Corporate Investment and the Real Exchange Rate [±]

Andrew Berg
Research Department
International Monetary Fund
aberg@imf.org

Mai Dao
Research Department
International Monetary Fund
mdao@imf.org

Camelia Minoiu
Research Department
International Monetary Fund
cminoiu@imf.org

Jonathan D. Ostry
Research Department
International Monetary Fund
jostry@imf.org

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We study a previously underexplored mechanism that establishes a positive relationship between real exchange rate depreciation and firm growth. Specifically, a real depreciation boosts internal cash flows and spurs corporate investment through increased internal financing. Using a simple model, we show that the positive impact of a real depreciation on profits, investment, and growth is larger for firms that have higher labor shares and face greater financial constraints. We call this the "internal financing channel" and test it in a dataset of more than 30,000 firms from 66 advanced economies and emerging market countries over the 2000-2011 period. The positive effect of this channel is also reflected in sustained gains in firm performance and market valuation.

Keywords: corporate investment, labor share, real exchange rate, real effects of depreciation

JEL classifications: E21, E22, O4

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I. INTRODUCTION

Temporary real exchange rate movements have immediate effects on firm outcomes such as sales and profits, but can also affect the medium and long-run performance of firms by influencing their investment decisions and hence future productivity. The literature identifies three main channels through which the exchange rate can affect firms' investment decisions. First, there is the competitiveness channel: a real depreciation makes exporting firms more profitable, thus increasing their marginal return to capital. Two other channels operate in the opposite direction, toward curtailing investment: large depreciations are often associated with weaker balance sheets of firms, hindering their ability to borrow (a "firm balance sheet" channel), or weaker balance sheets of banks, impairing their capacity to lend (a "lending channel"). Either or both channels operate particularly during financial crises and recessions.[1]

In this paper we test a novel mechanism through which the real exchange rate (RER) affects the investment financing capacity of firms, but one which works in the opposite direction of the balance sheet and lending channels. We call this the "internal financing channel." When firms are financially constrained in the sense that the cost of external finance exceeds that of internal finance, internal funds such as retained earnings play an important role in financing corporate investment.[2] When a depreciation boosts exporting firms' cash flows, it also expands the internal financing capacity of firms that rely on internal funds. This positive effect on available funds for investment financing can offset at least in part the negative balance sheet and lending effects during crises. It can also boost investment over and above the increase in profitability in normal times, as it helps relax firms' financial constraints for a given level of return to capital. Hence, unlike the balance sheet and lending channels, which are quantitatively relevant during crises or periods of large adverse shocks to aggregate demand, our internal financing channel operates in any environment where financially constrained firms exist,

[1] The literature is extensive. For effects of large devaluation on firm outcomes see Forbes (2002), Desai, Foley, and Forbes (2008). On the balance sheet and the lending channel, see Bleakley and Cowan (2008) and Kalemli-Ozcan, Kamil, and Villegas-Sanchez (2015).

[2] Even in large publicly-listed firms, the share of investment financed by internal cash flows is high and exceeds that of external debt: on average, around 60-70 percent of investment in large manufacturing firms worldwide was financed by internal cash flows in 2002-2006 (Chen and Chen, 2012).

allowing us to use a large amount of data across countries and years to empirically assess its contribution.

We develop a simple model of firm investment and hiring decisions in a small open economy subject to financial frictions. Wages are indexed to domestic consumer prices while tradable goods are priced in foreign currencies. The firm faces financial frictions in the sense that borrowing costs are increasing in leverage, so that firm investment is partly determined by the availability of internal funds. In this setting, a real depreciation reduces firms' product wages, frees up savings, and hence enhances firms' internal financing capacity. Higher labor-intensity firms benefit from a larger boost to profits through this channel and are thus able to accumulate more internal funds. Under the assumption that firms with the same labor intensity must rely more on internal financing when they face greater financial frictions, the higher savings of labor-intensive firms translate relatively more into investment and growth in countries with less developed financial systems.

To test this channel, we assemble a dataset of more than 30,000 firms from 66 countries and examine their growth, cash flow, and investment decisions during the 2000-2011 period. We exploit intrinsic variation in industry-level payroll shares coupled with a measure of country-level financial development—the private credit to GDP ratio—to differentiate among firms that are better able to translate labor-cost savings into investment and organic growth. Controlling for firm size and profitability, we show that tradable sector firms with a large share of labor costs have higher asset growth for the same real depreciation. The way in which they achieve this is through higher profits and higher fixed capital investment. This differential effect for labor-intensive firms is stronger in less financially developed countries. These results are consistent with our model prediction, as internal funds are relatively more important in relaxing borrowing constraints for firms in less developed financial systems.

The magnitude of the identified differential effects across firms is both statistically and economically significant. Our estimates indicate that a real depreciation of 10 percent is associated with a higher growth rate for high labor-share firms compared to low-labor share firms, with this differential being 2 percentage points higher in a country with low versus high financial development.[3]

A large literature on corporate investment studies firms' behavior during financial crises that entail large currency movements, when tradable sector firms become more competitive but also face higher cost or less availability of external financing. Forbes (2002) shows how these two counteracting forces can have ambiguous effects on corporate investment in the aftermath of large devaluations. Desai, Foley and Forbes (2008) and Kalemli-Ozcan, Kamil and Villegas-Sanchez (2015) show that multinational affiliates in emerging market countries experiencing financial crises can overcome such financial constraints by tapping funds from parent companies and thus sustaining investment compared to local firms. Large depreciations are also associated with a deterioration of local firms' balance sheets through increased liability/decreased collateral value when a substantial share of debt is denominated in foreign currency and a large share of overall debt is of short-term maturity. Bleakley and Cowan (2008) and Aguiar (2005), among others, estimate the effect of this firm balance sheet channel, with mixed results. The maturity mismatch, though potentially destabilizing for firms when the credit market deteriorates during a currency crisis, as argued by Change and Velasco (2000), has been shown to be empirically not as salient (Bleakley and Cowan, 2010).

One common theme in this literature is the focus on the effects of a depreciation on the external financing capabilities of firms, i.e., through bank credit, debt, or equity issuances. However, while external finance plays an important role, a large share of firm investment is in fact financed by internal funds, even in financially developed economies and in large publicly-listed firms. Firms' reliance on internal financing can arise from informational asymmetries, agency conflicts, tax issues, and other factors which drive a wedge between the cost of external and internal finance. It has been shown that exogenous variation in internal financial resources can have a significant effect on corporate investment decisions (Lewellen and Lewellen, forthcoming; Rauh, 2006), particularly when firms are financially constrained in the sense that the cost they face to obtain external finance is relatively high. For firms operating in the tradable

[3] Labor intensity differentials are computed for industries in the 90th versus the 10th percentile of the labor share distribution. The financial development differential is measured by the difference between the 90th and the 10th percentile of the credit-to-GDP distribution.

sector, variation in the RER has a strong impact on profits and hence their internal financing capacity for investment. Our paper is the first to focus on this internal financing channel in explaining the link between exchange rate variations on the one hand and corporate investment on the other.

In a related literature, Aghion, Bacchetta, Rancière, and Rogoff (2009) show that exchange rate volatility reduces long-run industry-level growth more in countries with larger financial frictions. Their channel is distinct, yet related to ours: nominal exchange rate volatility generates volatility in profits, which, given the role of profits for financially-constrained firms, reduces the investment of firms exposed to financial shocks. We argue that the exchange rate *level*, not only its volatility, can have implications for investment behavior, even in the absence of financial shocks, depending on the production structure of the firm and the financial system where the firm is located.

Our identification strategy relies on a difference-in-difference approach on firm-level data which exploits variation in firms' production structure and the degree of aggregate financial constraint. In addition, we control for unobserved effects in many dimensions (such as time, firm, industry-time, and country-time) to reduce the problem of omitted variables. In particular, any macroeconomic forces such as terms of trade changes and fiscal policy shocks that affect the RER and growth simultaneously are absorbed by country-year fixed effects, which we include in our baseline specifications. Unobserved trends and shocks to particular industries such as industry-specific productivity innovations that may affect the RER are controlled for by industry-year fixed effects. In all specifications we include firm fixed effects and hence examine within-firm changes in earnings, investment, and growth in response to real depreciations.

The remainder of the paper is organized as follows. In Section II we present a stylized model of firm investment and the RER with financial frictions to formally derive our mechanism. In Section III we discuss our data and empirical strategy. Section IV presents the main results. In Section V we address alternative interpretations of our results and present robustness tests. In Section VI we conclude.

II. THEORETICAL FRAMEWORK

A. A Stylized Model of Firm Investment and the RER with Financial Frictions

Consider a tradable goods producing firm in a small open economy. The firm is a price-taker on international markets, with its foreign price given at $P*$ normalized at 1, such that, by the law of one price, the domestic currency price of the tradable good is $P^T = eP* = e$, with e being the nominal exchange rate. Demand structure of the economy is Cobb-Douglas in tradable and non-tradable goods, so that the overall price index is given by:

$$P = (P^N)^{1-\gamma} e^{\gamma}$$

where P^N is the price of non-tradable goods and thus the RER, or relative price of tradable goods, is given by $RER = \frac{e}{P^N}$. For simplicity, assume also that labor supply is perfectly elastic (e.g., due to linear preferences in the extensive margin of labor), so that the real consumption wage is fixed, i.e., $\frac{W}{P} = \overline{w}$.

Profits and investment of tradable goods producing firm:

The firm lives for two periods. In the first period, it is endowed with a fixed level of capital, normalized to 1, and it maximizes profits by choosing labor input, taking prices and wages as given. At the end of the first period, the firm can invest in its capital stock for the second period using its accumulated profits and/or external borrowing. In the second period, the new capital level is attained, the firm re-optimizes labor input, and pays any internal and external user cost of capital.

The firm produces using the Cobb-Douglas technology:

$$y = K^{1-\alpha} L^{\alpha}$$

The firm maximizes its net present value of real profits (measured in units of tradable goods) as follows:

$$\max_{L_1, L_2, K} \left\{ (L_1^{\alpha} - wL_1) + \beta \left[K^{1-\alpha} L_2^{\alpha} - wL_2 - \Phi(K-1) - C(K - \Pi_1, f) \right] \right\}$$

where w denotes the product wage $\frac{W}{e}$ and profit in the first period is given by $\Pi_1 = L_1^{\alpha} - wL_1$.

