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Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Depreciations

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ABSTRACT

This paper examines how financial constraints and product market exposures determine the response of multinational and local firms to sharp depreciations. U.S. multinational affiliates increase sales, assets, and investment significantly more than local firms during, and subsequent to, depreciations. Differing product market exposures do not explain these differences in performance. Instead, a differential ability to circumvent financial constraints is a significant determinant of the observed differences in investment responses. Multinational affiliates also access parent equity when local firms are most constrained. These results indicate another role for foreign direct investment in emerging markets—multinational affiliates expand economic activity during currency crises when local firms are most constrained.

JEL Classifications: F23, F31, G15, G31, G32.

Keywords: investment, leverage, foreign direct investment, currency crises, financial constraints, depreciations

Introduction

This paper compares the response of American multinational affiliates and local firms in the tradable sectors of emerging markets to sharp depreciations. After depreciations, multinational affiliates increase sales and assets 5.4% and 7.5% more, respectively, than local firms. The improved relative performance of multinational affiliates is even more striking in investment. Capital expenditures are 34.5% higher for multinational firms than local firms in the aftermath of large depreciations. This paper investigates the sources of this distinctive performance, with particular emphasis on the possible role of differential operating exposures and financing capabilities.

Differential access to global product markets or a disproportional reliance on local markets could give rise to distinctive investment opportunities for local firms and multinational affiliates. For example, multinational affiliates may use sales outlets within a parent system, and depreciations might disproportionately increase the profitability of these outlets. In order to consider this possibility, we compare multinational and local firms with similar product market exposures. First, we investigate if where a multinational affiliate sells to, or sources inputs from, can explain their differential performance. Second, we compute measures of the operating exposures of firms and investigate if differences in operating exposures explain the distinctive responses of multinational affiliates and local firms to crises.

These tests provide little evidence that the relative growth of affiliates around sharp depreciations can be traced to differential investment opportunities. While multinational affiliates more reliant on exports prior to depreciations increase investment by larger amounts, affiliates that exclusively serve the local market increase investment by considerably more than local firms. Similarly, while measures of operating exposure are associated with differential investment responses, large differences in the investment responses of affiliates and local firms persist after including these measures of operating exposures as controls.

Given previous evidence on the opportunistic use of internal capital markets by multinational firms, it is possible that a superior ability to overcome financing constraints is the reason for their distinctive performance. In order to consider this possibility, we employ two different tests. First, we use differences in the level of leverage and its duration across local firms prior to crises to identify if the local firms most vulnerable to financing constraints

are those that invest and grow the least relative to affiliates. Second, we directly examine a multinational parent's internal capital markets to see if more resources are being allocated to affiliates in countries experiencing severe depreciations.

These tests reveal the decisive role of financing constraints in explaining the differential investment response of multinational affiliates and local firms. Local firms with the most leverage and with the shortest term debt reduce investment the most. The examination of the internal capital markets of multinationals indicates that multinational parents provide additional financing in response to sharp depreciations. These results indicate that multinational firms overcome the negative consequences of large depreciations by avoiding the financial constraints that handicap local firms.

In identifying the role of access to capital in explaining the enhanced performance of multinational affiliates, this paper contributes to the extensive literature on financial constraints and growth. This literature struggles with several identification issues that are mitigated by comparing the responses of two types of firms to the same shock. For example, many cross-country studies use country level variables to proxy for financial development and are therefore subject to concerns of omitted variable bias. Similarly, many analyses that use leverage as a proxy for financial constraints and study the effects of leverage on investment policies struggle with endogeneity; a negative relationship between leverage and growth may merely reflect the fact that managers facing poor growth opportunities choose high levels of leverage. Increases in leverage also may reflect a response to unobserved variation in investment opportunities.

This paper addresses these concerns by isolating a situation within a country in which an economic event that is exogenous to any individual firm simultaneously (i) improves investment opportunities, (ii) increases firm leverage or financing constraints, and (iii) increases financing constraints *differentially* across types of firms. In addition to providing a test of how financial constraints influence investment, this differential reaction illustrates an effect of FDI not previously emphasized. FDI can mitigate output contractions during currency crises, since multinational affiliates expand activity precisely when local firms are most constrained.[1] Finally, the analysis also indicates that financial constraints can explain the limited reactions of firms to the hypothesized benefits of depreciations.

Although the data set created for this analysis permits a novel approach for examining the relationship between financial constraints and investment decisions, it also has shortcomings. In particular, we do not observe the currency denomination of debt.[2] As a result, we are unable to document the exact mechanism by which depreciations differentially intensify financial constraints. Other datasets offer more promise for differentiating between the potential role of currency mismatches on balance sheets and credit crunches that are tied to currency crises.[3]

Section 1 motivates the subsequent analysis and empirical specifications in the context of a review of the existing literature. Section 2 identifies the depreciation episodes and describes the data set for local firms and multinational affiliates. Section 3 presents results on the relative performance of local and multinational firms around the depreciation episodes. Sections 4 and 5 consider the role of product market exposures and financial constraints, respectively, in determining the differential performance of local firms and multinational affiliates. Section 6 briefly discusses alternative explanations for these results and Section 7 concludes.

1. Related Literature and Empirical Methodology

The comparison of local and multinational firms in the wake of depreciations helps clarify the conflicting evidence on whether depreciations stimulate economic growth and addresses more general questions about the extent to which financial constraints limit growth. This section outlines our empirical approach and links our work to the relevant literatures.

1.1 Firm Performance During Currency Crises

Since firms in the tradable sector typically incur at least some costs in local currency terms, sharp depreciations are believed to increase competitiveness by raising the price of imports (causing consumers to substitute toward domestically-produced goods) and by lowering production costs relative to foreign competitors (providing a cost advantage in export markets).[4] As a consequence, depreciations are expected to create incentives for both affiliates and local firms in the depreciating country to expand. There is some evidence that firms do respond to these competitiveness effects. Krueger and Tornell (1999) provide empirical evidence at the sectoral level, and Aguiar (2005) and Forbes (2002a, 2002b) provide empirical evidence at the firm-level.[5] In particular, Forbes (2002b) shows that firms with

greater foreign sales exposure are more likely to have higher growth in sales, net income, market capitalization, and assets after depreciations.

Given these findings, it is somewhat puzzling that evidence on the aggregate effect of sharp devaluations on output is mixed. Agénor and Montiel (1996) and Gupta, Mishra and Sahay (2000) find that sharp depreciations do not have an unambiguously expansionary effect. Calvo and Reinhart (2000) distinguish between emerging and developed markets and conclude that currency crises in emerging markets are more likely to have large contractionary effects.

These mixed results, and especially the differential effect of devaluations in emerging and developed markets, have motivated several papers investigating factors that might offset the positive competitiveness effects described above. Most of this work considers how sharp depreciations can increase financial constraints. Such constraints can take a variety of forms. In a costly state verification model, Bernanke and Gertler (1989) show how deteriorating balance sheets can play an important role in explaining patterns of macroeconomic activity. When a large share of liabilities is denominated in a foreign currency, as is common in emerging markets, depreciations can aggravate credit constraints and worsen balance sheets, thereby hindering investment.[6] Alternatively, Radelet and Sachs (1998) and Chang and Velasco (2000) argue that excessive reliance on short term financing imposed significant constraints on firms when credit market conditions deteriorate. In addition, other macroeconomic changes that tend to intensify credit constraints often accompany currency crises. For example, Beck, Demirguc-Kunt, and Levine (2003) and Caprio and Klingebiel (1999) demonstrate that banking crises often occur at the same time as currency crises in emerging markets.

As noted by Stein (2003), these macroeconomic models are closely related to the larger literature that links financial constraints, stemming from various factors, to investment. This literature typically isolates a shock to one part of a firm and examines how leverage, stock prices, or cash flow (as in Lang, Ofek and Stulz (1996), Peek and Rosengren (1997) and Lamont (1997), respectively) determine a firm's subsequent investment behavior. A comparison of the responses of local and multinational firms to depreciations has an advantage relative to these studies. The shock is expected to improve investment

opportunities while increasing financial constraints at the same time, thus providing more robust identification of the link between financial constraints and investment.[7] Indeed, Lamont (1997) concludes with the suggestion that sharp depreciations might usefully be employed to investigate how financing constraints restrict investment.[8]

Existing work that investigates currency crises and the interaction of competitiveness effects and credit constraints has not reached definitive conclusions. Both Aguiar (2005) and Bleakley and Cowan (2002) estimate the importance of balance sheet effects, but the two papers reach opposing conclusions.[9] Comparing the responses of multinationals and local firms provides further insight on this question since multinational firms have greater access to international product and internal capital markets than local firms. Detailed data on the extent to which multinational firms actually access these international markets allow us to test the extent to which distinct mechanisms drive differential responses.

1.2 Firm Performance and Access to International Markets

One hypothesis which may explain differential performance following depreciations is that the two types of firms have a differential ability to overcome financial constraints. A large body of work indicates that access to international sources of capital can allow firms to overcome constraints associated with local capital markets, especially in emerging markets. Some of this evidence comes from changes in financial openness. Stulz (1999) shows that financial market liberalizations can reduce the cost of capital for local firms. Henry (2000a) and Bekaert and Harvey (2000) show that liberalizations increase stock market valuations, and Henry (2000b) shows that they also are associated with investment booms.

