Why is Dollar Debt Cheaper? Evidence from Peru

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Abstract

In emerging markets, a significant share of corporate loans are denominated in dollars. Using novel data that enables us to see currency and the cost of credit, in addition to several other transaction-level characteristics, we re-examine the reasons behind dollar credit popularity. We find that a dollar-denominated loan has an interest rate that is 2% lower per year than a loan in Peruvian Soles. Expectations of exchange rate movements do not explain this difference. We show that this interest rate differential for lending rates is closely matched by the differential in the deposit market. Our results suggest that the preference for dollar loans is rooted in the local household preference for dollar savings and a banking sector that is closely matching its foreign assets and liabilities. We find that borrower competitive pressure increases the pass-through of this differential.

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1 Introduction

Banks' direct or indirect exposure to dollar-denominated corporate debt has been central to understanding the unraveling of several emerging market crises. This includes the East Asian crisis of the late 1990s, (e.g., Krugman (1999); Roper and Harvey (1999)), and the economic collapse in Brazil, Argentina and Uruguay half a decade later (e.g., Larosiere (2005); Kalemli-Ozcan, Kamil, and Villegas-Sanchez (2016)). More recently, the prevalence of dollar denominated debt has been argued to be at the root of the Turkish 2018 crisis.[1] In fact, despite lessons drawn from earlier crises, significant corporate borrowing in U.S. dollars remains widespread: Brauning and Ivashina (2019) document that even for services industries which tend to be more internally oriented, and as such are likely to generate revenues in local currency, the dollar-denominated share of global banks' lending between 1990-2016 was 68% for emerging Asia and Africa, and 93% for emerging American economics. Similar evidence emerges from the bond market (albeit, bonds are a relatively small part of corporate borrowing for emerging markets). For example, Acharya et al. (2015), indicates that, as of 2013, 80% of outstanding non-financial corporate bonds issued by companies in emerging markets were denominated in foreign currency, with a large faction being denominated in dollars.[2]

What are the fundamental reasons why dollar credit remains so popular? It is an important and long standing question and several explanations have been proposed. Taking dollar discount as given, Bruno and Shin (2017), Caballero, Panizza, and Powell (2016), and Acharya and Vij (2016) emphasize the role of *carry trade* for borrowers by showing that the propensity to borrow in dollars increases when carry trade is more profitable. This evidence for the carry trade motive, however, is primarily concentrated in the period following the 2008 crisis, when covered interest rate parity (CIP) violations became economically large in most currencies (e.g., Du, Tepper, and Verdelhan (2018)). Historically, CIP violations even for emerging economies have been economically small, and therefore are unlikely to justify the preponderance of dollar credit.[3]Indeed, our first contribution consists in accurate measurement of the dollar-credit

[1]See for example, "Turkey's Corporate Debt Burden Sparks Jitters on Economy," Financial Times, April 24, 2018 or "This $16 Billion Turkish Wall of Debt Is at Risk from Lira Crash," Bloomberg, August 14, 2018.

[2]Relatedly, hedging of the FX exposure in emerging markets remains very expensive and insignificant. For example, the following is a statement by Advent LatAm managers, one of the most sophisticated and successful global private equity firms: "We [Advent] have never hedged; it is too expensive. The only hedge we have is growth." (Ivashina, Kostas, and Zogbi (2018)). Similar evidence is reflected in private equity survey conducted by Private Equity International (see "How to Manage Forex Risk in Your Portfolio," Emerging Markets Guide, December 2019/January 2020.)

[3]For example, Skinner and Mason (2011) show that between 2003 and 2006, CIP violations at the three-month horizon

discount using new Peruvian data, which enables us to see loan level interest rates for local currency and dollar denominated loans for a comprehensive sample of firms. [4] Our finding is striking: adjusting for expected exchange rate movements, we see that a dollar-denominated loan has an interest rate that is 2% lower per year than a loan in Peruvian Soles. This result is robust to an array of loan and firm controls, including borrower-quarter and bank-quarter fixed effects.[5]

Jiang, Krishnamurthy, and Lustig (2018) present a model that builds on the special demand for dollar safe assets. In this setting, a "convenience yield" on dollar assets lowers the equilibrium safe real interest rates in dollars relative to local currency. It is plausible that some of the effects that we identified are driven by this factor. Empirically, the convenience yield on corporate debt has been about 20 basis points over our sample, this is insufficient to explain our results. Using structural approach Jiang, Krishnamurthy, and Lustig (2020) and Koijen and Yogo (2020) backup that magnitude of the implied dollar convenience yield, with both paper pointing to a dollar convenience yield closer to what we find in out work. However, both papers provide a universal estimate, whereas our results point to additional forces that might be a work in emerging markets. In particular, in Peru, the root cause seems to be the local household preferences for dollar savings leading to cheap dollar deposit financing for banks. In line with the general equilibrium models in Bocola and Lorenzoni (2020), and Montamat (2020). As Bocola and Lorenzoni (2020) point out, an important obstacle to domestic currency borrowing is the unwillingness of domestic savers to save in domestic currency due to their concerns about domestic financial instability. Savings in foreign currency, therefore serves as insurance, and results in cheaper dollar credit.

Our results provide empirical support for theories that that emphasize dollarization of bank liabilities due to insurance motive. In addition to loan level information, we observe bank deposit rates by currency, and are able to show that the 2% differential for lending rates is closely matched by the differential in the deposit market. Figure 1 shows this result. We also confirm that close to 65% of the dollar liabilities are funded through dollar deposits. More broadly, dollarization of liabilities closely tracks the dollarization of loans, with banks nearly perfectly matching their dollar assets and liabilities. These patterns hold for both, domestic and foreign banks. This observation supports Montamat (2020) finding that, for six major

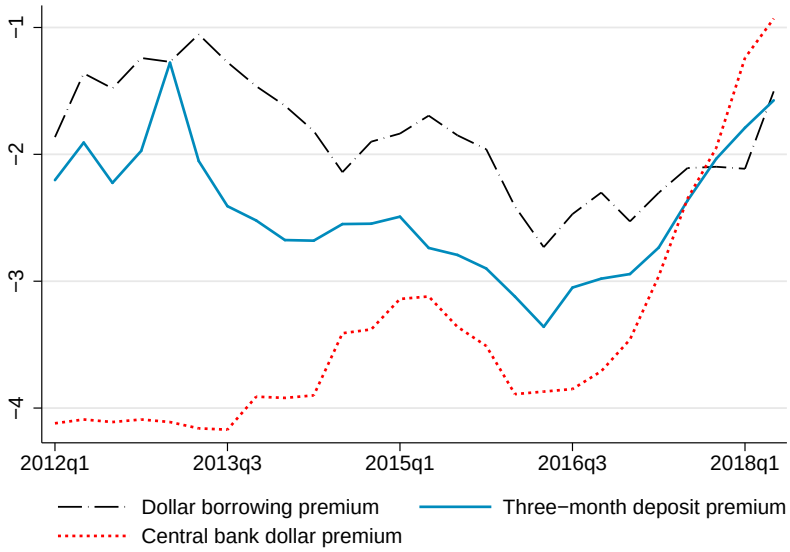
for multiple emerging economies did not exceed five basis points; that is before accounting for transaction costs.

[4] Although there are no restrictions to give loans in other currencies, the US dollar is the only foreign currency that banks give loans in. In the past twenty years, 51% of Peruvian bank credit has been denominated in dollars.

[5] We restrict our sample to commerical loans. Borrower-bank-quarter fixed effects is possible if we increase the sample by including loan types.

Latin American economies, households save heavily in dollars, the firms borrow heavily in dollars, and this pattern holds independently of foreign banks' activity. We also provide aggregate evidence for several Latin American countries, showing that a large share of loans are denominated in foreign currency, and foreign deposits have lower rates for at least nine other countries. Furthermore, the deposits rate differential is substantially different from the government rates differential, suggesting that in these countries deposit rates could also be tied to the cheapness of dollar credit. Finally, in these other countries, the difference in the deposit rates are not explained by expected exchange rate movements.

Figure 1: **Dollar premium, 2012 - 2018**



Given the magnitude of the discount for dollar-denominated credit, it is not surprising that borrowers have an incentive to issue dollar debt and take the currency mismatch on their balance sheet. Our data enables us to build a strong case that the choice of dollar credit over the local currency is not driven by a natural or financial hedge of the borrowers. We find that 46% of loans for firms with zero export shipments are denominated in dollars. While this is consistent with large borrowers foreign exchange (FX) exposure, this type of statistic could be missing industries where sales are largely local, but firms are able to adjust their prices in case of dollar appreciation, which is likely to be the case for electricity and water supply. Also, we might not be accounting for the fact that firms can mitigate their exposure to exchange

rate movements by locking forward and/or swap contracts. Relying on the supervisory classification of borrowers' potential exposure helps us overcome these problems. We find that about 25.6% of dollar credit is classified as "exposed" to FX risk (that is, those firms that in an exchange risk evaluation default in response to a 20% depreciation), and 6.5% as "very exposed" (those that default in response to a 10% depreciation). Consistent with the risk shifting incentives of the borrowers for taking on the FX risk, we show that firms with deteriorating performance are more likely to issue a dollar-denominated loan.

Banks near zero net exposure to FX risk is an important element for understanding the dollarization of credit. This practice is rooted in regulatory treatment of the FX risk on a bank's balance sheet. Whereas in developed economies banks are required to allocate a specific amount of capital to provision for potential losses due to FX exposure, in most emerging markets including Peru, banks are restricted from holding mismatched currency positions. [6] Therefore, a large demand for dollar savings likely results in a large supply of dollar credit. To provide further evidence that the dollar discount in Peru can be traced back to household preference for dollar savings we look at the impact of the dramatic change in the reserve requirements on dollar deposits that took place in Peru over our sample period. Consistent with highly inelastic demand for dollar deposits, we show that a 21.5 percentage point rise in differential reserve requirement has almost entirely been absorbed by the adjustment in dollar deposit rates, having almost no impact on the share for dollar credit in the economy. Furthermore, using policy shifts designed to discourage bank balance-sheet dollarization we are able to trace the impact of the cost of dollar deposits on the cost of dollar debt.

While our main focus is the measurement of the dollar-credit discount, and its connection to local preference for dollar saving, there are other contributing forces at play. In particular, we show that provisioning for indirect FX exposure by banks is minimal, which accentuates attractiveness of dollar borrowing. We also explore borrower and lender cross-sectional variation to understand why banks fail to voluntarily account for indirect exposure to FX risk, and find that some bank competitive pressure is likely to be at play. However, although the Peruvian banking sector is heavily concentrated, we find no support for implicit bailout guarantee as one of the mechanisms at play.

Our work contributes to several strands of literature. First, our empirical findings shed a new light on the profitability of the (implicit) carry trade for the borrowers. Importantly, the large magnitude of

[6] See Tobal (2017) for more details.

uncovered interest rate parity (UIP) violation in deposit rates, and evidence connecting the relative cost of dollar deposits to the cost dollar credit highlights that household preferences for saving in dollars are likely to be crucial in explaining the relative "cheapness" of dollar credit in emerging markets. This insight adds to a large body of research that tries to explain reasons for prominence of dollar credit outside of the U.S. and in emerging market in particular. This involves the carry trade literature and the theory work building on the dollar specialnessincluding Gopinath and Stein (2018) who links the preference for dollar invoicing in international trade to lower dollar financing costs, and Eren and Malamud (2018) who connects the choice of dollar debt to the fact that it depreciates in global downturns.

Our results also contributes to the literature that highlights the importance of the banking sector balance sheet in explaining the corporate sector preference for dollar loans. This includes Bruno and Shin (2015) and Giovanni et al. (2020) who focus on the importance of non-core bank funding and global banks in transmitting global financial cycles to the quantity and pricing of the domestic loan market. We show that the local preference for dollar deposits together with banking regulation leads to a lower dollar financing cost for all banks - local and foreign - and that this discount is passed-through to corporate loans.

More broadly, our work contributed to the long-dated literature on causes of economic instability in emerging market, and, specifically on the role of the dollarization and the incidence of the balance sheet exposure effects and vulnerability coming from foreign currency debt. See Frankel (2005) for an overview of the earlier literature. More recently, several advances had been made in quantifying the effects of this financial channel including work by Bruno and Shin (2019) and Kalemli-Ozcan, Kamil, and Villegas-Sanchez (2016).

