrent with the LHS investment variable). The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg/Economatica sample described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2.

Table 12. Determinants of Currency Composition of Debt

Independent Variables	Full Sample (A)	Full Sample (B)	Full Sample (C)	Sample with Ownership Data (D)	Sample with Ownership Data (E)
Indicators of Sensitivity of Profits to the Real Exchange Rate					
Dummy for Tradeable Sector	0.054 ***		0.045 ***	0.065 ***	0.059 ***
	(0.008)		(0.008)	(0.008)	(0.008)
Elasticity of Own-Sector Value Added to Real Exchange Rate		0.448 ***	0.299 ***		
		(0.076)	(0.047)		
Dummy for International Operations					0.098 ***
					(0.016)
Controls					
Log Assets	0.047 ***	0.042 ***	0.044 ***	0.046 ***	0.043 ***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Dummy if Has Parent Company					-0.021 **
					(0.009)
Regression Statistics					
N	3419	3419	3421	3242	3242
R^2	0.428	0.425	0.43	0.398	0.409

Note:
This table reports the OLS estimates of equation (7) in the text. Specification also includes (country x year) fixed effects. Standard errors adjusted for clustering by firm are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variable is the fraction of debt denominated in foreign currency. "Full sample" is pooled Bloomberg/Economatica data described in the text. "Sample with ownership data" consists of the Bloomberg sample with nonmissing ownership data. The elasticity of sectorial value added to the real exchange rate was computed using data from 1980 through 1999. The variable on international operations is an indicator constructed by searching in the Bloomberg company profile for references to foreign subsidiaries or other activities abroad. The indicator variable for whether the firm has a parent company was constructed by examining current ownership and the history of large share transactions. This variable is coded as one if firms had a parent company prior to their first appearance in the sample. For detailed sources and descriptions, see Section 2.

Table 13. Effect of Dollar Debt and Exchange-Rate Movements on Firm Income

	Dependent Variables					
	Sales	Earnings	Earnings (t+1)			
Independent Variables	(A)	(B)	(C)	(D)	(E)	(F)
	Panel A: Regression-Adjusted Double Difference					
Interaction Effect						
Dollar Debt x	2.616 ***	0.219 **	0.355 ***	0.350 ***	0.331 ***	0.248 ***
(Δ Log Real Exchange Rate)	(0.528)	(0.100)	(0.099)	(0.098)	(0.096)	(0.078)
Main Effects						
Total Debt	0.574 ***	-0.036 ***	-0.045 ***	-0.040 ***	-0.040 ***	-0.021 **
	(0.080)	(0.012)	(0.012)	(0.012)	(0.012)	(0.009)
Dollar Debt	-1.079 ***	-0.004	0.007	0.003	0.006	0.011
	(0.099)	(0.015)	(0.016)	(0.016)	(0.016)	(0.012)
Controls						
Total Debt x	-1.774 ***	-0.045	-0.100	-0.134	-0.141	0.017
(Δ Log Real Exchange Rate)	(0.301)	(0.082)	(0.109)	(0.112)	(0.112)	(0.061)
Fixed-Capital Investment				0.185 ***	0.173 ***	
(period t)				(0.025)	(0.025)	
Inventory Investment					0.126 ***	
(period t)					(0.041)	
Earnings (period t)						0.637 ***
						(0.022)
Regression Statistics						
N	2883	2807	2514	2368	2359	2359
R^2	0.093	0.107	0.096	0.116	0.121	0.121
	Panel B: Regression-Adjusted Double Difference with Corporation Fixed Effects					
Interaction Effect						
Dollar Debt x	0.666 **	0.096	0.222 **	0.198 **	0.195 **	0.221 ***
(Δ Log Real Exchange Rate)	(0.278)	(0.078)	(0.090)	(0.093)	(0.093)	(0.086)
Main Effects						
Total Debt	0.163 ***	0.044 ***	0.066 ***	0.079 ***	0.079 ***	0.056 ***
	(0.048)	(0.014)	(0.016)	(0.017)	(0.017)	(0.015)
Dollar Debt	-0.334 ***	-0.059 ***	-0.024	-0.019	-0.017	-0.007
	(0.072)	(0.020)	(0.021)	(0.022)	(0.022)	(0.020)
Controls						
Total Debt x	-0.350 ***	-0.082 **	-0.024	-0.011	-0.011	0.007
(Δ Log Real Exchange Rate)	(0.119)	(0.035)	(0.061)	(0.065)	(0.065)	(0.058)
Fixed-Capital Investment				-0.006	-0.010	
(period t)				(0.020)	(0.020)	
Inventory Investment					0.039	
(period t)					(0.032)	
Earnings (period t)						0.287 ***
						(0.020)
Regression Statistics						
N	3001	2928	2609	2463	2454	2583
R^2	0.181	0.052	0.079	0.08	0.081	0.165