Access to global capital markets may also affect the relative performance of the subset of firms in an economy that can access those markets. Desai, Foley and Hines (2004) analyze how multinationals capitalize affiliates around the world and demonstrate that multinational affiliates substitute internal borrowing for costly external finance stemming from adverse capital market conditions. In a related vein, Desai, Foley and Hines (forthcoming) demonstrate that affiliates of multinationals firms employ internal capital markets to circumvent capital controls in a manner that is unlikely to be available to local firms.

Differential access to global financial markets may also help explain aggregate patterns of FDI. Froot and Stein (1991) explain the correlation between FDI inflows and

currency devaluations with a model in which capital market imperfections limit the ability of local firms to access external markets, thus giving foreign firms an advantage in bidding for assets. Aguiar and Gopinath (2005) study the frequency and terms of cross-border mergers and acquisitions subsequent to currency crises in Asia. They present evidence that foreign firms buy assets at times that local firms may be liquidity constrained.

An alternative, although not mutually exclusive, hypothesis is that affiliates outperform local firms following depreciations as a consequence of their unique product market exposures. A number of papers, including Cushman (1985), McCulloch (1989), and Lipsey (2001), present theoretical arguments and empirical evidence that imply that affiliates that direct sales to foreign markets and do not make extensive use of imported inputs benefit the most from sharp depreciations. If affiliates are more export oriented than local firms, then they might face better investment opportunities than local firms following depreciations.[10] Blonigen (1997) offers another explanation for why product market exposures might induce foreign direct investment after depreciations. In his framework, firm-specific assets (such as intangibles) become more highly valued by foreign acquirers during depreciations, since product market imperfections allow these acquirers to better mobilize those assets abroad in the more highly valued currency.

1.3 Empirical Methodology

In order to identify if multinational affiliates and local firms perform distinctively in the aftermath of depreciations, we begin our empirical analysis by evaluating firm sales, assets, and investment using the following specification:

$$
\begin{aligned}
Y_{i,j,k,t} &= \theta_1 Depreciation(t\text{-}1)_{k,t} + \theta_2 Depreciation(t)_{k,t} + \theta_3 Depreciation(t+1)_{k,t} + \theta_4 Depreciation(t+2)_{k,t} \\
&+ \theta_5 Multinational_i * Depreciation(t\text{-}1)_{k,t} + \theta_6 Multinational_i * Depreciation(t)_{k,t} \\
&+ \theta_7 Multinational_i * Depreciation(t+1)_{k,t} + \theta_8 Multinational_i * Depreciation(t+2)_{k,t} \\
&+ \theta_9 X_{i,j,k,t} + \eta_{j,t} + \alpha_i + \varepsilon_{i,t}
\end{aligned} \tag{1}
$$

where i is a subscript for each firm, j is a subscript for each industry, k is a subscript for each country, t is a subscript for each year; $Y_{i,j,k,t}$ is a measure of operating activity (such as sales growth or capital expenditures); the depreciation dummy variables are respectively set equal to 1 for observations from one year before (t-1), the year of (t), one year after (t+1), and two years after (t+2) a depreciation in country k; $Multinational_i$ is a dummy variable equal to 1 if

company i is a multinational affiliate; $X_{i,j,k,t}$ is a set of firm-specific, time-varying controls including variables that account for producer-price inflation; $\eta_{j,t}$ is a set of industry-year dummy fixed effects based on BEA industry codes that are roughly equivalent to three-digit SIC codes; α_i is a firm-specific effect; and $\varepsilon_{i,t}$ is an error term. All standard errors are clustered at the firm level to correct for serial correlation.

The key variables of interest are the coefficients on the depreciation dummy variables and on these dummies interacted with the dummy variable for multinational affiliates. The depreciation dummies measure the response of local firms to depreciations, and the interaction terms capture the incremental performance of multinational affiliates relative to local firms. To facilitate calculations of the persistent effects of depreciations, we also estimate some specifications with only two depreciation dummies; the first is equal to one for observations in the year before a depreciation, and the second is equal to one for observations in the year of and each of the two years following a depreciation. Following Evans (1987a) and other empirical work on the growth of firms, we include the initial value of the relevant measure of operating activity when the dependent variable is measured as a growth rate.[11] All specifications include a fixed effect for each industry/year pair in order to control for time varying patterns in industry performance and investment opportunities.

Evidence of distinct responses for multinational and local firms does not, by itself, indicate the extent to which competitiveness benefits or changes in financial constraints explain differences in performance. To study the role of competitiveness effects, we employ interactions that include distinct measures of product market exposures to determine if certain types of firms respond differentially to the depreciation. These specifications also employ country/industry/year fixed effects to better control for investment opportunities that are unique to industries within a country and year. As a consequence, although the sample used in these tests includes both local firms and foreign affiliates, the tests only estimate effects for affiliates relative to local firms since the estimates of the depreciation dummies are subsumed by the fixed effects. As one measure of product market exposures, ratios of foreign sales to sales and net foreign sales (foreign sales less inputs from abroad) to sales are created for multinational affiliates and interacted with the multinational depreciation dummies to investigate if affiliates that are export oriented perform distinctively.[12] Second, we use

measures of exposures to exchange rate changes, based on the work of Adler and Dumas (1984), and investigate if including such controls diminishes the distinctive response of multinational affiliates to depreciations.

In order to consider the role of financial constraints in explaining the differential performance of affiliates and local firms, we employ two additional tests. First, we employ interaction terms in the basic specification to determine if local firms that are most likely to face financial constraints, those that are highly levered with short term debt, are the firms that reduce investment the most. Second, we employ more detailed data on multinational affiliates to examine if changed financing patterns might explain the distinct reactions to currency crises. The empirical setup is similar to the one outlined in equation (1), with the exception that the dependent variables are measures of intrafirm financing – such as related party lending and paid-in capital. There are also no multinational dummy variables since similar data are not available for local firms.

2. The Firm-level Dataset and Depreciation Episodes

2.1. The Firm-Level Dataset

The firm-level data set used in this paper is compiled from two major sources: the Bureau of Economic Analysis (BEA), which provides information on affiliates of U.S. multinationals, and Worldscope, which provides information on local firms. The Bureau of Economic Analysis (BEA) annual survey of U.S. Direct Investment Abroad from 1991 through 1999 provides a panel of data on the financial and operating characteristics of U.S. firms operating abroad. These surveys ask reporters to file detailed financial and operating items for each affiliate, as well as information on the value of transactions between U.S. parents and their foreign affiliates. The International Investment and Trade in Services Survey Act governs the collection of the data. The Act ensures that "use of an individual company's data for tax, investigative, or regulatory purposes is prohibited." Willful noncompliance with the Act can result in penalties of up to $10,000 or a prison term of one year. As a result of these assurances and penalties, BEA believes that coverage is close to complete and levels of accuracy are high.

U.S. direct investment abroad is defined as the direct or indirect ownership or control by a single U.S. legal entity of at least ten percent of the voting securities of an incorporated

foreign business enterprise, or the equivalent interest in an unincorporated foreign business enterprise. A U.S. multinational entity is the combination of a single U.S. legal entity that has made the direct investment, called the U.S. parent, and at least one foreign business enterprise, called the foreign affiliate. The foreign affiliate survey forms that U.S. multinational firms are required to complete vary depending on the year, the size of the affiliate, and the U.S. parent's percentage of ownership of the affiliate.[13] BEA collects identifiers linking affiliates through time, thereby permitting the creation of a panel.

The second major source of firm-level data is the Worldscope database produced by Thompson Financial. This database provides information on local firms and contains annual balance sheet, income statement, cash flow, and general company information for companies based around the world. Firms are identified as local based on the country in which they are incorporated. Since the database is derived from publicly-available information, virtually all of the sample consists of publicly-traded companies, so that smaller and government-owned companies are underrepresented.[14] Worldscope coverage of public companies, however, is fairly extensive. For example, the September 2002 CD-ROM includes information for over 20,000 firms from 55 countries, representing over 96% of global market capitalization. While most of the Worldscope data used in this paper are drawn from the September 2002 CD-ROM, we augment these data with information from the September 1997 CD-ROM, since Worldscope reports no more than 10 years of historical company information on each CD-ROM.[15]

We merge the Worldscope and BEA data[16] and create a common set of industry codes by translating the SIC codes in the Worldscope data into the ISI codes used by the BEA, which are roughly equivalent to three-digit SIC codes. In order to limit the sample to those firms that are likely to experience competitiveness effects from depreciations, we exclude all firms that produce non-tradable goods and services.[17] We also limit the sample to data from 1991 through 1999, which is the time period for which both data sources have extensive coverage of firms operating in emerging markets. Finally, we exclude firms missing information for key variables, such as sales.

2.2. Depreciation Episodes

In order to identify how depreciations affect multinational affiliates and local firms, it is necessary to identify a series of depreciation episodes in emerging markets.[18] We compute real exchange rates by first obtaining daily U.S. dollar exchange rates reported by Datastream for all available emerging markets from January 1990 through January 2000. Then we adjust these nominal exchange rates for inflation differentials using interpolated price data drawn from the IMF (2003).[19] We define depreciation episodes as periods when the real exchange rate increases by over 25% compared to the value of the exchange rate one year earlier.[20] Therefore, depreciation episodes include not only extreme events when a country's real exchange rate depreciates abruptly by at least 25% within a short window of time, but also periods when a country's exchange rate depreciates slowly for a cumulative depreciation of at least 25% within a year.