The rest of this paper is structured as follows: In Section 2, we describe our data sources and provide descriptive statistics on the corporate loans used in the analysis. In Section 3 we discuss the evolution and nature of the dollarization of corporate credit in Peru and other emerging markets. In Section 4, we establish our results on the pricing of dollar denominated loans relative to Peruvian Soles loans. In Section 5, we discuss the drivers of this pricing differential. Section 6 concludes.

2 Data

All data used in our study were collected and maintained by the Peruvian banking regulator, Superintendencia de Banca, Seguros, y AFPs (SBS), and concerns commercial credit to Peruvian firms. The core data set for our analysis has not been previously used in academic research. The data contains loan-level information on origination date, loan amount, currency, loan maturity and the interest rate. For banks operating in Peru, commercial loans are fixed rate regardless of the currency. There are upfront (closing) fees, but there are no annual or other recurring fees for current loans. The data are collected annually for all outstanding loans, but reflects the terms at loan origination. Individual loan will be the unit of observation in our main analysis. (Note that this data is a flow, as compared to credit registry data which is a stock.) These data have been gathered since 2012, and our sample covers the period of 2012-2018:Q2. We are able to use the sample of all loans recorded for firms with annual sales above 20 million soles (about 6.5 million dollars).[7]

We complement these data with several other sources. First, we use the Peruvian credit registry (Reporte Crediticio de Deudores or RCD). The registry records monthly loan balances for each individual borrowers by lender. In Peru, these data is disaggregated by currency and several other loan characteristics. In particular, we observe borrower's performance. There are five classifications: normal (0 days past-due), with potential problems (between 1 and 60 days past-due), deficient (between 61 and 120 days past-due), doubtful (between 121 and 365 days past-due) and loss (more than 365 days past-due). The data also included the type of the collateral (see Ivashina, Laeven, and Moral-Benito (2020)).

Superintendencia Nacional de Administración Tributaria (SUNAT) provides information on firms' industry classification and importing/exporting behavior. We merge this information using the firm's tax ID. Importantly, we also know whether the lender classified the loan as being exposed to currency risk. In 2003, SBS approved a regulation requiring lenders to classify borrower's exposure to exchange rate risk. For loans denominated in foreign currency, the regulation required lenders to establish internal procedures to qualify and monitor monthly whether the borrowers had an exposure to exchange rate risk due to balance sheet mismatch. Each bank calculates the cash flow of the firm with the confidential financial data reported to it by the borrower. The information includes sales and expenditures by currency,

[7]Firms are classified as "large" if its annual sales are above 20 million soles but below 200 million soles (about 65 million dollars). "Corporate" firms have sales above 200 million soles. For more details, see Resolucion SBS 11356-2008.

as well as any hedge positions. With this data, the bank runs a simulation of two scenarios: a 10% and a 20% depreciation shock. Firms that are projected to default on the loan in response to a 20% depreciation of local currency are classified as "exposed", while firms that default in response to a 10% depreciation are classified as "very exposed." These classifications were fully implemented within two years, and became basis for additional capital requirement.

The borrower's currency-exposure classification includes financial hedging positions. However, from the SBS, we also have direct data on derivative transactions of firms. That is, we observe if the firm has locked a forward or a swap contract and its terms (including the rate locked), and are able to confirm that financial hedging volumes are not significant in the Peruvian market: only 15% of firms with dollar debt have a forward position during the duration of the loan contract. We will use the universe of the forward contracts data to construct a measure of FX uncertainty.

Overall, in the data containing the interest rates, we observe all borrowing activity by firms with sales in excess of 20 million soles, which–across all loans types–constitutes 1.6 million transactions. These transactions represent 50% of business transactions in Peru. We focus our regression analysis on the more traditional type of loan transaction: *prestamos* (commercial loans). The commercial loans in our sample represent 55% of all commercial loans. By focusing in commercial loans, we exclude the possibility that our results are driven by loan types that are transaction-intensive such as factoring, *descuentos de letras* (discounting of letters of credit), or *líneas de crédito* (credit lines), which account for 85% of transactions, but only 5% in terms of the total loan volume. Our sample choice also excludes *créditos-comercio exterior* (trade loans) because 83% of this type of loan is denominated in dollars. Finally, we do not consider *arrendamiento financiero* (leasing) to rule out the possibility that the results are influenced by a different loan type behavior. It's worth highlighting that our results do not change if we consider all the types of loans. In Appendix B we show our main results with out entire sample.

Finally, from SBS's website we obtain monthly data on bank's balance sheet composition and deposit rates by currency. Financial institutions report weekly to SBS information on deposit rates, and deposit amounts. The data is available at the bank-currency-type of deposit level. The types of deposits are demandable, savings, and term deposits.

Table 1 summarizes loan and firm characteristics of soles and dollar denominated loans. Overall

the two types of loans are quite similar, with the exception of the interest rates. Dollar loans have, on average, significantly lower interest rates. Furthermore, this interest rate differential is also present when we restrict the sample for foreign banks. In Section 4, we will further explore this difference.

There are additional variables and data sources that we will use in the analysis, and we will explain them as we go.

3 Credit Dollarization: Aggregate Evidence

In the next section, we will use loan-level data to quantify the "dollar credit discount." In this section, we start by illustrating the heavy dollarization of banking activities in Peru and other Latin American countries. The dollar is the only foreign currency used for lending by the banks operating in Peru. In the early 1990s, the share of deposits and liabilities denominated in dollars was close to 80%. Although, dollarization of commercial credit in Peru has declined since 2000, as of 2018, it remains at 40%. (See Figure 2.). This prevalence of foreign currency funding and lending is common across many of emerging economies. Using data from the Financial Soundness Indicators database, Table 2 shows the share of foreign currency loans and bank liabilities for a several Latin American countries (Argentina, Bolivia, Chile, Costa Rica, Guatemala, Honduras, Nicaragua, Peru, Paraguay, Uruguay). The cross country average share of foreign currency loans is 39%, very close to what we observed for Peru. Table 2 shows that banks not only issue a large share of their loans in foreign currency but also finance heavily with it. Across the countries in the table, about 40% of the liabilities and deposits are denominated in foreign currency. [8]

Peru's share of foreign currency loans and deposits have been trending down: 2000-2007 average was 62% and 71% while 2008-2019 average was 36% and 38%, respectively. The stabilization of prices through inflation targeting polices has been considered one of the main reasons behind this decrease (Contreras et al. (2016)). The steady decline in the dollarization of credit has shown signs of potential reversal (Catão and Terrones (2016)) following negative repercussions of the Great Financial Crisis (e.g., Paravisini et al. (2015)). The Peruvian bank regulator was swift in enacting a series of measures to deter the escalation of credit dollarization, including the introduction of additional capital requirements for banks for indirect

[8] Data for foreign currency deposits and monetary aggregates comes from CEPAL.

exposure to foreign currency mismatch (the timing of these are indicated with dashed vertical lines in Figure 2.)

Like many other emerging markets, Peru's economy relies heavily on exports of natural resources. According to the Peruvian tax agency (SUNAT), 71% of the total export amount is related to primary sectors such as mining, fishing, oil, and gas. Thus, we need to evaluate the possibility that heavy credit dollarization in Peru is a reflection of "natural hedge" of the exporting firm.[9] We do so in Figure 3. In Panel A, we separate exporting firms using a dummy variable from customs, indicating whether the firm had any exports in 2018. As one can see, the dollarization of corporate loans is not concentrated in exporting and larger firms, although—as one would expect—these firms display a larger share of foreign currency loans. Non-exporters have a significant share of dollar loans (46%) while exporters have about 55%.Our sample is restricted to firms with sales above 20 million soles, however we were able to verify that for smaller firms without exporting activity, about 23% of all loans are denominated in dollars. Figure 3, Panel B looks at the dollarization of credit by economic sector. Mining and fishing, traditional export sectors in Peru, display the largest use of dollar credit (above 80% in 2018.). However, sectors oriented to the local economy, like services and construction, also display significant levels of dollarization with 28% and 50% levels of credit dollarization, respectively.

More broadly, measuring borrowers' FX exposure is not an easy task. A borrower's balance sheet exposure to FX risk can be hedged not only through dollar revenues from exporting, but through derivative contracts (e.g., Alfaro, Calani, and Varela (2020)), or a pass-through of exchange rate to local currency prices. As explained in the data section, we have an advantage of observing the regulators classification of borrowers into exposed and very exposed to FX risk, and this classification has been in place since 2003. We know that this classification accounts not only for revenue composition by currency, but also for borrowers' FX hedges and the ability to reprice their goods and services in the short run. The use of hedging data is rather straightforward, but some of the steps in the overall methodology that assess borrowers' FX exposure is a "black box" to us, so—while the intent is clear— it is hard for us to have a definitive view of its accuracy. Nevertheless, this evaluation is achieved through a substantial supervisory effort, and it is a unique feature of our data, that gets us the closes to being able to show the true

[9]The decline in dollarization could be consistent with the growth of the Peruvian economy over the sample period and the decline in exports share. For example, according to the World Bank, between 2009 and 2018 Peru's average growth rate was 5.9 percent in a context of low inflation (averaging 2.9 percent in real terms).

borrower's balance sheet exposure for a representative emerging market.

The results using the borrower's overall FX exposure are presented in Figure 3, Panel C. (The figure corresponds to 2018, the lowest point in credit dollarization.) The takeaway is that—even accounting for financial hedging activity and broader definition of "natural hedges"—Peru shows that there is substantial borrower balance sheet exposure to the dollar exchange rate depreciation. Interestingly, it is clear that this classification considers factors that are not picked up through industry classification, or exporter status. For example, traditional exporting sectors (mining and fishing) are showing an over 20% aggregate exposure on the dollar loans. The top sectors on overall exposure are agriculture (with over 40% exposure), construction and manufacturing. Whereas accommodations and food services, and wholesale and retail trade have the largest "very exposed share".

4 Dollar Pricing of Loans

The goal of this section is to quantify the difference in cost of credit in dollars and soles. To do so, we estimate the following empirical specification:

$$r_l = \beta_1 I_l(Dollar\,Loan) + \beta_2 Loan\,Controls + \beta_3 Firm\,Controls + \beta_4 D_{Jt} + \beta_5 D_{Lt} + \varepsilon_l \tag{1}$$

where the dependent variable is the interest rate–an actual or an adjusted rate that compensates for expected exchange rate movements–for loan l taken by borrower j (in industry J) in quarter t from lender L. (Recall that each observation in our analysis is a loan.) $I_l(DollarLoan)$ is a dummy variable that takes the value of one if the loan is denominated in dollars, and zero otherwise. Throughout the analysis we include other loan level characteristics including loan size, loan term, the assessed value of collateral, and previous loan balance with the same lender. All amount variables are expressed in local currency. We also add a set of firm time-varying characteristics including firm age, whether the firm is categorized as "small" (firms with sales below 200M soles), bank internal credit rating and number of banking relationships. $D_{Jt}$is the industry-quarter fixed effects; it allows us to control for time-varying industry heterogeneity that can affect differences in loan rates, such as the level of exchange rate pass-through in a given industry or industry specific demand. D_{Lt} is the lender-quarter fixed effects; it allows us to control for time-varying

bank heterogeneity, netting out any common time variation that may be driving the bank's benchmark interest rates. In some specifications we include borrower fixed effects which alleviates demand-driven explanations of differential loan rates such as firm size, location and industry. Note that our starting specification does not include borrower-quarter fixed-effects, which is commonly used to restrict influence of the loan-demand effects on the estimates. The identification using such narrow fixed effects is driven by firms that, in the same quarter, take at least two loans–one denominated in dollars and one in soles. It seems that firms that do that might not be representative of the broader borrower's universe. Regardless, we will show that our results are robust to inclusion of these narrower set of fixed effects.

