From Carry Trades to Trade Credit: Financial Intermediation by Non-Financial Corporations

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March 2019*

Abstract

We use unique firm level data from Mexico to document that non-financial corporations engage in carry trades by borrowing in foreign currency and lending in domestic currency, largely to related partners (trade credit), accumulating currency risk in the process. The interest rate differential between local and foreign currency borrowing can drive this behavior at a quarterly frequency, inducing an expansion in foreign currency borrowing, gross trade credit and sales. Firms that were active in carry-trade have decreased investment following a large depreciation, independent of currency exposure levels and export status, but maintain their supply of trade credit.

JEL-Codes: E44, G15
Keywords: Emerging market corporate debt, currency mismatch, liability dollarization, carry trades, trade credit

*We thank Hyun Song Shin, Şebnem Kalemli-Özcan, Pablo Slutzky, Colin Ward, William Mullins, and Stefan Avdjiev for helpful comments, as well as seminar participants at the BIS and IMF. All errors are our own. The views expressed here are those of the authors and not necessarily those of the Bank for International Settlements. Contact: bryan.hardy@bis.org, saffie@econ.umd.edu

1 Introduction

Non-financial firms are an important provider of financial resources to the economy, including the provision of trade credit to customers and others.[1] In emerging markets, these activities are intertwined with foreign currency (FX) credit, which can drive financial, and consequently real, behavior, as well as generate currency risk as firms borrow in foreign currency and accumulate local currency assets. Panel a) of Figure 1 illustrates these facts for a sample of 13 emerging markets. In fact, trade credit finances 28% of (externally financed) investment, while on average 31% of debt is in FX.[2] Therefore, FX credit conditions may impact inter-firm credit and sales, and potential risk from FX borrowing could spread elsewhere in the economy in the event of a large depreciation. Hit with such a balance sheet shock, firms may reduce their trade credit provision and withdraw FX deposits to meet repayment obligations. Nevertheless, regulation and prudential supervision tend to focus primarily on banks and other financial institutions. By contrast, non-financial firms tend to be much less regulated in their financial intermediation activities and currency risk exposure.

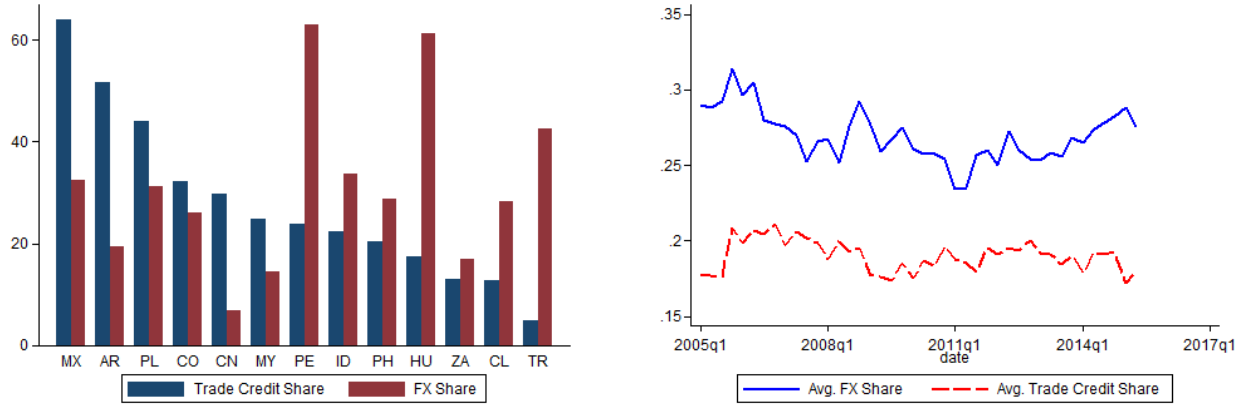
We use a unique firm level dataset from Mexico with detailed financial and real data to study financial intermediation by non-financial firms at quarterly frequency and its real implications. As with other emerging markets, panel b) of Figure 1 shows that trade credit liabilities and FX liabilities are important components of the balance sheet for our sample of firms, making up, respectively, 19% and 27% of total liabilities on average. We provide direct evidence showing that non-financial corporations borrow in FX to finance peso assets, a type of carry trade that exposes their balance sheets to currency risk. Moreover, we show that the main short-term destination of the proceeds from borrowing is the supply of trade credit to related partners, including trade credit in pesos.

A key driver of this behavior is the gap between FX and local currency interest rate, a key factor for carry trades (Acharya & Vij, 2017; Frank & Shen, 2016; Graham & Harvey, 2001; Huang, Panizza, & Portes, 2018). Therefore, firms borrow at low FX rates to ex-

[1] Throughout the paper, we use the term "trade credit" to generally refer to inter-firm credit (typically accounts payable/receivable). The term "accounts receivable" is used throughout to specifically reference the extension of trade credit (trade credit assets).

[2] Trade credit finances over 50% of working capital on average. See Finkelstein Shapiro, González Gómez, Nuguer, and Roldán-Peña (2018)

Figure 1: Trade Credit and FX Debt in Emerging Markets



(a) Emerging Markets

(b) Mexico, Listed Non-Financial Firms

Panel a): trade credit share is investment financed by trade credit as a percent of external finance, as reported in Table 1 of Finkelstein Shapiro et al. (2018) (year varies by country); FX share is the estimated currency share of total debt outstanding for non-government sectors in 2014, as reported in Table A1 of Chui et al. (2016). Panel b): trade credit and FX liabilities as a share of total liabilities, listed non-financial firms in Mexico (author's calculations).

pand their provision of trade credit, which carries a high effective interest rate (Klapper, Laeven, & Rajan, 2012) and is at least in part denominated in peso. This activity connects their trade credit linkages and sales to FX credit conditions, primarily the US dollar. Since carry trade behavior is thus linked to inter-firm trade credit lending, this can expose the economy to currency risk beyond the firms that borrow in FX. After documenting this link, we study the real effects of a depreciation on firms that accumulated short term FX exposure in a period of high carry trade incentives. We document that firms that were active in carry trade before the depreciation decrease their real activity during the depreciation, but they do not decrease their provision of trade credit, suggesting a high value for inter-firm relationship lending.

Our unique dataset provides a number of advantages over the existing literature studying carry trade behavior in non-financial corporates.[3] First, we build a panel database at a *quarterly* frequency. This enables us to examine higher frequency activities with short term maturities that are missed by studies relying on annual data. Second, our dataset

[3]See for instance Acharya and Vij (2017); Bruno and Shin (2018a, 2017)

includes detailed information of the currency composition of the balance sheet, both liabilities and assets.[4] This detail allows us to directly examine if FX borrowing with the carry trade leads to the accumulation of short term peso assets, a behavior only implied or indirectly observed before. Further we capture all sources of FX borrowing (e.g. bonds, loans, etc.) and can distinguish between them. Third, the data also include a detailed breakdown of short-term assets by instrument, which allows us to separately examine how firms adjust their cash holdings as compared to their extension of trade credit. And fourth, the dataset includes real outcomes such as sales, investment, and employment, making it possible to connect the carry trade and financial activities of the firm to real activity. This detailed dataset allows us to shed light on how firms borrow and accumulate assets in domestic and foreign currency and how real firm activity is impacted. We study the nature and consequences of this behavior, documenting four empirical findings.

First, we study currency mismatch at the firm level by examining the correlation between changes in liabilities and assets by currency. This analysis reveals that nearly 50% of the short term assets accumulated from FX borrowing are peso denominated, while peso borrowing mostly funds peso assets. Because this pattern is even stronger among non-exporter firms, it constitutes a good indicator of the build-up of firm-level currency risk. Our data enables us to show the co-evolution of these positions directly, providing a unique and valuable view into firm balance sheet management in multiple currencies.

Second, decomposing short term assets by instrument, we find that while firms do accumulate cash and financial assets out of their peso and FX borrowing, nearly 50% of the short-term assets accumulated from borrowing in either currency are accounts receivable. That is, they lend the proceeds of their increased borrowing, in any currency, by extending more trade credit. The magnitude of the saving from FX liabilities into short term peso assets is such that the currency mismatch generated must reflect at least in part the accumulation of trade credit assets in peso. Thus, firms appear to act as financial intermediaries, with a positive co-movement between financial assets and liabilities - funding peso assets with FX liabilities - but the main dimension along which they act as intermediaries is by extending trade credit to other firms. This is in contrast to previous work which has focused on the accumulation of cash and financial instruments (Bruno & Shin,

[4]This data is extracted from regulatory filings of non-financial firms listed on the Mexican stock exchange.

2018a, 2017). These first two results illustrate how balance sheet positions evolve and interact, providing a bridge to connect FX mismatch with firm financial intermediation.

Third, carry trade opportunities shape the dynamics of firm borrowing, lending, and saving, increasing the incentives for non-financial corporations to intermediate FX funds. We study the carry trade behavior at a quarterly frequency with the firm's short term borrowing and short-term asset accumulation, which enables us to capture the short term, higher frequency activity that would be missed by annual data. We use firm specific interest rates to compute the average interest rate differential on foreign and domestic currency borrowing faced by firms in our sample. We find that when the interest rate differential is high (i.e. local currency loan interest rates are much higher than FX loan interest rates), firms increase their short-term liabilities in FX and finance more short-term assets in FX and peso. However, in the following quarter, firms unwind most, but not all, of that position. On net, they increase their total and short-term FX exposure on the balance sheet when the interest rate differential widens. These results hold in the sub-sample of non-exporters, which would be most vulnerable to sudden swings in the exchange rate. The short-term nature of the asset and liability positions, the quick build-up and unwinding of FX positions around carry trades opportunities quarter-by-quarter, and the participation of non-exporters (which have little FX revenue to hedge) all constitute novel evidence for firm level carry trade behavior.

The quarterly nature of our panel and the ability to measure all sources of funding at the firm level is critical when documenting carry trade behavior by non-financial firms. In fact, firms' short-term FX borrowing patterns with the carry trade incentive comes from their loan borrowing and their trade credit borrowing. This is in contrast to much of the literature, which focuses on the issuance of FX bonds over longer horizons. It is easier for firms to draw on bank credit and trade credit on short notice in response to changes in the carry trade incentive, while bond issuance may take more time to plan and execute, reflecting longer term investment (and potentially carry trade) strategies.

Credit conditions in foreign currency also drive the trade credit extended by firms, and consequently their sales. Firms likewise appear to increase and unwind their extension of trade credit to other firms (accounts receivable) with the interest rate differential. Gross trade credit, both borrowing and lending of the firm, expands when the interest rate differential is high and contracts the next period. Thus, changes in borrowing con-

ditions between foreign and domestic currencies affect real firm outcomes by easing the flow of trade credit between firms, enabling increased sales. Financial conditions appear to drive cycles in both FX positions and trade credit extended and received.

Fourth, because firms increase their short-term FX positions when the interest rate differential widens, their carry trade behavior can build up currency mismatches and short-term currency exposure. We examine the consequences of this behavior over a high carry trade period, 2005-2008, which had a relatively stable exchange rate and large and increasing interest rate differential. This period was followed by a large, sudden, and unanticipated depreciation of the local currency at the end of 2008. Firms that accumulated more short term FX exposure over the carry trade period performed poorly following the depreciation, having lower investment growth than similar firms that did not increase their exposure. Non-exporting firms that had accumulated such exposure additionally saw decreases in their employment and profits following the depreciation. These effects are distinct from the balance sheet channel, as we control directly for the level of FX exposure (short or in total) on the balance sheet. Indeed, carry trade activity may be a better indicator of vulnerability to currency risk than traditional exposure measures.[5] Trade credit (borrowing or lending) for carry trade firms appears to be less affected by the depreciation shock. This suggests that firms may place a high value on their inter-firm credit and relationships, as they prefer to decrease physical investment or to draw from other financial assets in order not to cut credit to related partners.