This method of identifying depreciation episodes has two advantages over the strategies frequently used in past work. First, by focusing on depreciations over longer periods of time, it captures any large depreciations that occur in small increments (such as a 5 percent depreciation each month for several months) rather than just one-time large depreciations. Second, previous work using high frequency exchange rate data has not directly accounted for inflation. Studies often just exclude high-inflation countries, since large nominal depreciations combined with high inflation can be poor measures of real changes in competitiveness. By focusing on longer depreciation windows it is possible to adjust for differences in relative price movements and thereby calculate real, instead of nominal, depreciations. Moreover, since this analysis focuses on testing how depreciations affect firm activities, real depreciations are more relevant than nominal ones.

Next, in order to identify which countries are emerging markets, we use the classification from the back of the *Economist*.[21] We then exclude all countries for which there is no information in either of the two sources of firm-level data. Finally, we also exclude any country-years in which a country experiences inflation of over 100 percent, because it is difficult to accurately measure firm operating activity during periods of hyperinflation.

2.3. Summary Information

The resulting sample includes firms in 25 emerging markets, 15 of which experience a depreciation episode. Descriptive analysis contained in Desai, Foley and Forbes (2004)

shows that there is a strong clustering in depreciation episodes, with several depreciations around the time of the 1994 Mexican Peso Crisis, and another set of depreciations around the 1997-98 Asian/Russian crises. There are roughly equal numbers of local and multinational firms across the sample period. In the group of countries that experience depreciations, 49% of the sample is classified as local firms. In the control group of countries (which do not experience depreciations), 45% of the sample is classified as local firms. No more than 15% of the total observations are drawn from any single country. Although multinational affiliates dominate the samples in Mexico and Venezuela, local firms and multinational affiliates each comprise at least 20% of the sample in every other country.

Table 1 provides descriptive statistics for the variables used in the empirical analysis, separated for local firms and affiliates. Data on foreign sales shares and net foreign sales shares are only available for multinationals, and data on the composition of debt are only available for local firms. The bottom of Table 1 also reports descriptive statistics for variables only available for affiliates and used in Section 5.

3. Firm Performance during Currency Crises

In order to investigate the relative performance of multinational affiliates and local firms during currency crises, we begin with a simple, bivariate comparison of their differential reactions. Figure 1 suggests that the response of multinationals to depreciations, as measured by the growth in sales and assets, is quite distinctive from that of local firms. Panel A shows that the median sales growth of multinational affiliates is almost identical to that of local firms in the year prior to depreciations. In the year of, and each of the two years following depreciations, however, the median sales growth of multinational affiliates exceeds that of local firms by considerable margins. While median sales growth for multinational affiliates is higher after depreciations than before, median sales growth for local firms is lower after depreciations than before.

Panel B illustrates similar patterns for median asset growth rates. Although multinational affiliates have slightly lower asset growth than local firms in the year before depreciations, multinational affiliates have median asset growth more than twice as large as local firm asset growth in the year of and the two years after depreciations. The asset growth of multinational affiliates exceeds its pre-depreciation level in the year of and the two years

after depreciations, but the asset growth of local firms increases by only a modest amount in the year of a depreciation, and then falls below its pre-depreciation levels.

Table 2 analyzes the levels and growth of sales and assets around the time of depreciations using the specification in equation (1). The dependent variable in columns 1 and 2 is the log of sales (measured in nominal local currency units), so that the coefficients on the depreciation dummies are interpreted as the value of sales relative to mean firm sales, after controlling for individual industry/year fixed effects. The coefficient estimates in column 1 indicate that sales of local firms increase slightly at the time of depreciations, and then fall below their pre-depreciation levels in the year after and two years after a depreciation. The coefficient estimates of -0.0787 and -0.1270 on the $depreciation_{t+1}$ and $depreciation_{t+2}$ dummies imply, relative to the -0.0712 coefficient on the $depreciation_{t-1}$ dummy, that sales are 0.7 and 5.6 percentage points lower in the year following and two years following a depreciation, as compared to the year before a depreciation. An F-test indicates that the difference between the level of local firm sales in the year before a depreciation and the level two years after a depreciation is only marginally significant at the 10% level. The coefficients on the multinational depreciation interactions, however, indicate that sales of multinational affiliates do not decline after depreciations. The large, positive and significant coefficients on the post depreciation dummies for multinationals imply that affiliate sales increase relative to the sales of local firms after depreciations.

Column 2 of Table 2 presents results for the same specification as in Column 1, except the dummies for the year of a depreciation and the two subsequent years are combined into a single dummy variable that is equal to one for all three of these years. The -0.0852 coefficient on the post depreciation dummy is slightly less than the dummy capturing the pre-depreciation level of sales, indicating a small but statistically insignificant decline in sales for local firms, on average, after depreciations. The level of sales of multinational affiliates is indistinguishable from that of local firms in the year before a depreciation. The 0.0841 coefficient on the interaction between the multinational and post depreciation dummy, however, implies that the sales of affiliates are 8.4 percentage points higher than the sales of local firms after depreciations.

Columns 3 and 4 of Table 2 analyze sales' growth rates (measured as the difference in log values) instead of the level of sales.[22] This approach has the advantage of automatically excluding multinational affiliates that are extremely small and only appear in benchmark years, thereby ensuring that the results are not merely a byproduct of large changes in small affiliates. The coefficient estimates are deviations from average growth rates. The estimates suggest that multinational affiliates have faster sales growth than local firms after depreciations. More specifically, column 3 indicates that in the year of and year after depreciations, local firms experience significantly lower average sales growth than before depreciations. In contrast, multinational affiliates have higher sales growth than local firms after depreciations, and this difference is highly significant in the year following depreciations. These patterns are even clearer in Column 4 when the years following depreciations are considered jointly. Local firms have significantly lower sales growth after depreciations while the sales growth of multinational affiliates is 5.4 percentage points faster than that of local firms following depreciations.

Columns 5 and 6 of Table 2 repeat this analysis but employ the log of assets instead of sales as the dependent variable. Using firm size, as measured by assets, allows us to investigate if the output effects identified above are also associated with greater firm scale. The results indicate that multinationals expand assets more than local firms subsequent to depreciations. Column 5 shows that local firms' asset levels increase in the year of a depreciation, and then contract in the two subsequent years, so that after a depreciation asset levels for local firms are statistically indistinguishable from their pre-depreciation levels. In contrast, multinational affiliates' asset levels increase significantly after depreciations and remain significantly above their pre-depreciation levels in the two years after depreciations. The results in column 6 confirm that the asset base of multinational affiliates expands by significantly more than the asset base of local firms after depreciations.

The last two columns in Table 2 employ asset growth as the dependent variable, instead of the log of assets. Column 7 suggests that average asset growth for local firms was slightly higher in the year of depreciations than before, but significantly below average (by 6.2 and 5.0 percentage points, respectively) in the two years following depreciations. In contrast, asset growth for multinational affiliates significantly exceeded that for local firms in the year of depreciations. The difference in growth rates is a statistically significant 15

percentage points. Column 8 confirms that the asset growth of multinational affiliates was significantly greater than that of local firms in the period during and after depreciations.

Table 3 analyzes the investment behavior of local and multinational firms during depreciations. It uses two measures of investment as dependent variables: the log of capital expenditures and capital expenditures scaled by net property plant and equipment. Column 1 shows that although capital expenditures are not significantly different from their mean levels for local firms in the year before or the year of depreciations, investment falls significantly in the two years following depreciations. In contrast, capital expenditures increase significantly for multinational firms in the two years after depreciations. The results in column 2, using a single post-depreciation dummy, confirm these conclusions. Investment by local firms is 21 percentage points below pre-depreciations levels after depreciations. Investment by multinational affiliates after depreciations, however, is 34 percentage points higher than investment by local firms, and F-tests indicate that the level of affiliate capital expenditures in the year of and year following a depreciation differ from the level in the year before a depreciation by amounts that are statistically significant at the 5% level.

Different levels of investment between multinational affiliates and local firms may simply reflect differences in their scope of activity following depreciations, instead of differences in the investment responses of entities of a similar size. To address this possibility, columns 3 and 4 of Table 3 use capital expenditures scaled by end-of-period net property, plant and equipment (PPE) as the dependent variable. The results confirm those reported in columns 1 and 2.[23] After scaling by net PPE, local firm investment falls below pre-depreciation levels after depreciations, but multinational affiliate investment does not.

The evidence presented in Tables 2 and 3 demonstrates the differential reaction of multinational affiliates and local firms to currency crises. As discussed in Section 1, the competitiveness benefits of sharp depreciations would be expected to boost firm sales, assets and investment, but these effects could be outweighed by changed financing constraints. We turn next to an investigation of two hypotheses that are consistent with the distinctive responses to currency crises by these two types of firms. First, it is possible that both types of firms benefit from competitiveness effects, but local firms experience large changes in financial constraints that counteract any competitiveness effects from depreciations.

Alternatively, competitiveness effects may be stronger for multinational affiliates, and these effects alone may drive the differences in relative performance. Finally, we consider the robustness of these results and several alternative explanations.