Capital adjustment costs are quadratic:

$$\Phi(K-1)=\frac{\varphi}{2}(K-1)^2,$$

and the cost of external finance increases with the degree of leverage:

$$C(K-\Pi_1, f),\ C'(., f)>0 \text{ and } C''(., f)>0$$

The opportunity cost of investing equity (accumulated profits) is assumed constant, normalized to zero, so that $C'(.)$ effectively measures the wedge between external and internal finance. Note that the financing cost schedule is indexed by *f*, the degree of financial frictions, so that both $C'(., f)$ and $C''(., f)>0$ are increasing in *f*. Since the cost of internal finance is lower than that of external finance, firms will always exhaust their internal funds before borrowing externally. This specification for the cost of external finance and its relation to financial frictions follows a long line of literature (see, e.g., Fazzari, Hubbard, and Petersen, 2000).

The firm's first-order condition with respect to labor demand in both periods is given by:

$$L_1=\left[\frac{\alpha}{w}\right]^{\frac{1}{1-\alpha}},\ L_2=K\left[\frac{\alpha}{w}\right]^{\frac{1}{1-\alpha}}$$

Writing out the product wage in terms of the exogenous consumption wage and real exchange rate, $w=\frac{\overline{w}}{RER^{1-\gamma}}$, we obtain that labor demand and profits increase with a real depreciation (i.e., an increase in the RER), and the elasticities with respect to the RER are given by:

$$\frac{d\ln L}{d\ln RER}=\frac{(1-\gamma)}{(1-\alpha)}$$

$$\frac{d\ln \Pi_1}{d\ln RER}=(1-\gamma)\frac{\alpha}{(1-\alpha)}$$

Note that labor demand and profit are more sensitive to changes in the RER the higher is the labor share in production α and the higher is the non-tradable share in consumption $(1-\gamma)$. The former relation holds because a higher labor share implies that the wage bill is a large share of revenues, so that a given change in the product wages triggered by an RER change has a larger impact on the firm's profits. The second relation holds because a larger non-tradable share implies a higher sensitivity of the relative price of tradable goods with respect to the RER.

The first-order condition with respect to capital level in the second period is:

$$F'(K) = C'(K - \Pi_1, f) \quad \text{(Equation 1)}$$

where the return on capital function is given by:

$$F(K) = \psi RER^{\frac{\alpha}{1-\alpha}(1-\gamma)} K - \frac{\varphi}{2}\left(K-1\right)^2$$

and the optimal capital level is achieved when the marginal return on capital is equal to the marginal cost:

$$F'(K) = \psi RER^{\frac{\alpha}{1-\alpha}(1-\gamma)} - \varphi\left(K-1\right) = C'(K - \Pi_1, f) \text{ (Equation 2)}$$

Note that $F'(.) > 0$ for plausible range of parameter values and $F''(.) < 0$ so that a unique solution exists. Furthermore, by the implicit function theorem, we can derive the sensitivity of capital with respect to available internal funds as:

$$\frac{dK}{d\Pi} = \frac{C''\left(K - \Pi_1, f\right)}{C''\left(K - \Pi_1, f\right) - F''(K)} > 0 \quad \text{(Equation 3)}$$

due to convexity of external financing costs and diminishing marginal returns on investment. This is the classic result in Fazzari, Hubbard, and Petersen (2000). It says that capital investment is more sensitive to internal funds if the cost of external finance increases steeper with leverage, and if the marginal return to investment decreases slower.

Proposition: A real depreciation increases investment and capital of the tradable goods producing firm. That is,

$$\varepsilon_{K.RER} = \frac{d \ln K}{d \ln RER} > 0$$

Moreover, the elasticity of investment with respect to the RER is larger the higher the labor share α, and the larger the financial frictions embodied in $C''(.)$. That is,

$$\frac{d\varepsilon_{K.RER}}{d\alpha} > 0 \text{ and } \frac{d\varepsilon_{K.RER}}{df} > 0$$

Proof: See Appendix A.

While the algebraic proof is deferred to Appendix A, the intuition of these results can be sketched out as follows. The larger the labor share in production and hence the payroll share in firms' revenues, the more profits increase with a given real depreciation that reduces the product wage. Higher profits increase investment for any given financing cost schedule. Furthermore, for a given labor share of the firm, the steeper the external borrowing cost the firm faces, the more sensitive is its investment spending with respect to a given change in profit.

We illustrate the main theoretical predictions of the model in the three diagrams below. Figure 1 depicts the optimality condition given by Equation (1) which pins down the optimal level of capital. In the absence of financial frictions, when the marginal cost of borrowing is constant and equal to the opportunity cost of internal financing, here $C(.) = 0$, then the optimal capital level for the firm is $\overline{K}$. If the firm does not have any cumulated profits and must finance all investment externally, the capital level chosen would be K_0, where marginal cost of capital equals its marginal return. Availability of internal funds of the amount Π allows the firm to finance a higher level of capital K_1, which is the level of finance where the optimality condition (1) holds for $\Pi > 0$.

Figure 1

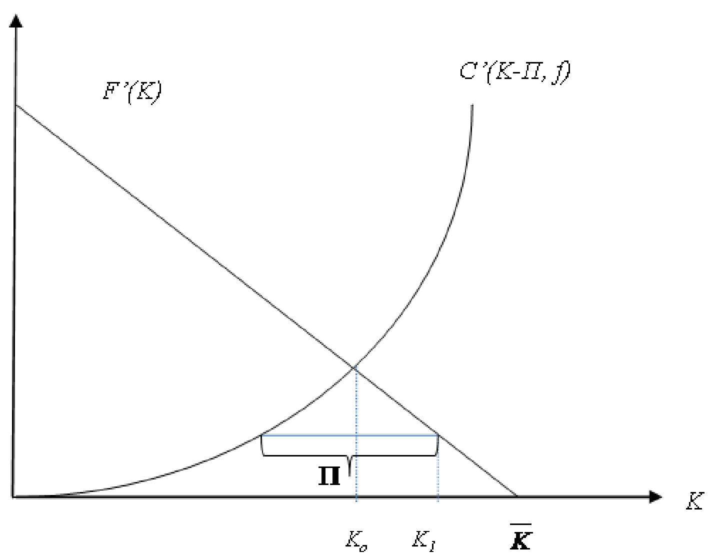

Figure 2 illustrates the effect of a real depreciation on optimal investment. A real depreciation increases profits from Π_0 to Π', and hence increases the capital level from K_1 to K_2, all else equal. At the same time, a depreciation also shifts the marginal return schedule $F'(.)$ outward (see Equation (2)), further increasing capital from K_2 to K_3. The magnitudes of these investment shifts depend on the firm's labor intensity. As shown in the proposition above, profits increase more, and marginal return shifts out more the higher is the labor share α.

Figure 2

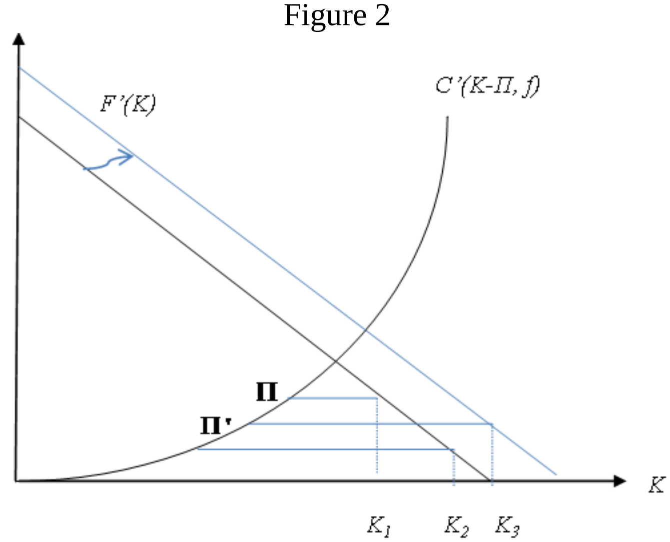

Figure 3

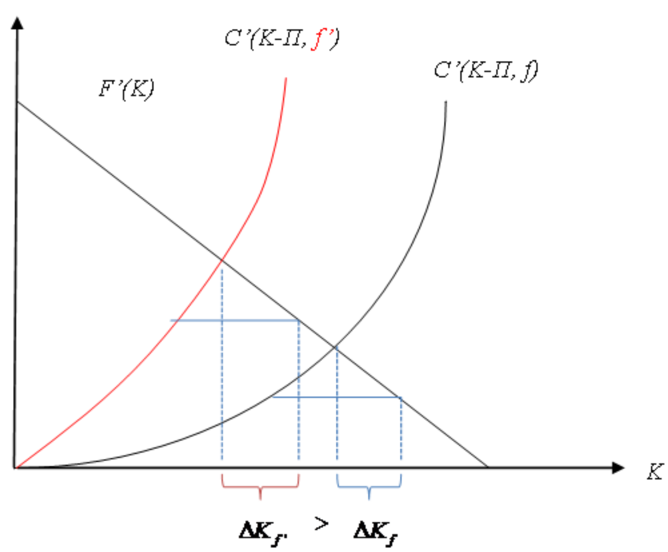

Figure 3 illustrates the differential effect of a given increase in profits on investment for different levels of financial frictions. A firm that increases profit from zero to a given amount Π in the relatively low financial friction regime *f* will increase its capital by ΔK_f . The same firm, with the same production technology and hence the same $F'(.)$ schedule, will increase its capital level by more given the same increase in profits if it faces larger financial frictions *f'*: $\Delta K_{f'} > \Delta K_f$.

B. Effects for Non-Tradable Sector Firms

The theoretical analysis yields unambiguous predictions for tradable sector firms. These predictions go through in a more complex environment where firms have price-setting power, if there are general equilibrium effects from the demand side, and possible reallocation effects across tradable and non-tradable sectors. By contrast, the predictions for non-tradable goods producing firms are less clear. A real depreciation reduces the relative price of non-tradable output and, all else constant, increases the product wage of non-tradable producers, leading to a contractionary supply effect. However, as non-tradable firms typically have more market power because of less competition, they can pass on some of the increase in product wages to consumers. Moreover, non-tradable outputs are used heavily as intermediate inputs in tradable production (di Giovanni and Levchenko, 2010), which means that an expansion of the tradable sector may increase demand for non-tradable goods (Chen and Dao, 2011). In addition, higher income in the tradable sector may increase demand for non-tradable goods. These general equilibrium effects can act toward mitigating the negative supply effect of a real depreciation on non-tradable firms. Overall, we expect the net effect of a real depreciation on non-tradable firm growth to depend on factors such as input-output linkages with the tradable sector, its demand elasticity with respect to tradable sector income, and the degree of market power of non-tradable sector firms.

C. Testable Hypotheses

Our model illustrates the internal financing channel by showing how real depreciation enables tradable sector firms with higher labor shares and facing greater financial frictions to growth faster than other firms. This mechanism operates through the impact of a real depreciation on producer real wages and hence labor costs, profits, and investment. Our main testable hypotheses are that, for a given real depreciation, (i) tradable sector firms with higher labor shares have higher profits and cash savings; and (ii) tradable sector firms that face higher financial constraints, as they do for instance in less financially-developed countries, have higher investment than other tradable firms. For non-tradable firms, we expect the effects to be negative as the supply effect operates symmetrically to tradable firms. However, the general equilibrium effects discussed earlier may overwhelm the negative supply effect, leading to smaller, statistically insignificant, or even positive effects in the data. Non-tradable sector firms thus constitute a useful subsample for placebo tests.

