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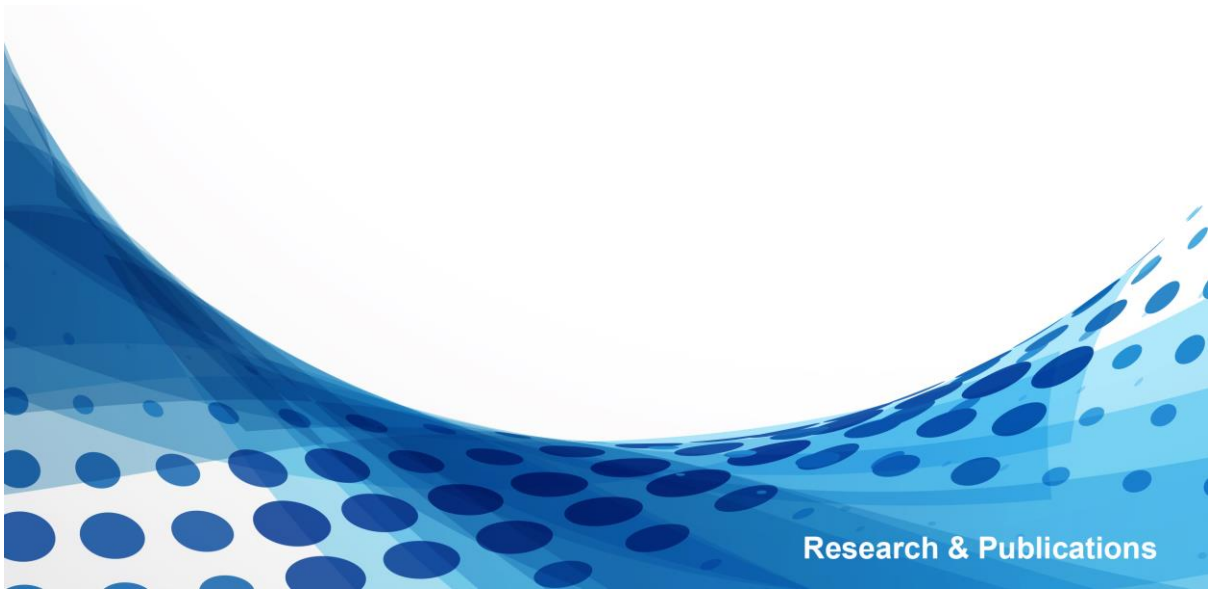

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Abstract

This study examines the relationship between foreign currency borrowing and financing constraints for Indian firms. Using panel data for 2,512 non-financial listed firms in India during 1996-2016, this study finds that the sensitivity of investment to internal cash flows, an indicator of financing constraints, is higher for firms with foreign currency debt exposure compared to other firms. Financing constraints are higher prior to new foreign currency borrowing compared to a matched sample of firms with only domestic borrowing, but decrease after foreign borrowing, suggesting that foreign debt reduces firms' financing constraints. Moreover, firms that have relationships with either private or foreign banks have higher financing constraints when undertaking new foreign borrowing compared to those enjoying exclusive relationships with only government-owned banks. The financing constraints for foreign currency borrowers are also found to be higher during domestic credit booms compared to other periods. Non-manufacturing firms and those with lower than median export revenues and higher than median tangible assets experience greater financing constraints compared to other firms when they borrow in foreign currencies. These findings provide new evidence on the role of foreign currency borrowing in mitigating financing constraints in emerging market economies.

Keywords: Foreign currency debt, financing constraint, cash flow, investment

JEL Codes: F34, G31, G21, E32

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1. Introduction

Firms in emerging market countries usually borrow in international credit markets to access debt financing at a lower cost than in the domestic market. Emerging market firms, however, often find it difficult to issue international debt in their own currency due to the negative perception of the quality of their country's institutions and macroeconomic fundamentals. Such firms, therefore, rely on foreign currency borrowing when accessing international credit markets. Larger and more creditworthy firms, and those with foreign currency revenues, are typically better positioned to issue debt in foreign currencies (Gelos, 2003).

Excessively accommodative monetary policies in advanced economies and abundant global liquidity after the financial crisis of 2008-09 encouraged firms in emerging market economies to increase their borrowing in foreign currencies (Caballero, Panizza, and Powell, 2016). Recent studies have documented that a persistent interest rate differential between advanced and emerging market economies creates opportunities for carry trade, and encourages increased foreign currency borrowing by emerging market firms (Acharya and Vij, 2017; Bruno and Shin, 2017; Huang, Panizza and Portes, 2018).[1] Foreign currency borrowing by firms can lead to a worsening external debt position of the corporate sector and is also a potential source of macroeconomic and financial instability (Vieira, Holland, and Resende, 2012; Huang and Kishor, 2017; Ongena et al., 2018; Yamani 2016).

An inadequate supply of domestic credit to firms in emerging market economies can hamper firms' investment activities and long-run growth. Access to foreign finance can alleviate such financing constraints (Harrison, Love, and McMillan, 2004). Harrison et al. (2004) show that direct foreign investment inflows and low restriction on capital account transactions are associated with a decrease in financing constraints for both domestically-owned enterprises

[1] A carry trade is a transaction where an investor or firm borrows at a low interest rate in one country and invests in assets that yield a higher return in another currency.

and firms without foreign assets. The recent literature on foreign currency borrowing, however, has not considered how such borrowing is related to firms' financing constraints.

This study uses detailed balance sheet data for 2,512 non-financial listed firms in India for the 1996-2016 period and provides new evidence on the relationship between the firms' foreign currency borrowing and their financing constraints. The sensitivity of investment to internal cash flows is a well-known measure of firms' financing constraints (Fazzari, Hubbard, and Peterson, 1988, 2000; Hubbard, 1998; Love, 2003). A detailed discussion of this measure is provided in Section 2.2. Using this measure, financing constraints are found to be higher for the firms with foreign currency debt compared to other firms. This result holds for a range of foreign currency debt indicators: (a) foreign debt outstanding in the last 5 years; (b) foreign currency debt outstanding currently; and (c) new foreign currency borrowing during the current year. Further, the sensitivity of investment to internal cash flows is found to be higher prior to new foreign currency borrowing, and decreases following new foreign currency borrowing, compared to a matched sample of domestic currency borrowers.

Since financing constraints can vary over the credit cycle (Beck, Degryse, De Haas, and Van Horen, 2018), an analysis of financing constraints is conducted in the context of the firms' foreign currency borrowing over the different phases of the credit cycle. The results indicate that during credit boom periods, the firms that borrow in foreign currencies are found to be more financially constrained than those with only domestic currency borrowing. Since credit booms are typically characterized by greater investment opportunities, this finding suggests that firms facing domestic financing constraints and with access to international credit markets use that access to raise additional foreign currency debt. However, no such differences are found for the non-boom periods.

Financing constraints for the firms with foreign-currency borrowing are found to be lower in the years following the global financial crisis, compared to the pre-crisis period. This is most likely attributable to accommodative global monetary conditions and easier access to foreign credit (Azis and Shin, 2015). The firms that have relationships with either privately-owned banks or foreign-owned banks are found to face higher financing constraints when undertaking new foreign borrowing than those firms that have exclusive relationships with government-owned banks.

Next, the effect of the firms' characteristics, such as sector, exports, and asset tangibility, on the relationship between financing constraints and foreign currency borrowing is examined. These findings suggest that non-manufacturing firms, firms with below-median export revenues, and those with higher than median tangible assets experience greater financing constraints compared to other firms when they borrow in foreign currencies.