4. Product Market Exposures and Differential Investment Responses

We employ two related approaches to investigate if differential investment opportunities arising from product market exposures explain the observed differential investment response of local firms and multinational affiliates. If multinational affiliates are outperforming local firms because of differential product market exposures, relative performance *amongst* affiliates should be a function of their product market exposures. Fortunately, the detailed multinational affiliate data allow for the creation of ratios of foreign sales to sales and net foreign sales (foreign sales less imported inputs) to sales to capture the degree to which affiliates are well-positioned to capitalize on the depreciations. We compute averages of these ratios for each affiliate over the three years prior to a crisis and use these ratios as part of interaction terms in specifications similar to those employed above. In these specifications, we also include more stringent fixed effects to further control for investment opportunities. Specifically, country/industry/year fixed effects are included.[24] Since these fixed effects are collinear with the depreciation dummies and the sample includes local firms as well as affiliates, these specifications only yield estimates of the activities of affiliates relative to local firms in years around the time of depreciations, and these estimates are the coefficients on the depreciation dummies for multinationals. Interaction terms using the ratios described above capture the extent to which the relative performance of affiliates differs for export oriented affiliates. The sample only includes firms in countries that experience crises, since firms in other countries do not help identify the magnitude of the industry effects that are now country specific. Table 4 displays results of tests using this approach.

The dependent variable in Table 4 is the log of firm capital expenditures, as in columns 1 and 2 of Table 3. The specification in column 1 includes the foreign sales share of affiliates (defined as the average share of affiliate sales outside of the affiliate's host country in the three years preceding a depreciation) interacted with the depreciation dummies for affiliates. In this setting, the coefficients on the multinational depreciation dummies indicate the relative performance of multinational affiliates that have no foreign sales, and the

interaction terms indicate the extent to which the relative effects of depreciations are a function of the extent to which affiliates sell output abroad. Specifically, the 0.0411 coefficient on the dummy for multinationals in the year prior to depreciations and the 0.3917 and 0.3520 coefficients on the dummies for multinationals in the year following and two years following depreciations imply that affiliates with no foreign sales increase investment by about 30% more than local firms, a result that approximates the basic results presented in Table 3. The –0.4308 coefficient on the foreign sales share variable interacted with the dummy that is equal to one for affiliates in the year before depreciations and the small and insignificant coefficients on these interaction terms for years after the depreciations indicate that affiliates focused on serving markets outside of their host country have low levels of investment relative to other affiliates (and local firms) prior to depreciations, but levels of investment that are similar to those of other affiliates (and higher than local firms) following depreciations.

The specifications presented in column 2 provide additional evidence that product market exposures provide an incomplete explanation for differences in how depreciations affect the investment of affiliates and local firms. In the specification presented in column 2, the net foreign sales share (defined as the average affiliate share of sales outside the host country less the average affiliate sales share of imports from the U.S.) is used in place of the foreign sales share in interaction terms. This variable captures not only the extent to which affiliates serve export markets but also the extent to which affiliates make use of a key source of imported inputs.[25] The results also reveal that affiliates that are exclusively locally focused outperform local firms by margins that approximate the results provided in Table 3. Again, affiliates with large net foreign sales invest less than locally-focused affiliates in the period prior to the depreciation. Following depreciations, however, affiliates that are export oriented and affiliates that exclusively serve local markets both invest considerably more than local firms. Using capital expenditures scaled by net ppe as the dependent variable provides similar results.

The prior analysis of the extent to which the differential investment response of affiliates can be explained by affiliate product market exposures can be criticized on several grounds. The measures of product market exposure use data on the location of buyers and suppliers, not the currency denomination of sales and input purchases, and these may differ.

Consequently, real exposures may not be fully captured by these measures. Furthermore, since detailed data on the sales and input purchases of individual local firms are not available, comparing effects for different kinds of affiliates to average effects for local firms may not be appropriate. In short, unobserved factors creating exchange rate exposures might confound the previous analysis.

In order to address these concerns, Table 5 presents a regression framework similar to that used in Table 4 but uses interaction terms that include a measure of the operating exposure of firms to exchange rates. Specifically, the correlation between a firm's operating profitability and the real exchange rate is used to measure firm-specific exchange rate exposure. This measure of operating exposure follows the large literature on exchange rate exposures pioneered by Adler and Dumas (1984) but substitutes operating profitability for firm value. Given the limited amount of data available for some firms prior to a depreciation, the exposures are computed using data from the entire sample period. Positive values of operating exposures measured in this way indicate that operating profitability tends to increase when the local currency depreciates relative to the dollar in real terms.

Table 5 parallels Tables 3 and 4 by investigating the determinations of the log of capital expenditures. In column 1, coefficients on the interaction between operating exposure and the depreciation time dummies provide estimates of the effect of operating exposure on the investment response of firms to depreciations. These specifications include country/industry/year and firm fixed effects so the depreciation dummies do not enter these specifications on their own. Reassuringly, the coefficient on the interaction term is positive and significant for the second year after depreciations and considerably higher than the coefficient on the pre-depreciation interaction term. These results indicate that firms that demonstrate improved operating profitability during depreciations invest more subsequent to the depreciation.

Of more interest to the investigation at hand, the specification in column 2 includes interactions of the depreciation dummies with the multinational affiliate dummies. Having controlled for differences in operating exposures, these interaction terms remain positive and significant for the years following a depreciation. As such, the results in Table 3 on the distinctive response of multinational affiliates do not seem to be driven by heterogeneity in operating exposures. The coefficients on the multinational dummies interacted with the

depreciation dummies in column 2 of Table 5 also do not differ substantially from the coefficients on these same terms in column 1of Table 3.[26] Neither the analysis of sales destinations across multinational affiliates nor the analysis of operating exposure indicates that the distinctive performance of multinational affiliates is the result of distinctive investment opportunities.

5. Financial Constraints and Differential Investment Responses

Since differences in investment opportunities arising from product market exposures do not appear to explain differences in the effects of depreciations on affiliates and local firms, we now consider an alternate explanation: a differential ability to overcome financial constraints.

5.1. Local Firms and Leverage Differences

If financial constraints contribute to the relative underperformance of local firms, then the relative performance *amongst* local firms should be dictated by the level and composition of leverage prior to the depreciation. While data on the duration of debt is not available for multinational affiliates, data on the level and duration of debt is available for local firms. For each local firm, we compute averages of the ratio of total debt to assets and the ratio of short term debt to total debt over the three years prior to a crisis. We then use the sample median level of these averages to classify if local firms have above or below medians levels of leverage and short term debt.[27] Dummies are included in interaction terms in the basic specifications from Table 3 to analyze if highly levered local firms, particularly those with short term debt, experienced the sharpest reductions in investment subsequent to depreciations. Local firms that rely heavily on short term debt are likely to face significant liquidity constraints, especially since interest rates often increase following depreciations. Table 6 presents the results for this analysis.

The specifications presented in Table 6 employ the log of capital expenditures as a dependent variable and the interaction terms of interest are those that discriminate amongst local firms on the basis of the level and duration of their leverage prior to the depreciation. In these three specifications, the coefficients on the post-depreciation dummy indicate how local firms with high leverage, high amounts of short term debt or firms with both characteristics

respond to the depreciations. In turn, the interaction terms indicate how the remaining local firms and how affiliates respond relative to these baseline coefficients.

In column 1, the coefficients indicate that local firms with high leverage are the firms associated with the low investment response. Indeed, the coefficients on the post-depreciation dummy and that variable interacted with the low leverage dummies are of similar magnitude but opposite signs, indicating that local firms with low leverage do not experience a sharp fall in investment. The coefficient on the post-depreciation dummy interacted with the multinational dummy indicates that affiliates increase investment. In column 2, the composition of debt is emphasized, and, similarly, firms with low amounts of short term debt do not experience a sharp investment drop. Finally, in column 3, the roles of the level and composition of debt are jointly considered and the results are even more stark. Local firms with low leverage and low amounts of short term debt experience investment increases subsequent to the depreciation as the coefficient on the relevant interaction term is greater, in absolute value, than the coefficient on the post-depreciation dummy alone. The increase in investment experienced by this set of local firms is similar in magnitude to the increase in investment of affiliates, as indicated by the coefficient on the depreciation dummy interacted with the multinational dummy. These results are robust to the use the ratio of capital expenditure to net PPE as the dependent variable. The average investment experience of local firms obscures much heterogeneity that is associated with their level and composition of leverage prior to the depreciation.

5.2. The Financing of Multinational Affiliates During Sharp Depreciations

While more granular data on local firms is not available, a closer look at the behavior of multinational affiliates provides further evidence on precisely how they circumvent financing constraints. Table 7 presents regressions that examine growth in different components of affiliate financing subsequent to depreciations. The results in columns 1-3 demonstrate that local debt, foreign debt (debt borrowed from non-local persons), and related party debt (debt borrowed from an affiliate's parent) all increase significantly in the year of depreciations. There are two interpretations of these results. First, new capital may flow to affiliates in one of these forms of debt. Second, if debt is denominated in foreign currency, then the reported increase in debt may simply reflect a revaluation of existing loans to reflect

the depreciation. This revaluation of existing debt would not necessarily include any new flows of capital. Since increases in debt occur in the year of depreciations and are larger for debt from foreign sources (which is more likely to be denominated in foreign currency), this revaluation effect is likely to explain at least some part of the growth in debt.

Examining changes in paid-in-capital provides cleaner measures of new capital infusions from the parents of affiliates. Paid-in-capital consists of the initial capital stock of an affiliate and any new equity infusions. This measure does not include retained earnings. Since this component of financing is measured in dollars, using historic exchange rates for translation when necessary, changes in the growth of paid-in-capital cannot be explained by changes in currency valuations.