Note:
This table contains OLS estimates of equation (6) in the text. The dependent variables are as indicated above. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values, except as indicated. All accounting variables are scaled by the lag of total firm assets. "Sales" are the firm's sales revenue for the current year. "Earnings" are the firm's current-year earnings before interest, depreciation, and taxes (EBITDA). "Earnings (t+1)" are the firm's EBITDA for the succeeding year. Macroeconomic variables are from the current period. The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg/Economatica sample described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2.

Table 14. Effect of Dollar Debt and Exchange-Rate Movements on Firm Liabilities

	Dependent Variables					
Independent Variables	**Debt Level** (A)	**Debt Level** (B)	**Change in Debt** (C)	**Change in Debt less New Issues** (D)	**Accrued Interest Charges** (E)	**Change in Debt plus Interest** (F)
Interaction Effect						
Dollar Debt x	1.118 ***	1.442 ***	1.118 ***	1.514 ***	0.159	1.280 ***
(Δ Log Real Exchange Rate)	(0.151)	(0.205)	(0.151)	(0.219)	(0.162)	(0.181)
Main Effects						
Peso Debt	1.055 ***	0.972 ***	0.055	-0.042	0.198 ***	0.252 ***
	(0.036)	(0.040)	(0.036)	(0.054)	(0.018)	(0.053)
Dollar Debt	0.870 ***	0.855 ***	-0.130 ***	-0.151 ***	0.111 ***	-0.019
	(0.033)	(0.028)	(0.033)	(0.032)	(0.016)	(0.040)
Δ Log Real Exchange Rate	0.038	0.013	0.038	0.005	0.042	0.082
	(0.088)	(0.090)	(0.088)	(0.089)	(0.027)	(0.088)
Controls						
Total Debt x	-0.440 ***	-1.039 ***	-0.440 ***	-1.217 ***	0.111 **	-0.332 **
(Δ Log Real Exchange Rate)	(0.118)	(0.136)	(0.118)	(0.203)	(0.052)	(0.166)
New Issues of Debt		0.684 ***				
		(0.144)				
Regression Statistics						
N	3003	2815	3003	2815	2918	2918
R^2	0.675	0.693	0.041	0.193	0.528	0.098

Note:
This table contains OLS estimates of equation (6) in the text. The dependent variables, various firm liabilities, are as indicated above. Specification also includes country fixed effects, Δ Log CPI, the interaction of the two with peso debt, and all relevent main effects. Standard errors adjusted for clustering by (country x year) are reported in parentheses. A single asterisk denotes statistical significance at the 90% level of confidence; double, 95%; triple, 99%. The dependent variables are as indicated above. Firm-level independent variables are once-lagged values, except for new issues of debt. All accounting variables are scaled by the lag of total firm assets. Macroeconomic variables are from the current period. The real exchange rate is defined as the nominal exchange rate divided by the domestic CPI. The accounting data are the pooled Bloomberg/Economatica sample described in the text. Macro data are drawn from various sources, principally International Financial Statistics. For detailed sources and descriptions, see Section 2.

Table 15. Did Firm Net Worth Actually Decline?

Panel A: Estimated Changes in Selected Dependent Variables

	Sign of Effect on Net Worth	Estimated Effect of (Dollar Debt times RER)	Source for Estimate
Current Period			
Debt	(-)	1.118	Table 14, Col. C
Debt Service	(-)	0.159	Table 14, Col. E
Earnings	(+)	0.219	Table 13, Col. B
Subtotal		-1.058	
Future Periods			
Earnings (period t+1)	(+)	0.331	Table 13, Col. E, Panel A

Panel B: Overall Change in Net Worth

	PDV of Above Effects	Calcluated Impact on Capital Inv.	Expressed as Fraction of Actual Effect
Full collateralizability of future earnings			
Deval. has one year half life	-0.506	-0.015	-0.067
Deval has eighteen month half life	-0.354	-0.011	-0.047
50% collateralizability of future earnings			
Deval. has one year half life	-0.782	-0.023	-0.104
Deval has eighteen month half life	-0.706	-0.021	-0.094
Zero collateralizability of future earnings	-1.058	-0.032	-0.140
Debt and debt service only	-1.277	-0.038	-0.170

Source: Authors' calculations. Assumes a 10% annual discount rate and coefficient of investment to wealth of -3%. See text.