III. Data and Empirical Strategy

A. Firm-level Data

We use balance sheet and income statement data from Thomson Reuters Worldscope for non-financial firms over the 2000-2011 period. Worldscope is a comprehensive data source for publicly listed firms around the world. Market capitalization coverage as a share of the S&P Global Stock Markets Factbook exceeds 90 percent for advanced economies and European emerging markets and is almost 70 percent for non-European emerging markets. The choice of this data source is in part guided by our need to control for firms' investment profitability, typically measured by Tobin's Q, for which market value is required. In the sample of firms with non-missing asset information, there are 25,416 tradable sector firms from 66 countries and 5,774 non-tradable sector firms from 63 countries.[4] The median tradable sector firm in the dataset has total assets of USD 114 million and capital stock of USD 47 million. The median firm has 515 employees.

The countries with largest coverage are the US (accounting for 23.2 percent of firms), Japan (12.2 percent), China (7.7 percent), and the UK (6.6 percent). (See Table 1 for geographical composition of the sample). Together these four countries cover half of the sample. Other emerging markets that contribute at least 2 percent of the sample include South Korea,

[4] Following the classification in Desai, Foley, and Forbes (2008), non-tradable sectors include construction, recreation, retailers, transportation, and utilities.

India, and Malaysia. For each firm we have basic information such as balance sheet size, employment (which we use as a proxy for size), capital stock, capital expenditure, market capitalization and debt (on the basis of which we compute Tobin's Q), and cash flow (used as a proxy for firm profits). Capital expenditure is scaled by lagged fixed assets while cash flow is scaled by lagged total assets.

Intrinsic labor intensity of firms is measured using the *average* payroll shares of US firms over the 2000-2011 period at the 3-digit level NAICS industry level, computed using data from Elsby, Hobijn and Sahin (2013). This measure allows us to exploit variation in labor shares across industries that are driven by technology and product characteristics rather than by firms' hiring and investment decisions, which themselves may be driven by profitability shocks or tax regimes. As shown in Figure 4, this measure is positively correlated with median payroll share across firms and is statistically significant at the 5 percent level. The latter is computed from Worldscope using data on payroll costs (salaries and benefits) scaled by firms' total sales. Since firm-level payroll information is only available for one third of firms and we are interested in measuring intrinsic rather than potentially endogenous current or recent labor shares, we opt for the average US firm payroll share for our analysis.

To compute the RER, we use data on nominal exchange rates (*XRAT*) and purchasing power parity conversion factors (*PPP*) from the Penn World Tables Mark 8.1. The RER is given by $\ln RER = \ln\left(XRAT / PPP\right)$ and is comparable across countries and years. To measure the extent to which firms face financial frictions, we employ the private credit-to-GDP ratio from the World Development Indicators database. This is a commonly used measure of financial development as it captures the amount of credit channeled through financial intermediation to the private sector. Table 2 reports descriptive statistics for the regression sample.

B. Empirical Specifications

We test our hypotheses in a triple difference-in-difference framework using the following baseline equations for asset growth, investment, and cash flow. For asset growth we estimate:

$$AssetGrowth_{ijct} = \beta_1\left(\ln RER_{ct} \times LaborShare_j \times Credit / GDP_{ct-1}\right) + \beta_2\left(\ln RER_{ct} \times LaborShare_j\right)$$
$$+ \beta_3\left(LaborShare_j \times Credit / GDP_{ct-1}\right) + \alpha_i + \delta_{ct} + \eta_{jt} + \gamma_1 Z_{ijct-1} + \varepsilon_{ijct}$$

where $AssetGrowth_{ijct}$ is total asset growth for firm *i* in industry *j* in country *c* in period *t*. Industries are identified using a 25-industry classification from Worldscope analogous to a standard two-digit industry classification. The regression includes firm fixed effects (α_i), industry-year effects (η_{jt}), and country-year effects (δ_{ct}), with the latter subsuming the interaction term that varies at the country-year level $\left(\ln RER_{ct} \times Credit / GDP_{ct-1}\right)$. Country-year fixed effects allow us to control for all macroeconomic factors affecting firms within a country-period (such as terms of trade shocks, fiscal policy, and external demand) and thus reduce the possibility of omitted variable bias. Industry-year fixed effects control for unobserved industry-level technology and demand shocks.

$LaborShare_j$ is an industry-specific labor share (denoted by α in the model) while $Credit / GDP_{ct-1}$ is our country-level measure of financial frictions (denoted by *f* in the model). Z_{ijct} is a vector of firm-level control variables which comprises lagged firm size to capture catching-up effects. We measure size using employment instead of assets to avoid endogeneity problems caused by a lagged dependent variable.

We define the credit-to-GDP ratio as $\left(-1 \times Credit / GDP_{ct-1}\right)$ such that higher values indicate less financial deepening and hence we expect a positive sign for β_1. The same applies to β_2 as firms with a higher wage bill should benefit from real depreciations more than firms with a lower wage bill.

For the investment equation we use a similar specification, given by:

$$\begin{aligned} Investment_{ijct} = {} & \beta_5\left(\ln RER_{ct} \times LaborShare_j \times Credit / GDP_{ct-1}\right) + \beta_6\left(\ln RER_{ct} \times LaborShare_j\right) \\ & + \beta_7\left(LaborShare_j \times Credit / GDP_{ct-1}\right) + \alpha_i + \delta_{ct} + \eta_{jt} + \gamma_2 Z_{ijct} + \varepsilon_{ijct} \end{aligned}$$

Here, the vector Z_{ijct} includes lagged capital stock (log-fixed assets) to control for size and measures of firm performance. In particular, we use Tobin's Q defined as the sum of total market value plus debt divided by total assets, but since this may be a noisy proxy for investment profitability, we supplement it with the firm's lagged sales growth as another predictor of return to capital (see Gilchrist and Himmelberg, 1995). We report regressions with and without Tobin's Q. The investment ratio is given by capital expenditure scaled by lagged fixed assets and is log-transformed to allow for non-linear effects at higher levels of investment. Our theoretical predictions are that β_5 and β_6 will be positive.

Finally, for firm profits we use the following specification:

$$CashFlow_{ijct} = \beta_8 \left(\ln RER_{ct} \times LaborShare_j \right) + \alpha_i + \delta_{ct} + \eta_{jt} + \gamma_3 Z_{ijct-1} + \varepsilon_{ijct}$$

where the dependent variable is cash flow scaled by lagged total assets, and Z_{ijct} refers to firm size (log-employment). We expect $\beta_8 > 0$. All regressions are estimated using Ordinary Least Squares (OLS) and standard errors are clustered at the firm level.

IV. Results

A. Stylized Facts: Firm Growth and the Real Exchange Rate

We start by documenting stylized facts regarding the relationship between the RER and firm growth. In particular, we explore the unconditional correlation between the RER and firm performance, measured by asset, market capitalization, and capital expenditure growth, during periods of real appreciation and depreciation. Figure 5 shows the median values for these firm outcomes in years when the currency is either depreciating or appreciating, separately for tradable sector firms from advanced economies and emerging market countries. This split allows us to indirectly account for the Balassa-Samuelson effect. In Table 3 we also report non-parametric tests of equality of medians for all the variables shown in the figure.

Figure 5 and Table 3 confirm our prior that real depreciations are associated with higher investment and growth for tradable sector firms. However, this correlation does not account for confounding factors nor does it pin down the precise mechanism through which it arises. In the next section we exploit firm heterogeneity in labor intensity and financing constraints to provide econometric evidence supporting one channel behind this relationship—the internal financing channel. Importantly, our analysis will not allow us to estimate the *economy-wide* effect of the RER on firm growth, but rather to identify a causal channel from real depreciation to corporate investment which holds regardless of the sign of the overall effect.

B. Baseline Results

Our main results for tradable goods producing firms are reported in Table 4. We show two variants of each specification, one in which we control for country-year fixed effects that absorb macroeconomic developments affecting all firms in a given period (including changes in the RER) and firm fixed effects; and another one that also control for industry-year fixed effects. We find that real depreciation raises balance sheet growth for firms with higher labor shares (columns 1-2). For firms with the same labor share, growth is higher in countries where firms face greater financial frictions, here proxied by lower credit-to-GDP ratios. These differential effects arise above and beyond the direct competitiveness effect of the RER on firms' profitability, as the estimated investment response is conditional on Tobin's Q and sales growth.

Both coefficients of interest are statistically significant at conventional levels and conform to our theoretical predictions. They are also economically significant. The estimates on the double and triple interaction terms (0.413 and 0.293 in column 2) indicate that, in countries with low financial development (10th percentile of the credit-to-GDP distribution corresponding to Turkey), a real depreciation of 10 percent is associated with a growth rate that is 1.8 percentage points higher for high versus low-labor share firms (90th vs. 10th percentile of the labor share distribution, corresponding to the difference between wood products and mining), whereas the same differential is close to zero in countries with high financial development (90th percentile of the credit-to-GDP distribution corresponding to the Netherlands). Alternatively, for high-labor share firms, a real depreciation of 10 percent is associated with an annual growth rate that is 3.7 percentage points higher in a country with low versus high financial development, whereas the same differential is only 1.6 percentage points for low-labor share firms. Given a median asset growth rate of 7.2 percent per year, these magnitudes are economically significant. Note that the cross-country difference in credit-to-GDP ratios, e.g., between the Netherlands and Turkey, could reflect differences in institutions, culture, or stage of development as deeper causes for financial depth. However, as long as such differences contribute to the wedge between external and internal finance for firms, they too are valid treatment variables for the differences-in-difference approach.

The regressions for fixed capital investment, shown in columns 3-6 of Table 4, yield similar results to those for total asset growth. Once again we find that a real depreciation increases the capital expenditure of firms with relatively higher wage bill, and even more so that of labor-intensive firms facing larger financial frictions. The coefficient signs are consistent with our theoretical predictions and hold up to controlling in a standard investment specification for Tobin's Q, sales growth, and the firms' capital stock.

In columns 7-8 of Table 4, we regress cash flow (scaled by lagged total assets) on firm size and the interaction of the RER with labor intensity. We find a positive and statistically significant coefficient, consistent with model prediction. The estimates indicate that, for the same RER depreciation, firms with a higher labor share have higher cash flow than other firms, which is consistent with the notion that depreciations depress real wages and increase the profits of firms that rely relatively more on labor, boosting their internal funds.