Column 4 of Table 7 reports regression results where the dependent variable is the growth in paid-in-capital. The paid-in-capital of multinational affiliates increases in the years following depreciations, although this increase is only significant in the year after a depreciation. The coefficient estimates suggest that the paid-in-capital of multinational affiliates increases by 10.8% in the year after depreciations. This result provides direct evidence that new equity infusions from parent companies enable multinational affiliates in emerging markets to capitalize on investment opportunities after depreciations. In combination with the evidence provided on the impact of the level and composition of local firm debt, this evidence further confirms the role of internal capital markets in allowing multinational firms to overcome financial constraints that handicap local firms.

6. Alternative Explanations

It is also possible that the relative performance of multinational affiliates and local firms reflects other factors associated with the two types of firms. For example, as hypothesized in Blonigen (1997), the depreciations could be accompanied by an increased incentive for foreign multinationals to purchase emerging market corporations and exploit their intangible assets abroad. This explanation of investment dynamics during depreciations, hypothesized in the context of U.S.-Japan mergers and acquisition activity, is less likely to be relevant in the emerging market setting where fewer firms have intangible assets worth exploiting in developed markets. Moreover, much of the evidence presented above is on capital expenditures and therefore is less likely to be driven by acquisitions, as hypothesized

in this theory. The differential response of multinational firms could also reflect over-investment by multinational firms in the aftermath of currency crises rather than constrained under-investment by local firms. If over-investment was operative, it is hard to explain why the analysis of operating exposures discussed above yield significant results. Moreover, analysis presented in Desai, Foley and Forbes (2004) does not indicate that multinational firms experience a decrease in operating profits relative to local firms following deprecations.

More generally, it is conceivable that other differences between the two samples are driving the results. The descriptive statistics indicate that local firms are larger than multinationals, and such size differences could help explain the results. In order to consider this possibility, interactions of the lag of the log of firm sales and the depreciation dummies have been included in the specifications presented in Table 3, and the results are not substantively changed. It is also possible that non-random entry, exit or switching between multinational and local status may conflate the results. In order to consider this possibility, the specifications presented in Table 3 have been performed using a balanced panel of firms and only those firms that were present two years prior to the depreciations. These analyses generate results very similar to those presented in the paper.

Finally, reduced investment by local firms could reflect the corporate governance deficiencies of local firms. Johnson et al. (2000) model this possibility and, in their model, stealing increases as investment becomes less profitable in environments with weak governance. To examine the possibility of this alternative explanation, we employ the country-level governance variables used in Johnson et al. (2000), split the sample at median levels of these governance variables, and investigate if continued differential performance persists in the subsamples. Splitting the sample at the median level of judicial efficiency, rule of law, or enforceable minority shareholder rights indicates that multinationals outperform local firms in all subsamples. Only if the sample is split at the median level of accounting standards is there a subsample where multinationals do not outperform local firms, and this is the subsample of countries with low, not high, accounting standards.[28]

7. Conclusion

Affiliates of multinational firms expand sales, assets and investment subsequent to depreciations, while local firms show little change or a decrease in each of these measures of

operating activity. Results on the investment response of locally-focused multinational affiliates and results from tests that include additional controls for exchange rate exposures indicate that these patterns are not solely the result of differential investment opportunities arising from product market exposures. A differential ability to overcome financing constraints appears to contribute significantly to the differential performance of multinational affiliates. Those local firms with the greatest financial exposure experience the largest investment reductions. An analysis of multinational affiliates also illustrates that multinationals receive equity infusions from their parent companies after depreciations. These analyses demonstrate the importance of internal capital markets to multinational firms and the role of financing constraints in hindering firm growth when investment opportunities are attractive.

These findings also point to an underappreciated effect of foreign direct investment in emerging markets. The internal capital markets of multinational firms allow their affiliates to expand output after severe depreciations, precisely when economies are fragile and prone to severe economic contractions. As a consequence, multinational affiliates can mitigate some of the aggregate effects of currency crises. This analysis, however, does not explore the long-run distributional consequences of the differential impact of currency crises on multinational affiliates. Does increased economic activity due to multinationals during crises help support local firms through spillover effects, such as increased demand for local inputs, improved access to trade credit, or higher levels of employment? Or does increased multinational investment crowd out activity by local firms, with potentially persistent effects? While multinational firms appear to mitigate the contractionary output effects of severe depreciations, the longer term effects on local firms remain an open question.

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[1] Analyses of the consequences of foreign direct investment (FDI) for host economies typically center on the presence of technology spillovers, the labor and environmental practices of multinational firms, or the effects of tax competition on the fiscal base of areas hoping to attract foreign direct investment. See, for example, Aitken and Harrison (1999), Harrison and McMillan (2003), Eskeland and Harrison (2003), and Figlio and Blonigen (2000).

[2] The existing literature does not provide any direct guidance on whether multinational or local firms might be more likely to have dollar-denominated debt. Allayannis, Brown and Klapper (2003) study how firms choose between foreign and local debt but do not distinguish between local firms and multinational affiliates. This paper also points out how illiquidity in derivative markets might affect the capital structure and performance of firms during currency crises. Caballero and Krishnamurthy (2003) and Bris and Koskinen (2002) also indicate theoretically how different investment opportunities might motivate different currency denominations for financings.

[3] Bleakley and Cowan (2002) and Bleakley and Cowan (2004) use data that are well suited to address the role of currency mismatches and maturity mismatches in local borrowing.

[4] An important determinant of the magnitude of these effects is the extent to which exchange rate movements are "passed through" into local prices. Numerous studies, many of which are summarized in Goldberg and Knetter (1997), find that exchange rate pass through is incomplete.

[5] Johnson et al. (2000) and Mitton (2002) emphasize the importance of corporate governance in determining how devaluations affect firm stock prices during the Asian crises.

[6] See Aghion, Bachetta and Banerjee (2001) and Caballero and Krishnamurthy (2001) for formal models of how depreciations can interact with credit constraints to cause large output contractions. For a more general review of the links between finance and growth, see Levine (2004).

[7] Bris and Koskinen (2002) argue that currency crises may not in fact be exogenous but may be triggered by the corporate sector. Bris, Koskinen, and Pons (2004) find that firms in emerging market countries suffer following depreciations, suggesting that it is unlikely that firms strategically cause depreciations in this setting.

[8] This link between investment and leverage is modeled as a debt overhang problem in Myers (1977), and examined empirically in Whited (1992), Lang, Ofek and Stulz (1996) and Hennessy (2004). A related literature attempts to describe the effect of financing constraints by analyzing investment-cash flow sensitivities as detailed in Fazzari, Hubbard and Petersen (1988, 2000) and Kaplan and Zingales (1997, 2000). Currency crises provides a setting where investment opportunities improve and, as argued below, financing constraints are differentially increased across types of firms, thereby circumventing some of the difficult identification issues described in those papers.

[9] Aguiar (2005) shows that balance-sheet effects significantly constrained investment in Mexican firms after the 1994 peso crisis. On the other hand, Bleakley and Cowan (2002) find that any balance-sheet effects are outweighed by the positive competitiveness effects of depreciations for firms from five Latin American countries between 1990 and 1999. In related work, Allayanis, Brown and Klapper (2003) find no relationship between stock market performance and the use of foreign currency debt.

[10] There is reason to believe that affiliates are more involved in international product markets than local firms, although not more export oriented than local firms. Using aggregate data on U.S. multinational affiliates, Zeile (1997) and Mataloni (2003) point out that these affiliates account for a large fraction of U.S. trade and that they have imported more from the U.S. than they have exported to the U.S. in most years over the last two decades.

[11] For other work on the growth of firms, see Evans (1987b) and Hall (1987).

[12] Unfortunately, reliable data on the destination of sales and source of inputs of local firms are not available.

[13] The most extensive data are available for 1994 and 1999, when BEA conducted Benchmark Surveys. In non-benchmark years, reporting exemption levels were higher and less information is collected. Although wholly-owned and majority-owned affiliates report many accounting items and information concerning operations each year, minority-owned affiliates need only file information about sales, net income, assets, employment, employment compensation, and trade with the United States in non-benchmark years. Majority-owned affiliates are foreign affiliates in which the combined direct and indirect ownership claim by a U.S. parent exceeds 50 percent.

[14] There are several limitations with this data. First, although Worldscope attempts to correct for major differences in cross-country accounting standards, significant differences may still exist for certain variables. The analysis below addresses this problem by controlling for firm fixed effects. Second, there are a number of extreme and unrealistic outliers that undoubtedly represent reporting errors. The analysis below addresses this problem by performing an extensive set of sensitivity tests that includes removing outliers. Third, there is some chance that local firms are actually affiliates of multinationals based elsewhere in the world. Since U.S. parents wholly own more than 80% of their affiliates and affiliates are rarely publicly traded, however, there is little chance that firms classified as local are in fact U.S. MNEs.

[15] We match companies across datasets based on company numbers, sedol numbers, and/or company names. Then we test if the time series across the two datasets is consistent for seven data series: cash and equivalents, total assets, total liabilities, equity, sales, net income, and sales in U.S. dollars. If the time series for each of these variables is not consistent across the two CD-ROMs, the company is not treated as a "match" across the two data sources.