This study makes several novel contributions to the literature on international finance relevant for emerging market economies. To the best of knowledge, this is the first research of its kind to provide evidence of the relationship between foreign-currency debt and financing constraints for India, the second-largest emerging market economy after China. Second, this study provides insights into how firms' financing constraints evolve prior to, during, and after foreign currency borrowing. Third, it demonstrates the extent to which global and domestic macroeconomic conditions, banks' ownership status, and firms' characteristics influence the relationship between financing constraints and foreign currency borrowing.

In the next section, the two strands of literature are reviewed, one on corporate foreign debt and the other on financing constraints. Section 3 presents the empirical strategy and a description of the data used to conduct the analysis. Section 4 discusses the main findings, and finally, the last section concludes with a summary and policy implications.

2. Foreign currency borrowing and financing constraints: Literature review

2.1 Foreign currency borrowing by firms

Eichengreen, Hausmann, and Panizza (2005) refer to the high ratio of foreign currency liabilities to total international liabilities as the original sin, in order to describe the inability of most developing countries to issue foreign debt in their domestic currency. Caballero and Krishnamurthy (2003) argue that the limited financial development of emerging market countries is a major reason for a large part of their external debt being denominated in foreign currencies. However, Vieira, Holland, and Resende (2012) argue that the foreign currency denomination of debt is a rational response to future inflation associated with investors' expectations of debt default observed in highly-indebted economies.

Recent literature attributes firms' foreign currency borrowings in emerging market economies to the carry trade motive, which relies on arbitrage opportunities stemming from interest rate differentials between emerging market economies and advanced economies. Bruno and Shin (2017) use firm-level analysis of borrowing in US dollars by non-financial corporates outside the United States and find that emerging market firms with high cash holdings are more likely to issue US dollar-denominated bonds under favorable dollar carry trade conditions. Acharya and Vij (2017) use data for Indian non-financial firms for the 2004-2015 period to show that the propensity to issue foreign currency debt is higher when the dollar carry trade is more profitable. The authors find that external commercial borrowing became more prevalent after the global financial crisis and that firms with low leverage were more likely to issue foreign currency-denominated debt, witness an increase in cash holding, and face greater foreign currency risk. Huang, Panizza, and Portes (2018) analyze international bond issuance by non-financial Chinese firms and find their dollar-denominated bond issuance to be positively correlated with the interest rate differential between domestic and foreign interest rates.

Gelos (2003) uses data on Mexican firms to show that the share of foreign currency-denominated debt in total debt is positively correlated with imports, exports, and the size of the firm. Mora, Neaime, and Aintablian (2013) use survey data on Lebanese firms to examine the decision of small firms to access dollar credit from domestic banks. They find that firms which rely on formal financing (banks and supplier credit) are more likely to obtain dollar debt than those that are reliant on informal financing channels, such as family, friends, and moneylenders. Nandy (2010) uses UK and Canadian firm-level data to find strong evidence to support the fact that firms with substantial foreign sales have a higher probability of raising bank loans in foreign currencies; and that both maturity and the secured status of debt affect the currency choice of the loans.

Several studies examine whether the surge in corporate foreign currency debt in recent years is attributable to the rise in demand by emerging market firms or is driven by supply-side considerations. Brown, Kirschenmann, and Ongena (2009) use a unique dataset of more than hundred thousand loans granted by one bank to sixty thousand different firms in Bulgaria to show that foreign currency borrowing is not only driven by borrowers who try to benefit from lower interest rates, but also by banks hesitant to lend for the long-term in local currency. Basso, Calvo-Gonzalez, and Jurgilas (2011) find that foreign-owned banks in transitional economies in Europe prefer lending in foreign currencies because they have easier access to foreign currency funds. Based on survey data from 193 banks in 20 emerging market countries in Europe, Brown, and Haas (2010) find the macroeconomic environment of a country to be a major determinant of the currency denomination of borrowing.

Borrowing in foreign currencies, however, has its own risks for firms, such as increased exposure to exchange rate volatility. Unhedged foreign currency debt can increase the debt burden in local currency terms during times of sharp exchange rate depreciation (Aghion et al., 2000; Krugman, 1999). However, this may not be a significant concern for exporting firms

with revenues in foreign currencies, which provides a natural hedge for their foreign currency debt (Mora et al., 2013). Non-exporting firms with a high share of imported inputs can also be adversely affected by currency depreciation as the price of imports in the domestic currency would rise. Excessive foreign currency borrowing by firms can also result in macroeconomic and financial instability (Acharya et al., 2015; Bordo, Meissner, and Stuckler, 2010).

2.2 Financing constraints and investment

Fazzari et al. (1988) interpret firms' sensitivity of investment to internal cash flows as a measure of financing constraints. According to the authors, internal and external finance are not perfect substitutes for each other since external financing is more costly than internal financing. The authors use US manufacturing firms' data to find evidence in support of their theory that a firm which faces difficulty in obtaining outside finance will display excess sensitivity to the availability of internal funds in its investment decisions. Several other studies use a similar methodology and, accordingly, divide firms on the basis of some observed characteristics to study the cash flow sensitivity of investment for those groups, and attribute any significant difference in this sensitivity to a difference in financing constraints. For example, Hoshi, Kashyap, and Scharfstein (1991) apply this rationale to two sets of Japanese firms, one with close financial relationship and the other with weak relationships with large financial institutions. They find that investment is more sensitive to internal cash flow for the second sets of firms.[2] Hubbard (1998) provides an extensive review of the use of the cash flow sensitivity of investment as a measure of firms' financing constraints.

[2] Other models of financing constraints exist but require more data. The Tobin's Q investment model requires the market value of equity to determine future growth opportunities and cannot be applied to unlisted firms. Whited (1992) uses an Euler equation model instead of Tobin's Q investment model because his sample also includes small firms for which calculation of the market value of equity was not possible. The model developed by Whited (1992) has found use in a number of studies including Laeven (2003), Love (2003), and Harrison, Love, and McMillan (2004).

In a study using firm-level data for 36 countries, Love (2003) finds that the level of overall financial development negatively affects the financing constraints of firms. The author argues that financial development impacts growth by reducing financing constraints that would otherwise distort the efficient allocation of investment. Laeven (2003) uses panel data for 13 developing countries and finds that financial liberalization affects small and large firms differently. According to the author, small firms are financially constrained before the liberalization process and financial liberalization eases their financing constraints, while financing constraints of large firms are low before financial liberalization, but increase after financial liberalization. Harrison et al. (2004), in a cross-country study for 38 countries, find that direct foreign investment is associated with lower financing constraints, as measured by the cash flow sensitivity of investment in a Euler investment model. The authors further find that restrictions on capital account transactions are also associated with higher financing constraints.

Arslan, Florackis, and Ozkan (2006) use data for non-financial Turkish firms to study how the cash holding level of firms impacts their investment-cash flow sensitivities. Pawlina and Renneboog (2005) use UK firm-level data during the 1992-1998 period to study financing constraints using cash flow sensitivity of investment and find the agency cost of free cash flows to be the main source of their investment-cash flow sensitivity. Poncet, Steinger, and Vandenbussche (2010) use Chinese firm-level data set over the period 1998–2005 and find that private Chinese firms face higher cash flow sensitivity of investment compared to state-owned and foreign-owned firms. Francis, Hasan, Song, and Waisman (2013) use firm-level data for 14 emerging market countries and show that firms with better corporate governance have lower dependence on their internal cash flows. They also find that direct foreign investment and restrictions on capital account transactions are associated with lower financing constraints. Pindado, Requejo, and De La Torre (2011) use data on firms in the Eurozone for the 1996-

2006 period and find that family-owned firms show significantly lower investment cash flow sensitivity than other classes of firms. Moshirian, Nanda, Vadilyev, and Zhang (2017) use firm-level data for 41 countries for the 1993–2013 period and find that the cash flow sensitivity of investment declined in developed economies, which they attributed to a declining share of tangible capital. The authors also find that in comparison to advanced economies, firms in developing countries have higher tangible capital and show a more stable relationship between investment and cash flows.