The results are reported in Table 3. Panel A, the depended variable is the actual interest rate on each loan. Therefore, we compare dollar loans interest rates directly to soles loans interest without considering that this difference may be a reflection of expected exchange rate movements. We will incorporate the expected exchange rate movements and deviations from the Uncovered Interest Parity (UIP) shortly; but, because doing so, requires additional data and computation that could potentially introduce a measurement error, we find it helpful to start with just a raw differential in rates. The central coefficient of interest is that on the dummy indicating whether the loan is denominated in dollars. Consistent with dollar "cheapness", we find that this coefficient is negative, economically large and statistically significant in all specifications. (Standard errors are calculated to allow for correlation of the error term across observations within a bank-quarter.) Given that the soles interest rate is around 7% per year in our data, the difference of about 2 percentage points is sizable.The first columns differ in the type of fixed effects used in the estimation. Overall, the estimates are very stable across all specification. Column (3) which includes the most extensive set of controls, indicates that a interest rate for loans in dollars are 2.20% lower than rates in soles. As mentioned earlier, we can observe whether the bank classifies the loan as having exchange rate exposure (net of financial and natural hedge). In Column (4), we add the dummy variable for loans classified as "exposed" to FX risk. We are particularly interested in the interaction term between *Exposed to FX* and the *Dollar Loan* dummy whether loans in dollars are priced differentially. As one would expect, dollar loans to the borrowers exposed to dollar appreciation have a higher interest rate by about 20 basis point. However, that only explain a fraction of the loan rate differential. In the final column, we do something similar, but instead focus on the borrowers classified exporters as, that

is, firms that are likely to be generating revenue in dollars. The expected sign should be the opposite of that of the firms flagged as having FX exposure. Consistent with this observation, we find that exporting receive a lower rate on dollar loans. However, as before, this only accounts for the small fraction of the benchmark result, as non-exporting firms pay a rate that is 1.88% lower when borrowing in dollars.

Naturally, the lower interest rate in dollar loans reported in Panel A does not necessarily imply that firms financing in dollars are expecting to pay about 30% lower interest expense than firms financing in soles. That is because the estimated difference is also capturing expected exchange rate movements that impact the final dollar cost. [10] Put simply, if Peruvian sol is expected to depreciate as compared to US dollar by about 2% during the duration of the loan–in expectation–borrowing in dollars is as costly as borrowing in soles. To capture the expected dollar financing costs, we construct UIP adjusted interest rate that takes into consideration the additional cost of expected exchange rate movements. Equation (2) shows the formula used to calculate the adjusted annual interest rates. For the expected exchange rate at each maturity we use monthly data from LatinFocus from Focus Economics. [11]

$$r_{\ell}^{adjusted} \equiv \begin{cases} (1+r_{\ell}) \times \left[\frac{E_t(s_{t+Maturity})}{s_t}\right]^{1/Maturity} - 1 & if \quad I_l(USD\,loan) = 1 \\ i_{\ell} & if \quad I_l(USD\,loan) = 0 \end{cases} \tag{2}$$

Results in Panel B of Table 3 use $r_{\ell}^{adjusted}$ as dependent variable. Peru is an emerging market, so one should anticipate that its expected inflation is higher than that of the U.S., which should make interest rate in soles higher. So the dollar discount estimated in Panel A is adjusted down when we add inflation expectations. But consistent with remarkable economic stability experience in Peru over the past two decades, the UIP adjustment falls short of explaining the 2% dollar discount. The estimates for *Dollar Loan* in Panel B are slightly smaller (in absolute terms), but, as before the differential between dollar and soles interest rates is negative, economically large and statistically significant in all specifications. Column (3), which has the expansive set of fixed effects, shows that dollar loans lead to a financing cost that is 2.15% lower. As before, we find that borrowers exposed to dollar appreciation receive a higher rate, and exporters receive a lower rate for loans denominated in dollars. But, overall, these results imply

[10] Note that, since the expected exchange rate movements is different across loans of different maturities, its effect may not be fully captured by the bank*time fixed effect.

[11] This survey provides monthly forecasts for the Soles/USD rate 1, 2 and 3 years ahead.

that even after accounting for expected dollar appreciation, dollar loans are about 30% cheaper than loans denominated in soles.[12]

The last column in Panel B, we add the standard deviation of the expected exchange rate. The idea is that uncertainty of the evolution of the exchange rate (its second moment) could matter in addition to the expectation. We measure FX uncertainty using the volatility of the forward rates locked in *all* forward contracts in Peru. We match the horizon of the uncertainty to the the maturity of the contract by focusing on the forward rates for the 3-months, 6-months, 1- and 2-year contracts. The result indicated that when the standard deviation of FX rates used in the forward contracts is larger–as expected–we see a wider discount on loans denominated in dollars. The mean of the FX standard deviation is 0.1, thus if the standard deviation goes from 0.1 to 0.2 (as it did in 2015-2016 episode) the premium increases by about 10%. Importantly for us, the average saving from borrowing in dollars is not explained by fluctuations in the FX uncertainty; the dummy for dollar loan continuous to have a similar magnitude.

In Table 4, we restrict the analysis to firms taking both soles and dollar loans from the same bank in a given quarter (about 13% of our sample). This is a sample for which we can include borrower*quarter fixed effects. Hence, using this sample, we estimate the following empirical specification:

$$r_{\ell}^{adjusted} = \beta_1 I_l(DollarLoan) + \beta_2 D_{Lt} + \beta_3 D_{Nt} + Controls + \varepsilon_l \tag{3}$$

where D_{Nt} are the borrower-quarter fixed effects. This follows methodology introduced by Khwaja and Mian (2008) and is commonly used in studies with credit registry data. The approach is designed to address concerns about unobserved time-varying borrower heterogeneity. Table 4 shows that after controlling for firm*quarter and bank*quarter fixed effects, firms pay 2.03% lower financing costs – after accounting for expected depreciation – on their dollar loans. Column (2) shows that firms classified as non-exposed pay on average 2.22% lower rates when borrowing in dollars while this different for firms exposed to exchange rate is 1.77%. Column (3) shows that non exporting firms pay on average 1.66% lower rates. These estimates are similar to the ones found for the entire sample (Table 3 Panel B). Hence, we are confident that our results are not being driven by time varying firm characteristics that could explain lower dollar costs, e.g. firms becoming an exporters or increasing its exporting share.

[12]Table A.1 in the appendix replicates the exercise of Table 3 Panel B calculating the dependent variable $r^{adjusted}$ using the forward rate as proxy of the expected exchange rate. This adjustment still falls short of explaining the 2% dollar discount.

Over the period of our analysis, the average depreciation of the Peruvian Sol was 2.7%. This might seem like roughly the 2% that we are capturing in Tables 3 and 4. Of course, we already account for FX expectations with forecast market data, which would be the best data available to the firms when making the loan currency decision. Although the possibility that borrowers know something that is not captured in this data is very unlikely, we can re-run our result using realized FX depreciation. In Table 5 we replace the expected exchange rate by the realized exchange rate at time of maturity of the loan. We see that dollar loans were not only expected to be cheaper but ended up being cheaper.

Although the majority of firms in Peru do not engage in financial hedging, about 5% of firm-quarters in our sample, the firm is borrowing in dollars and soles and covers some of the exchange rate exposure with derivative contracts. (For firms that take a loan in only one currency in the same quarter, the hedging activity is about 9%. For firms that borrow in both currencies, the hedging activity is actually higher, standing at about 37%, consistent with a potential higher financial sophistication of these firms.). For these firms, we replace $E_t(s_{t+Maturity})$ with the the future exchange rate reported in the hedging contract and recalculate the adjusted dollar rate in equation 2. [13] Regression results using this adjusted rate are reported in Table A.2 in the appendix. Column (1) shows that firms borrowing in foreign currency and hedging this exposure pay on average 2.30% lower interest rates. The saving for non exposed firms is 2.39% and 2.18% is the lower cost for firms classified as exposed to currency movements (column (2)). Non-exporting firms that hedge pay a cost that is 2.11% lower when financing in dollars (column (3)). [14]

Results of Tables 3 and 4 point to a very stable and significant difference in dollar interest rates that can not be explained by expected exchange rate movements. These results can be interpreted as micro (loan) level failure of the UIP condition. If UIP holds, once we account for expected depreciation, dollar loans should pay the same interest rate as soles loans. Therefore, the fact that we find a significant coefficient on

[13] That is, we use the exchange rate locked in the hedging contract with closest maturity to the loan as the future exchange rate. Specifically, this exchange rate adjusted rate is equal to

$$i_\ell^{adjusted2} \equiv \begin{cases} (1+i_\ell) \times \left[\frac{F_t(s_{t+Maturity})}{s_t}\right]^{1/Maturity} - 1 & if \;\; I_l(USD\,loan) = 1 \\ i_\ell & if \;\; I_l(USD\,loan) = 0 \end{cases}$$

where $F_t(s_{t+Maturity})$ is the hedging contract exchange rate.

[14] These results could be interpreted as violations of the covered interest rate parity (CIP). Since the firm's lock a derivative contract that limits their exposure to exchange rate movements, there is no risk. We do not go that far in making this claim because in our sample the timing and amount of the derivative contract does not always match the loan. Hence, firms are still incurring in some risk.

the Dollar Loan dummy when using rates adjusted for exchange rate movements as dependent variables is evidence of this parity condition being violated. The UIP condition is known to also fail on a macro-level, that is when it is calculated using government financing rates. Therefore, the difference in the dollar and soles interest rate can be a reflection of bank's pass-through of macro-level UIP deviations to firm loans. To test this hypothesis we construct a macro UIP deviation variable using the following equation:

$$MacroUIPDev_{t,t+n} \equiv (1 + r^*_{t+n})^n \frac{E_t(s_{t+n})}{s_t} - (1 + r_{t+n}) .^n \tag{4}$$

where r^*_{t+n} (r_{t+n}) is the interest rate for a the US (Peruvian) government bond issued at time t with maturity n periods from now. If UIP holds, this deviation should be equal to zero, implying that - in expectation - financing in dollars and soles cost the same. A positive (negative) deviation implies that financing in dollars is more (less) expensive in expectation. We calculate this deviation each month for different horizons ($n = 3M, 6M, 1Y, 2Y$) and match it to the maturity of the loan. For example, if we have a loan issued in May 2016 that matures in Aug 2016 we will match it to the $MacroUIPDev_{May2016,May2016+3M}$. For loans without the exact maturity match for UIP deviaton, we use the closest maturity in absolute terms. For example, if the loan is 4 months, the closest UIP deviation maturity is 3 months. To test the pass-through of macro UIP deviations to loans, we estimate the following specification:

$$r_\ell^{synthetic} = \beta_1 I_\ell(DollarLoan) + \beta_2 I_\ell(DollarLoan) \times MacroUIPDev_{t,t+n} + \beta_3 MacroUIPDev_{t,t+n} + \beta_4 D_{Lt} + \beta_5 D_{Jt} + Controls + \epsilon_l. \tag{5}$$

If the pass-through is perfect, we should find that $\beta_1 = 0$; $\beta_2 = 1$. Table 6 presents the results for this test using different combination of controls. In all cases, the coefficient for the Dollar Loan dummy (β_1) is significantly different from zero and with magnitudes close to the ones reported in Table 3. Furthermore, in all cases, the perfect pass-through hypothesis is rejected. The macro UIP deviation provides significant explanatory power in the loan level interest rate differences but the magnitude is small.

This result suggests thatgovernment rates used to construct the macro UIP violations are not the relevant set of rates for understanding "cheapness" of the dollar credit, and consequent borrower's preference for dollar loans. Related to this point, Table 1 shows that firm's foreign currency loans have lower rates, and Table 7 shows that bank's also pay relatively lower financing costs when financing in foreign

currency deposits. Furthermore, Figure 4 plots UIP deviations using government financing rates and bank's deposit rates. This figure shows that these deviations are consistently smaller - implying a higher benefit of dollar financing - for bank's financing rates.

Importantly, aggregate evidence suggests that this is likely to be a generalizable pattern for many emerging markets. Table 7 shows that the UIP deviations and deposit rate differential patterns observed for Peru are common across many Latin American economies that allow for foreign currency deposits. Moreover, the bank's relative benefit of dollar financing is consistently higher than the government's even after we account for expected exchange rate movements. [15] We will explore this point further using Peruvian data in the next section.

5 Dollar Discount Path-Through Mechanism

In the previous section, we documented a large and persistent difference in the cost of dollar credit as compared to the credit in local currency. In this section, we shift attention to bank funding. As pointed out earlier, in many emerging markets, the cost of dollar funding for banks carries a substantial dollar discount. Particularly, in Peru, we find that the 2% dollar discount that we see in the loan market appears to originate in the deposit market. Table 8 illustrates this is not a cross-sectional phenomenon. The roughly 2% discount is stable through the sample period, and in the distribution of banks. Note that dollar deposits are a primary source of dollar savings for households in Peru. More broadly, the main financial instruments for savings are bank deposits, mutual funds and pension funds. Although mutual and pension funds can be an alternative for dollar savings, these require longer investment periods and have higher fees than bank deposits. [16] In the bank data, we observe that households have a strong preference for liquid and short maturity savings instruments: the majority of the deposits in dollars are

[15] Data on deposit rates is collected from Central Bank websites. Few emerging markets issue debt dollars. Instead we use U.S. Treasury rates when comparing government rates. Whereas rates on deposits and loans in the same country carry the same country risk premium (CRP), this is not the case when we use the rates from two different economies. Hence, we add CRP to the local foreign rates (Fed Funds Rate) to generate the benchmark rate differential. We use the EMBI+ spread to proxy for country risk premium. For Argentina and Peru we use the country specific index. Since data is not available for the other countries, we use the Latin America Index.