We next turn to results for non-tradable sector firms, which are a useful placebo test for our main theoretical predictions. For firms producing non-tradable goods, our conceptual framework predicts negative coefficients as the supply effect of a real depreciation operates symmetrically to tradable sector firms. The results, shown in Table 5, suggest that the effects on investment and cash flow of a real depreciation for non-tradable sector firms through the same internal financing channel are either negative or statistically insignificant. These findings confirm our prior that the internal financing channel operates in the opposite direction or is not present for non-tradable goods producing firms.

C. Implications for Firm Value and Stock Returns

An interesting and relatively understudied aspect in empirical investment literature is how shifts in firms' internal financial resources which alter their investment behavior affect the market value of the firm. Boosts to cash flows (identified here by differential exposure to exchange rate variations) can either help firms overcome funding shortages and realize productive investment opportunities, or lead to wasteful projects associated with "empire building" and other perks (see detailed discussion in Tirole, 2006). One way to empirically discriminate between these two stories of under-investment (due to financial frictions) versus over-investment (due to agency conflict) in the context of our paper is to examine the effect of the internal financing channel on market capitalization and stock returns. If the rise in investment we estimated above is indeed driven by our internal financing channel as predicted by the model, then the internal funds should be directed towards productive projects. If so, the internal financing boost triggered by a depreciation should increase the market's assessment of the firm's value relatively more in labor-intensive industries and underdeveloped financial markets.

In Table 6 we present the results of this exercise. First, as shown in columns 1-2, a depreciation provides a stronger boost to sales growth in industries that are more labor intensive, and for a given labor intensity, more so in countries with less developed financial markets. This result suggests that the rise in cash flow is indeed directed toward increasing the productive capacity and performance of the firm. This positive effect on sales is evident in the current as well as subsequent year, suggesting a *sustained* benefit of higher productive capacity. Consistent with stronger sales, we also see that market capitalization and stock market returns increase relatively more in labor intensive industries and financially underdeveloped countries, both contemporaneously and after one year. These results strengthen the empirical relevance of our mechanism as market data provide an external validation of the baseline investment response.

V. COMPETING EXPLANATIONS AND ROBUSTNESS

We perform a battery of robustness tests to rule out alternative explanations for our results and examine the sensitivity of our primary analysis to methodological choices. The first set of tests aims at alleviating the possibility that our results are confounded by mechanisms other than the internal financing channel. A second set of tests considers specifications with richer controls, variations on our measure of Tobin's Q, alternative measures of financial constraints, and an alternative data frequency.

Controlling for the Aggregate Lending and Savings Channels

Recent studies highlight the "aggregate lending channel" by which a sharp depreciation affects the real economy by reducing firms' access to external finance and hence their investment (Desai, Foley and Forbes, 2008; Kalemli-Ozcan, Kamil and Villegas-Sanchez, 2015). Although this channel operates in the opposite direction than ours, the differential effect across firms could in principle be correlated to ours if, for example, higher labor share firms are also those less reliant on external finance (Forbes, 2002). A depreciating RER would thus harm those firms less than others for a given level of financial development.

There is also an opposite "aggregate savings channel" that operates during tranquil periods and through which real depreciation boosts economic growth. The idea is that when a country experiences higher aggregate savings and real depreciation, regardless of the underlying causes or direction of causation, higher savings can raise growth by setting in motion a process of capital accumulation. This channel is described in Levy-Yeyati, Sturzenegger, and Gluzmann (2013, 2012), who show that foreign exchange interventions aimed at preventing exchange rate appreciation raise growth by increasing domestic savings and investment.

To control for the aggregate lending and the aggregate saving channels in our empirical framework, we use a measure of firms' intrinsic dependence on external finance (Rajan and Zingales, 1998) and test whether firms that are more reliant on external finance benefit more from real depreciation than other firms. Firms' intrinsic dependence on external finance is measured at the 3-digit industry level using data from Claessens, Tong, and Wei (2012). The aggregate lending channel implies that the coefficient on an interaction term between RER and our measure of external finance dependence should be negative. By contrast, the aggregate savings channel implies that the same coefficient should be positive.

To check whether our results are driven by these channels, and indirectly to determine which channel is stronger in the data, to the baseline investment equation we add the triple interaction term $\ln RER_{ct} \times ExternalFinanceDependence_j \times Credit / GDP_{ct-1}$. The coefficient on this term captures the differential effect of a real depreciation on investment across industries with varying external finance dependence for a given level of financial development. As shown in Table 7, we find a weak but negative effect of this additional control for external financial dependence, suggesting the aggregate lending channel somewhat dominates, while the coefficients on our key interaction terms remain positive and statistically significant.

Controlling for Firms' Balance Sheet Channel

Another channel by which the RER can affect corporate investment is the firm balance sheet channel. When fluctuations in the RER affect firms' liabilities and assets differentially, the resulting fluctuations in net worth can alter firms' ability to access external finance. This channel gained particular attention in the wake of emerging market crises in the late 1990s, when private sector reliance on dollar-denominated debt coupled with large depreciations led to a sharp deterioration of firms' net worth, reducing their ability to borrow externally, invest, and grow (see Cespedes et al., 2004 for a theoretical contribution and Aguiar, 2005 for empirical tests of this channel). Note that this channel, similar to the aggregate lending channel, works in the opposite direction of our internal financing channel. If firms in countries with shallow credit markets are more dependent on foreign borrowing, as one would expect, and as we also confirm by simple cross-country correlations, then in fact this channel would bias our estimate of the triple interaction term downward, making it harder to detect the internal financing channel.

Unfortunately, we do not have data on currency composition of assets and liabilities for individual firms from Worldscope. Instead, we use a separate data source on corporate debt issuance, Dealogic, to compute the share of foreign currency denominated debt over 2000-2011 for each country. Two Dealogic datasets, Loan Analytics and DCM Analytics, cover the universe of individual loan and bond deals to public and private firms and have the advantage that they report the currency of each deal and the nationality of the borrower (issuer). We calculate the share of foreign currency denominated debt ($FXShare$) by aggregating total (loan and bond) deal volume in foreign currencies and dividing it by the overall deal volume in each country.[5] We then control for the balance sheet channel by adding to the baseline equation the triple interaction term $\ln RER_{ct} \times LaborShare_j \times FXShare_c$. This additional regressor should capture the differential effect of a real depreciation on firms in an industry with given labor intensity but located in a country with a higher share of foreign currency debt.

Table 8 shows the results. As the additional triple interaction term is highly collinear with our main variable, having two components in common, adding it to the baseline regression using the full sample delivers the right sign (negative for the balance sheet, positive for the internal financing channel), but foregoes statistical significance (columns 1-2). However, the magnitude and empirical relevance of the balance sheet channel is only expected to be discernible in countries with a substantial share of foreign debt, while our sample contains firms predominantly in countries which do not issue and/or borrow in foreign currency: more than one third of firms are located in the US and Japan who on average issue less than 4 and 10 percent of loans and bonds in foreign currency, respectively. In column 5, we limit the sample to countries in which

[5] Dealogic reports data on loan and bond origination rather than outstanding exposures, therefore our *FXShare*, which is based on cumulated debt flows, is an approximation to the share of foreign currency-denominated debt stock.

the share of foreign debt is higher than 50 percent, corresponding roughly to the 75th percentile of the distribution across countries during the sample period. As predicted by the balance sheet channel, the investment-enhancing effect of a real depreciation for firms with a given labor share is *lower* in countries with higher share of foreign debt: the coefficient estimate on the triple interaction term $\ln RER_{ct} \times LaborShare_j \times FXShare_c$ is negative and statistically significant, implying that the effect of a 10 percent real depreciation on the investment rate of a firm with a median labor share is by 20 percent lower in a country with high versus low reliance on foreign currency denominated debt (75th versus 25th percentile of the cross country distribution).[6] Also, as expected, controlling for this balance sheet channel in the sample of high foreign debt countries increases the estimate of our positive internal financing channel relative to baseline.

Lastly, we control for the balance sheet channel directly by adding the firm's lagged net worth as a regressor (columns 6-7 in Table 8). As expected, controlling for profitability, higher net worth firms invest more and benefit more from a depreciation than lower net worth firms. The balance sheet channel is therefore present in the data, but does not affect our estimate of the internal financing channel, which remains unchanged in magnitude and statistical significance.

Robustness during Currency and Banking Crises

As previously argued, the internal financing channel should operate both in normal and crises times. In particular, during currency and twin crises, when sharp depreciations are typically accompanied by widespread credit crunch, the internal financing boost should help to offset the negative effects of the aggregate lending and balance sheet channels. Furthermore, in normal times, it should increase investment beyond and above the impact of increased competitiveness as long as firms are reliant on internal finance. We check whether the internal financing channel indeed operates similarly during normal and crises times by dropping country-year pairs that fall into episodes of crises and compare the resulting sub-sample estimates with the baseline. Table 9 summarizes the results.

[6] This differential is computed using coefficient estimates from Table 8, column 5, as follows:

[-5.737*0.647*(0.900-0.348)]*10 = 20.

Columns 1-2 of Table 9 both drop the year of currency crises as classified by Laeven and Valencia (2013) for the asset growth and investment rate equations.[7] Estimates of both interaction terms of interest are very close to those in the full sample, indicating that the direction and strength of the internal financing channel is similar in normal and crisis years. Columns 3-4 additionally exclude observations one year after the onset of a currency crisis to account for delayed adjustment to crisis events and results are largely unchanged. Finally, columns 5-6 exclude country-years classified as belonging to a banking crisis according to Reinhart and Rogoff (2014).[8]

Banking crises may or may not be accompanied by a currency crisis (i.e., twin crisis) and capture episodes of systemic failure of major financial institutions that end up triggering widespread financial turmoil. As such, these are times when the aggregate lending channel should be most salient, and excluding them sheds light on whether our identification is to any extent capturing this lending channel instead. If it were, then the estimates of the main coefficients capturing the differential effect of a real depreciation would be significantly different when banking crises are left out. Instead, our results remain broadly unaffected when we drop banking crises from our sample, although they are also less precisely estimated due to the removal of a substantial share of variation from our data.

Robustness to Alternative Measures of Tobin's Q

In our baseline specifications, we control for the effect of a depreciation on firm-specific competitiveness and thus investment profitability with the contemporaneous value of Tobin's Q. This is essential to infer the impact of the RER on investment through the internal financing channel for any given level of investment profitability. However, investment also affects the

[7] Laeven and Valencia (2013) define currency crises as nominal depreciations vis-à-vis the US dollar of at least 30 percent that are also at least 10 percentage points higher than the rate of depreciation in the previous year. Country-years with currency crises in our regression sample are: Argentina 2002-2003, Iceland 2008-2009, Turkey 2002, Ukraine 2009, and Venezuela 2003.