Summarizing, we use detailed firm level financial data to document risky financial intermediation by non-financial firms and how FX credit conditions affect real activity. This has important policy implications, as most existing financial regulation focuses on financial institutions and missed firm-level risk and inter-firm lending. Interestingly, relationship lending at the firm level seems to be resilient, acting more as a buffer than a catalyst, in terms of the transmission of a currency crisis.

Our results point to other important macroeconomic implications. The connection between FX credit and trade credit implies that liquidity of US dollar credit can affect real business activity by influencing the availability of trade credit. With cheaper dollar

[5]The direct balance sheet exposure does not appear to play a large role for the average firm, while carry trade activity has an important general impact. Note that the traditional balance sheet effect does still play a role among smaller, non-exporting firms in this sample. See Hardy (2018).

borrowing, firms borrow more in FX, increase trade credit, and thus increase sales. This finding provides important evidence for how credit conditions can affect production via supply chains and production networks.

Related Literature. Evidence of carry trade behavior in non-financial firms has been shown in the literature in the case of emerging market firms, borrowing via USD bonds and holding cash with the proceeds. Using 6 years of annual data for a total of 1,200 firms in 18 countries, Bruno and Shin (2017) show that emerging market economy (EME) firms issue USD bonds when the carry trade is favorable, and firms with larger cash holdings are more likely to do so. These firms use the proceeds to disproportionately accumulate more cash in addition to the real investment made, suggesting a carry trade motive. Bruno and Shin (2018a) show that EME firms which issue USD bonds and accumulate cash when the carry trade incentive is high have share prices that are sensitive to a local currency depreciation. Their work suggests that the asset side of the balance sheet matters for how a depreciation affects firms that have borrowed in FX. They find that USD bond issuing firms which increased their cash holdings during a period of high carry trade opportunities had lower physical investment if their local currency depreciated against the dollar. Our database for Mexico allows us to complement these regularities along two dimensions. First, we go beyond bond issuance, also including loans and trade credit as sources of funding, doing so at a quarterly frequency. We complement their findings showing that carry trade opportunities are exploited at quarterly frequency using more liquid sources of funds than bonds. Second, because we can decompose assets by instrument and currency, we can relax the assumption that all cash holding in in local currency and directly show that firms use carry trades proceed to fund short-term assets in pesos.

Acharya and Vij (2017) also performs a country level study on corporate carry trade behavior, using Indian firm-level data. They find that a high interest rate differential (between local and USD denominated debt) induces firms to increase their issuance of USD debt (bank loans and bond), replacing local currency debt, and accumulating more cash in addition to making more investments. Firms that were more likely to engage in carry trade behavior, and especially those whose stock price was already sensitive to FX bond issuance, saw larger declines in their abnormal cumulative stock returns over a five-day period. We complement their results by linking this behavior to currency risk, inter-

firm lending activities, and real effects of the exposure during an exogenous depreciation of the currency. Additionally, our paper captures higher frequency carry trade activities of firms, documenting building and unwinding of positions quarter-by-quarter.

Several papers have documented the recent trend of non-financial firms acting like financial intermediaries. Shin and Zhao (2013) show this behavior among larger firms in India and China, where their financial assets and liabilities co-move positively, contrary to the standard pecking order theory of corporate finance. Caballero, Panizza, and Powell (2016) show that the tendency for firms to act like intermediaries is higher when there are more capital controls in place, pointing to a regulatory arbitrage explanation. Both of these papers suggest a story whereby firms borrow in dollars abroad, transfer the proceeds home, and deposit the excess in the local banking system, thus serving as indirect intermediaries. Our results are more in line with Huang et al. (2018), who find that risky firms in China tend to increase their USD bond issuance when the interest rate differential is higher, and these firms do more inter-firm lending. We directly show that firms finance trade credit out of their FX borrowing, and that both borrowing and lending in trade credit increases with relatively easier FX credit conditions and unwinds the following quarter.

Our results provided important evidence for how credit conditions can affect production via supply chains and production networks. Kalemli-Özcan, Kim, Shin, Sørensen, and Yeşiltaş (2014) provide a model and some empirical evidence that firms further up in the supply chain extend more trade credit and this trade credit is sensitive to credit conditions. Thus, credit shocks can amplify recessions when production chains are long, with many firms affected via their interlinked trade credit. Bruno and Shin (2018b) specifically highlights the role of fluctuations in the US dollar. They show that with a stronger dollar, credit conditions tighten and leads to a reduction in international supply chains. Hill, Kelly, Preve, and Sarria-Allende (2017) finds that firms tend to have more trade credit if access to finance is tighter, especially for emerging market firms, while Minetti, Murro, Rotondi, and Zhu (in press) show that Italian firms that can't get access to bank credit substitute to trade credit. Thus, the FX credit conditions may synchronize trade credit by increasing the flow of credit through the network of firms. Our results also suggest inter-firm trade credit networks are valuable to the firm, as they are maintained despite declines in investment and other resources in the event of a shock to the firm. Trade credit

may involve non-financial motives (Klapper et al., 2012), be used to maintain customer relationships (Giannetti, Serrano-Velarde, & Tarantino, 2018), and be used to smooth customer prices (Finkelstein Shapiro et al., 2018).

Uncovered interest rate parity (UIP) conditions are often violated in emerging markets, biasing borrowing towards foreign currency (Burnside, Eichenbaum, & Rebelo, 2007; di Giovanni, Kalemli-Özcan, Ulu, & Baskaya, 2018; Gilmore & Hayashi, 2011; Hardy, 2018; Hassan, 2013; Salomao & Varela, 2018).[6] Thus, firms in emerging markets borrow significantly in foreign currency, without offsetting foreign currency revenues (Acharya et al., 2015; Caballero, Panizza, & Powell, 2014; Chui et al., 2016; Du & Schreger, 2016; McCauley, McGuire, & Sushko, 2015). The interest rate differential is viewed as a key factor in determining FX borrowing.[7] We complement this view by showing that firms take advantage of these interest rate differentials quarterly with short term borrowing, increasing their FX exposure when borrowing in FX becomes more favorable.[8]

FX borrowing by firms may increase due to push factors from banks (Basso, Calvo-Gonzalez, & Jurgilas, 2011; Luca & Petrova, 2008; Rosenberg & Tirpák, 2008). Brown, Kirschenmann, and Ongena (2014) use data from a bank in Bulgaria that has information on the requested currency of the loan and the actual currency. Their results suggest that FX borrowing is driven both by firms trying to benefit from lower interest rates and by the bank trying to reduce risk by matching FX liabilities with FX loans. A firm's business may naturally generate a need for FX debt, such as for importers and exporters. Brown, Ongena, and Yeşin (2011) finds that exports are the key determining factor for borrowing in FX for small firms in central and eastern Europe, while Gelos (2003) finds that imports, exports, and firm size correlate with FX borrowing for firms in Mexico. Thus, carry trade

[6] Bocola and Lorenzoni (2018); Gabaix and Maggiori (2015); Gopinath and Stein (2018) provide models which microfound deviations from UIP and provide frameworks to understand risk of currency exposure. Our results suggest that inter-firm lending is an important element yet to be included in these models.

[7] Using a survey of CFO's in the United States and Canada, Graham and Harvey (2001) find that for 44% of firms surveyed, lower interest rates on FX debt is an "important" or "very important" factor in foreign borrowing decisions. McBrady and Schill (2007) documents that firms consider the covered and uncovered interest rate yields when determining the currency of borrowing. Frank and Shen (2016) and Huang et al. (2018) show that a higher interest rate differential increases the likelihood of USD bond issuance by firms in China, while Acharya and Vij (2017) shows this is the case for firms in India.

[8] Monetary policy of the local or foreign currency can affect the interest rate differential and thus the incentives to borrow and lend in each currency. Ongena, Schindele, and Vonnak (2016) and Avdjiev, Koch, McGuire, and von Peter (2018) find that lending by banks in a given currency increases with looser monetary policy in that currency. Capital controls can also influence the FX borrowing of firms (Keller, 2018).

activity is an additional and separate behavior that generates currency exposure beyond that dictated by the firm's business model and environment. We distinguish between the level of exposure, perhaps largely determined by normal operations, from the change in short term exposure, which may be driven more by carry trade motives.

We also contribute to the literature on exchange rate related balance sheet shocks. This literature often examines the level of firm FX borrowing interacted with exchange rate depreciation to capture balance sheet shocks. FX borrowing and balance sheet exposure generally result in lower investment following a depreciation (Aguiar, 2005; Cowan, Hansen, & Óscar Herrera, 2005b; Gilchrist & Sim, 2007; Kalemli-Özcan, Kamil, & Villegas-Sanchez, 2016; Pratap, Lobato, & Somuano, 2003; Serena Garralda & Sousa, 2017), however some conflicting results have been found (Benavente, Johnson, & Morande, 2003; Bleakley & Cowan, 2008; Bonomo, Martins, & Pinto, 2003; Luengnaruemitchai, 2003). The conflict in the literature may be partly due to the use of data from large listed firms, when smaller firms have the strongest impacts (Hardy, 2018; Kim, Tesar, & Zhang, 2015) or from using incomplete measures of firm FX exposure and currency mismatch (Alvarez & Hansen, 2017; Cowan, Hansen, & Óscar Herrera, 2005a; Hardy, 2018). We extend this literature by showing that firm carry trade activity which builds up short term FX exposure can affect real firm outcomes even after controlling for the level exposure to FX on the balance sheet. Indeed, our results suggest that a carry trade measure of FX exposure may be a valuable indicator of vulnerability to a depreciation, perhaps more so than traditional balance sheet measures.

The remainder of the paper proceeds as follows: in Section 2, we describe our data and sample; Section 3 examines the borrowing and saving of firms by currency and instrument; Section 4 provides evidence of carry trade activity in firm short term FX positions; the real consequences for firms of that exhibit carry trade behavior is explored in Section 5; and Section 6 concludes.

2 Data and Sample

We use a novel dataset of listed non-financial firms in Mexico that includes detailed information on both asset and liability FX exposure. This dataset is derived from quarterly

financial statements made by companies listed on the Mexican Stock Exchange (BMV).[9] This is a quarterly firm level dataset of 183 firms (unbalanced) over 2005q1-2015q2. Table 1 summarizes the available breakdowns of the FX liabilities and assets in the data. We can examine the liabilities by currency and maturity (2005-2015), currency, maturity, and instrument (2008-2015), and we have a breakdown of assets by currency (2005-2015), and currency and maturity (2012-2015). The instrument breakdown on the liability side includes bank credit, market credit (bonds), trade credit, and other. The assets can also be split by instrument, with short term assets split into cash, financial assets, inventories, accounts receivable, and other, though not simultaneously split by currency. Nevertheless, this detail in the balance sheet data is unique in the literature and makes it possible to examine how the accumulation of FX debt correlates with the accumulation of FX and peso assets, as well as connect these currency movements to trade credit borrowing and lending. While we can only examine the maturity of FX assets over 2012-2015, more than 90% of the FX assets in our sample are short term over this period, so we make the simplifying assumption that all FX assets are short term for the remainder of our analysis.

The dataset also includes data on interest rates at the loan level for 87% of our loan observations, which enables us to compute firm level interest rates for 87% of firms in either currency, with 47% of firms with both peso and FX interest rates simultaneously, and therefore examine carry-trade opportunities faced by non-financial firms.[10] Finally, the dataset also includes standard balance sheet information, as well as data on employment, physical investment, and exports.