[16] The majority of funds in Peru require households to keep their savings at least three months in the fund. Defined contribution pension plans are also an indirect way of saving in hard currency because they invest in dollar assets. However, by regulation, they face a restriction to allocate only 50% of their portfolio in foreign assets, a limit that historically has been even lower.

either demandable deposits or fixed maturity deposits with less than three months. In 2018, the share of current account and savings deposits was 72% of all dollar deposits; dollar term deposits with less than three months maturity represented another 27%.

Given the size of the dollar deposits discount, a bank would have a strong incentive to take on FX mismatch by funding itself in dollars and lending in local currency. Instead, we see that banks pass the discount to its borrowers. The central driver behind this phenomenon is the regulatory set up, which results in a tight matching of dollar assets and liabilities by the banks. In an 2015 interview, following a period of elevated dollar appreciation, the president of Peruvian Banks Association stated that exchange rate fluctuations have no important effect on the Peruvian banks, because they are perfectly matched.[17] This is illustrated in Figure 5. (Figure A.1 in the Appendix shows the same picture for four individual banks in our sample. It makes the point that the aggregate near zero FX exposure on banks' balance sheet also holds for individual banks.) Relatedly, Figure 6 illustrates that decline of dollarization in credit was accompanies by the decline in dollarization in deposits and liabilities, more broadly. Notably, this and other patterns are nearly identical for foreign banks operating in Peru.

In the introduction, we mentioned that in Peru and several other emerging markets, banks have restrictions on holding mismatched currency positions. In Peru, banks have steep capital requirements on net balance sheet dollar positions (that is, dollar asset minus dollar liabilities, plus net position of derivatives in dollars). The capital requirements are different for positive net dollar liabilities and positive net dollar assets. However, both are prohibitive in their effect. For example, during our sample, if a bank had \$100 in deposits and \$150 in loans (exposure of \$50 in assets) it would need to have at least \$100 equity capital, that is, twice as much as the exposure itself. Conversely, if the banks had \$150 in deposits and \$100 in loans (exposure of \$50 in liabilities), then the bank would need at least \$500 of equity capital, that is, ten times more than the exposure itself. The rational for asymmetric regulation is partly tied to banks' maturity transformation role. As Figure 7 illustrates, a significant fraction of dollar funding comes from deposits. (Figure A.2. shows that aggregate results are representative of individual banks.) A large share of these deposits are demandable (i.e., effectively, short-term). For example, in 2018, the share of current accounts and saving deposits was 72% of all dollar deposits; dollar term deposits with less than 3-month maturity represented another 27%. Similarly, foreign liabilities also tend to be short-term

[17] "Aggressiveness on the Dollar Loan Market and Bank Pass-Through," America Economía, January 12, 2015.

(Schnabl (2012)). Overall, it is easy to see how punishing these types of regulations are if banks are not turning dollar deposits into dollar loans.

To summarize the results so far, we have documented a significant dollar discount that is not reflected in the central bank rates, but it shows up in the cost of deposits and in the cost of credit. We have have shown that banks do not carry FX exposure on their balance sheet, which appears to be tied to the regulatory setting. We have also shown that dollar credit is pervasive among the firms that do not have a natural or financial hedge and that the risk premium charged by banks for firms exposed to exchange rate movements is relatively small. This evidence is not easy to explain with the demand for dollar credit (the "pull" hypothesis) as a the primary driver of the dollar discount. Instead, a likely explanation appears to be strong saver's demand for dollar deposits. To provide additional evidence for this connection, we look at the impact of the change in the reserve requirements on dollar deposits that took place in Peru over our sample period.

The cash reserve requirement is a minimum percentage of the deposits that has to be kept in cash with the central bank. For example, if reserve requirement is 20%, the bank can only lend 80 cents of each dollar of deposits. If the interest rate on deposits is 3%, then–assuming 0% interest rate on reserves, which is typically the case–the effective cost of funding for the bank is 3.75% (3%/0.8=3.75%). In Peru, as in most dollarized economies, the reserve requirement is different for local and dollar deposits. We use the differential changes in marginal reserve requirement for dollar deposits (as compared to deposits in local currency) to identify plausible shocks to the effective cost of dollar funding. The basic idea is to try to understand elasticity of dollar savings. A rise in reserve requirement is to be absorbed by either depositors and/or borrowers. At the limit, if demand for dollar saving is inelastic the adjustment would show up in contraction in rates on deposits, without movement in quantity. Thus, we can test rates and quantities response against this prediction.

The Peruvian Central bank uses the marginal reserve requirements in both currencies as a complementary policy tool to the traditional short-term interest rate monetary policy (Armas, Castillo, and Vega (2014)). Because reserve requirement is a monetary policy tool, changes in reserves are endogenous and anticipatory. In particular, adjustments in reserve requirements on dollar deposits could be reflecting the rise in demand for dollar credit. While direction and timing of these adjustments might be anticipated,

we rely on two episodes that led to significant and arguably unanticipated jumps in differential marginal reserve requirements on dollar deposits. These can be seen in Figure 8, Panel A.

- December 31, 2014 and February 26, 2015 (the marginal reserve requirements in foreign currency was increased from 50% to 70%; from 9.5% to 8% in local currency) – As can be seen from Figure 9, Panel A, this is a series of two policy moves, resulting in the differential adjustment in dollar reserve rate of 21.5 percentage points in a span of less two month. The magnitude of this policy response was unprecedented. For example, the shifts in the marginal reserve requirements for individual currencies are larger in the context of the Great Financial Crisis, but the differential was not that large: between 2008:Q1 and 2009:Q1 there is no two month period where policy response differential exceeds five percentage points. Over the fifteen years for which we have deposit rates, the next largest change in the differential reserve requirement was an increase in 10% in October 2004.

- December 27, 2016 (the marginal reserve requirements in foreign currency was reduced from 70% to 48%; from 6.5% to 6% in local currency) – Although the magnitude of the policy move is similar to the aggregate adjustment during the previous episode (the differential adjustment for dollar deposits is -21.5 percentage points), it is implemented in one stroke (vs. two month span), and is historically unprecedented. Any change in dollar reserve requirements that followed January 2017 adjustment did not exceed two percentage points. Figure 9, Panel B displays these magnitude of the changes in relation to one year ahead local currency depreciation forecast. It highlights that–for both episodes–similar levels of expected depreciation historically have been traditionally association with much more moderate adjustments to dollar reserve requirements. What also seems surprising is that the December 2016 move was a complete policy reversal bringing the dollar marginal reserve requirement back to its historic levels.

Another factor that is important to consider is whether there were any other contemporaneous policy actions that might have impacted deferentially dollar deposit rates. Thus, we should acknowledge that the 2014 and 2015 adjustments to marginal reserve rate coincide with the gradual implementation of additional capital requirement for indirect FX exposure for banks which was fully binding by December 2015. (We discuss it in more detail below.) Arguably, the rate's effects on these additional capital requirements

would precede the final implementation. Regardless, the December move was not accompanied by any major policy shift. Both episodes are independent from capital controls discussed in Keller (2019) which took place in 2011. Figure A.3 in the Appendix presents a complete time line of surrounding regulatory events.

Our tests looks at changes in deposit rates and the dollarization of deposits before and after changes in reserve requirements. Figure 9 presents a non-parametric look at the evolution of dollar deposits rates and dollarization of deposits. In the regression analysis, each episode is evaluated independently. Because deposit data is monthly, we look at the annualized average deposit rate and share of dollar deposits twelve month after the change as compared to (i) November-December 2014 for the first episode,[18] and (ii) 2016 calendar year for the second episode. The length of the window is chosen to stay reasonably distant from other policy changes. We estimate the following regressions:

$$ln(r^d_{Lt}) = \gamma_1 I(Post) + \gamma_2 D_L + \epsilon_{Lt} \tag{6}$$

$$\left(D^{USD}/D^{Total}\right)_{Lt} = \delta_1 I(Post) + \delta_2 D_L + \delta_3 S_t + \delta_4 E_{t-1}(S_t) + \varepsilon_{Lt} \tag{7}$$

The dependent variable in equation (6) is the interest rate paid on deposits by bank L in month t. D_L are bank fixed effects, and $I(Post)$ is a dummy variable that takes the value of one after the announcement of the corresponding change in dollar-deposits reserve requirement. The dependent variable in the equation is the share of dollar deposits held by bank L in month t. Equation (7) includes additional controls for spot (S) and expected exchange rates, this is because to construct the dependent variables we need to convert dollar deposits into local currency which could mechanically introduce fluctuations in the dependent variable. Expected depreciation is an important variable in explaining deposit dollarization. For example, during 2016-2017, the expected exchange rate was consistently going down, thus failing to account for the expected exchange rate that might create a spurious correlation between movements in the marginal reserve requirement and deposit dollarization. γ_1 and δ_1 which indicated the adjustments following the shift in reserve requirements, are the coefficients of interest and are reported in Table 9. We are interested in comparing the estimated coefficients against a scenario where the demand for dollar

[18] The result is robust to creating a symmetric window of six moth before and six month after the event.

deposits is perfectly inelastic. The estimates on share of dollar deposits are compared against zero. To construct benchmark for interest rates, we assume that compensation on dollar reserves held at the central bank is zero; this assumption biases against us. (In actuality, it is 0.06% over the sample period of the first policy intervention, and 0.20% over the sample period of the second policy intervention.) With this assumption, adjustment to the deposit rate is equal to $(ln(1-\alpha_0) - ln(1-\alpha_1))$, where α is the marginal reserve requirement rate.

The results reported in Table 9 indicate that–in the year following policy intervention–there was no substantial movement in the share of dollar deposits, despite a substantial differential impact on the dollar reserve requirement. On the other hand, both events are associated with an economically significant shift in rates paid on dollar deposits: drop in the first case, and rise in the second case. During the first episode, change in rates are statistically indistinguishable from the the model benchmark. These results are consistent with the highly inelastic demand for dollar savings.

Evidence for the role played by the demand for dollar savings in pushing the dollar credit onto borrowers, is complementary to other channels. In particular, in this setting, we would expect borrower FX risk-taking motive to be active, as incentive for carry trade are substantially higher. In Table 10, we look at the changes in the probability of obtaining a dollar loan for borrower j and lender L. The explanatory variable of interest is the internal credit rating or the number of days past due assigned by the lender and available through the credit registry data. We look at several lags of the variables. The result is very consistent, controlling for borrower characteristics and bank-quarter fixed effects, deterioration in credit quality is tied to an increase in dollar-denominated borrowing.[19]

We now return to banks' incentives. Banks hold a senior secured position in the capital structure, so by passing the FX exposure to the firms their risk is reduced. But even if the FX exposure is pushed to the firms, banks still carry some indirect exposure to FX risk. Thus, banks should still provision for an indirect exposure and charge borrower's for bearing this risk. We however find little evidence that this is done voluntarily. Over the period of our analysis, Peruvian bank regulators introduced additional capital requirements for banks' indirect exposure to FX risk. Currently, a bank that carries no FX mismatch

[19]This is consistent with the mechanism in Salomao and Varela (2018). Our results show that bank in Peru are not pricing in the firm's exchange rate exposure risk. Therefore, the interest rates charged by banks to firms prone to default due to dollar denominated debt does not include a premium for that risk. Since risk free dollar rates are lower than soles, even after accounting for expected depreciation, these firms will find beneficial to borrow in dollars.

on its balance sheet but extends a $100 loan to an "exposed" debtor would need to have $.80 (0.80%) in equity capital in additional to $10 (10%) of the base capital requirement for commercial loans (a total of $10.80 in equity capital). The specific magnitudes of adequate provisioning are not easy to pin down, but overall 0.8% seems moderate. With this in mind, what we want to show is that this regulation was binding and increased the cost of dollar credit. The introduction of the additional capital requirements was in June 2010, and started at 0.25%. This precedes the beginning of the interest rate data collection (our sample). However, over our sample, the FX parameter was gradually adjusted to 0.40% (December 2013), 0.60% (December 2014), and 0.80% (December 2015).