[16] In order to address the comparability of the two datasets, it would be helpful to have firms that are partially owned by multinationals that appear in both datasets. Unfortunately, very few such firms exist. Wholly owned affiliates dominate the multinational sample and most joint ventures are not publicly listed entities that appear in Worldscope. For the handful of firms that can be identified with certainty as being in both samples, it is reassuring to note that the financial and operating data are highly comparable. Differences between measures of sales, assets, and capital expenditures are small and for individual firms, series taken from the two data sets are highly correlated.

[17] More specifically, the resulting sample includes firms whose main BEA industry classification is in any industry between 010 and 0390 except for 070, 108, 124, 138, 148, and 150. The sample therefore includes firms that are active in the following broad categories of activity: agriculture, forestry, and fishing; mining; and manufacturing.

[18] We restrict our analysis to emerging markets as the literature has emphasized these settings for investigations of the role of financial constraints in mitigating the output response in the tradable sector that would be expected to accompany large depreciations.

[19] Price adjustments are based on annual producer prices (line 63..zf) whenever possible. If producer prices are not available, we use consumer prices (line 64..zf), or the most relevant price data available. Quarterly or monthly price information is not available for a majority of countries in the sample.

[20] If a country experiences a depreciation episode in a given year, the next year is excluded, so that a country can experience, at most, one depreciation event in any 2-year period. Moderate adjustments to the cutoff to qualify as a depreciation episode do not significantly affect the key results.

[21] The only exception is the Slovak Republic that is not included in the section on emerging markets or developed countries in the back of the *Economist*. We classify the Slovak Republic as an emerging market (which is the same classification as the Czech Republic).

[22] Since lagged values are required to compute growth rates, all observations from 1991 and all other observations of local firms and multinational affiliates that did not report in the previous period are dropped from the analysis.

[23] Qualitatively similar results are obtained if the denominator of this ratio is beginning of period net PPE.

[24] For these fixed effects, industries are defined at roughly the two digit SIC code level to ensure that country/industry/year cells contain both local and multinational affiliates.

[25] Ideally, we would like to use data on imports of inputs from all foreign countries, but such data are not available.

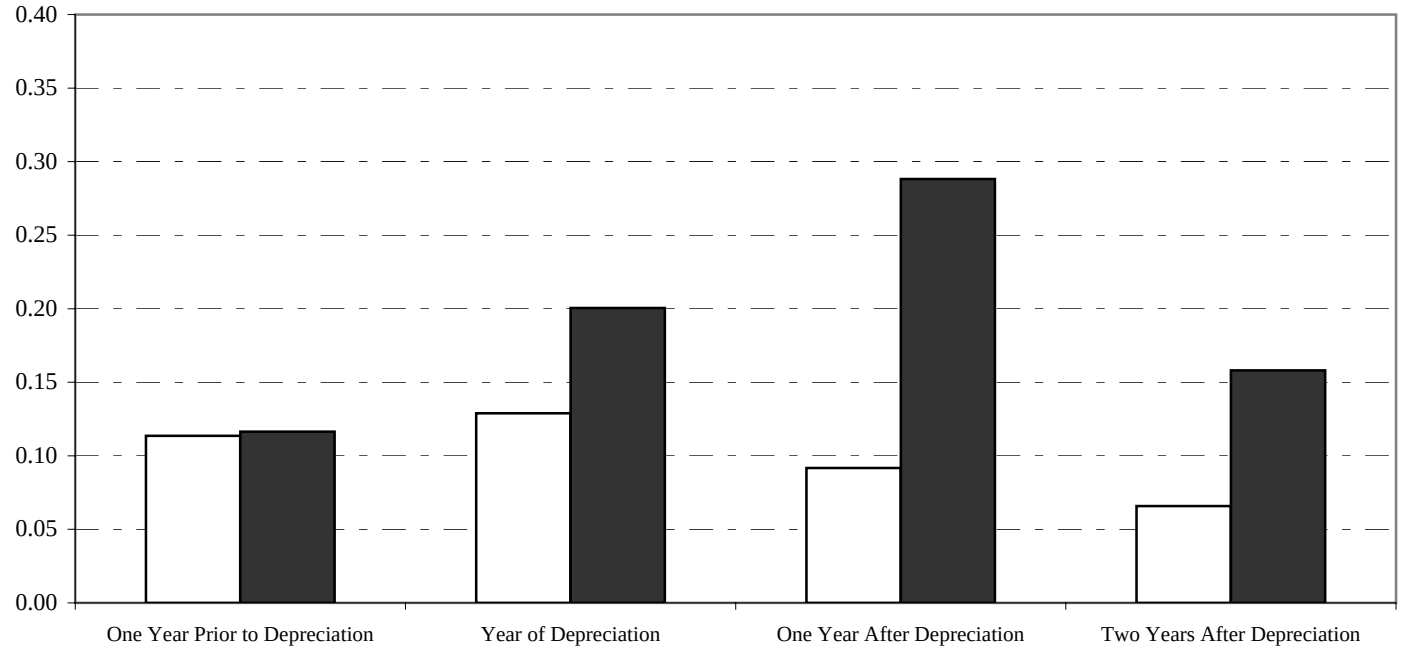
[26] We have also investigated an alternative measure of operating exposure as the measure employed in Table 5 relies on post-depreciation information. This alternative measure is the median exchange rate exposure of a firm type (either local or multinational affiliate) within an industry group. Said another way, firm-specific exchange rate exposures are calculated and median exchange rate exposures are drawn from industry-firm type cells. For this measure, the correlations of operating profitability and real exchange rates are computed using only pre-depreciation data but we have augmented the Worldscope CD data with Worldscope data from Datastream that dates back to 1982 and used BEA data going back to 1982. The results of tests using this measure are qualitatively similar to those presented in Table 5.

[27] These dummies are set equal to zero for all multinational affiliates.

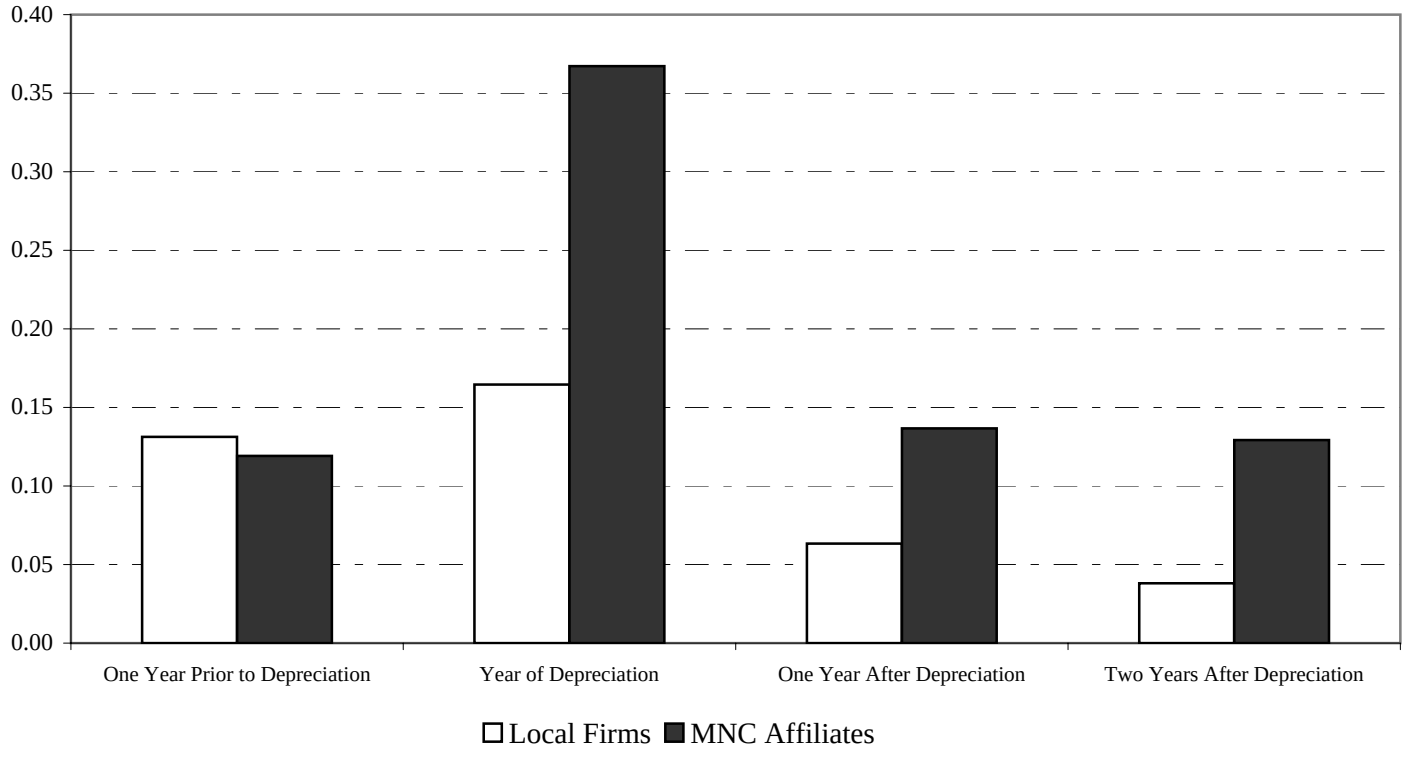
[28] This analysis is unreported but available from the authors.