[8] Reinhart and Rogoff (2014) define a banking crisis as episodes marked either by bank runs or by the closure, merging, takeover, or large-scale government assistance of one or more important financial institutions. Country-years with banking crises in our regression sample are: Argentina 2002-2003, the years 2008-2009 for Austria, Belgium, Denmark, France, Germany, Greece, Hungary, the Netherlands, Portugal, Russian Federation, Spain, and Switzerland; Iceland 2007-2009, Indonesia 2002, Ireland 2007-2009, South Korea 2002, UK 2007-2009 and US 2007-2009.

contemporaneous value of the firm, leading to potential reverse causation that can bias upward the Tobin's Q estimate and could affect our estimate of the internal financing channel. In columns 1-2 of Table 10 we replace contemporaneous with lagged Tobin's Q, as is common in the empirical investment literature, and find that the coefficient on Tobin's Q is indeed somewhat smaller (0.05 instead of 0.07), but that the estimate of the internal financing channel is unaffected. This result indicates that our triple differences-in-differences identification strategy is not picking up the differential effect of exchange rate variations on firms' investment profitability. Columns 3-4 use the average of lagged and contemporaneous Tobin's Q value to control for investment opportunities while alleviating the concern for reverse causation from investment to market capitalization. As expected, the estimate on this average Tobin's Q lies between the lagged and the contemporaneous level, while the estimates of the internal financing channel once again are unaffected. Finally, columns 5-6 use an alternative definition of Tobin's Q, namely market capitalization to book ratio, without accounting for debt (Kaplan and Zingales, 1997), and the estimates of our channel remain unchanged.

Robustness to Alternative Measures of Financial Constraints

The literature on finance and growth has shown that beyond a certain threshold, increased credit expansion and financial sector proliferation can lead to excessive volatility of economic activity and a higher probability of crises, possibly reducing productive corporate investment (Pagano and Pica, 2012; Kaminsky and Schmukler, 2008). Put differently, a one percentage point increase in the credit to GDP ratio relaxes firms' financial constraints at diminishing rates as a country experiences financial deepening beyond a certain point. We allow for a possible non-linearity in financial development by log-transforming the credit-to-GDP ratio. The results are shown in columns 1-2 of Table 11. The differential effect of a depreciation on investment remains positive, statistically significant and is, in fact, larger in magnitude when holding the level of financial development fixed and only varying the labor share (the coefficient on the double interaction term $\ln RER_{ct} \times LaborShare_j$ is more than double that in the baseline).

It is well established that, for a given level of current and expected profitability, smaller firms face higher financial constraints as they tend to be younger and hence suffer more from informational asymmetries and other financial market frictions (Gilchrist and Himmelberg, 1995). In the primary analysis, we measured financial constraints at the country level with the credit-to-GDP ratio. We did so following the literature using similar differences-in-differences strategies to subject firms to exogenous "treatment" effects from financial development (Rajan and Zingales, 1998; Beck, Demirguc-Kunt, Laeven, and Levine, 2008). This strategy also has direct implication for policy, as it delivers a prediction for the differential in average investment rates resulting from a policy-driven increase in financial deepening. However, the causal mechanism of our model works at the firm level, with the differential impact of depreciation expected to hold across firms within a country-industry pair, as long as such firms vary in the degree of financial constraint. If our results hold up using firm-level proxies for financial constraint, the evidence for our mechanism would be strengthened.

We therefore modify the baseline specification by replacing the credit variable in all interaction terms with two measures of firm size serving as proxies for ex-ante financial constraint: lagged log assets and lagged log employment. Columns 3-6 in Table 11 summarize the results where financial constraint is the negative of firm size. Based on either measure of firm size, the estimates confirm the baseline findings: the impact of a real depreciation for firms with a given labor intensity in production is larger among smaller, more financially constrained firms.

Robustness to Additional Fixed Effects

Our empirical specification encompasses a host of fixed effects aimed at absorbing any firm-specific, country-year specific and industry-year specific factors driving the investment rate across firms. This rich set of controls reduces the risk of omitted variable bias that may arise from unobserved firm-level and macro-level forces. However, since our main variables of interest only vary at the country-industry-year level, we could not control for other unobserved country-industry-year factors which may correlate with our interaction variables of interest. For example, shocks to demand or productivity at the industry level within a country could deviate from those at the aggregate level, possibly correlating with our measure of differential investment sensitivity to exchange rates. That said, since our labor share variable is defined at the 3-digit level (according to the 2002 NAICS), we can approximate such shocks by additionally assigning firms to a slightly coarser industry classification and control for country-industry-year fixed effects using this coarser industry variable. Table 12 repeats the baseline regressions including such country-industry-year fixed effects, where the industry classification is based on the 25-industry classification system defined by Worldscope, roughly corresponding to a 2-digit industry disaggregation. While these fixed effects can absorb time-varying shocks at the 2-digit industry level in a given country, they do not completely subsume the variation at the more granular 3-digit level that is necessary to measure the impact of the labor share interaction term.[9] The results indicate that the effect of a real depreciation on corporate investment as identified in the baseline analysis is robust to demand and productivity shocks at this reasonably granular level. The estimates in the investment equation are, if anything, stronger than under the baseline and largely unchanged for the asset growth and cash flow equations.

Robustness in Panel of Four-Year Averages

As an additional robustness test, we shift our baseline regressions from annual frequency to non-overlapping four-year averages. Averaging the data allows us to minimize the impact of short-term fluctuations and capture the medium-run variation rather than the transitory components of our main variables. In addition, we expect investment to respond more to exchange rates movements that are sustained over several years than to short-run spikes, as short-lived boosts to profits will likely be saved rather than invested. Table 13 presents results based on the baseline specification using the panel of four-year averages. All pre-determined controls, that is, variables previously defined as lagged by one year, now take the values as of the start of the four-year period. Consistent with our conjecture, a given depreciation that is sustained on average over four years leads to a stronger differential response of cash flows and investment across industries with varying labor share and financial frictions. This exercise further alleviates potential concerns about the confounding effect of the aggregate lending channel operating in non-crisis times, as variations in aggregate availability of credit at the business cycle frequency are largely smoothed in this panel.

Finally, we also carried out a sensitivity analysis to dropping single years or single countries at a time, other measures of the real exchange rate, and explored asymmetry across depreciation versus appreciation episodes. In unreported results, we confirm the robustness of our main findings and find that in fact symmetry applies: appreciations reduce investment and firm growth through the internal financing channel as much as depreciations increase them.

[9] For example, "Rubber and Miscellaneous Plastic Products" is a separate 2-digit industry in NAICS (2002 NAICS code 326), while it is subsumed into the category of "Chemicals", which includes rubber and other industrial chemicals, in the broader 2-digit system.

VI. Conclusions

In this paper we derived and tested an “internal financing channel” through which variations in the real exchange rate affect corporate investment and firm growth through the availability of internal financial resources. In particular, we analyzed the investment decisions and growth of tradable sector firms in response to variations in the real exchange rate. We showed that firms with higher labor shares enjoy higher profits for a given real depreciation. In addition, firms that face greater financial frictions, for instance when located in less financially developed countries, are more inclined to translate these higher profits into fixed capital investment and growth.

We then empirically documented this channel using a triple difference-in-differences methodology in a large sample of firms from advanced economies and emerging market countries. Our results support the presence of a corporate investment channel for tradable sector firms. Moreover, we showed that higher investment stemming from this channel subsequently translates into higher firm sales and stock market returns, further validating our identification strategy. By contrast, and serving as a placebo test, we found no evidence of this mechanism for non-tradable sector firms. Our results are robust to controlling for the standard firm balance sheet and aggregate lending channels, removing financial crisis and large depreciation episodes from the sample, and employing alternative measures of financial constraints.

Our results join a large volume of work on the effect of financial constraints on firm investment decisions for a given level of profitability (see Gilchrist and Himmelberg, 1995; Rauh, 2006). As such, they add to the evidence that financial market development that can mitigate financial constraints also boosts aggregate investment and overall economic growth, supporting the finance-growth literature along the lines of Rajan and Zingales (1998). To the extent that relaxing financial constraints to firms makes their investment behavior less dependent on internal financial resources, financial deepening can also reduce the volatility of investment and aggregate demand.

Our findings also speak to a large cross-country empirical literature on the contentious link between the real exchange rate and economic growth (see Rodrik, 2008). Although this literature is inconclusive on the direction of causality, on balance it supports a positive link from depreciation to growth. Our paper adds to this literature by documenting a particular causal channel underlying this positive correlation, suggesting that the link between the real exchange rate and growth identified elsewhere stems at least in part from our internal financing channel. However, our empirical design, which exploits *differences* in production structure and financial frictions across industries and countries, cannot deliver an estimate of the *overall* effect of real depreciation on growth.

It is important to note that the policy implications of our findings do not call for systematic undervaluation to boost investment and growth. Our results show that for *given* investment profitability, real depreciation frees up internal funds which may serve as means to realize these opportunities, while they are silent on the potential effect of real depreciation on productivity and investment profitability itself. In the spirit of Rajan and Zingales (1998), these internal funds, though not a substitute for the motor of the growth machine, serve as important "lubricants," and more essentially so in environments with underdeveloped financial markets and labor-intensive production structure. Similarly, in an environment where capital misallocation is limiting overall total factor productivity (TFP) growth, as in Hsieh and Klenow (2009), forces that boost internal financing resources of firms can also partly correct the capital misallocation across firms, enhancing aggregate efficiency and TFP growth.