Because within our sample this was a plausibly anticipated change, and some banks could have provisioned the necessary capital in the year and a half preceding the start of sample, our results are likely to be biased toward zero. With that in mind, Table 11 expands the results in Table 3, Panel B by separating dollar loans to exposed borrowers issued before and after end of 2015 (end of capital requirement implementation). The estimated marginal effect for exposed borrowers ranges between 0.193 and 0.371 percentage points[20]

Overall, regulatory setting sets strong incentives for banks to push dollar deposits into loans, despite the indirect exposure to FX risk carried by the banks. But there could be other reasons that contribute to banks failure to account for indirect FX exposure. There are a few potential reasons. The most common hypothesis is that this is reflection of moral hazard due to implicit bailout guarantees. As of 2018, the top-4 banks in Peru represent about 83% of all credit and assets. Conceptually, given this large concentration, and the fact that the financial system is bank-centered, it is plausible that implicit bailout guaranteed in Peru are substantial. Empirically, however, we find little support for this hypothesis. To assess it, we estimated empirical model is as in Table 3, Panel B with a focus on top-4 banks. Overall, differences for top-4 banks in pricing of loans denominated foreign currency are not statistically different from the rest of the banking sector. Consistent with evidence in Table 8, the economic significance of the differential in dollar rates for the top-4 banks is also small (see Table 12) . In Table 13, we look at a different motive and that is the level of competition for any given borrowers. As proxies of coveted clients we use firm's age,

[20]The dollar discount before the increase in capital requirements for non-exposed debtors was -1.977 while after the capital requirement it was -2.278 (= -1.977-0.301). For exposed debtors it was -1.535 (-1.977+0.442) and then -1.643 (-1.977+0.442+0.193-0.301). Thus, after the introduction of capital requirements, the dollar discount was 0.193 lower for exposed debtors compared to the non-exposed ((-1.643+ 1.535)-(-2.278+1.977))

size and number past banking relationships. We find that older firms, as compared to younger firms, get a 43 basis points larger discount on their dollar loans (significant 5% level). Larger firms, as compared to younger firms, get a 48 basis points incremental dollar-borrowing discount (significant at 10%). Finally, firms with above median number of banking relationships get 42 basis points incremental dollar-borrowing discount (significant at 1%).

6 Conclusion

Dollarization of credit is a global phenomenon, and, for many reason, it is a long standing subject in economics. In emerging markets, there are many examples in history where borrowers' currency mismatch has been at the center of a widespread economic crisis. Yet, again and again, things return to where they started and the prevalence of dollar lending is still the central characteristic of most emerging markets. Among the borrowers, the most common explanation of this phenomenon is that dollar credit is "cheap" (as compared to credit in local currency). But what exactly does this mean? Is this an erroneous assessment, a reflection of UIP deviation across central banks rates, or something else entirely? Importantly, what might be the source of dollar credit "cheapness"? These are the questions that we tackle in this paper.

The dollar "cheapness" hypothesis has been previously acknowledged by academics. Several studies show that carry trade motive among borrowers—that is, desire to capture UIP deviations—is one of the forces at play. The typical rational for this behavior is either risk-shifting or implicit bailout guarantee. While borrowers' carry motive is an essential part of the overall mechanism, it does not speak to the magnitudes of the dollar discount. Using a loan pricing data collected by Peruvian bank regulatory agency, we bring new and striking facts to the debate on the preponderance of dollar loans in emerging markets.

We show that the popularity of dollar loans in Peru is explained by 2% discount for loan dollar that is not explained by macro UIP deviations. Instead, this large discount originates in the preference of local agents (households and firms) for savings in dollars. The regulatory limits for banks on-balance sheet exposure to exchange risk play a key role. Banks nearly perfectly match their dollar assets and liabilities. Therefore, banks are unable to directly profit from carry trade opportunities coming from cheaper dollar

financing of deposits. To entice firms into holding mismatched balance sheets, banks pass-through their cheaper dollar financing to loans.

Banks indirectly participate in this "enhanced" carry trade through the balance sheet of the corporate sector. Importantly, a large share of these dollar loans goes to firms classified, by the bank, as exposed to exchange rate risk. We do not find evidence that banks require compensation for this exposure, the risk premium charged on loans to exposed firms is quite small.

We further disentangle the drivers of the bank's pass-through of the deposit dollar discount to loans by exploring cross-sectional variation of banks and borrowers. Larger, older firms with more banking relationships also receive a significantly larger fraction of the dollar discounts. This result provides evidence that competitive pressure is likely an important factor as well. We do not find evidence that supports bank's moral hazard motive.

Our results brings further understanding of the drivers of dollar corporate loans. We provide compelling evidence of the importance of the transmission of dollar deposit rates to dollar loans in driving dollar credit decision. This is likely an important channel for other economies as preference for dollar deposits is common across a wide number of emerging markets.

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Figures and Tables

Figure 2: Percentage of Loans in Dollars, by Categories, 2001 - 2018

The red lines indicate the months in which a new additional capital requirement was introduced. Commercial loans is a category that includes all types of firms.

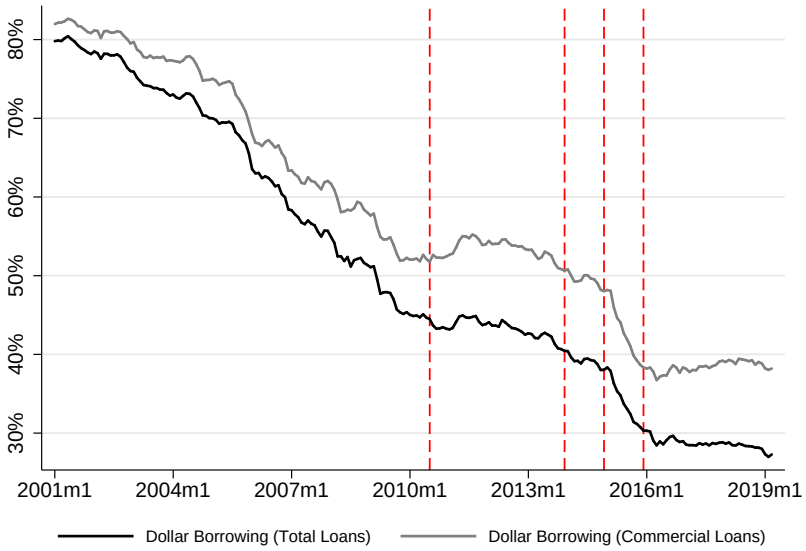
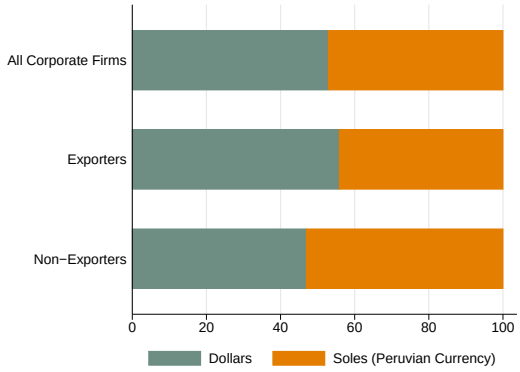
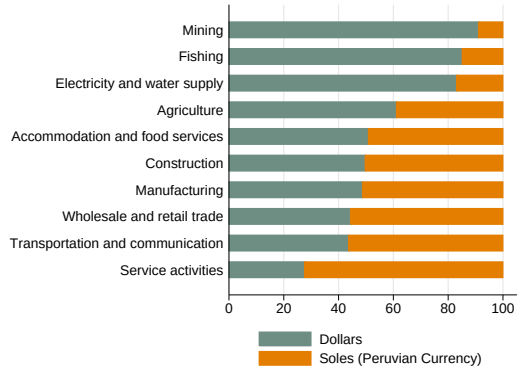


Figure 3: Dollarization of Loans by Exporting Status and Economic Sectors, 2018

Panel A: Exporters and non-exporters



Panel B: Currency composition by economic sectors



Panel C: Exchange rate exposure of dollar loans by economic sectors

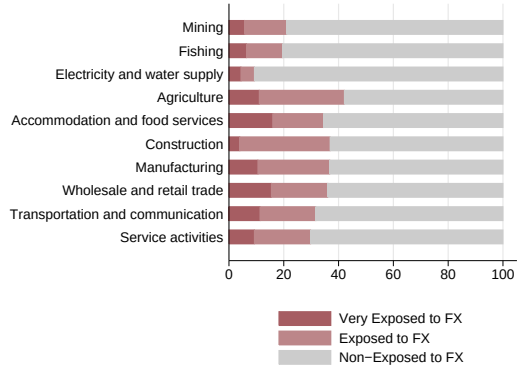
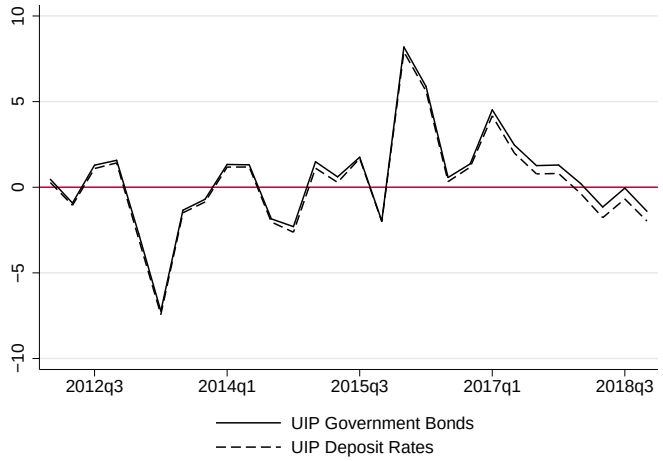


Figure 4: Government Bonds UIP and Deposit UIP, 2012 - 2018

The figures plot the deviation from the uncovered interest rate parity calculated as $UIP\ Deviation = (1 + r^F)\frac{E(s_{t+1})}{s_t} - (1 + r)$. Solid lines use government financing rates, US Treasury Bills plus the Embi for Peru as r^F and Peruvian givenmnet bond rates as r. Dashed lines use deposit rates in dollars for r^F and in soles for r. We use Consensus forecast data for $E(s_{t+1})$. Panel A displays the deviation for a 3 month maturity while Panel B series has a maturity of one year.

Panel A: Three months



Panel B: One year

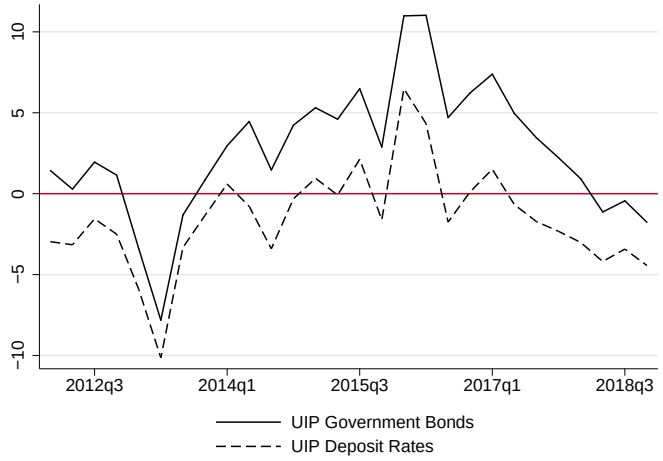
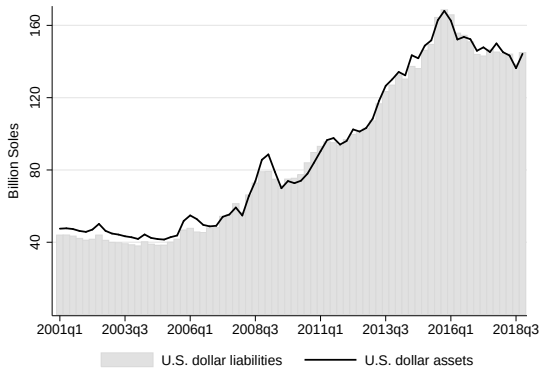