Ghosh (2006) uses a panel dataset of listed Indian manufacturing firms for the 1995–2004 period to show that financial liberalization led to a significant easing of financing constraints for Indian firms. Srinivasan and Thampy (2017) analyze banking relationships and cash flow sensitivity of investment using a sample of listed non-financial Indian firms. They find that firms with exclusive banking relationships with government-owned banks, in general, have lower investment cash flow sensitivity than firms with relationships with foreign or private banks. George, Kabir, and Qian (2011) use Indian firm-level data for 1997–2000 to analyze the cash flow sensitivity of investment for business group-affiliated and other independent firms. Their empirical results show positive and statistically significant cash flow sensitivity of investment for all firms, but no significant difference in the sensitivity between Indian group-affiliated and other firms. Sasidharan, Lukose, and Komera (2015) examine research and development (R&D) expenditure for Indian manufacturing firms in the 1991-2011 period and find significant sensitivity of R&D investment to internal cash flows, especially for small and young firms.

3. Empirical strategy and data

3.1. Econometric methodology

This section describes the methodology used to measure financing constraints among Indian firms with and without foreign currency borrowing. A similar methodology is used for measuring firms' cash flow constraints as employed by earlier studies, such as Fazzari et al. (1988), Ghosh (2006), George, Kabir, and Qian (2011), and Srinivasan and Thampy (2017). Firms' investment is regressed on the Tobin's Q (an indicator of future growth opportunities) and internal cash flows, while controlling for firms' characteristics and industry-specific time-varying shocks. A higher value of sensitivity of investment to internal cash flows is interpreted as an indicator of greater financing constraints. The investment model is used to measure financing constraints for Indian firms that have issued foreign currency debt relative to a control group of non-issuers. The baseline estimation is given in the equation (1) below:

$$\left(\frac{I_{i,t}}{K_{i,t-1}}\right) = \alpha + \beta * \left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \gamma * \left(\frac{CF_{i,t}}{K_{i,t-1}}\right) * FCB_{i,t} + \pi * FCB_{i,t}$$

$$+ \delta * Q_{i,t-1} + \varphi * \boldsymbol{Z}_{i,t-1} + \theta_i * \rho_t + \mu_i + \varepsilon_{i,t} \qquad (1)$$

The dependent variable (*I/K*) is investment as a share of lagged fixed assets (property, plant, and equipment). The interaction of cash flows as a share of lagged fixed assets (*CF/K*) and a dummy variable for foreign currency borrowing (*FCB*) is used to measure the additional effect of foreign borrowing on firms' financing constraints. The variable *Q* is Tobin's Q measured as the market value of firms' assets divided by the book value of assets. The vector $\boldsymbol{Z}$ includes other firm-specific covariates included in the regression, such as log of total assets, and leverage. The logarithm of total assets is used as a proxy for the size of the firm, while leverage (total debt as a share of total assets) is included since higher leverage can negatively impact a

firm's investment (Aivazian, Ge and Qiu, 2005). To control for industry-specific temporal shocks, which may influence investment by firms, the interaction of industry dummies (θ_i) and year dummies (ρ_t) are included in all specifications. Industry dummies correspond to the 2-digit Indian National Industry Classification (NIC) code. Additionally, firm-specific fixed effects (μ_i) are included in all the specifications.

In alternative specifications, the *FCB* variable is allowed to range from a broad definition to progressively narrower definitions—from any foreign borrowing in the last five years, to foreign debt outstanding currently, and finally to only *new* foreign borrowing—as described in the next section. The variation in firm financing constraints in the years prior to and after new foreign borrowing is analyzed next. Further, the implications of the type of firms' banking relationship (i.e., whether a firm has relationships with government-owned banks, privately-owned banks, or foreign-owned banks) on the financing constraints of firms with and without foreign currency debt are analyzed. The sample period is then divided into credit booms and other periods, and into pre- and post-financial crisis periods, to understand if the financing constraints of foreign-currency borrowers differ across these sub-periods. The variation in financing constraints for foreign-currency borrowers with firm size (based on total assets) is also studied.

3.2. Firm-level and macroeconomic variables

The Centre for Monitoring Indian Economy's (CMIE) Prowess database is used to obtain annual company-level data for this study. The Prowess database includes detailed information about Indian firms, such as profit and loss accounts, balance sheets, banking relationship, and ownership structure. The sample includes data for all publicly traded non-financial firms in India during 1996-2016. The final sample only contains data for the firms with average total assets greater than 1 million rupees and annual sales greater than 0.1 million rupees (both

measured in Indian Rupees and at 2010 prices). Firms whose banking relationship information is not available are dropped from the sample. The final sample consists of 25,785 firm-year observations for 2,512 unique firms, including 17,739 firm-year observations for 1,596 manufacturing firms and 8,046 for 916 services firms.

The firms' balance sheet variable on foreign currency debt (in a currency other than Indian rupees) is used to construct the foreign currency borrowing indicator. It is defined in three ways: (a) a broad definition based on any foreign currency debt outstanding over the last five years (as a proxy for recent access to foreign debt); (b) foreign currency debt outstanding currently; and finally, (c) a narrow definition of new foreign borrowing in the current financial year. An increase in foreign debt outstanding does not necessarily imply new net foreign borrowing by firms. For example, outstanding debt may increase due to exchange rate movements. Hence, in defining the new foreign debt (*New FD*) indicator, only instances where foreign currency debt outstanding changes from zero in the previous year to positive in the current year are considered. 1,020 such instances of new foreign borrowing are found in the sample. Note that the *New FD* indicator excludes additional foreign borrowing when there is foreign debt outstanding in the current year.

The Prowess database provides the names of all banks with which a firm has a banking relationship in a given year. This information is used to classify firms' banking relationship type into three categories: firms with exclusive relationships with government-owned banks (GOB); firms with a relationship with at least one foreign-owned bank (FOB); and, firms with a relationship with at least one domestic privately-owned bank (DPOB) but not with any government-owned or foreign-owned bank. Srinivasan and Thampy (2017) use a similar classification of banking relationships. The first category, GOB, includes the possibility that a firm may have a relationship with more than one government-owned bank, while the other categories include the possibility of a non-exclusive relationship with government banks.

Macroeconomic variables for India used in this analysis include the consumer price index (CPI) and domestic credit, obtained from the International Monetary Fund's International Financial Statistics database. The CPI is used to convert nominal amounts for macroeconomic and financial variables into constant 2010 rupees terms. Quarterly domestic credit growth in constant 2010 (real) terms is used to identify periods with a significant rise in real credit to the private sector in comparison to the average real credit growth for the full sample. A financial year is classified as part of a credit boom period if the growth of real domestic credit in at least three out of four quarters of the year is higher than the average credit growth for the full sample period. This classification gives four credit boom periods: 1999-2001, 2002-03, 2004-09, and 2010-12. The remaining periods are classified as other (non-boom) periods. The variable definitions are provided in Appendix Table 1 and summary statistics are provided in Appendix Table 2.

4. Results

4.1. Foreign currency debt exposure and financing constraints

In order to estimate the impact of foreign currency borrowing on firms' cash flow sensitivity of investment, as discussed earlier, several measures of firms' exposure to foreign currency debt are used. Table 1 reports the results of these estimations with investment as a share of fixed assets (*I/K*) as the dependent variable. Column (1) reports the results without any interaction terms while columns (2)-(6) report the interaction of cash flows (*CF/K*) with various measures of the firm's foreign debt. All the regressions include firm-level controls for lagged

firm size, lagged leverage, Tobin's Q, and firm fixed effects. Industry-year fixed effects are included in all specifications in order to account for time varying industry-specific shocks.