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Appendix A. Proof of Proposition

First, note that the optimal capital level in the second period, according to Equation 2 in the text, is a function of the RER and first-period profits:

$$K = f(RER, \Pi_1(RER))$$

A change in RER affects K through its direct effect (by shifting the *F'(.)* schedule), but also indirectly through the effect of RER on Π_1. That is:

$$\frac{dK}{dRER} = \frac{\partial K}{\partial RER} + \frac{\partial K}{\partial \Pi_1}\frac{\partial \Pi_1}{\partial RER}$$

Applying the implicit function theorem to Equation 2, we have:

$$\frac{\partial K}{\partial RER} = \frac{\left(\partial F'(K)/\partial RER\right)}{C''(K)-F''(K)} = \frac{1}{C''(K)-F''(K)}\frac{\alpha(1-\gamma)}{1-\alpha}\frac{\left[C'(K-\Pi_1, f)+\varphi(K-1)\right]}{RER}$$

We can simplify the expressions by normalizing the RER prior to perturbation to 1, and scaling the consumption wage $\overline{w}$ such that profits prior to the RER change are equal 1, which amounts to setting $\overline{w} = \alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}}$. Combining with the expression for the sensitivity of capital level with respect to profits (Equation 3 in the text), and of profits with respect to the RER: $\frac{d\ln \Pi_1}{d\ln RER} = (1-\gamma)\frac{\alpha}{(1-\alpha)}$, we obtain:

$$\varepsilon_{K,RER} = \frac{d\ln K}{d\ln RER} = \frac{(1-\gamma)\frac{\alpha}{1-\alpha}}{C''(K-\Pi_1, f)-F''(K)}\left[C'(K-\Pi_1, f)+\varphi(K-1)+C''(K-\Pi_1, f)\right] > 0$$

It follows immediately that $\frac{d\varepsilon_{K,RER}}{d\alpha} > 0.$

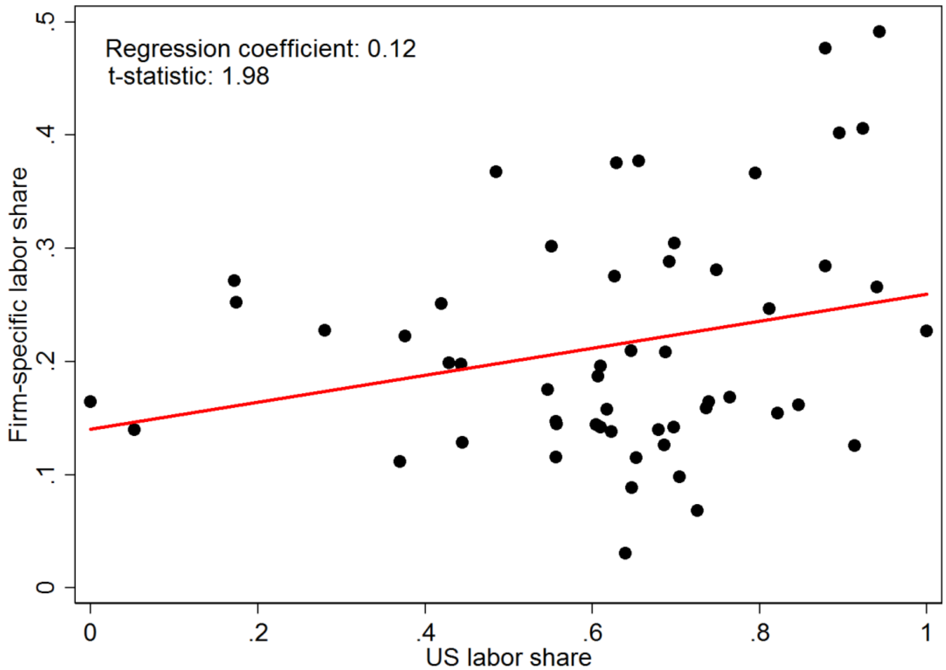
Moreover, if the marginal return to investment is kept constant, i.e., $\frac{\partial F'(K)}{\partial RER} = 0$, then we unambiguously obtain:

$$\frac{d\varepsilon_{K,RER}}{df} = \frac{-F''(K)}{\left[C''(K-\Pi_1, f)-F''(K)\right]^2}\frac{\alpha}{(1-\alpha)}(1-\gamma)\frac{\partial C''(.)}{\partial f} > 0.$$

In the data, we test for the second prediction by controlling for expected return to investment, or Tobin's q, in the investment equation.

Appendix B. Figures and Tables

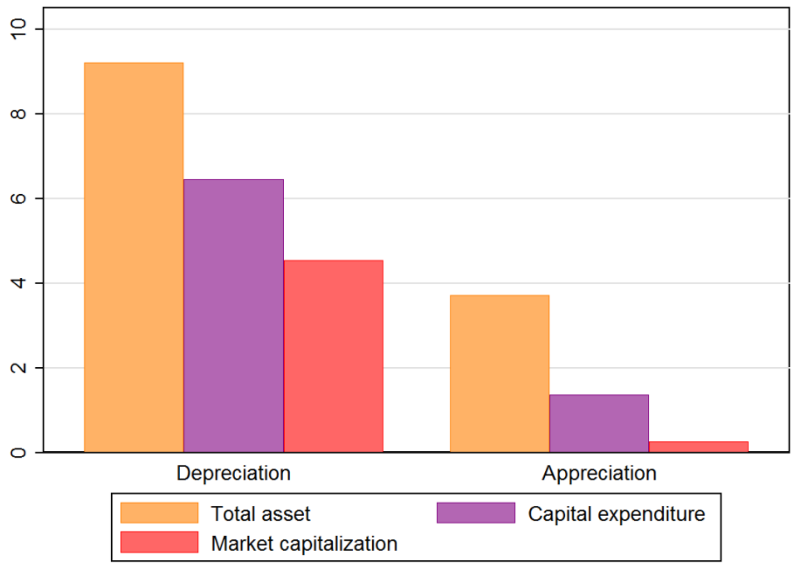
Figure 4. Correlation between US Labor Share and Median Firm-Specific Labor Share



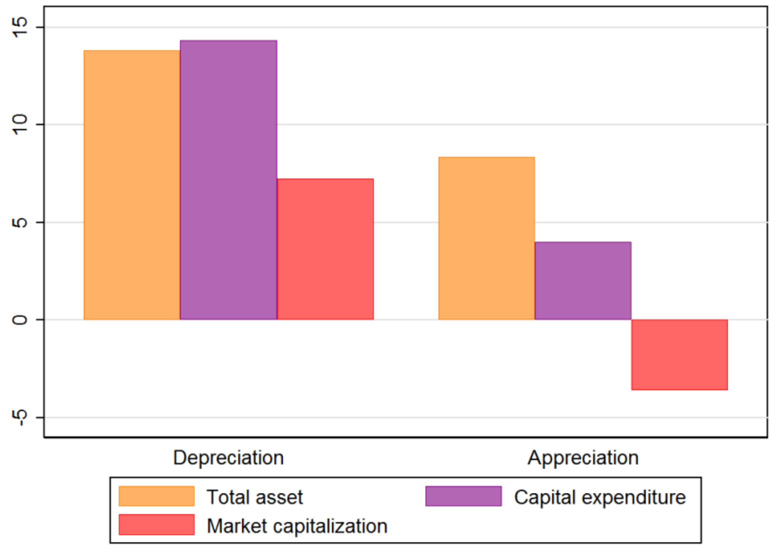
Notes: The chart depicts the correlation between the median labor share across firms (defined as expenses related to salaries and benefits scaled by total sales) and the US labor share at the 3-digit (NAICS) industry level. In our sample, the firm-specific labor share is available for one third of firm-year observations. Data sources: Elsby, Hobijn, and Sahin (2013), Worldscope.

Figure 5. Firm Growth and the Real Exchange Rate

A. Firms in advanced economies



B. Firms in emerging market countries



Notes: The figures are based on data for about 25,000 tradable sector firms from 66 countries during 2000-2011. Data sources: Worldscope, International Finance Statistics (IFS).

Table 1. Sample Composition

	IFS	Emerging market	# firms	# traded sector firms	% traded sector firms
Argentina	213	1	12	10	83%
Australia	193	0	1287	1087	84%
Austria	122	0	75	69	92%
Bahrain	419	1	4	2	50%
Belgium	124	0	104	84	81%
Brazil	223	1	101	62	61%
Bulgaria	918	1	148	148	100%
Canada	156	0	970	862	89%
Chile	228	1	132	86	65%
China	924	1	2,404	1,947	81%
Colombia	233	1	55	43	78%
Croatia	960	1	92	89	97%
Czech Republic	935	0	36	19	53%
Denmark	128	0	103	84	82%
Egypt	469	1	51	44	86%
Estonia	939	0	16	9	56%
Finland	172	0	86	72	84%
France	132	0	869	736	85%
Germany	134	0	775	650	84%
Greece	174	0	261	182	70%
Hong Kong, SAR	532	0	831	644	77%
Hungary	944	1	34	25	74%
Iceland	176	0	13	11	85%
India	534	1	1,171	993	85%
Indonesia	536	1	245	173	71%
Ireland	178	0	75	61	81%
Israel	436	0	331	314	95%
Italy	136	0	241	180	75%
Japan	158	0	4154	3099	75%
Jordan	439	1	170	165	97%
Kazakhstan	916	1	16	16	100%
Kuwait	443	1	53	39	74%
Lithuania	946	1	29	26	90%

Country	IFS	Emerging market	# firms	# traded sector firms	% traded sector firms
Luxembourg	137	0	24	19	79%
Malaysia	548	1	1000	666	67%
Mauritius	684	1	22	22	100%
Mexico	273	1	60	37	62%
Morocco	686	1	19	16	84%
Netherlands	138	0	177	140	79%
New Zealand	196	0	48	33	69%
Norway	142	0	176	138	78%
Oman	449	1	53	49	92%
Pakistan	564	1	172	150	87%
Peru	293	1	64	58	91%
Philippines	566	1	140	83	59%
Poland	964	1	367	298	81%
Portugal	182	0	47	45	96%
Qatar	453	1	6	3	50%
Romania	968	1	150	149	99%
Russia	922	1	552	446	81%
Saudi Arabia	456	1	37	23	62%
Singapore	576	0	561	416	74%
Slovak Republic	936	0	18	15	83%
Slovenia	961	0	39	31	79%
South Africa	199	1	244	183	75%
South Korea	542	0	1691	1509	89%
Spain	184	0	152	115	76%
Sweden	144	0	336	294	88%
Switzerland	146	0	128	104	81%
Thailand	578	1	183	137	75%
Turkey	186	1	275	233	85%
Ukraine	926	1	69	65	94%
United Kingdom	112	0	2120	1683	79%
United States	111	0	6993	5904	84%
Venezuela	299	1	7	6	86%
Vietnam	582	1	316	315	100%
Total			31,190	25,416	81%

Notes: The table is based on the sample of firms with non-missing total asset information. Data sources: Worldscope, World Economic Outlook (WEO).