Figure 5: Dollar Assets and Liabilities, 2001 - 2018

Panel A: All banks



Panel B: Foreign banks

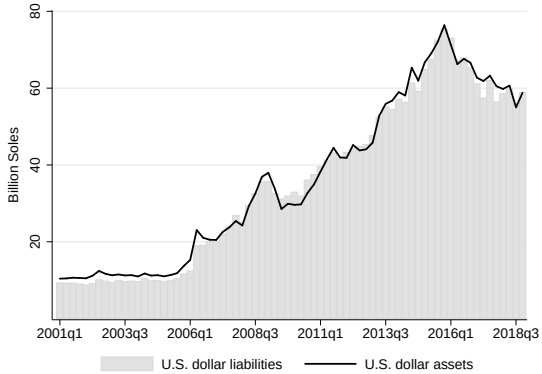
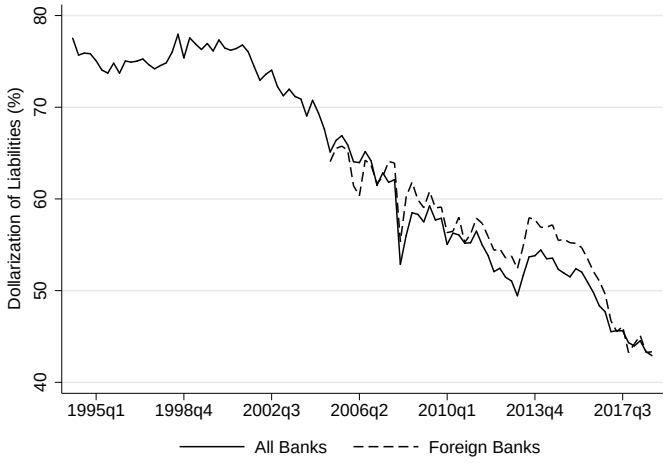


Figure 6: Dollarization of Liabilities and Deposits by Type of Bank, 2005 - 2018

Panel A: Liabilities



Panel B: Deposits

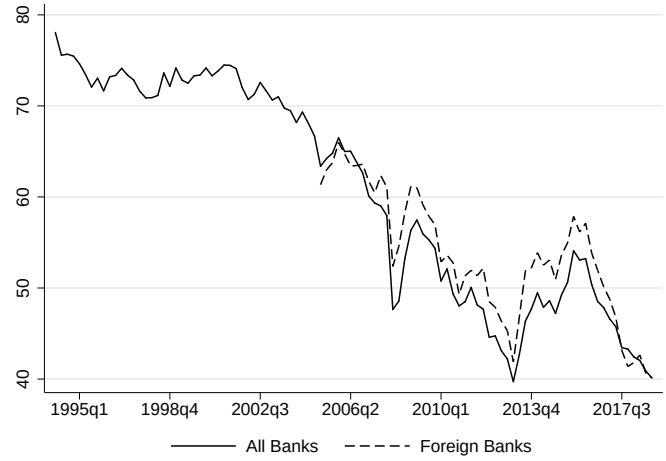
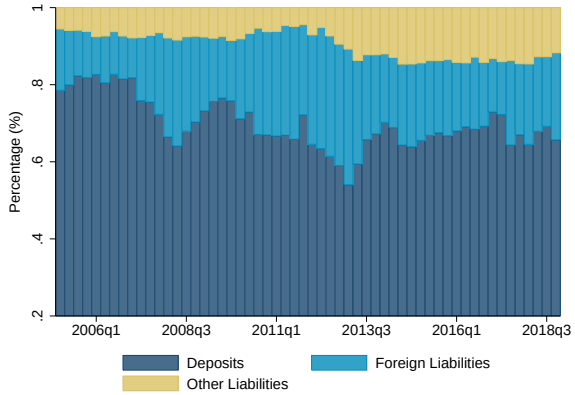


Figure 7: Dollar Liabilities Disaggregation by Type of Bank, 2005 - 2018

Panel A: Domestic banks



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Panel B: Foreign banks

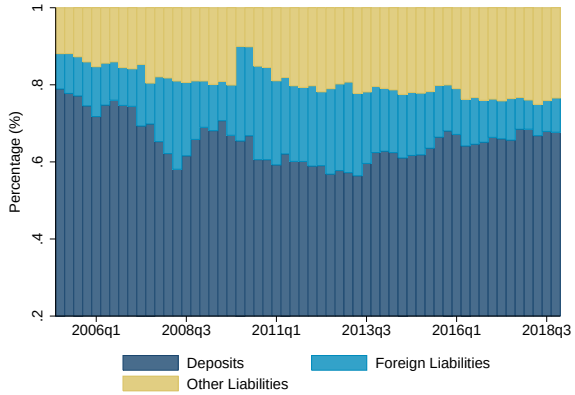
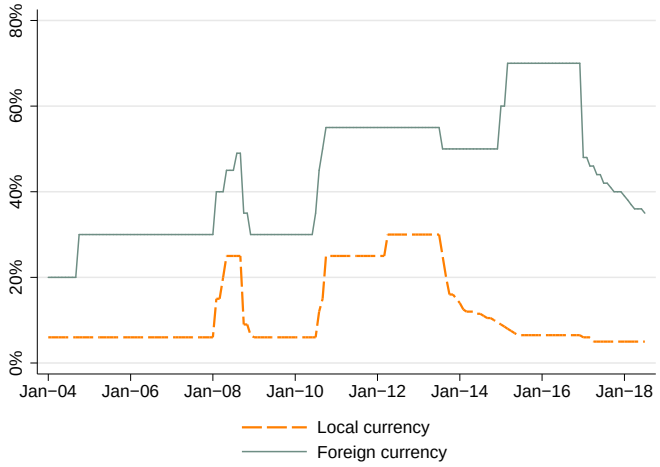


Figure 8: Marginal Reserve Requirements on Deposits, 2012-2018

Panel A depicts reserve requirements when they become effective (vs. announced, which is what we use for the analysis. Panel B computes the expected depreciation using the one year ahead forecast. The information about reserve requirements is from the Peruvian Central Bank and the expected depreciation is from Consensus Forecast. The period of analysis covers January 2004 through July 2018. We omit from the plot the periods in which the change in the differentials was equal to zero. Additionally, we did not include the information from August 2008, in which there was a huge reduction in the expected depreciation.

Panel A: Evolution of marginal reserve requirement



. Panel B: Differential changes in marginal reserve requirements on deposits in dollars and expected depreciation

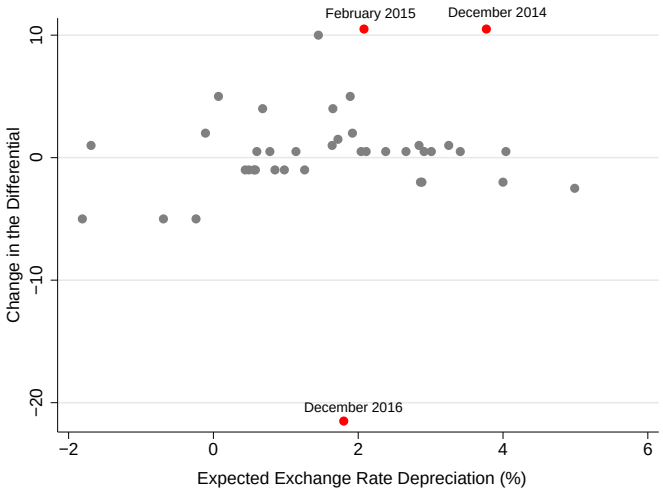
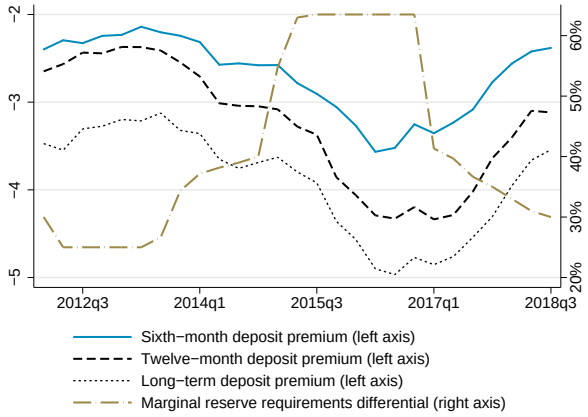


Figure 9: Marginal Reserve Requirements and Dollar Deposits, 2012 - 2018

Panel A: Deposit interest rates



Panel B: Deposit dollarization

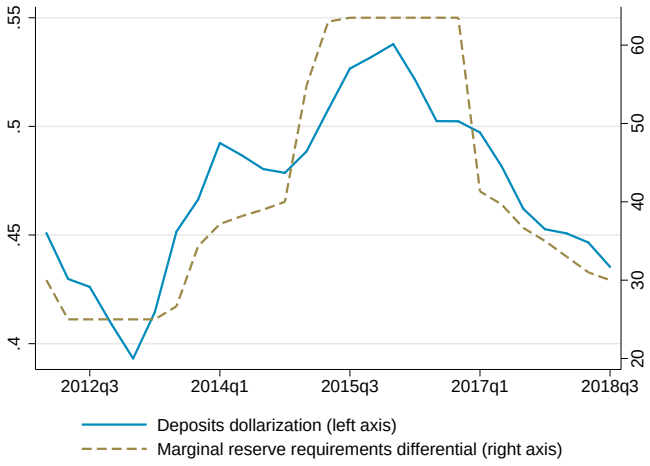


Table 1: Summary Statistics

The data set was created merging the loan information with the firm's characteristics information. Statistics reported in this table comes from a separate loan. The period of analysis spans quarter 1 in 2012 to quarter 2 in 2018

	Loans in Soles	Loans in Dollars
Loan Characteristics (Average Values)		
Interest Rate (All Banks)	7.1%	5.2%
Interest Rate (Foreign Banks)	6.9%	5.1%
Loan Amount (Million of Soles)	4.5	4.0
Loan Maturity (Months)	12.4	13.6
Firm Characteristics (Average Values)		
Outstanding Debt (Million of Soles)	25.9	26.8
Collateral Value (Million of Soles)	21.9	18.1
Number of Bank Relationships	4.2	4.1
Firm Age (Years)	26.7	25.6
Firm Characteristics (Percentage Values)		
Large Corporate Firms	33.9%	32.5%
Firms with Past Due Loans	1.3%	1.9%
Exporting Firms	54.2%	56.6%

Table 2: Cross Country Dollarization of Loans and Liabilities

This table displays the share of loans, bank liabilities and deposits denominated in foreign currency for a sample of Latin American countries. Data on foreign currency loan and liability share is from Financial Soundness Indicators (IMF). Data for foreign deposit share is from CEPAL. Due to data availability the share of dollar deposits is calculated foreign currency deposits (denominated in local currency) divided by M3-M1+Demand Deposits. The sample period varies per country. Argentina's sample is 01/2005 -09/2018. Bolivia's sample is 01/2010 - 08/2018. Chile's sample is 01/2001-10/2018. Guatemala's sample is 1/2009 -09/2018. Honduras' sample is 01/2006-09/2018 . Nicaragua's sample is 01/2008-09/2018 . Peru's sample is 01/2010-09/2018. Paraguay's sample is 01/2005-09/2018. Uruguay's sample is 01/2008-11/2016. FSI base does not include Costa Rica.

	Loans (%)	Liab. (%)	Deposit (%)	Corr(loans,liab)
Argentina	11.60	16.78	13.60	0.91
Bolivia	17.68	27.06	26.42	0.99
Chile	15.15	21.77	10.65	0.63
Costa Rica			39.33	
Guatemala	35.09	28.02	28.65	0.90
Honduras	30.98	34.51	28.54	0.72
Nicaragua	97.65	65.74	89.13	-0.33
Peru	37.82	47.56	44.58	0.75
Paraguay	43.03	46.61	50.49	0.82
Uruguay	63.02	71.11	72.53	0.72

Table 3: Interest Rate Discount on Dollar-Denominated Loans

In panel Panel A, we use the raw interest on the loan, that is, the rate paid by the borrower. In Panel B, we adjust the interest rate on loans in dollars using the expected exchange rate from LatinFocus. Each observation used for the analysis reported in this table is a separate loan. *I(Dollar Loan)* is a dummy for the loan being denominated in U.S. dollars. *Loan Size* is the total loan amount. *Loan Term* is the number of months in which the loan should be repaid. *Collateral* is one plus the total collateral amount, in the same currency of the loan, of firm j with bank L in quarter t. *Previous Loan Balance* is the previous total debt, in the same currency of the loan issued, of firm j with bank L in quarter t. *Firm Age* is the number of years elapsed since the incorporation of the firm. *I(Small Corporate Firm)* is a dummy indicating if the firm is a small corporate firm or not. *Bank Internal Credit Rating* is one plus the internal rating in bank L. *Number of Bank Relationships* is the total number of banks in which the firm has debt. *Exposed to FX* is a dummy variable equal to one if bank L identifies firm j as exposed or very exposed to FX in quarter t. Industry fixed effects are computed according to the divisions of the Standard Industrial Classification of All Economic Activities (ISIC). Columns (1)-(3) show the estimates controlling for different fixed effects. Column (4) replicates Column (2), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (4) also add an interaction of the exposed to FX dummy with the dollar loan dummy. Column (5) replicates Column (2), but includes a dummy variable for exporters and its interaction with the dollar loan dummy. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