Figure 1: The Differential Response of U.S. Multinational Affiliates and Local Firms During Currency Crises

Panel A: Sales Growth



Panel B: Asset Growth



Note: The panels compare the median growth rates of sales and assets of local firms and U.S. multinational affiliates. In each panel, the pairs of bars correspond to years relative to a currency crisis. Within each pair, the first bar represents the median growth rate for local firms and the second bar represents the median growth rate for the multinational affiliates.

Table 1
Descriptive Statistics for Local Firms and Multinational Affiliates

	Local Firms			Multinational Affiliates		
	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median
Log of Sales	15.0488	3.0231	14.5613	13.3198	2.9091	12.8418
Sales Growth	0.1266	0.3144	0.1096	0.1969	0.3759	0.1494
Log of Assets	15.4664	2.9699	14.9050	13.5045	2.7861	12.8514
Asset Growth	0.1460	0.2448	0.1128	0.1689	0.2958	0.1405
Log of Capital Expenditures	12.4075	3.1360	12.0052	10.2501	3.0486	9.7854
Capital Expenditures/ Net PPE	0.1967	0.1697	0.1522	0.2303	0.2259	0.1696
Foreign Sales Share	N/A	N/A	N/A	0.2841	0.3714	0.0748
Net Foreign Sales Share	N/A	N/A	N/A	0.1641	0.3790	0.0081
Operating Exposure	0.2287	0.1814	0.2784	0.2842	0.1648	0.3207
Leverage	0.4651	0.2099	0.4591	N/A	N/A	N/A
Short Term Share	0.3385	0.3687	0.3231	N/A	N/A	N/A
Price Index	115.3496	75.1014	103.2000	115.8554	67.7326	100.0000
Inflation	0.0796	0.1272	0.0459	0.1082	0.1434	0.0656
Growth in Local Debt				0.1401	0.6110	0.1291
Growth in Foreign Debt				0.1228	0.7418	0.0690
Growth in Related Party Debt				0.0852	0.8119	0.0000
Growth in Paid-in-Capital				0.0624	0.3446	0.0000

Note: Values of sales, assets, capital expenditures, net PPE, local debt, foreign debt, and related party debt are measured in thousands of local currency units. The growth rates are calculated as differences in log values. "Foreign Sales Share" is the average share of affiliate sales outside of the affiliate host country in the three pre-crisis years. "Net Foreign Sales Share" is the average affiliate's share of sales outside of the affiliate host country less the average affiliate sales share of imports from the US; averages are taken over the three pre-crisis years. "Operating Exposure" is the correlation between operating profitability and the real exchange rate at the firm level using data from 1991 to 1999. Operating profitability is defined as the ratio of the sales less the cost of goods sold to sales. "Leverage" is the average ratio of total debt to assets in the three pre-crisis years. "Short Term Share" is the average ratio of short term debt to total debt over the three pre-crisis years. The price index and inflation are taken from Datastream and measure prices and changes in prices in the host country. Local debt is borrowing by an affiliate from persons in the affiliate's host country. Foreign debt is borrowing by an affiliate from person's outside the affiliate's host country. Related party debt is borrowing by an affiliate from the affiliate's parent. Paid-in-capital includes equity capital investments in an affiliate, and this item is measured in U.S. dollars.

Table 2
Responses of Multinationals and Local Firms to Currency Crises

Dependent Variable:	Log of Sales		Sales Growth		Log of Assets		Asset Growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	12.8621	12.8581	1.3997	1.4149	12.8046	12.8235	2.8180	2.9006
	(0.6518)	(0.6531)	(0.4276)	(0.4269)	(0.7287)	(0.7511)	(0.3849)	(0.4061)
Price index	0.0048	0.0049			0.0044	0.0043		
	(0.0003)	(0.0003)			(0.0002)	(0.0002)		
Inflation			0.7361	0.7236			0.2050	0.1456
			(0.0534)	(0.0528)			(0.0375)	(0.0374)
Lag of Sales			-0.1419	-0.1424				
			(0.0200)	(0.0200)				
Lag of Assets							-0.2181	-0.2275
							(0.0112)	(0.0114)
$Depreciation_{t-1}$	-0.0712	-0.0782	-0.0185	-0.0147	-0.0286	-0.0265	-0.0223	-0.0217
	(0.0265)	(0.0262)	(0.0146)	(0.0145)	(0.0188)	(0.0186)	(0.0111)	(0.0111)
$Depreciation_{t}$	-0.0437		-0.0284		0.0376		0.0199	
	(0.0283)		(0.0154)		(0.0209)		(0.0127)	
$Depreciation_{t+1}$	-0.0787		-0.0845		-0.0219		-0.0624	
	(0.0316)		(0.0179)		(0.0228)		(0.0136)	
$Depreciation_{t+2}$	-0.1270		-0.0247		-0.0579		-0.0499	
	(0.0327)		(0.0144)		(0.0242)		(0.0114)	
Post Depreciation		-0.0852		-0.0414		-0.0143		-0.0266
		(0.0272)		(0.0114)		(0.0207)		(0.0098)
Multinational* $Depreciation_{t-1}$	0.0073	0.0174	-0.0580	-0.0593	-0.0147	-0.0168	-0.0147	-0.0218
	(0.0404)	(0.0397)	(0.0193)	(0.0192)	(0.0243)	(0.0240)	(0.0162)	(0.0163)
Multinational* $Depreciation_{t}$	-0.0447		0.0248		0.1256		0.1488	
	(0.0528)		(0.0210)		(0.0285)		(0.0183)	
Multinational* $Depreciation_{t+1}$	0.1466		0.1415		0.1019		0.0104	
	(0.0546)		(0.0251)		(0.0327)		(0.0197)	
Multinational* $Depreciation_{t+2}$	0.1898		0.0088		0.0779		0.0250	
	(0.0580)		(0.0242)		(0.0362)		(0.0176)	
Multinational* Post Depreciation		0.0841		0.0544		0.1130		0.0753
		(0.0456)		(0.0158)		(0.0278)		(0.0136)
No. of Obs.	27,969	27,969	19,627	19,627	27,767	27,767	19,476	19,476
R-Squared	0.9684	0.9683	0.5250	0.5235	0.9898	0.9898	0.5345	0.5221

Note: The dependent variable is the logarithm of sales in columns (1) and (2), growth in sales in columns (3) and (4), the logarithm of assets in columns (5) and (6), and growth in assets in columns (7) and (8). The sample used in all specifications includes U.S. multinational and local firms operating in emerging markets. Each specification includes industry/year and firm fixed effects. "Price index" is an index of producer prices (or consumer prices if producer prices are unavailable) in the host country; the base year of 1995 has a price index of 100. "Inflation" is the change in the producer price index over the period. Changes in consumer price indices are used if changes in producer price indices are not available. "Lag of Sales" is the log of sales in the previous period, and "Lag of Assets" is the log of beginning of period assets. The time sub-scripted "Depreciation" variables are a set of dummies equal to one in the year prior to, the year of, and the two years following a depreciation. "Post Depreciation" is a dummy equal to one in the year of and the two years following a depreciation. "Multinational" is a dummy set equal to one for affiliates of U.S. multinationals. Heteroskedasticity-consistent standard errors that correct for clustering of errors by firm appear in parentheses.

Table 3
Investment Responses of Multinationals and Local Firms to Currency Crises

Dependent Variable:	Log of Capital Expenditures	Log of Capital Expenditures	Capital Expenditures/ Net PPE	Capital Expenditures/ Net PPE
	(1)	(2)	(3)	(4)
Constant	7.5609	7.6623	0.2267	0.2228
	(0.9240)	(0.9401)	(0.2081)	(0.2162)
Price Index	0.0048	0.0047	0.0001	0.0001
	(0.0004)	(0.0004)	(0.0000)	(0.0000)
$Depreciation_{t-1}$	0.0362	0.0253	0.0122	0.0103
	(0.0522)	(0.0518)	(0.0074)	(0.0073)
$Depreciation_{t}$	0.0650		0.0070	
	(0.0570)		(0.0072)	
$Depreciation_{t+1}$	-0.2820		-0.0326	
	(0.0604)		(0.0073)	
$Depreciation_{t+2}$	-0.3942		-0.0373	
	(0.0625)		(0.0071)	
Post Depreciation		-0.2101		-0.0220
		(0.0506)		(0.0058)
Multinational*$Depreciation_{t-1}$	-0.0173	-0.0011	-0.0031	-0.0003
	(0.0719)	(0.0711)	(0.0111)	(0.0110)
Multinational*$Depreciation_{t}$	0.0790		-0.0215	
	(0.0797)		(0.0116)	
Multinational*$Depreciation_{t+1}$	0.5311		0.0619	
	(0.0887)		(0.0136)	
Multinational*$Depreciation_{t+2}$	0.4133		0.0460	
	(0.0934)		(0.0122)	
Multinational*Post Depreciation		0.3448		0.0257
		(0.0700)		(0.0095)
No. of Obs.	23,950	23,950	25,524	25,524
R-Squared	0.9382	0.9379	0.5817	0.5801

Note: The dependent variable in columns (1) and (2) is the log of capital expenditures, and the dependent variable in columns (3) and (4) is capital expenditures scaled by net property, plant, and equipment. The sample used in all specifications includes U.S. multinational and local firms operating in emerging markets. Each specification includes industry/year and firm fixed effects. "Price index" is an index of producer prices (or consumer prices if producer prices are unavailable) in the host country; the base year of 1995 has a price index of 100. The time sub-scripted "Depreciation" variables are a set of dummies equal to one in the year prior to, the year of, and the two years following a depreciation. "Post Depreciation" is a dummy equal to one in the year of and the two years following a depreciation. "Multinational" is a dummy set equal to one for affiliates of U.S. multinationals. Heteroskedasticity-consistent standard errors that correct for clustering of errors by firm appear in parentheses.