In Table 1, the first column shows that firms' investments are positively and significantly related to their cash flows for the full sample, with investment as a share of fixed assets (I/K) rising by 0.285 for each unit increase in cash flows as a share of assets (CF/K). Column (2) shows the interaction of (CF/K) with foreign debt over the last 5 years. Firms with foreign debt in the last five years have an additional cash flow sensitivity of investment of 0.066 relative to those firms without foreign debt. In column (3), the interaction of cash flows with the indicator for foreign debt outstanding currently is used. The additional cash flow sensitivity of investment for this group rises to 0.167 compared to firms without foreign debt. Column (4) shows the results for the new foreign borrowing (*New FD*) indicator defined earlier. The additional cash flow sensitivity of investment rises to 0.248 for this narrowest definition of foreign borrowing, relative to firms without foreign debt. In column (5), an interaction of Tobin's Q with cash flows is also included, in order to account for the possibility that additional cash flows may allow a firm to respond to growth opportunities (proxied by Tobin's Q). The coefficient representing the additional cash flow sensitivity of investment remains statistically significant and fairly stable in magnitude, though declining slightly to 0.237.

These results in columns (1)-(5) of Table 1 show that as the definition of the foreign currency borrowing indicator becomes narrower, the magnitude of the interaction term for cash flows with the foreign debt indicator increases. Taken together, these results imply that the firms' borrowing in foreign currency are more financially constrained than other firms, and that financing constraints are the highest during the year of new borrowing. Column (6) reports the interaction of cash flows with a continuous variable, the share of foreign currency debt in total assets. The results show that as foreign debt as a share of total assets rises from 0 to 1, the cash

flow sensitivity of investment rises by 0.895. In other words, a 10-percentage point increase in foreign debt (as a share of total assets) is associated with a 0.089 higher cash flow sensitivity of investment. The results for the continuous foreign debt variable are consistent with the finding for the discrete foreign currency borrowing indicators.

4.2. Financing constraints prior to and after foreign currency borrowing

This section attempts to understand how financing constraints vary in the period leading up to new foreign borrowing and during the subsequent period. The results reported in Table 2 show the firms' cash flow sensitivity of investment in a 5-year window of foreign borrowing, from two years prior to new foreign debt (*New FD*) until the subsequent two years (i.e., from year t-2 to year t+2). Only instances where foreign debt outstanding is zero in the two years prior to the year of *New FD*, and positive in the following two years are considered.

Firms' cash flow sensitivity of investment increases as the year of new foreign borrowing approaches (see column (1) in Table 2). This additional sensitivity rises from 0.114 two years prior to foreign borrowing to 0.163 one year before foreign borrowing, and is the highest at 0.269 in the year of new foreign borrowing. As shown in column (2), the additional cash flow sensitivity of investment decreases in the subsequent two years. Column (3) includes both the years prior to and subsequent to foreign borrowing, and shows a similar pattern as columns (1) and (2).

It is possible that the sample of new foreign borrowers may differ systematically from the ones without any foreign debt. For instance, such firms may be larger and have access to foreign currency export revenues. In order to account for such potential selection bias, a propensity score matching method proposed by Abadie, Drukker, Herr, and Imbens (2004) is used to create a counterfactual sample of only domestic currency borrowers. The propensity score is calculated from a logistic regression of foreign currency borrowing on the firms' and industry

characteristics. The following categorical variables are included in this regression: NIC two-digit industries dummies, a dummy for business group (equal to 1 if a firm is part of a business group), a manufacturing sector dummy, and year dummies. The non-categorical variables include firm size (logarithm of assets), firm age (since the year of incorporation), return on assets (ROA), tangibility ratio (fixed assets as a share of total assets), and exports-to-sales ratio. The propensity score is then used to match each firm-year observation for new foreign currency debt with another firm-year observation without any foreign currency borrowing but new net domestic borrowing in that year (a positive change in domestic currency debt), using a one-to-one nearest neighbor matching technique.[3]

The results for the matched counterfactual sample of domestic currency borrowers reported in columns (4)-(6) of Table 2 shows a similar pattern to foreign-currency borrowers during the five-year window. There is an increase in financing constraints in the period leading up to new domestic-currency debt and a decline in the subsequent period, as shown in the interaction terms for cash flow sensitivity of investment in columns (4)-(6). Figure 1 presents the coefficient of the additional cash flow sensitivity of investment over the five-year time window for foreign currency borrowers (from column (3) of Table 2) and the matched sample of the only domestic currency borrowers (from column (6) of Table 2). As shown in Figure 1, the cash flow sensitivity of investment increase as the year of new foreign borrowing approaches. It is highest in the year of new foreign borrowing and decreases in the subsequent years. However, financing constraints for firms with only domestic currency borrowing are lower than those with foreign currency borrowing in this five-year time window. These findings suggest that firms which borrow in foreign currency face higher financing constraints, which then decline after foreign borrowing. However, the cash flow sensitivity of investment of

[3] The STATA psmatch2 command is used to create the counterfactual sample (Leuven and Sianesi, 2003). We find that the Abadie et al. (2004) estimator produces exact matches on categorical variables but not for continuous variables. However, it does apply a bias correction to control for it.

foreign currency borrowers remains higher compared to domestic currency borrowers. These results after correcting for possible sample selection bias validate the finding that firms with access to foreign credit markets resort to foreign currency debt when they face significant financing constraints.

4.3. Financing constraint, credit cycle and foreign currency borrowing

The financing constraints of firms can vary over the credit cycle (Beck et al., 2018). This section considers whether financing constraints for foreign currency borrowers depend on domestic credit conditions in India. As discussed earlier, the sample period is divided into credit boom periods and other (non-boom) periods. The results for the three different measures of foreign borrowing—foreign debt in the last five years, foreign debt outstanding currently, and new foreign borrowing—are reported in Table 3 for the two different time periods. Columns (1) and (2) show the interaction of cash flow (CF/K) with foreign debt outstanding for the credit boom periods and other periods, respectively. Firms with foreign debt in the last five years have additional cash flow sensitivity of investment of 0.065 relative to other firms during credit boom periods (column 1), while in other periods the interaction of cash flows with the debt indicator is statistically insignificant (column 2). Columns (3) and (4) show the interaction of cash flows with the indicator for foreign debt outstanding currently. The additional cash flow sensitivity of investment for this group is 0.191 compared to other firms in boom periods (column 3), while in other periods the additional cash flow sensitivity is lower at 0.054. Columns (5) and (6) show the results for the new foreign borrowing (*New FD*) indicator defined earlier. The additional cash flow sensitivity of investment rises to 0.266 relative to other firms during boom periods for this narrowest definition of foreign borrowing (column 5), while during other periods there is no statistically significant difference in the cash flow sensitivity for the two groups of firms (column 6). These results imply that firms that borrow in foreign currencies are more financially constrained than other firms during credit

boom periods. This likely reflects greater investment opportunities during credit booms, resulting in more reliance on foreign borrowing by firms that have insufficient access to domestic credit.

4.4. Global financial crisis, financing constraints and foreign currency borrowing

Accommodative monetary policies and quantitative easing in advanced economies in the period following the global financial crisis of 2008-09 resulted in greater foreign currency borrowing in the emerging markets (Caballero et al., 2016). This easier access to foreign credit may have influenced the financing constraints of firms that depend on foreign currency debt. To consider this possibility, the sample period is divided into two parts. The first sub-period includes firm-year observations for 1996-2008 (pre-crisis period) and the second sub-period for 2009-2016 (post-crisis period).