Panel A. Interest Rates

	(1)	(2)	(3)	(4)	(5)
I(Dollar Loan)	-2.202***	-2.072***	-2.205***	-2.161***	-1.878***
	(-10.50)	(-14.20)	(-10.42)	(-13.85)	(-13.34)
Ln(Loan Size)	-0.101***	-0.265***	-0.102***	-0.263***	-0.256***
	(-6.13)	(-5.81)	(-6.23)	(-5.78)	(-5.65)
Ln(Loan Term)	0.166***	0.216***	0.160***	0.215***	0.224***
	(7.48)	(4.57)	(7.31)	(4.52)	(4.91)
Ln(Collateral)	0.00834	0.0248***	0.00748	0.0254***	0.0237***
	(1.31)	(5.01)	(1.16)	(5.35)	(4.89)
Ln(Previous Loan Balance)	-0.104*	-0.465***	-0.107**	-0.466***	-0.459***
	(-2.56)	(-13.88)	(-2.60)	(-13.39)	(-13.92)
Ln(Firm Age)	0.0699	-0.661***	0.124	-0.654***	-0.650***
	(0.35)	(-13.85)	(0.58)	(-13.89)	(-13.34)
I(Small Corporate Firm)	0.104	0.359***	0.0812	0.352**	0.315**
	(1.54)	(3.50)	(1.02)	(3.12)	(3.18)
Ln(Bank Internal Credit Rating)	1.376***	2.189***	1.323***	2.174***	2.264***
	(7.34)	(7.29)	(7.83)	(7.31)	(7.49)
Ln(Number of Bank Relationships)	-0.0478	0.0827	-0.0476	0.0716	0.120
	(-0.87)	(1.36)	(-0.86)	(1.11)	(1.90)
Dollar Loan × Exposed to FX				0.209*	
				(2.26)	
Exposed to FX				0.0717	
				(0.67)	
Dollar Loan × Exporter					-0.326**
					(-2.74)
Exporter					-0.270***
					(-3.57)
Fixed Effects:					
Firm	Yes	No	Yes	No	No
Industry-Quarter	No	Yes	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes	Yes
Observations	87,426	87,773	87,402	87,773	87,773
R-squared	0.797	0.476	0.800	0.477	0.480

Panel B. Exchange Rate Adjusted Interest Rates

	(1)	(2)	(3)	(4)	(5)	(6)
I(Dollar Loan)	-2.144***	-2.004***	-2.146***	-2.080***	-1.801***	-2.114***
	(-10.31)	(-14.68)	(-10.22)	(-15.17)	(-14.36)	(-11.07)
Ln(Loan Size)	-0.0995***	-0.268***	-0.101***	-0.267***	-0.260***	-0.102***
	(-6.18)	(-5.88)	(-6.29)	(-5.84)	(-5.72)	(-6.19)
Ln(Loan Term)	0.138***	0.187***	0.132***	0.187***	0.196***	0.110**
	(5.48)	(3.66)	(5.31)	(3.62)	(3.98)	(3.17)
Ln(Collateral)	0.00862	0.0254***	0.00776	0.0259***	0.0243***	0.00763
	(1.38)	(5.38)	(1.23)	(5.69)	(5.28)	(1.18)
Ln(Previous Loan Balance)	-0.105**	-0.460***	-0.108**	-0.461***	-0.454***	-0.107*
	(-2.61)	(-13.96)	(-2.65)	(-13.45)	(-14.03)	(-2.59)
Ln(Firm Age)	0.0803	-0.646***	0.141	-0.640***	-0.636***	0.116
	(0.41)	(-14.04)	(0.66)	(-13.96)	(-13.58)	(0.50)
I(Small Corporate Firm)	0.0757	0.342**	0.0537	0.335**	0.297**	0.0695
	(1.09)	(3.29)	(0.67)	(2.94)	(2.96)	(0.87)
Ln(Bank Internal Credit Rating)	1.381***	2.180***	1.322***	2.166***	2.256***	1.293***
	(7.31)	(7.16)	(7.75)	(7.17)	(7.36)	(7.50)
Ln(Number of Bank Relationships)	-0.0698	0.0603	-0.0679	0.0502	0.0981	-0.0608
	(-1.27)	(0.99)	(-1.23)	(0.77)	(1.57)	(-1.07)
I(Dollar Loan)× Exposed to FX				0.173*		
				(2.20)		
Exposed to FX				0.0787		
				(0.74)		
I(Dollar Loan) × Exporter					-0.345**	
					(-2.82)	
Exporter					-0.265***	
					(-3.53)	
I(Dollar Loan) × Standard Deviation of FX						-1.831*
						(-2.13)
Standard Deviation of FX						2.253**
						(3.11)
Fixed Effects:						
Firm	Yes	No	Yes	No	No	Yes
Industry-Quarter	No	Yes	Yes	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes	Yes	Yes
Observations	87,426	87,773	87,402	87,773	87,773	87,402
R-squared	0.795	0.472	0.799	0.473	0.476	0.8

Table 4: Interest Rate Discount on Dollar-Denominated Loans: Within Firm Analysis

In this table we re-examine the results in Table 3 but only for the sub-sample of firms which have new loans issued in the same quarter in both currencies. The difference is that, in this sample, we can include firm-quarter fixed effects in addition to bank-quarter fixed effects. The table displays the results for the adjusted interest rate using the the expected exchange rate as reported by LatinFocus. Column (1) exhibits the estimates using the same controls and fixed effects than Column (3) of Table 3. Column (2) shows the estimates controlling for firm-bank-time fixed effects. Column (3) replicates Column (2), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (3) also add an interaction of the exposed to FX dummy with the dollar loan dummy. Column (4) replicates Column (2), but includes a dummy variable for exporters and its interaction with the dollar loan dummy. *t*-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)
I(Dollar Loan)	-1.957***	-2.029***	-2.215***	-1.655***	-1.893***
	(-10.45)	(-10.45)	(-10.18)	(-12.64)	(-9.13)
Ln(Loan Size)	-0.169***	-0.132***	-0.133***	-0.135***	-0.136***
	(-6.19)	(-5.56)	(-5.58)	(-5.70)	(-5.73)
Ln(Loan Term)	0.128**	0.0767*	0.0813*	0.0724*	-0.024
	(3.02)	(2.24)	(2.28)	(2.12)	(-0.35)
Ln(Collateral)	0.004	0.012	0.014	0.009	0.012
	(0.44)	(1.12)	(1.34)	(0.93)	(1.13)
Ln(Previous Loan Balance)	-0.085	-0.083	-0.093	-0.070	-0.081
	(-1.29)	(-1.09)	(-1.28)	(-1.06)	(-1.05)
Ln(Firm Age)	3.706***				
	(4.87)				
I(Small Corporate Firm)	0.439*				
	(1.97)				
Ln(Internal Credit Rating)	1.301**				
	(3.15)				
Ln(Number of Bank Relationships)	-0.124				
	(-0.74)				
I(Dollar Loan) × Exposed to FX			0.441***		
			(3.37)		
I(Dollar Loan) × Exporter				-0.756***	
				(-4.99)	
I(Dollar Loan) × Standard Deviation of FX					-2.14*
					(-1.98)
Fixed Effects:					
Firm	Yes	No	No	No	No
Firm-Quarter	No	Yes	Yes	Yes	Yes
Industry-Quarter	Yes	No	No	No	No
Bank-Quarter	Yes	Yes	Yes	Yes	Yes
Observations	11,508	11,508	11,508	11,508	11,508
R-squared	0.675	0.710	0.713	0.711	0.713

Table 5: Interest Rate Discount on Dollar-Denominated Loans Adjusted by Observed Exchange Rates

	(1)	(2)	(3)	(4)	(5)
I(Dollar Loan)	-2.201***	-2.071***	-2.204***	-2.161***	-1.878***
	(-10.48)	(-14.15)	(-10.40)	(-13.79)	(-13.28)
Ln(Loan Size)	-0.101***	-0.263***	-0.102***	-0.263***	-0.256***
	(-6.13)	(-5.79)	(-6.23)	(-5.77)	(-5.65)
Ln(Loan Term)	0.166***	0.216***	0.161***	0.215***	0.224***
	(7.50)	(4.58)	(7.33)	(4.54)	(4.92)
Ln(Collateral)	0.00833	0.0248***	0.00748	0.0254***	0.0236***
	(1.30)	(5.00)	(1.16)	(5.34)	(4.87)
Ln(Previous Loan Balance)	-0.104*	-0.465***	-0.107**	-0.466***	-0.459***
	(-2.56)	(-12.87)	(-2.60)	(-12.38)	(-12.91)
Ln(Firm Age)	0.0695	-0.661***	0.123	-0.655***	-0.650***
	(0.35)	(-13.83)	(0.58)	(-13.88)	(-13.32)
I(Small Corporate Firm)	0.103	0.359***	0.0812	0.352**	0.315**
	(1.53)	(3.50)	(1.01)	(3.12)	(3.18)
Ln(Bank Internal Credit Rating)	1.375***	2.189***	1.323***	2.175***	2.264***
	(7.33)	(7.29)	(7.83)	(7.31)	(7.49)
Ln(Number of Bank Relationships)	-0.0470	0.0834	-0.0468	0.0724	0.121
	(-0.85)	(1.37)	(-0.85)	(1.12)	(1.91)
Dollar Loan × Exposed to FX				0.210*	
				(2.12)	
Exposed to FX				0.0714	
				(0.66)	
Dollar Loan × Exporter					-0.326**
					(-2.74)
Exporter					-0.270***
					(-3.56)
Fixed Effects:					
Firm	Yes	No	Yes	No	No
Industry-Quarter	No	Yes	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes	Yes
Observations	87,426	87,773	87,402	87,773	87,773
R-squared	0.797	0.476	0.800	0.477	0.479

Table 6: The Role of Macro UIP Deviations

This analysis expands on Table 3, Panel B, specifications (1), (2) and (3). As before, the dependent variable is the adjusted interest rate of the loan originated by a bank L to a firm j in a quarter t (in levels). The focus is on the *Macro UIP Deviation* which is the differential between risk-free rates as postulated by the uncovered interest parity condition (UIP). A positive (negative) value implies that dollar financing is more (less) costl$y$. Firm level controls and loan level controls are as in Table III. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)
I(Dollar Loan)	-2.171***	-2.027***	-2.174***
	(-10.49)	(-15.07)	(-10.42)
I(Dollar Loan) × Macro UIP Deviation	0.0471***	0.0473***	0.0494***
	(4.47)	(3.36)	(4.44)
Macro UIP Deviation	-0.0334***	-0.0246	-0.0336***
	(-3.66)	(-1.73)	(-3.54)
Controls:			
Loan Level	Yes	Yes	Yes
Firm Level	Yes	Yes	Yes
Fixed Effects:			
Firm	Yes	No	Yes
Industry-Quarter	No	Yes	Yes
Bank-Quarter	Yes	Yes	Yes
Observations	87,426	87,773	87,402
R-squared	0.796	0.472	0.800
Test:			
$\beta_1 = 0;\ \beta_2 = 1$	Rejected	Rejected	Rejected

Table 7: Foreign Currency Deposit and Monetary Policy Rates

The data on deposit rates were collected from respective central banks' websites. The sample period is April 2001 through October 2018 for most countries with exception of Guatemala and Paraguay for which the sample starts in January 2004 and January 2003 respectively. Column (1) and (2) calculate the average deposit rates. Columns (3) and (4) calculate the difference of local and foreign currency rates. In column (4) we use the Consensus Forecast data for expected exchange rate, for Guatemala, Honduras and Nicaragua this data only starts in January 2009. Columns (5) and (6) compares the deposit rate data with monetary policy rate data from CEPAL. We use the Fed Funds rate as the foreign currency monetary policy rate. Column (5) adjusts the fed fund rates with the Embi spread. For Peru and Argentina we use the country specific Embi spread. For other countries we use the index for Latin America. The monetary policy rates data start for Argentina starts in November 2002, for Bolivia in December 2002, for Costa Rica in January 2005, Guatemala in January 2005, Honduras in April 2005, Nicaragua January 2007 and Uruguay September 2007. For the other countries we have data for all the sample period. Column (7) displays standard deviation of annual inflation for the 2001 to 2018 period. The inflation rate has base 100 in 2010 for all countries. The table presents times series averages of the periods when we have the necessary data for calculation. Stars implies that we reject that the mean of the series is different from zero at 10% (*), 5% (**) and 1% (***) .