Table 4
Foreign Sales Exposures and Investment Responses of Multinationals and Local Firms

Dependent Variable:	Log of Capital Expenditures	Log of Capital Expenditures
	(1)	(2)
Constant	11.3694	11.4021
	(0.1382)	(0.1389)
Multinational Depreciation$_{t-1}$	0.0411	0.0126
	(0.0893)	(0.0803)
Multinational Depreciation$_{t}$	0.0435	0.0679
	(0.0992)	(0.0908)
Multinational Depreciation$_{t+1}$	0.3917	0.4195
	(0.1207)	(0.1072)
Multinational Depreciation$_{t+2}$	0.3520	0.3877
	(0.1382)	(0.1227)
Foreign Sales Share * Multinational Depreciation$_{t-1}$	-0.4308	
	(0.1758)	
Foreign Sales Share * Multinational Depreciation$_{t}$	-0.0125	
	(0.1973)	
Foreign Sales Share * Multinational Depreciation$_{t+1}$	0.0793	
	(0.2054)	
Foreign Sales Share * Multinational Depreciation$_{t+2}$	0.0886	
	(0.2349)	
Net Foreign Sales Share * Multinational Depreciation$_{t-1}$		-0.5281
		(0.1760)
Net Foreign Sales Share * Multinational Depreciation$_{t}$		-0.1707
		(0.1935)
Net Foreign Sales Share * Multinational Depreciation$_{t+1}$		-0.0255
		(0.1971)
Net Foreign Sales Share * Multinational Depreciation$_{t+2}$		-0.0533
		(0.2157)
No. of Obs.	14,984	14,984
R-Squared	0.9438	0.9438

Note: The dependent variable is the log of capital expenditures. The sample used in all specifications includes U.S. multinational and local firms operating in emerging markets that experience depreciations. Each specification includes country/industry/year and firm fixed effects. The time sub-scripted "Multinational Depreciation" variables are a set of dummies equal to one for multinationals in the year prior to, the year of, and the two years following a depreciation. "Foreign Sales Share" is the average share of affiliate sales outside of the affiliate host country in the three pre-crisis years. "Net Foreign Sales Share" is the average affiliate's share of sales outside of the affiliate host country less the average affiliate sales share of imports from the US; averages are taken over the three pre-crisis years. Heteroskedasticity-consistent standard errors that correct for clustering of errors by firm appear in parentheses.

Table 5
Operating Exposures and Investment Responses of Multinationals and Local Firms

Dependent Variable:	Log of Capital Expenditures	Log of Capital Expenditures
	(1)	(2)
Constant	11.2127	11.1787
	(0.1384)	(0.1404)
Operating Exposure * Depreciation$_{t-1}$	-0.2009	-0.1996
	(0.0541)	(0.0541)
Operating Exposure * Depreciation$_{t}$	-0.1431	-0.1398
	(0.0621)	(0.0621)
Operating Exposure * Depreciation$_{t+1}$	0.0417	0.0474
	(0.0729)	(0.0721)
Operating Exposure * Depreciation$_{t+2}$	0.2346	0.2405
	(0.0778)	(0.0773)
Multinational Depreciation$_{t-1}$		-0.0730
		(0.0785)
Multinational Depreciation$_{t}$		0.1085
		(0.0878)
Multinational Depreciation$_{t+1}$		0.4206
		(0.0987)
Multinational Depreciation$_{t+2}$		0.3411
		(0.1170)
No. of Obs.	13,637	13,637
R-Squared	0.9389	0.9392

Note: The dependent variable is the log of capital expenditures. The sample used in all specifications includes U.S. multinational and local firms operating in emerging markets that experience depreciations. Each specification includes country/industry/year and firm fixed effects. The time sub-scripted "Depreciation" variables are a set of dummies equal to one in the year prior to, the year of, and the two years following a depreciation. The time sub-scripted "Multinational Depreciation" variables are a set of dummies equal to one for multinationals in the year prior to, the year of, and the two years following a depreciation. "Operating Exposure" is the correlation between operating profitability and the real exchange rate at the firm level using data from 1991 to 1999. Operating profitability is defined as the ratio of the sales less the cost of goods sold to sales. Heteroskedasticity-consistent standard errors that correct for clustering of errors by firm appear in parentheses.

Table 6
Leverage Characteristics and Investment Responses of Multinationals and Local Firms

Dependent Variable:	Log of Capital Expenditures	Log of Capital Expenditures	Log of Capital Expenditures
	(1)	(2)	(3)
Constant	11.1462	11.0520	11.0249
	(1.0176)	(1.0137)	(1.0045)
$Depreciation_{t-1}$	0.0880	0.0143	0.0778
	(0.0785)	(0.0759)	(0.0908)
Post Depreciation	-0.3550	-0.3500	-0.4291
	(0.0902)	(0.0834)	(0.1097)
Low Leverage * $Depreciation_{t-1}$	-0.0806		
	(0.0977)		
Low Leverage * Post Depreciation	0.3437		
	(0.1116)		
Low Short Term Share of Debt * $Depreciation_{t-1}$		0.0682	
		(0.0979)	
Low Short Term Share of Debt * Post Depreciation		0.3652	
		(0.1111)	
High Leverage and Low Short Term Share * $Depreciation_{t-1}$			0.0312
			(0.1466)
High Leverage and Low Short Term Share * Post Depreciation			0.2161
			(0.1742)
Low Leverage and High Short Term Share * $Depreciation_{t-1}$			-0.1620
			(0.1362)
Low Leverage and High Short Term Share * Post Depreciation			0.1934
			(0.1514)
Low Leverage and Low Short Term Share * $Depreciation_{t-1}$			-0.0185
			(0.1203)
Low Leverage and Low Short Term Share * Post Depreciation			0.5676
			(0.1409)
Multinational * $Depreciation_{t-1}$	-0.0460	0.0284	-0.0342
	(0.0901)	(0.0878)	(0.1001)
Multinational*Post Depreciation	0.5121	0.5073	0.5869
	(0.1012)	(0.0951)	(0.1184)
No. of Obs.	17,950	17,939	17,939
R-Squared	0.9419	0.9419	0.9420

Note: The dependent variable is the log of capital expenditures. The sample used in all specifications includes U.S. multinational and local firms operating in emerging markets that experience depreciations. Each specification includes country/industry/year and firm fixed effects. Each specification includes industry/year and firm fixed effects. The time sub-scripted "Depreciation" variables are a set of dummies equal to one in the year prior to, the year of, and the two years following a depreciation. "Post Depreciation" is a dummy equal to one in the year of and the two years following a depreciation. "Multinational" is a dummy set equal to one for affiliates of U.S. multinationals. "Low Leverage," "High Leverage," "Low Short Term Share" and "High Short Term Share" are dummy variables set equal to one if the local firm is either below or above the relevant median of the sample. Coefficients on price indices are not presented. Heteroskedasticity-consistent standard errors that correct for clustering of errors by firm appear in parentheses.

Table 7

Financing Responses of Multinationals to Currency Crises

Dependent Variable:	Growth in Local Debt	Growth in Foreign Debt	Growth in Related Party Debt	Growth in Paid-in-Capital
	(1)	(2)	(3)	(4)
Constant	1.1335	-0.6397	0.6131	0.3137
	(0.4222)	(0.4869)	(0.4159)	(0.3391)
Lagged Value	-0.0787	-0.0597	-0.0663	-0.0915
	(0.0282)	(0.0175)	(0.0164)	(0.0283)
Inflation	0.5428	0.1361	0.3679	0.0300
	(0.3385)	(0.4265)	(0.4013)	(0.1034)
$Depreciation_{t-1}$	-0.0165	-0.0427	-0.0774	-0.0077
	(0.0687)	(0.0895)	(0.0937)	(0.0288)
$Depreciation_{t}$	0.1798	0.3517	0.2480	0.0276
	(0.0792)	(0.1055)	(0.1160)	(0.0298)
$Depreciation_{t+1}$	-0.1092	-0.0472	-0.1568	0.1079
	(0.0952)	(0.1187)	(0.1223)	(0.0411)
$Depreciation_{t+2}$	0.0092	0.0135	-0.0504	0.0281
	(0.0971)	(0.1167)	(0.1370)	(0.0436)
No. of Obs.	3,153	3,153	3,153	4,377
R-Squared	0.5127	0.4912	0.4644	0.4310

Note: The dependent variable is the growth in debt borrowed from local persons in column (1), the growth in debt borrowed from foreign persons in column (2), the growth in debt borrowed from related parties in column (3), and the growth in paid-in-capital in column (4). The sample used in all specifications is comprised of U.S. multinationals operating in emerging markets. Each specification includes industry/year and firm fixed effects. "Lagged Value" is the log of the value of the component of sales or financial capital in the previous period. "Inflation" is the change in the producer price index over the period. Changes in consumer price indices are used if changes in producer price indices are not available. The time sub-scripted "Depreciation" variables are a set of dummies equal to one in the year prior to, year of, and the two years following a depreciation. Heteroskedasticity-consistent standard errors that correct for clustering of errors by firm appear in parentheses.