Table 2. Descriptive Statistics for Selected Regression Variables

	(1) Obs.	(2) Mean	(3) St. Dev.	(4) Min	(5) p25	(6) Median	(7) p75	(8) Max
A. Firm-level variables 2000-2011								
Assets_t (USD million)	132,200	1260.06	9631.95	0.00	30.85	114.37	415.55	797800.00
Capital Stock: K_t (USD million)	121,205	737.02	5345.27	0.00	9.33	47.35	213.66	374094.22
Capital Expenditure Capex_t (USD million)	130,213	68.15	591.42	0.00	0.45	3.21	17.23	54683.88
Employment_t	121,833	3923	18610	1	127	515	2016	2333000
Asset Growth_t	132,200	0.144	0.384	-0.390	-0.058	0.072	0.226	1.513
Market Capitalization Growth_t	123,893	0.207	0.770	-0.725	-0.304	0.019	0.461	2.476
Sales Growth_t	126,279	0.150	0.359	-0.414	-0.053	0.099	0.268	1.287
Capital Expenditure Growth_t	124,984	0.537	1.632	-0.907	-0.405	0.045	0.718	6.369
Stock Market Return_t (pct)	123,632	-0.072	0.756	-8.739	-0.406	-0.014	0.322	10.455
Investment Rate (Capex_t/K_{t-1})	117,722	0.130	0.156	0.000	0.035	0.077	0.161	1.000
Cash $\text{Flow}_t/\text{Assets}_{t-1}$	128,106	0.067	0.390	-2.499	0.004	0.068	0.133	2.577
Tobin's Q_t (market value+total debt/assets`	124,471	1.713	2.278	0.000	0.653	0.998	1.768	16.414
Tobin's Q_t (market value/assets)	124,837	1.642	3.436	0.038	0.388	0.775	1.585	54.237
B. Country-level variables								
Log(Real exchange $\text{rate})_t$	665	0.311	0.451	-0.664	-0.032	0.291	0.575	1.612
$\text{Credit}_t/\text{GDP}_{t-1}$	661	0.882	0.564	0.088	0.394	0.815	1.216	3.195
FX share	730	0.606	0.313	0.009	0.348	0.695	0.900	1.000
Currency crisis_t (1: Onset of crisis)	644	0.017	0.130	0.000	-	-	-	1.000
Banking crisis_t (1: Year of crisis)	505	0.135	0.342	0.000	-	-	-	1.000
C. Industry-level variables								
Labor share	608	0.637	0.199	0.052	0.556	0.647	0.748	0.010
External finance dependence	569	0.340	2.301	-10.089	-0.273	0.046	0.409	13.047

Notes: Summary statistics for firm-level variables are for tradable sector firms in our regression sample. All firm-level variables are winsorized at the 1 percent level and growth rates are winsorized at the 5 percent level to minimize the impact of outliers. Data sources: Worldscope, IFS, World Development Indicators (WDI), WEO, Dealogic Loan Analytics and DCM Analytics, Laeven and Valencia (2013), Reinhart and Rogoff (2014), Elsby, Hobijn, and Sahin (2013).

Table 3. Firm Growth and the Real Exchange Rate

	(1)	(2)	(3)	(4)
	Appreciation	Depreciation	Difference (2)-(1)	p-value test (2)>(1)
Growth of:		*All firms*		
Total Assets	4.7%	10.3%	5.6%	0.000
Capital Expenditure	2.0%	8.0%	6.0%	0.000
Market Capitalization	-0.5%	5.2%	5.7%	0.000
		Firms in advanced economies		
Total Assets	3.7%	9.2%	5.5%	0.000
Capital Expenditure	1.4%	6.5%	5.1%	0.000
Market Capitalization	0.3%	4.5%	4.3%	0.000
		Firms in emerging market countries		
Total Assets	8.4%	13.8%	5.5%	0.000
Capital Expenditure	4.0%	14.3%	10.3%	0.000
Market Capitalization	-3.6%	7.3%	10.9%	0.000

Notes: The table reports median growth rates across firms during 2000-2011 during split in country-years of real depreciation (col 1) vs. country-years of real appreciation (col 2). Col 4 reports the p-value of non-parametric test of equality of medians. Data sources: Worldscope, IFS.

Table 4. Baseline - Tradable Sector Firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Asset Growth		Investment		Investment		Cash Flow	
Log(Employment$_{t-1}$)	-0.122***	-0.121***					-0.016***	-0.016***
	(0.003)	(0.003)					(0.003)	(0.003)
Tobin's Q$_t$			0.070***	0.068***				
			(0.004)	(0.004)				
Sales Growth$_{t-1}$			0.039***	0.034**	0.049***	0.044***		
			(0.015)	(0.015)	(0.015)	(0.015)		
Log(K$_{t-1}$)			-0.376***	-0.384***	-0.399***	-0.407***		
			(0.013)	(0.013)	(0.013)	(0.013)		
Log(RER)$_t$*Labor share	0.413***	0.413***	0.960**	0.880*	0.935**	0.896*	0.107***	0.082**
	(0.104)	(0.104)	(0.465)	(0.472)	(0.458)	(0.464)	(0.036)	(0.039)
Log(RER)$_t$*Labor share*(Credit/GDP)$_{t-1}$	0.290***	0.293***	0.766**	0.731**	0.713**	0.718**		
	(0.081)	(0.081)	(0.339)	(0.342)	(0.332)	(0.334)		
Labor share*(Credit/GDP)$_{t-1}$	-0.062	-0.062	-0.155	-0.182	-0.222	-0.262		
	(0.049)	(0.049)	(0.184)	(0.186)	(0.180)	(0.182)		
Observations	132,200	132,200	93,271	93,271	95,988	95,988	137,484	137,484
R-squared	0.369	0.371	0.628	0.631	0.624	0.627	0.719	0.720
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is total asset growth (cols 1-2), log-investment ratio (cols 3-6), and cash flow (cols 7-8). The sample contains tradable sector firms. The double interaction term “RER*Credit/GDP” and the level variables “RER” and “Credit/GDP” are absorbed by country-time fixed effects. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 5. Placebo - Non-Tradable Sector Firms

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment		Investment		Cash Flow	
$\text{Log(Employment}_{t-1})$					-0.024***	-0.024***
					(0.004)	(0.004)
Tobin's Q_t	0.128***	0.127***				
	(0.016)	(0.016)				
Sales Growth_{t-1}	0.019	0.022	0.032	0.035		
	(0.033)	(0.033)	(0.032)	(0.032)		
$\text{Log}(K_{t-1})$	-0.316***	-0.319***	-0.346***	-0.348***		
	(0.026)	(0.026)	(0.026)	(0.026)		
Log(RER)_t*Labor share	-1.812	-1.833	-1.633	-1.625	-0.063	-0.087
	(1.191)	(1.202)	(1.146)	(1.155)	(0.050)	(0.057)
Log(RER)_t*Labor share*$\text{(Credit/GDP)}_{t-1}$	-1.777**	-1.197	-1.759**	-1.113		
	(0.885)	(0.898)	(0.866)	(0.881)		
Labor share*$\text{(Credit/GDP)}_{t-1}$	-0.184	-0.462	-0.273	-0.561		
	(0.459)	(0.460)	(0.446)	(0.449)		
Observations	24,631	24,631	25,736	25,736	33,515	33,515
R-squared	0.651	0.653	0.646	0.648	0.782	0.782
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is log-investment ratio (cols 1-4) and cash flow (cols 5-6). The sample contains non-tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 6. Baseline - Firm Value and Stock Returns

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total Sales Growth		Market Capitalization Growth			Stock Market Return		
	Current (t)	One-year ahead (t+1)	Current (t)	One-year ahead (t+1)		Current (t)	One-year ahead (t+1)	
Log(Employment$_{t-1}$)	-0.143***	-0.104***	-0.097***	-0.030***		-0.075***	-0.012**	
	(0.004)	(0.007)	(0.009)	(0.006)		(0.005)	(0.006)	
Tobin's Q$_t$					-0.054***			-0.046***
					(0.003)			(0.003)
Sales Growth$_{t-1}$					-0.033*			-0.031***
					(0.016)			(0.010)
Log(K$_{t-1}$)					-0.015			0.004
					(0.011)			(0.007)
Log(RER)$_t$*Labor share	0.324***	0.228**	0.181	0.432**	0.908**	0.069	0.593***	0.823***
	(0.103)	(0.103)	(0.238)	(0.198)	(0.407)	(0.164)	(0.193)	(0.245)
Log(RER)$_t$*Labor share*(Credit/GDP)$_{t-1}$	0.223***	0.129**	0.236***	0.244*	0.429*	0.224*	0.563***	0.660***
	(0.080)	(0.052)	(0.079)	(0.129)	(0.208)	(0.132)	(0.152)	(0.182)
Labor share*(Credit/GDP)$_{t-1}$	-0.003	-0.134*	0.033	-0.040	-0.014	-0.109	-0.266***	-0.200**
	(0.051)	(0.075)	(0.049)	(0.104)	(0.139)	(0.088)	(0.099)	(0.101)
Observations	126,279	105,727	123,893	97,197	75,256	123,632	106,019	80,707
R-squared	0.396	0.385	0.425	0.426	0.472	0.474	0.485	0.506
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	Yes	No	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is net sales growth (cols 1-2), total market capitalization growth (cols 3-5), and annual stock market return (cols 6-8). The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 7. Alternative Channels - Controlling for the Aggregate Lending and Savings Channels

	(1)	(2)	(3)	(4)	(5)	(6)
	Asset Growth		Investment		Investment	
$Log(Employment_{t-1})$	-0.123***	-0.123***				
	(0.003)	(0.003)				
Tobin's Q_t			0.071***	0.069***		
			(0.005)	(0.005)		
Sales $Growth_{t-1}$			0.040***	0.035**	0.050***	0.044***
			(0.015)	(0.015)	(0.015)	(0.015)
$Log(K_{t-1})$			-0.374***	-0.382***	-0.398***	-0.405***
			(0.014)	(0.014)	(0.014)	(0.014)
$Log(RER)_t$*Labor share	0.374***	0.388***	0.995**	0.966*	0.946**	0.967**
	(0.108)	(0.109)	(0.488)	(0.494)	(0.480)	(0.485)
$Log(RER)_t$*Labor share*$(Credit/GDP)_{t-1}$	0.301***	0.312***	0.874**	0.855**	0.812**	0.844**
	(0.084)	(0.084)	(0.353)	(0.354)	(0.346)	(0.347)
$Log(RER)_t$*Ext. Finance Dependence*$(Credit/GDP)_{t-1}$	-0.082	-0.083	-0.280	-0.297	-0.359*	-0.389**
	(0.052)	(0.052)	(0.192)	(0.195)	(0.188)	(0.191)
Labor share*$(Credit/GDP)_{t-1}$	0.005	0.005	-0.025	-0.019	-0.033*	-0.024
	(0.004)	(0.004)	(0.019)	(0.019)	(0.018)	(0.019)
Observations	121,375	121,375	86,681	86,681	89,152	89,152
R-squared	0.365	0.368	0.627	0.630	0.623	0.625
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is total asset growth (cols 1-2) and log-investment ratio (cols 3-6). The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. "External finance dependence" varies at the 3-digit SIC industry level. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 8. Alternative Channels - Controlling for the Firms' Balance Sheet Channel