Table 1: Currency Composition Data

	FX Liabilities				FX Assets	
	Total	by Maturity	by Instrument	by Inst. & Mat.	Total	by Maturity
2005q1-2007q4	✓	✓			✓	
2008q1-2011q4	✓	✓	✓	✓	✓	
2012q1-2015q2	✓	✓	✓	✓	✓	✓

Because our goal is to study currency risk it is important to distinguish between ex-

[9] See Hardy (2018) for more detail on the dataset.

[10] While many firms borrow in both currencies, fewer borrow from banks simultaneously in both currencies.

porters (firms with a natural hedge for FX borrowing) and non exporting firms. Exporters are defined as having the median of the export share of sales greater than 15%. This captures firms that consistently have a meaningful amount of their revenues from foreign buyers, and thus potentially denominated in a foreign currency. The maturity breakdown of liabilities in the data is based on remaining maturity, with short term defined as having a remaining maturity at 1 year or less.

Table 2 provides summary statistics for the balance sheet positions for firms in our data, with detail by currency, instrument, and maturity. For the average firm, FX liabilities stand at 15% of assets compared to peso liabilities which are closer to 38% of assets. Nearly half of the FX liabilities are short term. Panel (a) of Figure 2 shows the average share of FX liabilities by instrument for firms of different size.[11] Among firms that borrow in FX, a large portion of FX liabilities comes from loan debt (33%) and trade credit (32%), though bond debt (14%) can also be important for large firms. For all firms, bank credit and trade credit form the majority of FX liabilities, a fact which highlights the importance of considering all forms of FX credit rather than FX bonds only. Because trade credit is typically short term, FX trade credit is on average 46% of the short term FX liabilities. While firms do hold FX assets, on average those holdings are less than their FX liabilities.

Among the short term assets held by firms, panel (b) of Figure 2 shows that accounts receivable is the largest category for all groups, and are nearly twice as large on average than cash and financial asset holdings. Cash and financial assets make up a smaller portion of short term assets for smaller firms, which tend to hold more inventory. Thus, FX positions and trade credit (as an asset and as a liability) are important components in a firm's balance sheet.

[11] Size categories are based on the average of log assets over the sample. Number of firms in each size group is roughly equal.

Table 2: Summary Statistics

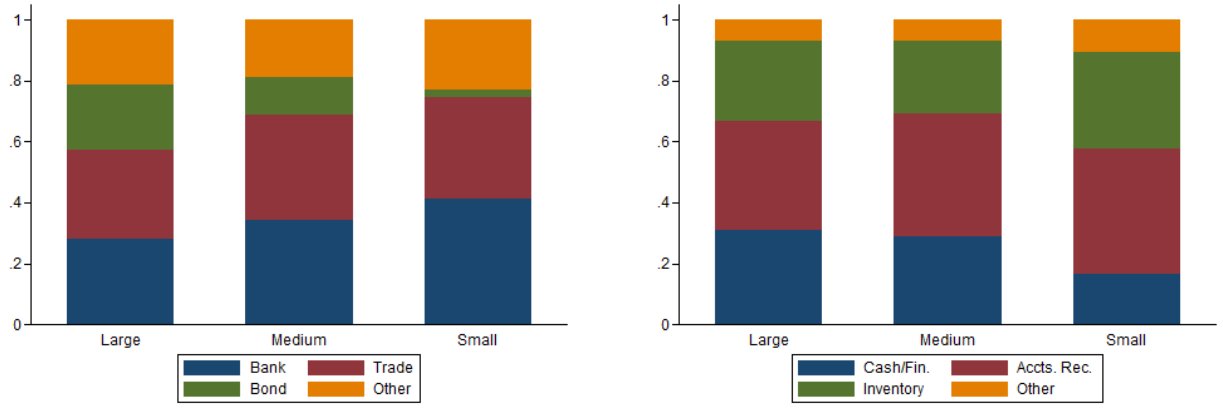
	N	Avg	p10	p50	p90	Std Dev
FXL/A	5028	0.154	0	0.081	0.421	0.185
Short	4528	0.075	0	0.040	0.188	0.120
PSL/A	5028	0.378	0.136	0.342	0.631	0.399
Short	4528	0.197	0.044	0.153	0.379	0.216
Bond/A	5126	0.099	0	0.000	0.268	0.199
FX	3472	0.027	0	0	0.113	0.198
Peso	3472	0.059	0	0	0.145	0.198
Loan/A	5126	0.133	0	0.103	0.308	0.138
FX	3472	0.052	0	0.004	0.181	0.088
Peso	3472	0.071	0	0.030	0.204	0.095
TradeCredit/A	5126	0.093	0.008	0.071	0.194	0.088
FX	3472	0.024	0	0.004	0.071	0.044
Peso	3472	0.050	0.000	0.029	0.118	0.076
FXA/A	4562	0.091	0.001	0.047	0.23	0.128
STPSA/A	4562	0.308	0.073	0.258	0.682	0.258
Cash&Fin/A	5114	0.080	0.008	0.055	0.186	0.086
AcctsRec/A	5122	0.162	0.031	0.126	0.335	0.143
Inventories/A	5126	0.137	0.002	0.085	0.331	0.167
log(Assets)	5157	16.12	13.63	16.34	18.32	1.787
Net Income/A	4782	0.008	-0.015	0.010	0.034	0.088

FX denotes foreign currency; PS denotes local currency (pesos); L indicated liabilities; A indicates assets; ST indicates short term. TradeCredit is trade credit liabilities, while AcctsRec is trade credit assets (accounts receivables). Data is quarterly, 2005q1-2015q2.

3 FX Borrowing and Saving

We first examine how changes in the liabilities of the firm correlate with changes in the short term assets of the firm. That is, how much of a firm's incoming cash is saved in short term assets, and how do these patterns vary by the currency of both the liability and the

Figure 2: Balance Sheet Positions, share of total



(a) Average FX Liabilities

(b) Average Short Term Assets

Source: Author's calculations, averages over 2008q1-2015q2. Firm size groups based on assets: small (avg. assets<33rd pctile), medium (33rd pctile < avg. assets < 66th pctile) and large (avg. assets>66th pctile).

asset. We examine changes in bond, loan, and trade credit debt of the firm, as well as changes in total FX and peso liabilities. Although FX bond issuance is an increasingly important source of firm FX funding, it is important to capture all FX liabilities, especially bank and trade credit, to get a full picture of the firm's FX exposures. We examine the relationship between firm liabilities and short term assets with the following regression:

$$\frac{\Delta STAsset_{it}}{TotalAssets_{it-1}} = \alpha_i + \alpha_t + \gamma \frac{CashFlow_{it}}{TotalAssets_{it-1}} + \sum_{type} \beta^{type} \frac{\Delta Borrowing_{it}^{type}}{TotalAssets_{it-1}} + \epsilon_{it} \qquad (1)$$

CashFlow is the net income of the firm over the quarter, which captures non-debt funds which the firm could use to acquire assets. $Borrowing^{type}$ is one section of the firm's liability structure, such as bonds, FX liabilities, etc. *STAsset* is one section of the firm's short term assets, such as FX assets, cash, etc. Firm and time fixed effects are included to capture any common shocks to all firms and any level differences among firms. Standard errors are clustered at the firm level.[12]

[12]The R^2 reported in this paper is the within-R^2.

Table 3 takes a first look at the relationship between changes in borrowing by instrument and accumulation of short term assets. Column (1) shows that firms tend to accumulate short term assets at high rates out of both loan and bond borrowing, and especially their trade credit. Columns (2) and (3) decompose short term assets by currency. Column (2) shows that firms use more of their loan and trade credit borrowing to finance the acquisition of short term FX assets. Column (3) implies that peso assets are accumulated out of both bonds and loans, but especially so out of trade credit. Thus, there is valuable information in loans and trade credit when studying the accumulation of short term FX and peso liabilities. Column (4) and (5) show two different short term assets: cash and financial assets, and account receivables. The focus of the literature has been on the strong correlation between bond borrowing and increases in cash and financial assets depicted in column (4). The granularity of the data allows us to switch perspective to examine trade credit extended by the firm. In fact, as seen in column (5), all three sources of funding correlate positively with the extension of trade credit to other firms and customers (by accumulating accounts receivable).

Result 1: Firm Level Currency Mismatch. We take advantage of the currency composition of both assets and liabilities to examine how currency of borrowing and currency of short term assets correlate. This is important because it allows us to directly examine if firms on average use their FX borrowing to accumulate short term peso assets, and thus understand better how currency mismatches arise on the balance sheet. Table 4 studies how the currency of borrowing correlated with the currency of short term assets. Column (1) shows that firms accumulate short term assets at a rate of a little under 50% on the dollar, regardless of the source of funds. Columns (2) and (3) decompose these assets by currency. Column (3) shows that peso borrowing are not associated with balance sheet mismatches as these peso liabilities are used to accumulate short term assets almost exclusively in peso. However, for every $1 increase in FX funding, firms increase their holdings of short term assets by about $0.43, $0.21 of which is in FX and $0.19 of which is in peso. Thus, we directly show that, on average, firms use FX liabilities to fund short term peso assets. Columns (4) and (5) show that this tendency is not exclusive to exporting firms, which have more foreign currency revenues and thus more activity in their FX positions, pointing to motives that go beyond exporting to save pesos out of dollar bor-

Table 3: Corporate Saving by Instrument of Borrowing

	(1) Total	(2) FX	(3) Peso	(4) Cash and Financial	(5) Accounts Receivable
Cash Flow$_{it}$	0.0999	0.0665	0.0719	0.0248	0.0235
	(0.0819)	(0.0638)	(0.0687)	(0.0209)	(0.0209)
Δ Bond$_{it}$	0.541***	0.291***	0.274***	0.119**	0.346***
	(0.0782)	(0.0740)	(0.0720)	(0.0546)	(0.105)
Δ Loan$_{it}$	0.409***	0.263***	0.248***	0.0930***	0.216***
	(0.0419)	(0.0775)	(0.0779)	(0.0239)	(0.0290)
Δ Trade$_{it}$	0.695***	0.612***	0.635***	0.0936***	0.187***
	(0.0572)	(0.0607)	(0.0618)	(0.0258)	(0.0406)
Observations	4779	4225	4225	4756	4771
R^2	0.237	0.0874	0.0898	0.0345	0.129
Firms	183	161	161	183	183
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in column (1) is change in short term assets, column (2) is change in short term FX assets, column (3) is change in short term peso assets, and column (4) is change in cash and short term financial assets. Cash flow is net income over the previous quarter; Δ Bond is the change in bond debt over the previous quarter; Δ Loan is change in bank debt over the previous quarter; Δ Trade is the change in trade credit liabilities over the previous quarter. All variables are normalized by lagged assets. Errors are clustered at the firm level. * p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01

rowing.[13] This is consistent with the indirect evidence of FX borrowing leading to short term local currency assets shown in Bruno and Shin (2017) and Bruno and Shin (2018a).

For robustness, Table A1 shows that these results hold both before and after the 2008 financial crisis.[14] Table A2 shows that these patterns are common to both manufacturing firms and retail firms (consisting of retail, wholesale, hotels, and restaurant firms).

Table 4: Corporate Saving by Currency of Borrowing

	All Firms			Non-Exporters	
	(1) Total	(2) FX	(3) Peso	(4) FX	(5) Peso
Cash Flow$_{it}$	0.470***	0.0563*	0.408***	0.0112	0.521***
	(0.0538)	(0.0323)	(0.0563)	(0.0437)	(0.177)
Δ FX Liab$_{it}$	0.432***	0.210***	0.188***	0.219***	0.181**
	(0.0496)	(0.0331)	(0.0530)	(0.0532)	(0.0898)
Δ Peso Liab$_{it}$	0.488***	0.0361	0.416***	0.0206	0.417***
	(0.0443)	(0.0248)	(0.0465)	(0.0310)	(0.0620)
Observations	4683	4225	4225	2631	2631
R^2	0.296	0.0507	0.141	0.0567	0.145
Firms	179	161	161	102	102
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in column (1) is change in short term assets, columns (2) and (4) is change in short term FX assets, and columns (3) and (5) is change in short term peso assets. Cash flow is net income over the previous quarter; FX Liab is the exchange rate adjusted change in FX liabilities over the previous quarter; Peso Liab is change in peso liabilities over the previous quarter. All variables are normalized by lagged assets. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Result 2: Firm Level Financial Intermediation. What types of short term assets do firms accumulate with their peso and FX liabilities? Table 5 breaks down the short term

[13] We do not have comprehensive data on imports. However, exporting firms in Mexico tend to also be importers (Blaum, 2017).