The results reported in Table 4 show the cash flow sensitivity of investment for the pre-crisis period (columns (1)-(3)) and the post-crisis period (columns (4)-(6)). Columns (1) and (4) show the results for the full sample without any interaction for foreign currency borrowing for the pre-crisis and the post-crisis periods, respectively. The cash flow sensitivity of investment for the pre-crisis period is 0.278 (column (1)), which decreases slightly to 0.251 in the post-crisis period (column (4)). The additional cash flow sensitivity of investment for firms that have foreign debt outstanding is 0.210 compared to other firms (column (2)) in the period prior to the global financial crisis. Similarly, the additional cash flow sensitivity of investment for firms with new foreign debt is 0.200 relative to other firms in the pre-crisis period (column (3)). However, the additional cash flow sensitivity of investment decreases in magnitude during the post-crisis period, to 0.107 for firms with foreign debt outstanding (column (5)) and to 0.159 for firms with new foreign debt (column (6)). This decline in financing constraints in the post-crisis period relative to the period prior to the financial crisis for firms with foreign debt is

consistent with a surge in global liquidity and easier financing conditions in the post-crisis period.

4.5. Firm size, financing constraints, and foreign currency borrowing

This section attempts to understand the relationship between firm size, financing constraints, and foreign currency borrowing. The firm-year observations are divided into three groups based on firm size measured as total assets in real (constant price) terms and the baseline regression model is re-estimated for each group for firms.

Table 5 column (1) shows the cash flow sensitivity for three groups of firms without any interaction with foreign debt indicators in the top, middle, and bottom panels. The results in columns (2) and (3) in the top panel (Panel 1) representing the bottom third of the firms' size distribution show that the interactions of cash flows with foreign debt outstanding and new foreign debt are both statistically insignificant. However, the column (2) of Panel 2, with the middle-third of firms by asset size, shows a positive and statistically significant interaction of cash flows with foreign debt outstanding, with additional cash flow sensitivity of 0.136 for such firms. Similarly, column (3) of Panel 2 shows that the cash flow sensitivity of firms with new foreign debt is higher by 0.316 compared to other firms for the middle-third firms by assets size.

The third panel (Panel 3) for the top one-third of the firms' size distribution shows that the interactions of cash flows with foreign debt outstanding and new foreign debt are both statistically significant. The additional cash flow sensitivity of the firms with foreign debt outstanding is 0.186 (column (2)), while the additional cash flow sensitivity of firms with new foreign debt is 0.135 (column (3)) compared to other firms. These findings suggest that the baseline results for higher financing constraints for foreign borrowers are driven mainly by medium-sized and large firms.

4.6. Banking relationship, foreign currency borrowing, and financing constraints

In this section, we consider how firms' choice of banking relationships and foreign currency borrowings are related to their cash flow sensitivity of investment. An earlier study finds that firms enjoying exclusive relationships with government-owned banks, in general, have lower cash flow sensitivity of investment than those with a banking relationship with at least one domestic or private sector bank (Srinivasan and Thampy, 2017). Additionally, foreign-owned banks may prefer lending in foreign currency because they have easier access to foreign currency funds (Basso et al., 2011).

To examine the difference in the financing constraints across the types of the firms' banking relationships, the sample is divided into three categories: (a) firms that have exclusive banking relationships with government-owned banks, (b) firms that have banking relationships with foreign-owned banks, and (c) firms that have banking relationships with domestic privately-owned banks. The baseline regression for new foreign borrowing for each group is estimated separately.

Column (1) of Table 6 shows that for firms that have exclusive relationships with government-owned banks, the interaction of cash flows with new foreign borrowing is not statistically significant. However, other firms with no such exclusive banking relationships with government-owned banks have additional cash flow sensitivity of investment of 0.350 during new foreign borrowing (column (2)).

For the group of firms that have banking relationships with foreign-owned banks, the cash flow sensitivity of investment is higher by 0.288 for the firms with new foreign currency borrowing relative to other firms (column (3)). Similarly, for the firms with relationships with domestic privately-owned banks, the additional cash flow sensitivity for foreign currency borrowers is 0.403 compared to other firms.

The result in column (1) suggests that for the firms that rely exclusively on government-owned banks, financing constraints of the firms that access foreign currency debt do not differ from other firms. However, for the firms that have relationships with privately-owned and foreign-owned banks (columns (2)-(4)), the results are suggestive of higher financing constraints as a factor driving new foreign currency borrowing. These findings are especially relevant for emerging markets such as India where government-owned banks account for a large share (about 60 percent) of overall credit outstanding.

4.7. Firm characteristics, financing constraints, and foreign currency borrowing:

This section considers whether the relationship between financing constraints and foreign borrowing differs based on firms' characteristics. The services sector has grown faster in India in comparison to the manufacturing sector and has been characterized by higher labor productivity (Ghani and Kharas, 2010). Hence, firms in the faster growing services sector are likely to have better access to financing. Financially constrained firms with export revenue may find it easier to borrow in foreign currency as these hard currency revenues provide a natural hedge for their foreign currency debt (Mora et al., 2013). Firms with more tangible assets can pledge these assets as collateral to raise domestic financing, and are likely to access foreign currency debt when they find it difficult to borrow from domestic sources. The baseline sample is re-estimated for the sub-samples for manufacturing firms and other firms, firms with above-median exports and those with below-median exports, and firms with above-median tangible assets and those with below-median tangible assets.

The results reported in Table 7 show that the additional cash flow sensitivity of investment for new foreign borrowing is about four times higher at 0.444 for non-manufacturing firms (column (2)) compared to 0.110 for manufacturing firms (column (1)). The result suggests that

the firms in the faster growing non-manufacturing sector in India, which typically have better access to domestic financing, borrow in foreign currency only when they face severe financing constraints. Similarly, firms with below-median exports revenue have additional cash flow sensitivity of investment of 0.285 (column (4)) compared to 0.183 for firms with above-median exports revenue (column (3)) when borrowing in foreign currencies. This is likely because firms with high exports have a natural hedge in the form of better access to hard currency revenues, which can be used to service foreign currency debt, than other firms. Finally, the additional cash flow sensitivity of investment for new foreign debt is higher at 0.341 for firms with greater than median tangible assets (column (5)) compared to 0.215 for firms with below-median tangible assets (column (6)). This could be due to the preference of domestic banks to lend to borrowers with higher tangible assets, which they can pledge as collateral. Such firms are likely to access foreign currency debt only when they face severe financing constraints.

5. Conclusion

This study examines the relationship between foreign currency borrowing and financing constraints for non-financial firms in India, the second-largest emerging market economy after China. The cash flow sensitivity of investment, an indicator of financing constraints, is higher for firms with foreign currency debt exposure than for firms without foreign debt. The firms' access to foreign borrowing is found to reduce their financing constraints, even after correcting for possible sample selection bias.

The relationship between foreign currency borrowing and financing constraints varies with domestic and global financial conditions and firms' characteristics such as sector, export revenues, tangibility, and banking relationship. Financing constraints are found to be higher during domestic credit booms for firms with foreign currency debt exposure compared to other firms. The firms' financing constraints decline after the global financial crisis period, likely

due to a surge in global liquidity and easier financing conditions in the post-crisis period. The non-manufacturing firms, firms with lower than median export revenues, and those with higher than median tangible assets face greater financing constraints when borrowing in foreign currencies compared to manufacturing firms, and those with above-median export revenues and below-median tangible assets. The firms that have relationships with either privately-owned banks or foreign-owned banks face higher financing constraints when undertaking new foreign borrowing than those that have exclusive relationships with only government-owned banks. This is consistent with Srinivasan and Thampy (2017) who finds that Indian firms having exclusive relationships with government-owned banks are less credit constrained in general.