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Asset Growth		Investment				Investment
	Full sample		Full sample		FX share>50%	Full sample	
$Log(Employment_{t-1})$	-0.122***	-0.121***					
	(0.003)	(0.003)					
Tobin's Q_t			0.070***	0.068***	0.073***	0.073***	0.072***
			(0.004)	(0.004)	(0.011)	(0.004)	(0.004)
Sales $Growth_{t-1}$			0.039***	0.035**	0.090**	0.053***	0.054***
			(0.015)	(0.015)	(0.036)	(0.015)	(0.015)
$Log(K_{t-1})$			-0.376***	-0.384***	-0.294***	-0.354***	-0.351***
			(0.013)	(0.013)	(0.033)	(0.013)	(0.013)
Net $worth_{t-1}$						0.008***	0.008***
						(0.000)	(0.000)
$Log(RER)_t$*Labor share	0.414***	0.438***	0.168	0.116	6.079***	0.743	0.733
	(0.154)	(0.156)	(0.654)	(0.681)	(2.234)	(0.472)	(0.474)
$Log(RER)_t$*Labor share*$(Credit/GDP)_{t-1}$	0.291***	0.302***	0.464	0.445	1.200**	0.655*	0.655*
	(0.092)	(0.092)	(0.364)	(0.369)	(0.592)	(0.342)	(0.343)
Labor share*$(Credit/GDP)_{t-1}$	-0.062	-0.062	-0.195	-0.221	-0.125	-0.136	-0.144
	(0.049)	(0.050)	(0.186)	(0.188)	(0.328)	(0.183)	(0.183)
$Log(RER)_t$*Labor share*FX share	-0.003	-0.041	1.321*	1.256	-5.737**		
	(0.183)	(0.184)	(0.773)	(0.801)	(2.599)		
$Log(RER)_t$*$(Net\ worth)_{t-1}$							0.004***
							(0.001)
Observations	132,200	132,200	93,271	93,271	15,611	93,271	93,271
R-squared	0.369	0.371	0.628	0.631	0.672	0.637	0.637
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is total asset growth (cols 1-2) and log-investment ratio (cols 3-7). The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. "FX share" is a country-level variable representing the share of foreign exchange (bond and loan) borrowing of firms in a country during 2000-2011. Firm net worth is defined as common equity divided by total assets. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Dealogic Loan Analytics and DCM Analytics, Elsby, Hobijn, and Sahin (2013).

Table 9. Robustness - Excluding Currency and Banking Crises

	(1)	(2)	(3)	(4)	(5)	(6)
	Asset Growth	Investment	Asset Growth	Investment	Asset Growth	Investment
	Drop onset of currency crises		Drop onset and following year of currency crises		Drop banking crises	
$Log(Employment_{t-1})$	-0.121***		-0.121***		-0.112***	
	(0.003)		(0.003)		(0.004)	
Tobin's Q_t		0.068***		0.068***		0.066***
		(0.004)		(0.004)		(0.005)
Sales $Growth_{t-1}$		0.035**		0.035**		0.034**
		(0.015)		(0.015)		(0.016)
$Log(K_{t-1})$		-0.384***		-0.383***		-0.378***
		(0.013)		(0.013)		(0.015)
$Log(RER)_t$*Labor share	0.415***	0.854*	0.404***	0.793	0.386***	0.830
	(0.107)	(0.479)	(0.107)	(0.485)	(0.113)	(0.509)
$Log(RER)_t$*Labor share*$(Credit/GDP)_{t-1}$	0.295***	0.711**	0.285***	0.669*	0.234***	0.678*
	(0.083)	(0.346)	(0.083)	(0.350)	(0.088)	(0.373)
Labor share*$(Credit/GDP)_{t-1}$	-0.064	-0.188	-0.066	-0.191	-0.003	-0.048
	(0.049)	(0.186)	(0.050)	(0.186)	(0.060)	(0.217)
Observations	132,033	93,184	131,880	93,107	114,485	80,559
R-squared	0.372	0.631	0.371	0.631	0.410	0.646
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is total asset growth (cols 1-2) and log-investment ratio (cols 3-6). The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. Currency crisis dates are taken from Laeven and Valencia (2013). Banking crisis dates are taken from Reinhart and Rogoff (2014). *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013), Laeven and Valencia (2013), and Reinhart and Rogoff (2014).

Table 10. Robustness - Variations on the Measure of Tobin's Q

	(1)	(2)	(3)	(4)	(5)	(6)
	Lagged Tobin's Q_{t-1}		Average Tobin's $Q_{t,t-1}$		$(\text{Market/Book value})_t$	
Tobin's Q	0.050***	0.049***	0.061***	0.059***	0.049***	0.047***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.004)	(0.004)
Sales Growth_{t-1}	0.040***	0.036**	0.039***	0.035**	0.041***	0.037**
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
$\text{Log}(K_{t-1})$	-0.363***	-0.371***	-0.381***	-0.389***	-0.378***	-0.386***
	(0.014)	(0.014)	(0.013)	(0.014)	(0.013)	(0.013)
Log(RER)_t*Labor share	0.859*	0.784	0.988**	0.909*	0.976**	0.902*
	(0.475)	(0.482)	(0.466)	(0.472)	(0.463)	(0.470)
Log(RER)_t*Labor share*$\text{(Credit/GDP)}_{t-1}$	0.687**	0.644*	0.758**	0.717**	0.760**	0.728**
	(0.345)	(0.349)	(0.339)	(0.342)	(0.338)	(0.340)
Labor share*$\text{(Credit/GDP)}_{t-1}$	-0.185	-0.199	-0.168	-0.189	-0.160	-0.188
	(0.186)	(0.187)	(0.184)	(0.186)	(0.184)	(0.186)
Observations	90,371	90,371	92,937	92,937	93,345	93,345
R-squared	0.628	0.630	0.626	0.629	0.628	0.630
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is log-investment ratio. The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. Tobin's Q is lagged one year in cols 1-2, it is the average over (t-1,t) in cols 3-4, and it is defined as market/book value in cols 5-6. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 11. Robustness - Variations on the Measure of Financial Constraints

	(1)	(2)	(3)	(4)	(5)	(6)
	Log(Credit/GDP)$_{t-1}$		Log(Employment)$_{t-1}$		Log(Assets)$_{t-1}$	
Tobin's Q_t	0.068***		0.070***		0.091***	
	(0.004)		(0.004)		(0.004)	
Sales Growth$_{t-1}$	0.034**	0.043***	0.035**	0.050***	0.020	0.033**
	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)
Log(K_{t-1})	-0.384***	-0.407***	-0.389***	-0.402***	-0.464***	-0.480***
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)
Log(RER)$_t$*Labor share	2.644**	2.860**	0.432	0.337	0.740***	0.715***
	(1.339)	(1.309)	(0.278)	(0.282)	(0.245)	(0.250)
Log(RER)$_t$*Labor share*Financial Constraints	0.569**	0.607**	0.078***	0.062**	0.056**	0.060**
	(0.281)	(0.275)	(0.025)	(0.025)	(0.026)	(0.026)
Labor share*Financial Constraints	-0.147	-0.226	0.009	0.042**	-0.449***	-0.370***
	(0.264)	(0.260)	(0.018)	(0.018)	(0.019)	(0.019)
Observations	93,271	95,988	101,003	104,011	101,003	104,011
R-squared	0.631	0.627	0.632	0.628	0.638	0.632
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The dependent variable is given by log-investment ratio. Our measures of financial constraints are country-level credit/GDP (log-transformed) (cols 1-2) and firm specific size (measured by log-employment in cols 3-4 and log-assets in cols 5-6). The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-time fixed effects. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 12. Robustness - Specifications with Country-Industry-Year Fixed Effects

	(1)	(2)	(3)	(4)
	Asset Growth	Investment		Cash Flow
$\text{Log}(\text{Employment}_{t-1})$	-0.121***			-0.016***
	(0.003)			(0.003)
Tobin's Q_t		0.067***		
		(0.005)		
Sales Growth_{t-1}		0.031**	0.039***	
		(0.015)	(0.015)	
$\text{Log}(K_{t-1})$		-0.386***	-0.409***	
		(0.014)	(0.014)	
$\text{Log}(\text{RER})_t$*Labor share	0.491***	1.369**	1.256**	0.133***
	(0.130)	(0.643)	(0.636)	(0.048)
$\text{Log}(\text{RER})_t$*Labor share*$(\text{Credit/GDP})_{t-1}$	0.291***	1.018**	0.927**	
	(0.101)	(0.458)	(0.449)	
Labor share*$(\text{Credit/GDP})_{t-1}$	-0.163***	-0.033	-0.126	
	(0.060)	(0.235)	(0.231)	
Observations	132,200	93,271	95,988	137,484
R-squared	0.394	0.649	0.646	0.727
Country-industry-year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Notes: Dependent variables are as in the baseline regressions (Table 4). The sample contains tradable sector firms. The double interaction term “RER*Credit/GDP” and the level variables “RER” and “Credit/GDP” are absorbed by country-industry-time fixed effects. *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).

Table 13. Robustness - Estimation in Panel of Four-Year Averages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Asset Growth		Investment		Investment		Cash Flow	
Log(Employment$_{t-1}$)	-0.072***	-0.071***					0.059***	0.057***
	(0.003)	(0.003)					(0.014)	(0.014)
Tobin's Q_t			0.026**	0.020*				
			(0.011)	(0.011)				
Sales Growth$_{t-1}$			0.065*	0.073**	0.061*	0.068**		
			(0.034)	(0.034)	(0.034)	(0.033)		
Log(K_{t-1})			-0.414***	-0.430***	-0.424***	-0.438***		
			(0.023)	(0.024)	(0.023)	(0.024)		
Log(RER)$_t$*Labor share	0.309***	0.336***	1.794**	1.665*	1.854**	1.726*	1.227***	0.948***
	(0.114)	(0.117)	(0.855)	(0.889)	(0.851)	(0.885)	(0.279)	(0.283)
Log(RER)$_t$*Labor share*(Credit/GDP)$_{t-1}$	0.393***	0.420***	1.743***	2.014***	1.687***	1.973***		
	(0.101)	(0.102)	(0.633)	(0.637)	(0.628)	(0.633)		
Labor share*(Credit/GDP)$_{t-1}$	0.036	0.046	-0.120	0.008	-0.210	-0.066		
	(0.067)	(0.067)	(0.444)	(0.451)	(0.439)	(0.446)		
Observations	46,726	46,726	24,491	24,491	24,796	24,796	34,672	34,672
R-squared	0.728	0.730	0.895	0.897	0.896	0.897	0.830	0.831
Country-period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-period FE	No	Yes	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The regressions are run in a panel of four-year averages over 2000-2003, 2004-2007, and 2008-2011. Dependent variables are as in the baseline regressions (Table 4). The sample contains tradable sector firms. The double interaction term "RER*Credit/GDP" and the level variables "RER" and "Credit/GDP" are absorbed by country-period fixed effects. Firm-level variables are measured as of the beginning of the period, other than Tobin's Q which is contemporaneous (i.e., the average over the period). *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level. Standard errors are clustered at the firm level. Data sources: Worldscope, IFS, WDI, Elsby, Hobijn, and Sahin (2013).