[14] The results also hold in all periods if the crisis is broken out into its own period.

assets on the LHS of the regression by instrument: cash and other financial assets, accounts receivable (i.e. trade credit extended), inventories, and other short term assets. Increases in both FX and peso liabilities are associated with the accumulation of all of these types of assets. However, nearly half of every new dollar (or peso) borrowed, that is allocated to short term instruments, goes towards accounts receivable (roughly \$0.22 out of \$0.45). As firms receive additional resources, they extend more credit to customers and suppliers. Firms also use the additional FX and peso resources to accumulate financial assets (\$0.08) and increase inventory (\$0.11). Because the firm accumulates short term assets in peso out of its FX borrowing at \$0.19 per dollar, much of the mismatch that the firm generates must be in non-financial short term assets, likely trade credit. Therefore, trade credit cannot be ignored when analyzing the allocation of the proceeds from FX borrowing.[15]

These first two results highlight the value of using more granular financial data. While bond debt and cash holdings has been at the forefront of the discussion around non-financial firm carry trade behavior, firm borrowing and lending in trade credit plays a significant role in a firm's decision to increase their FX exposure on the balance sheet.

Again, the results are consistent both before and after the 2008 crisis, as shown in Table A3. The results are also consistent within manufacturing and retail firms (Table A4), the two sectors with the most observations in the sample.[16]

4 Carry Trades and FX Exposure

Having documented how firms expose themselves to currency risk when borrowing in FX and how those proceeds are allocated to provide credit to their relevant business partners, we turn our attention to the nature of foreign currency borrowing. In particular, we study the borrowing behavior of firms during high carry trade periods. To study this, we consider the following regression:

[15]These results complement Huang et al. (2018), who find that risky firms in China, which appear to increase dollar bond issuance with a larger interest rate differential, do more inter-firm lending.

[16]Manufacturing firms appear also to use peso borrowing to finance accounts receivable alongside their FX borrowing. Note that the retail sector here includes firms in retail, wholesale, restaurants, and hotels.

Table 5: Corporate Saving into Short Term Assets

	(1) Cash and Financial	(2) Accounts Receivable	(3) Inventories	(4) Other Short Term
Cash Flow$_{it}$	0.0914***	0.204***	0.123***	0.0463*
	(0.0233)	(0.0526)	(0.0367)	(0.0237)
Δ FX Liab$_{it}$	0.0826***	0.209***	0.104***	0.0218***
	(0.0175)	(0.0381)	(0.0249)	(0.00799)
Δ Peso Liab$_{it}$	0.0881***	0.240***	0.110***	0.0420***
	(0.0210)	(0.0595)	(0.0306)	(0.0153)
Observations	4660	4675	4683	2811
R^2	0.0372	0.141	0.0709	0.0264
Firms	179	179	179	175
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in column (1) is change in cash and short term financial assets, column (2) is change in accounts receivable, column (3) is change in inventories, and column (4) is change in other short term assets. Cash flow is net income over the previous quarter; FX Liab is the exchange rate adjusted change in FX liabilities over the previous quarter; Peso Liab is change in peso liabilities over the previous quarter. All variables are normalized by lagged assets. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$$\frac{\Delta Position_{it}}{TotalAssets_{it-1}} = \alpha_i + \sum_{k=0,1} \delta_k (IRD_{t-k} + Vol_{t-k}) + X_{it-1}\beta + \epsilon_{it} \quad (2)$$

where *Position* is the relevant balance sheet position (e.g. short term FX liabilities, cash holdings, etc.); IRD is the interest rate differential between peso and FX borrowing, our measure of carry trade incentives; *Vol* is the standard deviation of the daily peso depreciation rate (vis-à-vis the US dollar) over the quarter; and X is a vector of controls. Controls include one period lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio.

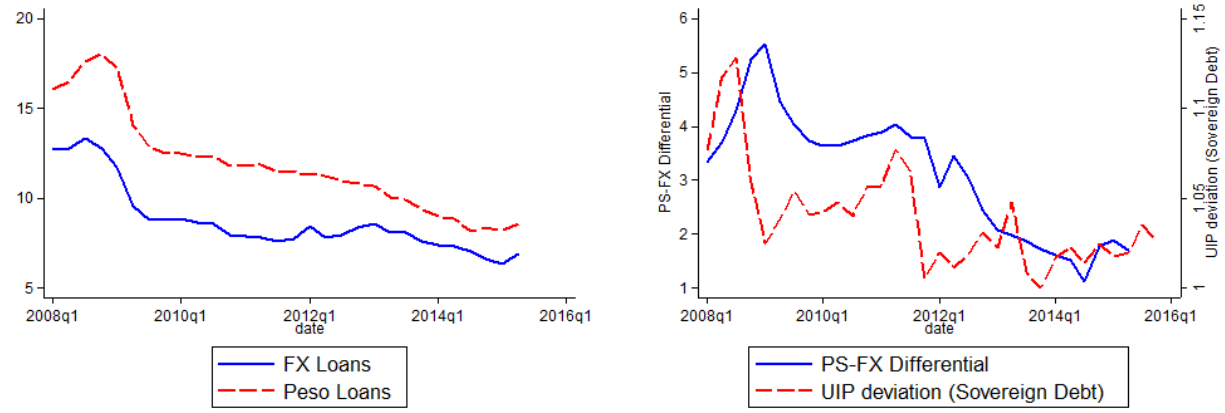
To construct the IRD, we use data on loan level borrowing of these firms to build firm and aggregate level interest rates. Thus for this part of our analysis, we restrict ourselves to firms with loan level data and borrowing. We construct the IRD by computing a weighted average of each interest rate, separately by currency, for each firm, with the weights determined by the remaining volume of the loan. This creates an effective interest rate for each firm in each currency. We have interest rate data for 87% of loan observations in our sample, which results in firm level interest rate data in either currency for 87% of firm observations. From these firm level interest rates, we compute simple averages across firms to construct the "aggregate" average effective interest rates in FX and peso for these firms. We also compute firm-specific interest rate differentials, but we can only do so for 47% of observations in our sample, as many firms borrow in both currencies but do not carry both FX and peso loans simultaneously on their balance sheet. Results including the firm specific IRD can be found in the appendix.

Panel (a) of Figure 3 displays the evolution of the aggregated rates. The average interest rate on FX loans is consistently lower than that of peso loans. For both rates, there is a spike around the global financial crisis, which was also associated with a large dollar appreciation, followed by a long slow decline. Panel (b) compares the interest rate differential between peso and FX loans with a measure of deviation from uncovered interest parity (UIP), defined as $dev_t \equiv \frac{s_t}{E[s_{t+1}]} * \frac{(1+i_t)}{(1+i_t^*)}$ with the interest rates i_t, i_t^* from 1 year T-bills and exchange rate s_t expectations from year ahead forecasts.[17] There is a strong

[17]Source: Banco de Mexico, FRED. Exchange rate expressed as Dollars per Peso. Forecast from survey of professional forecasters provided by the Banco de Mexico. i is rate on Mexican T-Bills, i^* is rate on US

correlation between these two series, though with an important delay between when the sovereign rates change (thus affecting the UIP measure) and when the realized rates for firms change. We use the aggregated firm interest rate differential as our preferred measure of carry trades opportunities for non-financial firms, as that more closely reflects the business environment faced by firms.

Figure 3: Average Interest Rates, 2008q1-2015q2



(a) Average Interest Rates by Currency

(b) Interest Rate Differential vs UIP Deviations

Interest Rates take loan/bond level interest rates by currency, computes a loan/bond volume weighted average up to the firm level, and then takes a simple average of those rates across firms in eah quarter. PS-FX Differential is the difference between the average Peso rate and the average FX rate on loans. UIP Deviation defined as $(s_t/E[s_{t+1}]) * ((1+r_t)/(1+r_t^*))$, where s_t is the exchange rate expressed as dollars per peso, $E[s_{t+1}]$ is the year ahead expected exchange rate (from survey of professional forecasters, Banco de Mexico), and r and r^* are the the interest rates on 1 year treasury bills for Mexico and the U.S., respectively. All rates are period averages over each quarter.

Result 3: Firm Level Carry Trades. If firms are seeking to profit from carry trade opportunities by taking a foreign currency exposure, they may accumulate short term instruments so as not to unnecessarily expose themselves to the long term risk. As explanatory variables, we consider both the aggregate interest rate differential of firms, but also the within firm interest rate differential.

Table 6 considers short term FX and peso liabilities as the dependent variable. Columns (1) and (2) show that short term peso borrowing does not systematically respond to carry

T-bills. All rates are period averages over each quarter.

trades opportunities. In columns (3) and (4), we see that when the interest rate differential is high (meaning FX loans are relatively cheaper than peso loans), firms increase their accumulation of short term FX liabilities. This position is reversed in the following quarter.[18] The fact that the FX position adjusts, and not the peso, and the fact that position is short term and reacts to quarterly movements in financial conditions, suggests this activity is consistent carry trade behavior. Firms appear to engage in the carry trade, even when (perhaps especially when) it becomes more risky to do so with a higher exchange rate volatility (column (4)). The use of quarterly data is crucial to document these behaviors and uncover the short term build-up and unwinding pattern of FX borrowing with the interest rate differential.

Columns (5)-(7) breakdown short term FX liabilities by instrument: loans, bonds, and trade credit. The response of short term FX borrowing to the carry trade comes mainly from loans and trade credit. Loans and trade credit may be easier to obtain on a shorter notice, as firm's try to take advantage of a favorable change in interest rates. This constitutes further evidence of carry trade behavior and yet another sign of the importance of expanding the analysis of carry trade behavior beyond bond liabilities.[19]

Table 7 explores how short term asset dynamics change with carry trade opportunities, estimating regressions on short term assets in FX and in peso. Columns (1)-(3) show that firms accumulate short term FX assets with the carry trade opportunities as well. Thus, it seems that firms, at least in part, cover their speculative borrowing with FX assets, which are likewise wound down in the following period. Column (3) shows that this hedging is driven by the volatility of the exchange rate. When there is a high interest rate differential, firms borrow more in short term FX, but if the exchange rate is uncertain, they accumulate more short term FX assets as a hedge. Columns (4) to (6) consider short term peso assets. Column (4) indicates that firms also accumulate short term peso assets with the carry trade environment. These peso positions are thus an explicit currency mismatch as firms are short the dollar and long peso. This position is likewise unwound in the next period, but not in full. The results are not robust to the inclusion of firm controls in column (5), driven by the inclusion of controls for firm size, liabilities, and sales. Nevertheless,

[18] Further lags are not significant. When the individual firm interest rate differential is included, it carries some explanatory power, but the magnitudes are small relative to the aggregate variable. See Tables A5-A7.

[19] These results thus complement those of Bruno and Shin (2017) and Bruno and Shin (2018a), which focus on bond issuance and cash holdings in annual data.

Table 6: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the change in short term peso liabilities, and in columns (3)-(7) is the change in short term FX liabilities (for the instruments listed in the column heading). Short term is based on remaining maturity at one year or less. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

changes to the net currency position of the firm will reveal the evolution of the firm's currency mismatch, as explored next in Table 8.