This study contributes to the growing literature on international credit markets and their impacts at the firm level. Given policy concerns about the risks inherent in foreign-currency borrowing by the private sector, it is important for policymakers to understand the dynamics of foreign currency borrowing by firms. The findings of this study, on the role of domestic and global macroeconomic conditions, firm financing constraints, and foreign currency borrowing, can provide directions for policy to better leverage the benefits of international financial integration.

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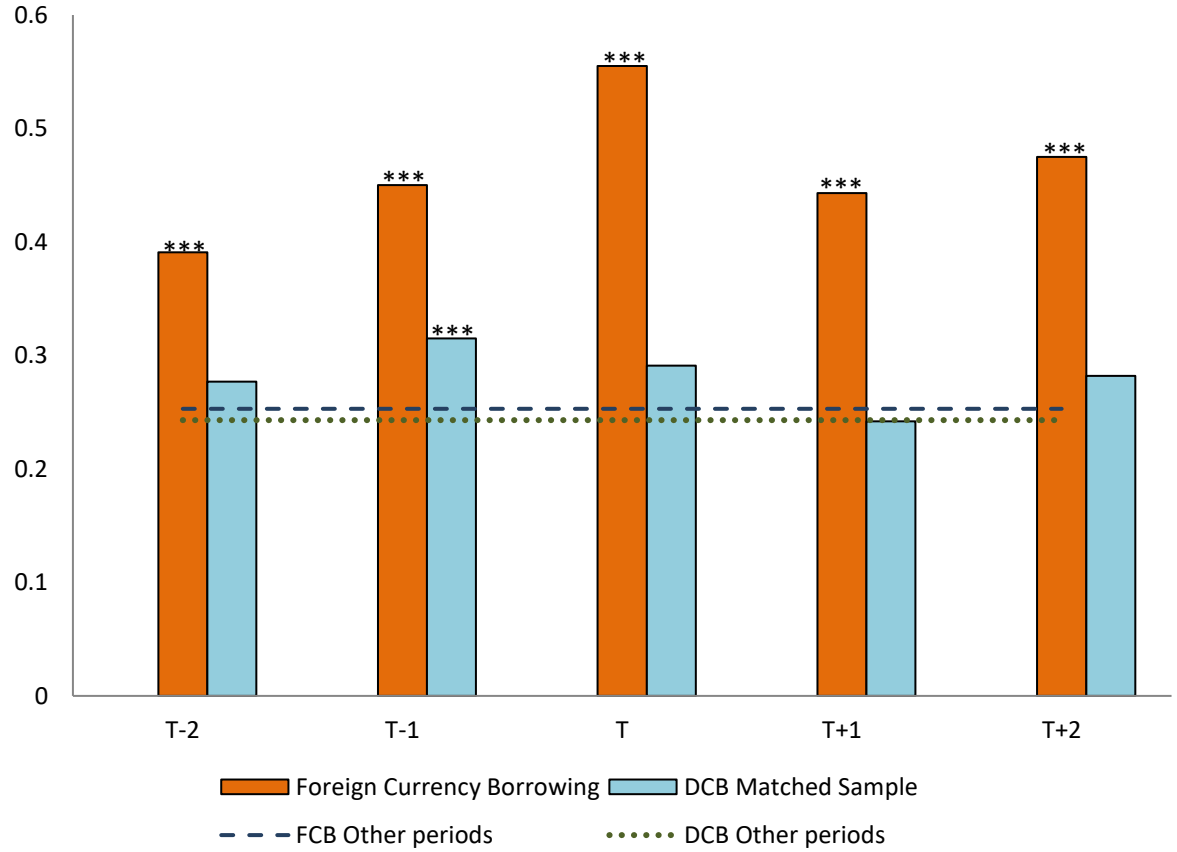
Figure 1: Cash flow sensitivity of investment prior to and after new foreign borrowing



Notes: * indicates significance at 10 percent level, ** at 5 percent level and *** at 1 percent level. New foreign currency borrowing (FCB) is only for instances where foreign currency debt outstanding is positive in year T and zero in the previous two years. The construction of the matched sample for domestic currency borrowing (DCB) is described in the text.

Table 1: Foreign currency borrowing and cash flow sensitivity of investment

	All firms	Foreign debt in last 5 years	Foreign debt out-standing	New foreign debt	New foreign debt & Tobin's Q	FC debt as share of total assets
	(1)	(2)	(3)	(4)	(5)	(6)
Cash flow	0.285***	0.267***	0.256***	0.275***	0.276***	0.268***
	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Cash flow*FD in last 5 years		0.066***				
		(0.015)				
FD in last 5 years		-0.036***				
		(0.010)				
Cash flow*FD outstanding			0.167***			
			(0.017)			
FD outstanding			-0.044***			
			(0.010)			
Cash flow*New FD				0.248***	0.237***	
				(0.031)	(0.033)	
New FD				-0.031*	-0.044**	
				(0.016)	(0.021)	
Tobin's Q_{t-1}*New FD					0.018	
					(0.017)	
Cash flow*FC Debt/Total Asset						0.895***
						(0.095)
FC Debt/Total Asset						0.087
						(0.064)
Tobin's Q_{t-1}	0.014***	0.014***	0.013***	0.014***	0.014***	0.014***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Leverage $_{t-1}$	-0.186***	-0.185***	-0.187***	-0.184***	-0.184***	-0.194***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Log(Assets)	0.046***	0.048***	0.045***	0.045***	0.045***	0.039***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	-0.153***	-0.153***	-0.142***	-0.142***	-0.138***	-0.096**
	(0.047)	(0.048)	(0.048)	(0.047)	(0.047)	(0.048)
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-year fixed effects	Y	Y	Y	Y	Y	Y
Firm-year obs.	21,856	21,856	21,856	21,856	21,856	21,856
R^2	0.193	0.194	0.197	0.196	0.196	0.198
Adjusted R^2	0.043	0.044	0.047	0.047	0.047	0.049

Notes: The dependent variable is investment in year t scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with foreign currency debt indicators. Access to foreign debt is based on foreign borrowing in any year in the sample period. NIC 2-digit industry dummy and year dummy interactions are included in all specifications. * indicates significance at 10 percent level, ** significance at 5 percent level, and *** significance at 1 percent level.

Table 2: Cash flow sensitivity of investment prior to and after foreign currency borrowing