Table 7: Change in Short Term Assets by Currency

	Short Term FX Assets			Short Term Peso Assets		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.584***	0.470**	-0.0748	0.808**	0.288	0.489
	(0.219)	(0.214)	(0.285)	(0.320)	(0.325)	(0.361)
IRD_{t-1}	-0.709***	-0.806***	-0.197	-0.547*	-0.418	-0.461
	(0.218)	(0.223)	(0.287)	(0.324)	(0.340)	(0.400)
$XRvol_t$			1.238**			-0.576
			(0.504)			(0.501)
$XRvol_{t-1}$			-1.357**			-0.213
			(0.625)			(0.676)
Observations	2390	2348	2348	2390	2348	2348
R^2	0.00394	0.0109	0.0255	0.00287	0.0255	0.0262
Firms	123	117	117	123	117	117
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	No	Yes	Yes	No	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(3) is change in short term FX assets and columns (4)-(6) is change in short term peso assets. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The previous results show that firms expand both the assets and liabilities in trade credit and in FX with carry trades opportunities, but they also tend to unwind those positions in the following quarter. Is the firm increasing their FX exposure on net with the carry trades, or are they keeping their positions hedged with FX assets? Are these positions fully unwound in the following quarter, or is FX exposure being built up? Table 8

uses the change in the short term FX positions as the dependent variable, which is defined as $\frac{(ShortFXLiab_{it}-FXAssets_{it})-(ShortFXLiab_{it-1}-FXAssets_{it-1})}{TotalAssets_{it-1}}$. Results are similar if we use total FX liabilities in the measure for the change in total FX position. Firms increase their short term and total FX exposure when the carry trade incentive is high, and then unwind that position in the next period, at least in part. This is robust to the inclusion of the volatility controls in column (2). Column (3) examines the change in the interest rate differential, to confirm if this differential widens that firms build up FX risk on avreage. From columns (3) and (6), this seems to be the case. These results hold among the sample of non-exporting firms (columns (4)-(6)), suggesting again that this is not to hedge FX revenues, but rather to take advantage of cheap FX funding.

Are firms using derivatives to hedge these short term positions? Our data does not tell us about the exact derivative contracts firms have engaged in, but we can get an idea of how active firms might be with their derivatives usage. In Table A8, we examine the net and gross market value of derivatives on the firm balance sheet to see if they react to carry trade opportunities. We find that the gross derivatives positions increase with the carry trades and unwind the following period. However, this behavior is driven mainly by exporters. Thus, while we can't rule out that exporters may be hedging in part their carry trade positions, they do not appear to move their net positions and non-exporters do not appear to be as active in derivatives use with their FX borrowing.[20]

Table 9 decomposes short term assets by instrument. Here, we see that a significant portion of the carry trade activity is carried using financial assets held by the firm. This is in line with the usual narrative around carry trades by non-financial firms. Interestingly, cash holdings themselves do not follow the same pattern, decreasing with the interest rate differential (perhaps as those funds are put to a higher yielding use), and increasing with exchange rate volatility (perhaps accumulated as a hedge). Accounts receivable and, to a less robust extent inventories, do exhibit dynamics similar to the FX positions with the carry trade. Thus, firms increase their short term FX liabilities in response to carry trades opportunities and use these short-run funds not only in short term financial assets, but also to extend trade credit and possibly accumulate inventory.

[20]The unhedged nature of this strategy could be a reflection of illiquid derivative markets or deeper arbitrage deviations in the system (e.g. covered interest parity (CIP) deviations as documented by Du, Tepper, and Verdelhan (2018), Du, Im, and Schreger (in press), and Avdjiev, Du, Koch, and Shin (in press)).

Table 8: Change in Short Term FX Position

	All Firms			Non-Exporters		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.944**	0.921**		0.826***	1.072**	
	(0.362)	(0.367)		(0.306)	(0.412)	
IRD_{t-1}	-0.582	-0.749*		-0.557*	-0.847*	
	(0.376)	(0.394)		(0.311)	(0.435)	
$XRvol_t$		0.183	0.319		-0.551	-0.366
		(0.663)	(0.611)		(0.636)	(0.602)
$XRvol_{t-1}$		0.705	0.854		0.690	0.883
		(0.622)	(0.607)		(0.784)	(0.756)
Δ IRD_t			0.823**			0.946**
			(0.374)			(0.418)
Observations	2346	2346	2346	1393	1393	1393
R^2	0.0163	0.0178	0.0175	0.0142	0.0173	0.0164
Firms	116	116	116	72	72	72
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1), (3), and (5) is change in FX position (FX liabilities - FX assets) and in columns (2), (4), and (6) is change in short term FX position (short term FX liabilities - FX assets). All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. Δ IRD is the change in IRD over the past quarter. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Exporting firms are those whose sample median ratio of foreign sales to total sales is above 15%. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Given that trade credit is an important source of funding but also a major instrument for short term asset holdings, and an important facilitator of sales, we study the correlation between the size of the firm's trade credit relationships and the firm's sales in response to the interest rate differential. In Table 10, columns (1)-(2) shows that the firm's trade credit network, measured by the gross trade credit (trade credit + accounts receivable), expands (and then contracts) with the interest rate differential, mirroring the FX borrowing and exposure results. Along with these fluctuations in trade credit, sales (columns (3)-(4)) similarly expands and contracts. Columns (5)-(6) examine the accounts receivable to sales ratio, a measure of the fraction of sales made on credit, to see if firms adjust their invoicing patterns with credit conditions. This ratio does not appear to change with the interest rate differential. Thus, easier FX credit appears to boost trade credit networks and sales by facilitating cheaper credit between firms, but firms maintain consistent invoicing patterns (e.g. keep a constant share of sales on credit).

Because these regressions exclude time fixed effects, other time varying factors besides the interest rate differential may play a role in driving the results. Table A9 includes the controls for the VIX, which captures other relevant aspects of international conditions, and oil prices, which captures information about global trade and the commodity cycle. Results are robust for all the dependent variables. Table A10 decomposes results for the manufacturing and retail sectors. Both sectors' FX borrowing appears to respond to the interest differential, but manufacturing firms have a stronger response. They also drive the response of accounts receivable to the differential. This may be because manufacturing firms extend more trade credit to other firms than do retail firms, and thus they may be more in a position to leverage their FX borrowing into trade credit lending. Tables A11-A12 confirm that the main results hold when using the change in the interest rate differential, rather than current and lagged levels, indicating that an increase in this differential may indeed lead to a change in financial and real activities. Columns (1)-(2) of Table A11 show that FX borrowing responds to the increase in the interest rate gap while peso borrowing does not. Columns (3)-(4) indicate that peso assets respond much more to an increase in the interest rate differential, as compared to FX assets in columns (5)-(6), confirming that FX borrowing in times of an increasing gap between foreign and domestic currency interest rates translates into peso assets and thus currency risk.

Table 9: Change in Short Term Assets

	Financial Assets		Cash		Accounts Receivable		Inventories	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IRD_t	0.500***	0.437**	-0.642***	-0.834***	0.305	0.389**	0.252*	0.265*
	(0.142)	(0.168)	(0.147)	(0.177)	(0.204)	(0.159)	(0.145)	(0.145)
IRD_{t-1}	-0.452***	-0.375**	0.107	0.145	-0.397**	-0.288*	-0.307**	-0.153
	(0.157)	(0.173)	(0.161)	(0.181)	(0.187)	(0.163)	(0.134)	(0.155)
$XRvol_t$		0.137		0.566***		-0.341		-0.157
		(0.186)		(0.133)		(0.298)		(0.273)
$XRvol_{t-1}$		-0.186		0.221**		-0.596**		-0.641***
		(0.201)		(0.112)		(0.251)		(0.211)
Observations	2487	2487	2471	2471	2487	2487	2487	2487
R^2	0.0241	0.0247	0.118	0.123	0.0105	0.0134	0.0345	0.0376
Firms	121	121	121	121	121	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is change in financial assets, columns (3)-(4) is change in cash holdings, columns (5)-(6) is change in accounts receivable, and columns (7)-(8) is change in inventories. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Change in Trade Credit and Sales

	Gross Trade Credit		Sales		Accounts Receivable to Sales Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.754***	0.637***	0.730***	0.355**	-0.0843	-0.267
	(0.241)	(0.203)	(0.159)	(0.152)	(1.295)	(1.230)
IRD_{t-1}	-0.907***	-0.495**	-0.689***	-0.135	-1.318	-1.025
	(0.228)	(0.214)	(0.162)	(0.172)	(0.926)	(0.866)
$XRvol_t$		0.0539		0.746***		0.349
		(0.372)		(0.250)		(1.391)
$XRvol_{t-1}$		-1.414***		-1.478***		-0.803
		(0.347)		(0.266)		(1.659)
Observations	2487	2487	2487	2487	2445	2445
R^2	0.0168	0.0243	0.163	0.186	0.0247	0.0249
Firms	121	121	121	121	119	119
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

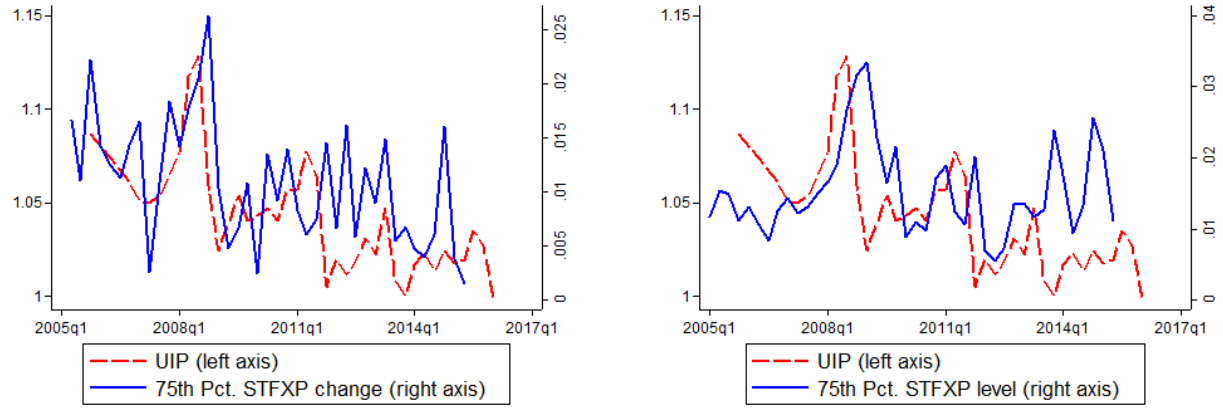
Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the gross trade credit (trade credit liabilities plus accounts receivable), normalized by the previous period's assets; in columns (3)-(4) is change in Sales to assets ratio; and in columns (5)-(6) is accounts receivable divided by the sum of sales over the past 4 quarters, winsorized at 1%. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Concluding the third result of the paper, firms exploit carry trade opportunities to increase their FX borrowing and use the proceeds to accumulate financial assets and extend trade credit to related partners. This increase in available trade credit and expansion of the firm's trade credit network facilitates an increase in sales. In the process of these activities, firms increase on net their balance sheet exposure to currency risk.

5 Real Effects of the Carry Trades

Evidence from the previous section suggests that in periods of prolonged carry trade incentive, firms build up FX exposure on their balance sheet. Figure 4 plots the 75th percentile for quarterly change and level of short term FX exposure, along with deviations from UIP. This figure shows that some firms are indeed increasing their short term FX exposure when the carry trade is high, suggesting they are building up vulnerabilities over time due to their carry trade behavior. But does this behavior affect real outcomes? We address this by examining the growth of firm level employment and investment, and firm profits. We use a large depreciation episode in late 2008 precipitated by the collapse of Lehman brothers in the U.S. as an exchange-rate shock experiment. This depreciation was very sudden and very large (33% depreciation of the peso from top to bottom). This depreciation was not driven by a crisis in Mexico, and so it provides a large shock while avoiding the identification problems of using a currency crisis.