	Foreign currency borrowing (FCB)			Domestic currency borrowing (DCB): matched sample		
	Prior to borrowing	Post borrowing	Prior to and Post borrowing	Prior to borrowing	Post to borrowing	Prior to and Post borrowing
	(1)	(2)	(3)	(4)	(5)	(6)
Cash flow	0.269***	0.261***	0.253***	0.244***	0.282***	0.243***
	(0.008)	(0.008)	(0.009)	(0.010)	(0.008)	(0.010)
Cash flow*Yr$_{t-2}$ to New Debt	0.114***		0.138***	0.038		0.034
	(0.043)		(0.043)	(0.037)		(0.038)
Y$_{t-2}$ to New Debt	-0.018		-0.017	0.016		0.014
	(0.019)		(0.019)	(0.020)		(0.020)
Cash flow*Yr$_{t-1}$ to New Debt	0.163***		0.197***	0.072***		0.072***
	(0.038)		(0.038)	(0.012)		(0.012)
Yr$_{t-1}$ to New Debt	-0.032*		-0.033*	0.028***		0.028***
	(0.018)		(0.018)	(0.006)		(0.006)
Cash flow*New Debt	0.269***	0.274***	0.302***	0.05	0.041	0.048
	(0.031)	(0.031)	(0.031)	(0.030)	(0.031)	(0.031)
New Debt	-0.033**	-0.032**	-0.034**	0.054***	0.052***	0.051***
	(0.016)	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)
Cash flow*Yr$_{t+1}$ after New Debt		0.172***	0.190***		-0.006	-0.001
		(0.033)	(0.033)		(0.032)	(0.032)
Yr$_{t+1}$ after New Debt		-0.001	0		-0.024	-0.026
		(0.017)	(0.018)		(0.017)	(0.017)
Cash flow * Yr$_{t+2}$ after New Debt		0.206***	0.222***		0.031	0.039
		(0.036)	(0.036)		(0.032)	(0.032)
Yr$_{t+2}$ after New Debt		-0.039**	-0.038**		-0.039**	-0.040**
		(0.018)	(0.018)		(0.018)	(0.018)
Tobin's Q $_{t-1}$	0.014***	0.014***	0.014***	0.013***	0.014***	0.013***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Leverage $_{t-1}$	-0.182***	-0.188***	-0.186***	-0.166***	-0.183***	-0.167***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Log(Assets)	0.045***	0.043***	0.043***	0.048***	0.046***	0.049***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	-0.141***	-0.134***	-0.129***	-0.185***	-0.149***	-0.201***
	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)	(0.047)
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-year fixed effects	Y	Y	Y	Y	Y	Y
Firm-year obs.	21,856	21,856	21,856	21,856	21,856	21,856
R^2	0.198	0.200	0.201	0.199	0.194	0.199
Adjusted R^2	0.048	0.050	0.052	0.050	0.044	0.050

Notes: The dependent variable is investment in year t scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with dummies for periods prior to and after foreign currency borrowing, and compares that with a matched sample of only domestic-currency borrowers. The construction of the matched sample is described in the text. NIC 2-digit industry dummy and year dummies are included in all specifications. * indicates significance at 10 percent level, ** significance at 5 percent level, and *** significance at 1 percent level.

Table 3: Credit booms, foreign currency borrowing, and financing constraints

	Foreign debt outstanding in last 5 years		Foreign debt outstanding currently		New foreign borrowing	
	Boom periods (1)	Other periods (2)	Boom periods (3)	Other periods (4)	Boom periods (5)	Other periods (6)
Cash flow	0.299***	0.250***	0.283***	0.238***	0.303***	0.246***
	(0.015)	(0.013)	(0.014)	(0.012)	(0.013)	(0.012)
Cash flow*FD indicator	0.065***	-0.015	0.191***	0.054**	0.266***	0.009
	(0.024)	(0.022)	(0.027)	(0.027)	(0.041)	(0.059)
FD indicator	-0.041**	-0.029**	-0.058***	-0.02	-0.052**	0.029
	(0.016)	(0.013)	(0.016)	(0.014)	(0.023)	(0.026)
Tobin's Q $_{t-1}$	0.023***	0.007**	0.023***	0.007**	0.023***	0.007**
	(0.007)	(0.003)	(0.007)	(0.003)	(0.007)	(0.003)
Leverage $_{t-1}$	-0.264***	-0.136***	-0.270***	-0.138***	-0.261***	-0.138***
	(0.031)	(0.021)	(0.031)	(0.021)	(0.031)	(0.021)
Log(Assets)	0.092***	0.025***	0.088***	0.021***	0.088***	0.020***
	(0.011)	(0.008)	(0.011)	(0.008)	(0.011)	(0.008)
Constant	-0.445***	0.016	-0.419***	0.026	-0.431***	0.038
	(0.082)	(0.059)	(0.082)	(0.059)	(0.080)	(0.058)
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-year fixed effects	Y	Y	Y	Y	Y	Y
Firm-year obs.	11,405	10,451	11,405	10,451	11,405	10,451
R^2	0.204	0.154	0.208	0.154	0.208	0.153

Notes: The dependent variable is investment in year t scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with foreign currency debt indicators for boom periods and other periods. NIC 2-digit industry and year dummy interactions are included in all specifications. The boom year are 1999-2001, 2002-03, 2004-09, and 2010-12. * indicates significance at 10 percent level, ** significance at 5 percent level and *** significance at 1 percent level.

Table 4: Foreign currency borrowing and firm financing constraints before and after the global financial crisis

	Prior to Global Financial Crisis			Post-Global Financial Crisis		
	(1)	(2)	(3)	(4)	(5)	(6)
Cash flow	0.278***	0.250***	0.267***	0.251***	0.231***	0.247***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)
Cash flow*FD outstanding		0.210***			0.107***	
		(0.028)			(0.028)	
FD outstanding		-0.062***			-0.024	
		(0.016)			(0.017)	
Cash flow*New FD			0.200***			0.159***
			(0.037)			(0.054)
New FD			-0.047**			-0.008
			(0.020)			(0.026)
Tobin's Q $_{t-1}$	0.023***	0.021**	0.022***	0.007*	0.007*	0.007*
	(0.008)	(0.008)	(0.008)	(0.004)	(0.004)	(0.004)
Leverage $_{t-1}$	-0.188***	-0.188***	-0.186***	-0.284***	-0.283***	-0.282***
	(0.028)	(0.028)	(0.028)	(0.033)	(0.033)	(0.033)
Log(Assets)	0.149***	0.141***	0.146***	0.130***	0.131***	0.129***
	(0.011)	(0.011)	(0.011)	(0.017)	(0.017)	(0.017)
Constant	-0.886***	-0.822***	-0.868***	-0.764***	-0.765***	-0.762***
	(0.080)	(0.081)	(0.080)	(0.131)	(0.132)	(0.132)
Firm fixed effect	Y	Y	Y	Y	Y	Y
Industry-year fixed effects	Y	Y	Y	Y	Y	Y
Firm-year obs.	11,044	11,044	11,044	9,479	9,479	9,479
R^2	0.154	0.156	0.156	0.211	0.216	0.214

Notes: The dependent variable is investment in year t scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with foreign currency debt indicators for the periods prior to and after the global financial crisis. NIC 2-digit industry and year dummy interactions are included in all specifications. * indicates significance at 10 percent level, ** significance at 5 percent level, and *** significance at 1 percent level.

Table 5: Firm size subsamples, foreign currency borrowing, and firm financing constraints

	(1)	(2)	(3)
Panel 1: Firm size less than 33 Percentile (Bottom one-third)			
Cash flow	0.261***	0.262***	0.261***
	(0.017)	(0.017)	(0.017)
Cash flow*FD outstanding		-0.008	
		(0.071)	
FD outstanding		0.015	
		(0.028)	
Cash flow*New FD			0.007
			(0.113)
New FD			0.017
			(0.040)
Firm-year obs.	6,908	6,908	6,908
R^2	0.241	0.241	0.241
Panel 2: Firm size between 33-66 Percentile (Middle one-third)			
Cash flow	0.280***	0.262***	0.270***
	(0.016)	(0.017)	(0.016)
Cash flow*FD outstanding		0.136***	
		(0.038)	
FD outstanding		-0.041**	
		(0.018)	
Cash flow*New FD			0.316***
			(0.059)
New FD			-0.044
			(0.028)
Firm-year obs.	7,337	7,337	7,337
R^2	0.29	0.292	0.294
Panel 3: Firm size greater than 66 Percentile (Top one-third)			
Cash flow	0.267***	0.211***	0.259***
	(0.014)	(0.016)	(0.014)
Cash flow*FD outstanding		0.186***	
		(0.024)	
FD outstanding		-0.040***	
		(0.015)	
Cash flow*New FD			0.135***
			(0.043)
New FD			-0.004
			(0.024)
Firm-year obs.	7,611	7,611	7,611
R^2	0.295	0.303	0.297

Notes: The dependent variable is investment in year t scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with foreign currency debt indicators. All control variables in Table 1 are included for the estimations, but not reported here. NIC 2-digit industry and year dummy interactions are included in all specifications. * indicates significance at 10 percent level, ** significance at 5 percent level, and *** significance at 1 percent level.

Table 6: Banking relationship, foreign currency borrowing, and firm financing constraints

	Exclusive banking relation with govt. owned banks	No exclusive banking relation with govt. owned banks	Banking relationship with at least one foreign-owned bank	Banking relation with domestic private banks and no foreign-owned bank
	(1)	(2)	(3)	(4)
Cash flow	0.269***	0.298***	0.299***	0.320***
	(0.014)	(0.011)	(0.015)	(0.021)
Cash flow * New FD	0.035	0.350***	0.288***	0.403***
	(0.059)	(0.038)	(0.047)	(0.079)
New FD	0.000	-0.053**	-0.028	-0.064*
	(0.027)	(0.021)	(0.028)	(0.036)
Tobin's Q $_{t-1}$	0.009*	0.017***	0.045***	0.000
	(0.005)	(0.004)	(0.008)	(0.006)
Leverage $_{t-1}$	-0.231***	-0.155***	-0.145***	-0.345***
	(0.029)	(0.025)	(0.034)	(0.052)
Log(Assets)	0.085***	0.038***	0.013	0.058***
	(0.010)	(0.010)	(0.015)	(0.019)
Constant	-0.351***	-0.064	0.06	-0.123
	(0.075)	(0.083)	(0.136)	(0.150)
Firm fixed effects	Y	Y	Y	Y
Industry-year fixed effects	Y	Y	Y	Y
Firm-year obs.	10,301	11,555	6,321	5,234
R^2	0.199	0.264	0.315	0.351

Notes: The dependent variable is investment scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with dummies for the type of banking relationships for government-owned banks, foreign-owned banks, and domestic privately-owned banks. NIC 2-digit industry and year dummy interactions are included in all specifications. * indicates significance at 10 percent level, ** significance at 5 percent level, and *** significance at 1 percent level.

Table 7: Firm characteristics, foreign currency borrowing, and financing constraints

	Mfg. firms	Other firms	Above median exports	Below median exports	Above median tangible assets	Below median tangible assets
	(1)	(2)	(3)	(4)	(5)	(6)
Cash flow	0.324***	0.223***	0.302***	0.256***	0.701***	0.208***
	(0.011)	(0.013)	(0.012)	(0.013)	(0.022)	(0.010)
Cash flow*New FD	0.110***	0.444***	0.183***	0.285***	0.341***	0.215***
	(0.038)	(0.053)	(0.035)	(0.063)	(0.084)	(0.038)
New FD	0.003	-0.086**	-0.017	-0.054*	-0.038*	-0.050*
	(0.018)	(0.037)	(0.019)	(0.031)	(0.023)	(0.027)
Tobin's Q $_{t-1}$	0.014***	0.012***	0.020***	0.005	0.007	0.016***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Leverage $_{t-1}$	-0.165***	-0.223***	-0.287***	-0.157***	-0.159***	-0.229***
	(0.019)	(0.040)	(0.030)	(0.023)	(0.022)	(0.033)
Log(Assets)	0.053***	0.031***	0.052***	0.055***	0.092***	0.020**
	(0.007)	(0.012)	(0.009)	(0.010)	(0.009)	(0.010)
Constant	-0.283***	-0.104	-0.267***	-0.281***	-0.658***	0.013
	(0.057)	(0.092)	(0.075)	(0.077)	(0.071)	(0.078)
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-year fixed effects	Y	Y	Y	Y	Y	Y
Firm-year obs.	15226	6630	11150	10706	10963	10893
R^2	0.163	0.267	0.249	0.229	0.267	0.23

Notes: The dependent variable is investment in year t scaled by net fixed assets at the end of period t-1. This table shows the results of a Tobin's Q investment model with cash flows interacted with foreign currency debt indicators for different sub-samples based on firm characteristics. Other firms include those in the services sector such as construction and transportation. Firms with above-median export have export/sales ratio higher than the median of the sample. Firms with above-median tangible assets have fixed assets/total assets ratio higher than the median of the sample. All control variables in Table 1 are included for the estimations, but not reported here. NIC 2-digit industry and year dummy interactions are included in all specifications. * indicates significance at 10 percent level, ** significance at 5 percent level and *** significance at 1 percent level.

Appendix

Appendix Table 1: Sources and definition of variables

Variable	Definition	Source
FD in last 5 years	Equals one if a firm has foreign currency debt outstanding in any year in the last five years	Prowess: Financial Statement
FD outstanding	Equals one if a firm has foreign currency debt outstanding currently	Prowess: Financial Statement
New FD	Equals one if foreign currency debt is positive in year t and zero in year t-1	Prowess: Financial Statement
FC debt/Total assets	Foreign currency debt outstanding as a share of total assets	Prowess: Financial Statement
Investment (I/K)	Purchase of Fixed Asset in period t/Net fixed assets at the end of period t-1	Prowess: Financial Statement
Cash flow (C/K)	(Profit After Tax + Depreciation and amortization)/Capital stock	Prowess: Financial Statement
Tobin's Q	(Market value of equity + Total debt)/Total assets	Prowess: Financial Statement
Leverage	Total Debt/Total Assets	Prowess: Financial Statement
Log(Assets)	Logarithm of total assets in constant 2010 million rupees	Prowess: Financial Statement
Export/Sales	Export/Total sales (%)	Prowess: Financial Statement
ROA	Return on assets (Profit after tax/Total assets)	Prowess: Financial Statement
Tangibility	Net fixed asset/Total assets	Prowess: Financial Statement
Part of business group	Equals one if a firm is part of business agglomerate	Prowess: Identity Information
Age	Age of a firm from year of incorporation	Prowess: Identity Information
NIC code	2-digit industry National Industrial Classification (NIC) code	Prowess: Identity Information
GOB dummy	Equals one if a firm has exclusive banking relationships with only government-owned banks	Prowess: Banking Relationship
FOB dummy	Equals one if a firm has a banking relationship with at least one foreign-owned bank	Prowess: Banking Relationship
DPOB dummy	Equals one if a firm has a banking relationship with at least one domestic privately-owned bank but not with foreign-owned bank	Prowess: Banking Relationship
Domestic Credit Supply	Quarterly data on domestic credit supply	IMF International Financial Statistics
Consumer Price Index	Consumer Price index (Base year 2010)	IMF International Financial Statistics

Appendix Table 2: Summary statistics

Variable	Obs.	Mean	P25	P50	P75	Std. Dev.
Log(Assets)*	25,785	7.55	6.36	7.45	8.6	1.69
Investment	25,785	0.26	0.05	0.13	0.30	0.41
Cash flow	25,785	0.27	0.09	0.2	0.38	0.44
Leverage	25,785	0.35	0.18	0.32	0.47	0.29
Tobin's Q	25,785	0.94	0.51	0.69	0.99	1.21
Export/Sales (%)	25,785	17.11	0.00	4.18	23.89	25.53
ROA	25,785	0.03	-0.26	0.03	0.06	0.08
Foreign debt in last 5 years	25,785	0.28	0.00	0.00	1.00	0.45
Foreign debt outstanding	25,785	0.19	0.00	0.00	1.00	0.4
New foreign debt	25,785	0.04	0.00	0.00	0.00	0.19
FC debt/total assets	25,785	0.02	0.00	0.00	0.00	0.06
GOB dummy	25,785	0.48	0.00	0.00	1.00	0.5
FOB dummy	25,785	0.28	0.00	0.00	1.00	0.45
DPOB dummy	25,785	0.23	0.00	0.00	1.00	0.42

* Assets in constant 2010 million Rupees