Figure 4: UIP Deviations and Short Term FX Exposure



(a) 75th Percentile - Quarterly Change

(b) 75th Percentile - Level

Short term FX exposure is defined as Short term FX liabilities minus FX assets, normalized by total assets. UIP Deviation defined as $(s_t/E[s_{t+1}]) * ((1+r_t)/(1+r_t^*))$, where s_t is the exchange rate expressed as dollars per peso, $E[s_{t+1}]$ is the year ahead expected exchange rate (from survey of professional forecasters, Banco de Mexico), and r and r^* are the the interest rates on 1 year treasury bills for Mexico and the U.S., respectively. All rates are period averages over each quarter.

The building up of short term FX exposure peaks at 2008q4. Thus, the relevant period

of carry trades activity before the shock is 2005q1-2008q4. We want to separate the effect of engaging in carry trade-type speculation from standard balance sheet effects. That is, we want to distinguish the level effect from the change effect in a firm's short term FX positions. Therefore, our regression takes the following form:

$$Y_{it} = \alpha_i + \alpha_t + \beta_0 \Delta STFXP_i \times Shock_t + \beta_1 STFXP_i \times Shock_t + X_{it-1}\beta + \epsilon \quad (3)$$

Short term FX exposure is defined as $\frac{STFXLiabilities - FXAssets}{Assets}$.[21] $\Delta STFXP_i$ is the change in this value between 2005q1 and 2008q4. This is our measure of engaging in carry trades. This period was one of a high interest rate differential and stable exchange rate, and results from Table 8 suggest that firms engaging in carry trades will build up their exposure over time, as seen in Figure 4. $STFXP_i$ is the level value at 2008q4 of the short term FX exposure. Including the level term captures the average effect on a firm after the shock which had that level of exposure, regardless of whether they engaged in carry trades to reach that position. This allows us to separate firms that got exposed via carry trades from firms that had a given level of exposure before as part of normal operations.[22] We run our regression with a two year pre-shock period (2007-2008), a two year shock period (2009-2010) and a two year post-shock period (2011-2012). Thus, *Shock* takes a value of 1 during 2009-2010 (the aftermath of the depreciation) and 0 otherwise. The interaction of the exposure measures with the shock thus provides a difference-in-difference experimental approach.[23] We stop the sample in 2013q1 to avoid a long, protracted depreciation period following the Taper Tantrum episode. Y_{it} is the firm outcome variable: $\Delta \log(PPE_{it})$, where PPE is property, plant, and equipment; $\Delta \log(Emp_{it})$ the logged value of total employment; and profits (net income) over the past quarter, normalized by last period's assets.

[21] Note again that, based on our data from 2012q1-2015q2 where we can separate FX assets by maturity, over 90% of FX assets are short term assets. Thus, we make the simplifying assumption that all FX assets are short term in order to construct our short term exposure measure for the earlier period of our data.

[22] Results are robust to including a control for the overall level FX position instead of the short term level FX position.

[23] We justify the difference in difference approach by testing with a placebo for the pre-period (2007-2008) in the Appendix Table A13. We find no significant difference in outcomes for firms of different $STFXP$ changes during the pre-period for investment and profit outcomes. Employment growth in the pre-period is marginally significantly different.

Result 4: Real Effects of Firm Level Carry Trades. Tables 11 presents the results. We find that engaging in carry trade activities that increase the short term FX position of the firm results in a negative and significant impact on the growth of physical capital. This holds, and perhaps even strengthens, after controlling for the level effect. Employment appears to be not as affected, as seen in columns (3) and (4). A negative impact on profits is only significant in column (6) after the level effect has been controlled for. A change in short term FX exposure of 0.11 over this period, the 75th percentile increase, results in about a 0.4% decrease in investment growth. The average (quarterly) PPE growth for firms with the 75th percentile carry trade was 2% in the non-shock period and -0.4% during the shock period. Thus, our estimates suggest the carry trade activity accounted for roughly 17% of the overall investment decline from these firms.

Table 12 splits the sample into exporters and non-exporters. Because exporters are more active in the use of derivatives, we additionally include a control for gross derivatives position to assets. This control restricts the sample to 2008q2 onward. The general patterns are maintained. Columns (1) and (2) show that both exporters and non-exporters which engaged in the carry trades experienced a decline in their investment growth following the depreciation. Non-exporters additionally saw declines in employment (column 3) and profits (column 5). Thus, the repercussions of carry trade behavior, in the event of a depreciation, can affect all firms, and is particularly negative for non-exporting firms.

Table A14 examines the pre-period placebo for the results of Table 12. The pre-period differences are not significant for investment and non-exporter employment, justifying the difference-in-difference design. However, profits are different in the pre-period, but precisely in the way we would expect. That is, we expect firms that engage in carry trades are taking advantage of the interest rate differential for profit, and that is indeed reflected in that those firms were making more profit during the carry trade period relative to other firms not so involved.

Table 11: Carry Trade Impacts

	Investment		Employment		Profits	
	(1)	(2)	(3)	(4)	(5)	(6)
STFXP Change$_i$ × Shock$_t$	-0.0298***	-0.0431**	0.0146	0.0168	-0.00656	-0.0105**
	(0.0111)	(0.0173)	(0.0142)	(0.0194)	(0.00515)	(0.00486)
STFXP Level$_i$ × Shock$_t$		0.0266		-0.00438		0.00779
		(0.0221)		(0.0185)		(0.00537)
Observations	1973	1973	1960	1960	1888	1888
R^2	0.0186	0.0195	0.00964	0.00966	0.0159	0.0167
Firms	87	87	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2006q1-2012q4. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the log difference of physical capital outstanding, measured as Property, Plant, and Equipment, winsorized at 2%; in columns (3)-(4) is the log difference of total employment, winsorized at 2%; in columns (5)-(6) is net income (profits) divided by total assets, winsorized at 1%. STFXP level is short term FX liabilities minus FX assets, normalized by total assets, at 2008q4. STFXP change is the difference between the STFXP levels at 2008q4 and 2005q1. Shock is a dummy equal to 1 during 2009 and 2010, and 0 otherwise. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Carry Trade Impacts - Exporter vs Non-Exporter

	Investment		Employment		Profits	
	(1) Non-Exporter	(2) Exporter	(3) Non-Exporter	(4) Exporter	(5) Non-Exporter	(6) Exporter
STFXP Change$_i$ $\times$ Shock$_t$	-0.0505**	-0.0409*	-0.0399**	0.0406	-0.0287***	0.00545
	(0.0198)	(0.0219)	(0.0183)	(0.0241)	(0.00606)	(0.00848)
STFXP Level$_i$ $\times$ Shock$_t$	-0.0188	0.0312	0.0630*	-0.0337*	0.0143	-0.00279
	(0.0329)	(0.0187)	(0.0359)	(0.0174)	(0.0125)	(0.00655)
Observations	948	591	942	588	943	587
R^2	0.0253	0.0301	0.0469	0.0483	0.0672	0.121
Firms	53	34	53	33	53	33
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2012q4. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the log difference of physical capital outstanding, measured as Property, Plant, and Equipment, winsorized at 2%; in columns (3)-(4) is the log difference of total employment, winsorized at 2%; in columns (5)-(6) is net income (profits) divided by total assets, winsorized at 1%. STFXP level is short term FX liabilities minus FX assets, normalized by total assets, at 2008q4. STFXP change is the difference between the STFXP levels at 2008q4 and 2005q1. Shock is a dummy equal to 1 during 2009 and 2010, and 0 otherwise. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), sales to assets ratio, and gross derivatives positions to assets winsorized at 3%. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Given that an important share of the carry trade FX funds are used to extend trade credit to related firms, it is possible that carry trade firms propagate their currency risk by cutting lending to their related partners when they are caught exposed to a depreciation. Therefore, we finish this section by studying how trade credit responds for carry trade firms following the depreciation. Table 13 does not reveal systematic differences in trade credit borrowed or extended by these firms, suggesting that inter-firm lending surprisingly stable during the episode. Consequently, sales also remains relatively stable.

Table 13: Carry Trade Impacts - Trade Credit and Sales

	(1) Borrowing	(2) Lending	(3) Gross	(4) Sales
STFXP Change$_i$ × Shock$_t$	0.00322	0.00649	0.0102	0.0197
	(0.00400)	(0.00461)	(0.00671)	(0.0176)
STFXP Level$_i$ × Shock$_t$	-0.00668	-0.00521	-0.0129	-0.00606
	(0.00518)	(0.00466)	(0.00805)	(0.0226)
Observations	1960	1960	1960	1959
R^2	0.0214	0.0190	0.0288	0.234
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

Sample spans 2006q1-2012q4. Firms reports the number of firms in each regression. Dependent variable in column (1) is the change in trade credit borrowed by the firm; in column (2) is the change in trade credit extended by the firm; in column (3) is the change in gross trade credit of the firm (trade credit + accounts receivable); and in column (4) is the change in quarterly sales. All dependent variables are normalized by lagged assets and winsorized at 1%. STFXP level is short term FX liabilities minus FX assets, normalized by total assets, at 2008q4. STFXP change is the difference between the STFXP levels at 2008q4 and 2005q1. Shock is a dummy equal to 1 during 2009 and 2010, and 0 otherwise. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14 adds an interaction with a dummy variable with value 1 if the firm's level of trade credit extended over 2005-2008 was in the 75th percentile. These high accounts receivable firms show interesting behavior. Firms with larger carry trade exposure, and

high accounts receivable, decrease their cash and financial holdings following the depreciation (column 1), suggesting that they are drawing down those resources to cover their near term FX obligations. However, these firms simultaneously increase, in relative terms, their trade credit extended to other firms. Columns (3) and (4) reveal that these firms increase their short term FX assets, but not their short term peso assets. Thus, it appears that when firms which extend large amounts of trade credit get caught exposed from carry trading activity, they draw down their liquid financial assets in order to maintain or increase their trade credit extended, likely denominated in FX. Thus trade credit relationships appears to be extremely valuable to the firm. This could reflect a desire to keep clients or suppliers afloat that may have lost access to FX credit, or it may indicate that the implicit interest rate priced into FX denominated invoices makes trade credit a profitable asset to hold and maintain, especially during a credit crunch when other sources of FX credit are less available, as was the case following the late 2008 depreciation. Interestingly, firms are even willing to cut their physical investment before reducing trade credit. Therefore, more than a catalyst of the crisis, inter firm lending constitutes a buffer that stabilizes credit supply at the cost of real activity.

6 Conclusion

We use a unique panel database of Mexican firms to study the borrowing and saving behavior of non-financial corporations, accounting for different instruments and currencies. We document risky financial intermediation by non-financial firms. Our database has four main advantages with respect to the empirical literature. First, we have quarterly frequency data that can be used to understand short-run behavior. Second, we have all sources of funding, in both FX and local currency, while most of the literature focuses exclusively on bonds. Third, we have information on the currency composition of FX assets, which allows us to directly examine if firms accumulate a currency mismatch with carry trade opportunities. Fourth, we additionally have a detailed decomposition of short term assets which allows us to go beyond the behavior of cash and directly study inter-firm lending and its relation to firm FX positions. We show that all of these advantages are critical to study carry trade and inter-firm lending.

Four core results constitute the main message of our paper. First, firms accumulate

Table 14: Carry Trade Impacts - Short Term Assets

	(1) Cash and Financial	(2) Accounts Receivable	(3) ST FX	(4) ST Peso
$\text{Shock}_t \times \text{High AR}_i$	0.00576**	-0.0109***	-0.00285	0.00230
	(0.00263)	(0.00351)	(0.00326)	(0.00939)
$\text{STFXP Change}_i \times \text{Shock}_t$	-0.000219	0.000533	-0.0371	0.0348
	(0.00554)	(0.00417)	(0.0335)	(0.0304)
$\text{STFXP Change}_i \times \text{Shock}_t \times \text{High AR}_i$	-0.0391***	0.0480***	0.0940**	-0.0590
	(0.0113)	(0.0160)	(0.0420)	(0.0569)
$\text{STFXP Level}_i \times \text{Shock}_t$	0.00990	-0.00218	0.139**	-0.135**
	(0.00782)	(0.00457)	(0.0556)	(0.0534)
$\text{STFXP Level}_i \times \text{Shock}_t \times \text{High AR}_i$	0.00684	-0.0343**	-0.146**	0.146
	(0.0168)	(0.0154)	(0.0615)	(0.0910)
Observations	1945	1960	1920	1920
R^2	0.0287	0.0234	0.0337	0.0327
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

Sample spans 2006q1-2012q4. Firms reports the number of firms in each regression. Dependent variable in column (1) is the change in holdings of cash and financial assets; in column (2) is the change in trade credit extended by the firm (accounts receivable), winsorized at 1%; in column (3) is the change in short term FX assets; and in column (4) is the change in short term peso assets. All dependent variables are normalized by lagged assets. STFXP level is short term FX liabilities minus FX assets, normalized by total assets, at 2008q4. STFXP change is the difference between the STFXP levels at 2008q4 and 2005q1. Shock is a dummy equal to 1 during 2009 and 2010, and 0 otherwise. High AR is a dummy for if the firm was in the 75th percentile for the 2005-2008 average of accounts receivable to assets. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

short term peso assets out of their short term FX borrowing, while peso borrowing is exclusively associated with peso assets. Thus, firms build currency risk when borrowing in foreign currency. Second, non-financial firms act as financial intermediaries extending trade credit out of both their peso and FX borrowing, even at a higher rate than they accumulate cash and financial assets out of that borrowing. Third, during periods of high interest rate differential, firms increase both their currency exposure and their trade credit participation. The expansion of the firm's trade credit network facilitates increased sales, providing a connection between FX credit conditions and real activity via facilitating larger production chains. Firms increase their borrowing in short term FX and increase their overall FX exposure with w widening interest rate differential. Over a period of widening interest rate differentials, short term FX exposure can build up for firms which engage in the carry trades. Fourth, in the event of a depreciation, accumulating short term FX exposure leads to a negative shock to real firm investment, and in the case of non-exporting firms also employment and profits. This effect is separate from, and stronger than, the traditional balance sheet effect from the level of FX exposure on the balance sheet. Interestingly, carry trading firms hit by the depreciation shock prefer to cut physical investment and draw financial resources from their assets instead of cutting the trade credit that they provide to their customers and others. Thus, in contrast to the banking literature, our findings suggest that the value of inter-firm relationships is strong enough to provide a buffer preventing the propagation and amplification of a currency crisis.

Our results highlight the growing concerns over the financial activities of non-financial firms. Firms may engage in risky and speculative borrowing when the interest rate differential is high, increasing their FX exposure, and possibly extending additional trade credit to customers and other firms. This risk taking by firms can affect the firms themselves, but may also influence the prevalence of trade credit in the economy, which also moves with the FX-peso interest rate differential. Borrowing and lending in the form of trade credit appears to be important to these firms and is tied to their FX positions. Understanding the financial behavior of non-financial firms is increasingly important for financial stability and may point in new directions to understand the nature of currency mismatch, FX borrowing, and financial intermediation in emerging markets. This is especially important since policy discussions tend to focus much more on bank regulation

than on the role that large firms play in financial intermediation.

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A Other Results

Table A1: Corporate Saving by Currency of Borrowing: Pre- and Post- Crisis

	2005q2-2008q3			2008q4-2015q2		
	(1) Total	(2) FX	(3) Peso	(4) Total	(5) FX	(6) Peso
Cash Flow$_{it}$	0.408***	0.0114	0.479***	0.593***	0.0989	0.466***
	(0.0698)	(0.0586)	(0.0819)	(0.155)	(0.0746)	(0.177)
Δ FX Liab$_{it}$	0.394***	0.209***	0.196***	0.456***	0.213***	0.174**
	(0.0593)	(0.0429)	(0.0523)	(0.0699)	(0.0583)	(0.0738)
Δ Peso Liab$_{it}$	0.438***	-0.00775	0.507***	0.499***	0.0558**	0.362***
	(0.0602)	(0.0545)	(0.0729)	(0.0586)	(0.0276)	(0.0592)
Observations	1540	1372	1372	3141	2850	2850
R^2	0.320	0.0578	0.248	0.287	0.0494	0.104
Firms	141	129	129	152	137	137
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) and (4) is change in short term assets, columns (2) and (5) is change in short term FX assets, and columns (3) and (6) is change in short term peso assets. Cash flow is net income over the previous quarter; FX Liab is the exchange rate adjusted change in FX liabilities over the previous quarter; Peso Liab is change in peso liabilities over the previous quarter. All variables are normalized by lagged assets. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Corporate Saving by Currency of Borrowing: by Sector

	Manufacturing			Retail		
	(1) Total	(2) FX	(3) Peso	(4) Total	(5) FX	(6) Peso
Cash Flow$_{it}$	0.450***	0.0657	0.441***	0.289	0.427**	-0.119
	(0.0736)	(0.0489)	(0.0680)	(0.171)	(0.182)	(0.322)
Δ FX Liab$_{it}$	0.440***	0.177***	0.267***	0.690***	0.219**	0.478***
	(0.0461)	(0.0279)	(0.0513)	(0.129)	(0.0900)	(0.105)
Δ Peso Liab$_{it}$	0.470***	0.0531	0.446***	0.447***	0.0745	0.379**
	(0.0620)	(0.0440)	(0.0667)	(0.136)	(0.0616)	(0.143)
Observations	2286	2138	2138	696	636	636
R^2	0.267	0.0376	0.167	0.141	0.173	0.0890
Firms	84	80	80	29	26	26
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) and (4) is change in short term assets, columns (2) and (5) is change in short term FX assets, and columns (3) and (6) is change in short term peso assets. Cash flow is net income over the previous quarter; FX Liab is the exchange rate adjusted change in FX liabilities over the previous quarter; Peso Liab is change in peso liabilities over the previous quarter. All variables are normalized by lagged assets. Retail includes firms in retail, wholesale, restaurants, and hotels. Errors are clustered at the firm level. * p < 0.10, ** p < 0.05, *** p < 0.01

Table A3: Corporate Saving into Short Term Assets: Pre- and Post- Crisis

	2005q2-2008q3				2008q4-2015q2			
	(1) Cash and Financial	(2) Accounts Receivable	(3) Inventories	(4) Other Short Term	(5) Cash and Financial	(6) Accounts Receivable	(7) Inventories	(8) Other Short Term
Cash Flow$_{it}$	0.0991***	0.163***	0.0894***	0.0632*	0.130	0.166***	0.322**	-0.0387
	(0.0236)	(0.0467)	(0.0250)	(0.0377)	(0.0967)	(0.0463)	(0.147)	(0.0355)
Δ FX Liab$_{it}$	0.0832***	0.202***	0.0825***	0.0261**	0.0833***	0.218***	0.107***	0.0235*
	(0.0279)	(0.0254)	(0.0269)	(0.0117)	(0.0232)	(0.0632)	(0.0327)	(0.0140)
Δ Peso Liab$_{it}$	0.103***	0.187***	0.103***	0.0541*	0.0823***	0.260***	0.0997**	0.0402**
	(0.0251)	(0.0438)	(0.0258)	(0.0279)	(0.0253)	(0.0786)	(0.0385)	(0.0196)
Observations	1539	1532	1540	1204	3119	3141	3141	1606
R^2	0.0465	0.150	0.0634	0.0463	0.0349	0.141	0.0903	0.0252
Firms	141	141	141	139	152	152	152	135
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) and (5) is change in cash and short term financial assets, in columns (2) and (6) is change in accounts receivable, in columns (3) and (7) is change in inventories, and in columns (4) and (8) is change in other short term assets. Cash flow is net income over the previous quarter; FX Liab is the exchange rate adjusted change in FX liabilities over the previous quarter; Peso Liab is change in peso liabilities over the previous quarter. All variables are normalized by lagged assets. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Corporate Saving into Short Term Assets: by Sector

	Manufacturing				Retail			
	(1) Cash and Financial	(2) Accounts Receivable	(3) Inventories	(4) Other Short Term	(5) Cash and Financial	(6) Accounts Receivable	(7) Inventories	(8) Other Short Term
Cash Flow$_{it}$	0.103***	0.168***	0.138***	0.0573	0.191***	0.195	-0.0399	-0.0438
	(0.0377)	(0.0503)	(0.0355)	(0.0441)	(0.0596)	(0.140)	(0.0464)	(0.0311)
Δ FX Liab$_{it}$	0.0725***	0.198***	0.151***	0.0223	0.195**	0.181***	0.189***	0.0625
	(0.0238)	(0.0294)	(0.0257)	(0.0141)	(0.0774)	(0.0595)	(0.0656)	(0.0597)
Δ Peso Liab$_{it}$	0.0957***	0.190***	0.155***	0.0474	0.0769***	0.0940	0.124	0.125***
	(0.0319)	(0.0467)	(0.0361)	(0.0343)	(0.0262)	(0.0631)	(0.0754)	(0.0307)
Observations	2275	2284	2286	1373	692	696	696	416
R^2	0.0287	0.0778	0.164	0.0323	0.0445	0.0771	0.159	0.211
Firms	84	84	84	83	29	29	29	28
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2005q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) and (5) is change in cash and short term financial assets, in columns (2) and (6) is change in accounts receivable, in columns (3) and (7) is change in inventories, and in columns (4) and (8) is change in other short term assets. Cash flow is net income over the previous quarter; FX Liab is the exchange rate adjusted change in FX liabilities over the previous quarter; Peso Liab is change in peso liabilities over the previous quarter. All variables are normalized by lagged assets. Retail includes firms in retail, wholesale, restaurants, and hotels. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Change in Short Term Liabilities

	Short Term Peso Liabilities	Short Term FX Liabilities			
	(1)	(2) All	(3) Loan	(4) Bond	(5) Trade
IRD_t	0.724	1.743***	0.695***	-0.103	0.566*
	(0.687)	(0.489)	(0.193)	(0.0852)	(0.289)
IRD_{t-1}	-0.887	-1.707***	-0.699***	-0.0361	-0.641**
	(0.591)	(0.427)	(0.192)	(0.118)	(0.270)
Firm IRD_{it}	-0.000699	0.00193***	0.00145***	0.000203	-0.000471
	(0.00114)	(0.000698)	(0.000424)	(0.000192)	(0.000795)
Firm IRD_{it-1}	0.000377	-0.00116*	-0.00115***	0.000126	0.000469
	(0.00114)	(0.000677)	(0.000356)	(0.000206)	(0.000723)
Observations	1100	1100	1123	1123	1123
R^2	0.0347	0.0453	0.0512	0.0189	0.0162
Firms	70	70	71	71	71
FirmFE	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the change in short term peso liabilities, and in columns (3)-(7) is the change in short term FX liabilities (for the instruments listed in the column heading). Short term is based on remaining maturity at one year or less. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Firm IRD is the individual firm's average Peso loan interest rate minus the firm's average FX loan interest rate. Interest rates are loan weighted averages of all firm loans up to the firm level, and then for IRD they are a simple average across firms. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6: Change in Short Term Assets

	(1) Financial Assets	(2) Cash	(3) Accounts Receivable	(4) Inventories
IRD_t	0.735***	-0.647***	0.558***	0.117
	(0.184)	(0.191)	(0.208)	(0.188)
IRD_{t-1}	-0.647***	0.0818	-0.599***	-0.0240
	(0.243)	(0.262)	(0.169)	(0.254)
Firm IRD_{it}	-0.000168	0.000192	0.000392	-0.000341
	(0.000556)	(0.000413)	(0.000575)	(0.000779)
Firm IRD_{it-1}	0.0000170	-0.0000197	-0.000284	-0.000624
	(0.000644)	(0.000433)	(0.000721)	(0.000852)
Observations	1123	1112	1123	1123
R^2	0.0829	0.215	0.0387	0.0539
Firms	71	70	71	71
FirmFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is change in financial assets, columns (3)-(4) is change in cash holdings, columns (5)-(6) is change in accounts receivable, and columns (7)-(8) is change in inventories. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Firm IRD is the individual firm's average Peso loan interest rate minus the firm's average FX loan interest rate. Interest rates are loan weighted averages of all firm loans up to the firm level, and then for IRD they are a simple average across firms. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Change in Trade Credit and Sales

	Gross Trade Credit		Sales		Accounts Receivable to Sales Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.941***	0.802***	0.641***	0.126	-0.584	-0.0973
	(0.222)	(0.255)	(0.164)	(0.208)	(1.391)	(1.504)
IRD_{t-1}	-0.986***	-1.063***	-0.659***	-0.392**	-0.819	-1.926
	(0.220)	(0.218)	(0.168)	(0.158)	(1.089)	(1.299)
Firm IRD_{it}		0.000924		0.00120**		0.00297*
		(0.000693)		(0.000534)		(0.00177)
Firm IRD_{it-1}		-0.000732		-0.000918		0.00294
		(0.000913)		(0.000565)		(0.00202)
Observations	2542	1123	2536	1123	2462	1110
R^2	0.00620	0.0591	0.00671	0.191	0.00540	0.0476
Firms	127	71	127	71	120	71
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	No	Yes	No	Yes	No	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the gross trade credit (trade credit liabilities plus accounts receivable), normalized by the previous period's assets; in columns (3)-(4) is change in Sales to assets ratio; and in columns (5)-(6) is accounts receivable divided by the sum of sales over the past 4 quarters, winsorized at 1%. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Firm IRD is the individual firm's average Peso loan interest rate minus the firm's average FX loan interest rate. Interest rates are loan weighted averages of all firm loans up to the firm level, and then for IRD they are a simple average across firms. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Change in Derivatives Positions

	Non-Exporters		Exporters	
	(1) Net	(2) Gross	(3) Net	(4) Gross
IRD_t	-0.00733	0.0335	-0.426**	0.463***
	(0.0694)	(0.0694)	(0.159)	(0.151)
IRD_{t-1}	-0.00845	-0.0145	0.397**	-0.460***
	(0.0945)	(0.0923)	(0.151)	(0.138)
$XRvol_t$	0.392**	0.219	-0.265	0.484**
	(0.178)	(0.189)	(0.208)	(0.205)
$XRvol_{t-1}$	-0.177	-0.183	-0.0408	-0.0903
	(0.122)	(0.118)	(0.154)	(0.138)
Observations	1519	1519	968	968
R^2	0.0282	0.0146	0.0704	0.0951
Firms	76	76	45	45
FirmFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) and (3) is change in the market value of the net on-balance sheet derivatives position (derivatives assets - derivatives liabilities) and in columns (2) and (4) is the change in the market value of the gross on-balance sheet derivatives position (derivatives assets + derivatives liabilities). All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Exporting firms are those whose sample median ratio of foreign sales to total sales is above 15%. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Robustness to Time Varying Controls

	(1) ST FXP	(2) FX TC	(3) Gross TC	(4) Sales
IRD_t	0.584*	0.257**	0.840**	0.749***
	(0.347)	(0.116)	(0.323)	(0.198)
IRD_{t-1}	-0.239	-0.349***	-0.965***	-0.681***
	(0.372)	(0.122)	(0.266)	(0.147)
$\Delta \log(VIX_t)$	-0.00179	0.00641**	0.0284***	0.0291***
	(0.00986)	(0.00288)	(0.00719)	(0.00409)
Oil Price $Growth_t$	-0.0164	0.00205	0.0418***	0.0402***
	(0.0131)	(0.00330)	(0.0113)	(0.00760)
Observations	2346	2487	2487	2487
R^2	0.0174	0.0183	0.0289	0.192
Firms	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the change in short term FX position (short term FX liabilities - FX assets); columns (3)-(4) is the change in FX trade credit received; columns (5)-(6) is change in gross trade credit (received + extended); and columns (7)-(8) is change in sales. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. VIX is the CBOE volatility index, from FRED. Oil prices are the global price of WTI crude, from FRED. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Carry Trade Responses by Sector

	Manufacturing			Retail		
	(1) ST FXL	(2) AR	(3) Sales	(4) ST FXL	(5) AR	(6) Sales
IRD_t	1.851***	0.481**	0.422**	0.648*	-0.00345	0.476
	(0.676)	(0.230)	(0.180)	(0.321)	(0.455)	(0.452)
IRD_{t-1}	-1.751***	-0.563**	-0.659***	-0.653**	-0.235	-1.487***
	(0.642)	(0.222)	(0.157)	(0.286)	(0.447)	(0.340)
Observations	1203	1234	1234	346	375	375
R^2	0.0325	0.0204	0.125	0.0643	0.0383	0.478
Firms	55	56	56	18	19	19
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) and (4) is the change in short term FX liabilities; columns (2) and (5) is the change in accounts receivable (trade credit extended); columns (3) and (6) is change in sales. All dependent variables are normalized by lagged assets. The retail sector includes firms in retail, wholesale, restaurants, or hotels. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A11: Change in Short Term Positions

	(1) ST PSL	(2) ST FXL	(3) ST PSA	(4) ST PSA	(5) ST FXA	(6) ST FXA
Δ IRD$_t$	0.212	0.903***	0.831**	0.473	0.0727	0.0803
	(0.437)	(0.316)	(0.370)	(0.371)	(0.284)	(0.281)
XRvol$_t$	0.902*	1.341***	-0.473	-0.554	1.091**	1.022**
	(0.504)	(0.494)	(0.482)	(0.493)	(0.469)	(0.475)
XRvol$_{t-1}$	-0.701**	-0.739***	-0.0866	-0.189	-1.474**	-1.593**
	(0.343)	(0.246)	(0.643)	(0.645)	(0.596)	(0.622)
Observations	2346	2346	2390	2348	2390	2348
R^2	0.0220	0.0345	0.00221	0.0262	0.0182	0.0240
Firms	116	116	123	117	123	117
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	No	Yes	No	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) is the change in short term peso liabilities; in column (2) is the change in short term FX liabilities; in columns (3)-(4) is change in short term peso assets (short term assets less FX assets); and in columns (5)-(6) is change in FX assets. Short term is based on remaining maturity at one year or less. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Change in Short Term Positions

	(1) Fin	(2) Cash	(3) AR	(4) Gross TC	(5) Sales
Δ IRD$_t$	0.402**	-0.445***	0.332**	0.556***	0.230*
	(0.165)	(0.169)	(0.155)	(0.186)	(0.132)
XRvol$_t$	0.186	0.0224	-0.261	0.166	0.920***
	(0.189)	(0.142)	(0.291)	(0.380)	(0.243)
XRvol$_{t-1}$	-0.131	-0.381***	-0.508**	-1.291***	-1.285***
	(0.186)	(0.107)	(0.231)	(0.296)	(0.205)
Observations	2487	2471	2487	2487	2487
R^2	0.0245	0.0971	0.0132	0.0240	0.184
Firms	121	121	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2015q2. Firms reports the number of firms in each regression. Dependent variable in columns (1) is the change in short term financial assets; in column (2) is the change in cash holdings; in column (3) is change in accounts receivable (trade credit extended); in column (4) is gross trade credit (extended + received); and in column (5) is sales. Short term is based on remaining maturity at one year or less. All dependent variables are normalized by lagged assets. IRD is the average interest rate on peso loans minus the average interest rate on FX loans in each quarter. Interest rates are loan weighted averages of all firm loans up to the firm level, and then a simple average across firms. XRvol is the standard deviation of the daily peso depreciation rate over the quarter. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A13: Carry Trade Impacts - Pre-period Placebo

	Investment		Employment		Profits	
	(1)	(2)	(3)	(4)	(5)	(6)
STFXP Change$_i$ × Pre$_t$	0.0282	0.0300	-0.0290*	-0.0294*	0.000207	0.000547
	(0.0202)	(0.0217)	(0.0151)	(0.0162)	(0.00694)	(0.00725)
STFXP Level$_i$ × Shock$_t$		0.00831		-0.00163		0.00156
		(0.0216)		(0.0144)		(0.00511)
Observations	1973	1973	1960	1960	1888	1888
R^2	0.0183	0.0184	0.0105	0.0105	0.0148	0.0149
Firms	87	87	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2006q1-2012q4. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the log difference of physical capital outstanding, measured as Property, Plant, and Equipment, winsorized at 2%; in columns (3)-(4) is the log difference of total employment, winsorized at 2%; in columns (5)-(6) is net income (profits) divided by total assets, winsorized at 1%. STFXP level is short term FX liabilities minus FX assets, normalized by total assets, at 2008q4. STFXP change is the difference between the STFXP levels at 2008q4 and 2005q1. Pre is a dummy equal to 1 during 2007 and 2008, and 0 otherwise. Shock is a dummy equal to 1 during 2009 and 2010, and 0 otherwise. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), and sales to assets ratio. Errors are clustered at the firm level.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A14: Carry Trade Impacts - Pre-period Placebo, Exporter vs Non-Exporter

	Investment		Employment		Profits	
	(1) Non-Exporter	(2) Exporter	(3) Non-Exporter	(4) Exporter	(5) Non-Exporter	(6) Exporter
STFXP Change$_i$ $\times$ Pre$_t$	0.0841	0.0133	0.00794	-0.0423*	0.0256**	-0.0212*
	(0.0591)	(0.0388)	(0.0294)	(0.0242)	(0.0109)	(0.0112)
STFXP Level$_i$ $\times$ Shock$_t$	-0.0420	0.00954	0.0399	-0.0172	-0.000659	-0.00321
	(0.0303)	(0.0177)	(0.0366)	(0.0161)	(0.0131)	(0.00625)
Observations	948	591	942	588	943	587
R^2	0.0303	0.0270	0.0456	0.0483	0.0627	0.126
Firms	53	34	53	33	53	33
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Sample spans 2008q2-2012q4. Firms reports the number of firms in each regression. Dependent variable in columns (1)-(2) is the log difference of physical capital outstanding, measured as Property, Plant, and Equipment, winsorized at 2%; in columns (3)-(4) is the log difference of total employment, winsorized at 2%; in columns (5)-(6) is net income (profits) divided by total assets, winsorized at 1%. STFXP level is short term FX liabilities minus FX assets, normalized by total assets, at 2008q4. STFXP change is the difference between the STFXP levels at 2008q4 and 2005q1. Pre is a dummy equal to 1 during 2007 and 2008, and 0 otherwise. Shock is a dummy equal to 1 during 2009 and 2010, and 0 otherwise. Firm Controls include one quarter lags of firm size (log assets), cash to assets ratio winsorized at 1%, total liabilities to assets ratio winsorized at 2%, bond credit to assets, share of sales to foreigners (including exports and sales by foreign subsidiaries), sales to assets ratio, and gross derivatives positions to assets winsorized at 3%. Errors are clustered at the firm level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$