	Deposit Rates				Relative to Monetary Policy Rate		Inflation
	Foreign Currency	Local Currency	Rate Difference	UIP Deviation	Rate Difference	UIP Deviation	
	r^*	r	$\Delta^r = r^F - r$	$UIP = (1+r^F)\frac{E(s_{t+1})}{s_t} - (1+r)$	$\Delta^r_{deposit} - \Delta^r_{MP}$	$UIP_{deposit} - UIP_{MP}$	$\sigma(\pi)$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Argentina	1.49	14.86	-13.38^{***}	2.69^{**}	-12.78^{***}	-14.16^{***}	115.37
Bolivia	1.39	4.18	-2.79^{***}	-0.24	-3.13^{***}	-3.22^{***}	29.06
Chile	2.03	4.41	-2.37^{***}	-0.82^{***}	-4.98^{***}	-5.02^{***}	17.30
Costa Rica	2.17	7.77	-5.60^{***}	-0.40^{***}	-3.49^{***}	-3.62^{***}	29.79
Guatemala	4.10	7.27	-3.16^{***}	-0.47^{***}	-4.09^{***}	-4.05^{***}	26.04
Honduras	2.32	6.73	-4.41^{***}	0.88^{***}	-2.73^{***}	-2.41^{***}	29.67
Nicaragua	4.39	4.88	-0.49^{***}	4.57^{***}	-0.95^{***}	-1.51^{***}	36.42
Peru	1.19	2.86	-1.68^{***}	-0.48^{***}	-1.93^{***}	-1.97^{***}	17.67
Paraguay	1.98	5.07	-3.09^{***}	2.57^{***}	-2.45^{***}	-2.67^{***}	15.64
Uruguay	1.12	10.51	-9.39^{***}	-2.89^{***}	-1.60^{***}	-1.83^{***}	43.30

Table 8: Deposit Rate Premium Statistics

This table displays the main descriptive statistics for the difference between dollar and soles (Peruvian currency) deposit rates for 17 banks. The period of analysis spans quarter 1 in 2012 to quarter 4 in 2018.

Year	Mean (*All banks*)	Mean (*Top-4 banks*)	Median	Standard Deviation	10th Percentile	90th Percentile
2012	-1.74	-1.50	-1.64	0.43	-2.31	-1.14
2013	-1.64	-1.42	-1.55	0.41	-2.17	-1.13
2014	-2.06	-1.91	-1.94	0.51	-2.51	-1.45
2015	-2.12	-1.91	-1.95	0.56	-2.77	-1.46
2016	-2.65	-2.27	-2.57	0.47	-3.12	-1.93
2017	-2.57	-2.13	-2.33	0.61	-2.98	-1.54
2018	-1.62	-1.28	-1.68	0.57	-2.43	-1.15

Table 9: Pass-through of the Marginal Reserve Requirements Cost

This table summarizes result of examining changes in dollar deposit rates and share of dollar deposits following two episodes of adjustments to marginal reserve requirement rate. Estimates are changes in the dependent variable; each estimate corresponds to a different regression. Benchmark quantities reflect calculations for perfectly inelastic demand for dollar savings. *** indicates that coefficient is statistically different from zero at 1% level.

	December 2014 and February 2015			**December 2016**		
	Reserve on dollar deposits increased from 50% to 70% (differential dollar reserve change 21.5%)			Reserve on dollar deposits decreased from 70% to 48% (differential dollar reserve change -21.5%)		
	Benchmark (model)	Estimate	Test	Benchmark (model)	Estimate	Test
Deposits ($ln(r^d)$)	-0.287	-0.22^{*}	Fail to reject	0.55	$+0.37^{***}$	Reject
Loans ($ln(r^l)$)		+0.15			-0.17^{**}	
Share of dollar deposits	0	−1.19	Fail to reject	0	−0.30	Fail to Reject

Table 10: Firm Health and Dollar Borrowing

The dependent variable is a dummy indicating if the firm j has a dollar loan in bank L at quarter t. Specifications (1) to (6) to the following regression:

$$Dollar\ Loan_{Ljt} = \phi Ln(Firm\ Health\ Indicator_{j;t-n}) + D_{Lt} + Firm\ Level\ Controls + \nu$$

$Firm\ Health\ Indicator_{j;t-n}$ is a measure of deterioration of quality of the firm j at time $t-n$. For this table we are considering the internal credit rating and the average number of days past due. D_{Lt} is the bank-time fixed effects. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
$Ln(Internal\ Credit\ Rating_{j;t-1})$	0.047*					
(Lagged 1 Quarter)	(1.98)					
$Ln(Days\ Past\ Due_{j;t-1})$		0.035***				
(Lagged 1 Quarter)		(3.59)				
$Ln(Internal\ Credit\ Rating_{j;t-2})$			0.075*			
(Lagged 2 Quarters)			(2.00)			
$Ln(Days\ Past\ Due_{j;t-2})$				0.030*		
(Lagged 2 Quarters)				(2.05)		
$Ln(Internal\ Credit\ Rating_{j;t-6})$					0.096*	
(Lagged 6 Quarters)					(2.41)	
$Ln(Days\ Past\ Due_{j;t-6})$						0.031*
(Lagged 6 Quarters)						(2.48)
Controls:						
Firm Level	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects:						
Bank-Quarter	Yes	Yes	Yes	Yes	Yes	Yes
Observations	85,940	85,940	84,869	84,869	76,541	76,541
R-squared	0.0661	0.0588	0.0660	0.0756	0.0545	0.0533

Table 11: How does an increase in Capital Requirements affects the Dollar Premium?

Each observation used for the analysis reported in this table is a separate loan. The dependent variable is the adjusted interest rate of the loan originated by a bank L to a firm j in a quarter t (in levels). *Post* is a dummy equals to 1 after December 2015. The period of analysis covers January 2015 through December 2016. *Firm Level Controls* and *Loan Level Controls* are as in Table III, Panel B. All other variables are as in Table III, Panel B. Columns (1)-(3) show the estimates controlling for different fixed effects. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)
Dollar Loan	-1.977***	-2.019***	-1.968***
	(-17.82)	(-13.99)	(-17.71)
Exposed to FX	0.0992	0.0672	0.111
	(1.73)	(0.73)	(1.75)
Post × Exposed to FX	0.0433	0.214	0.0581
	(0.63)	(1.74)	(0.80)
Post × Dollar Loan	-0.301***	-0.445*	-0.302***
	(-3.52)	(-2.21)	(-3.52)
Exposed to FX× Dollar Loan	0.442**	0.709***	0.462**
	(3.08)	(3.57)	(3.34)
Post × Dollar Loan × Exposed to FX	0.193*	0.371*	0.219*
	(2.06)	(2.29)	(2.19)
Controls:			
Loan Level	Yes	Yes	Yes
Firm Level	Yes	Yes	Yes
Fixed Effects:			
Firm	Yes	No	Yes
Industry-Quarter	No	Yes	Yes
Bank-Quarter	Yes	Yes	Yes
Observations	24,230	24,557	24,230
R-squared	0.786	0.493	0.787

Table 12: Bailout and Dollar Premium

Each observation used for the analysis reported in this table is a separate loan. The dependent variable is the adjusted interest rate of the loan originated by a bank L to a firm j in a quarter t (in levels). *Large Bank* is a dummy variable indicating if the bank is one of the four largest. *Firm Level Controls,* and *Loan Level Controls* are as in Table IV. Columns (1)-(3) show the estimates controlling for different fixed effects. Column (4) replicates Column (2), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (4) also add an interaction of the exposed to FX dummy with the dollar loan dummy. Column (5) replicates Column (2), but includes a dummy variable for exporters and its interaction with the dollar loan dummy. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)
Dollar Loan	-2.227***	-1.925***	-2.235***	-2.036***	-1.664***
	(-10.29)	(-7.43)	(-10.59)	(-8.11)	(-7.77)
Dollar Loan × Large Bank	0.104	-0.200	0.162	-0.203	-0.277
	(0.50)	(-0.71)	(0.80)	(-0.70)	(-1.10)
Large Bank	-0.570***	-0.423*	-0.641***	-0.411*	-0.482**
	(-3.77)	(-2.56)	(-5.27)	(-2.36)	(-3.16)
Controls:					
Firm Level	Yes	Yes	Yes	Yes	Yes
Loan Level	Yes	Yes	Yes	Yes	Yes
Trade Status	No	No	No	No	Yes
Fixed Effects:					
Firm	Yes	No	Yes	No	No
Industry-Quarter	No	Yes	Yes	Yes	Yes
Bank-Quarter	No	No	No	No	No
Observations	87,511	87,844	87,475	87,844	87,844
R-squared	0.773	0.442	0.788	0.444	0.448

Table 13: How does Competition affects the Dollar Premium?

Each observation used for the analysis reported in this table is a separate loan. The dependent variable is the adjusted interest rate of the loan originated by a bank L to a firm j in a quarter t (in levels). *Firm Level Controls* and *Loan Level Controls* are as in Table IV. Columns (1)-(3) split the sample by age. Column (4)-(5) split the sample by borrower size. Columns (6)-(7) split the sample by the number of banking relationships with the largest banks. In particular, in a given year, we consider that a borrower is more coveted if it had loans with at least three of the four largest banks during that year. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively. (a) t-statistic for difference in coefficients in columns 1 and 3 is -3.46***. (b) t-statistic for difference in coefficients in columns 4 and 5 is -3.13**. (c) t-statistic for difference in coefficients on Dollar Loan in columns 1 and 2 is -2.11*.

	Firm Age			Borrower Size		Banking Relationships	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Older Firms	Middle-Aged Firms	Younger Firms	Larger Firms	Small Firms	More Coveted	Less Coveted
Dollar Loan	-2.31***(a)	-2.00***	-1.68***	-2.49***(b)	-1.91***	-2.02***(c)	-1.75***
	(-13.80)	(-11.69)	(-10.03)	(-15.47)	(-11.61)	(-9.61)	(-14.12)
Controls:							
Firm Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects:							
Industry-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,813	28,808	28,982	29,177	58,536	41,224	46,482
R-squared	0.557	0.412	0.399	0.676	0.421	0.470	0.512

Appendix A

Figure A.1: Dollar Assets and Liabilities of Representative Banks, 2005 - 2018

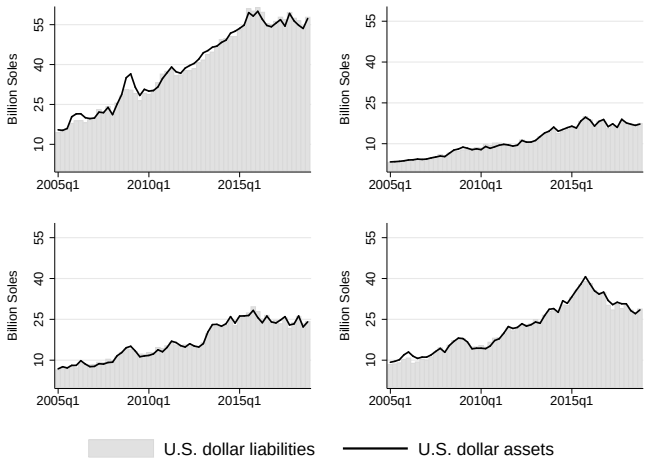


Figure A.2: Dollar Liabilities of Representative Banks, 2005 - 2018

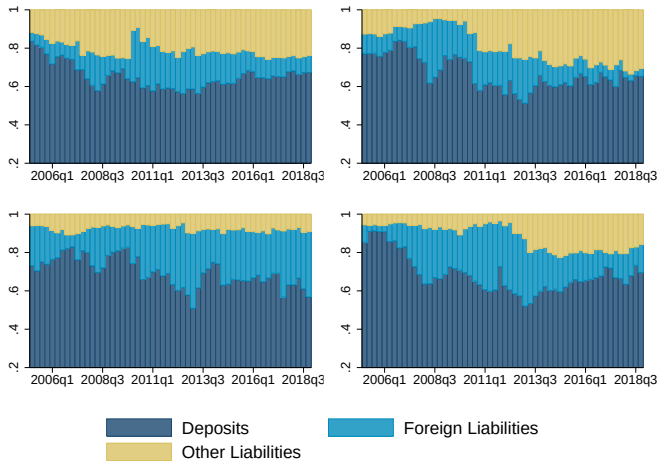


Figure A.3: Dollarization Policy Timeline, 2012 - 2018

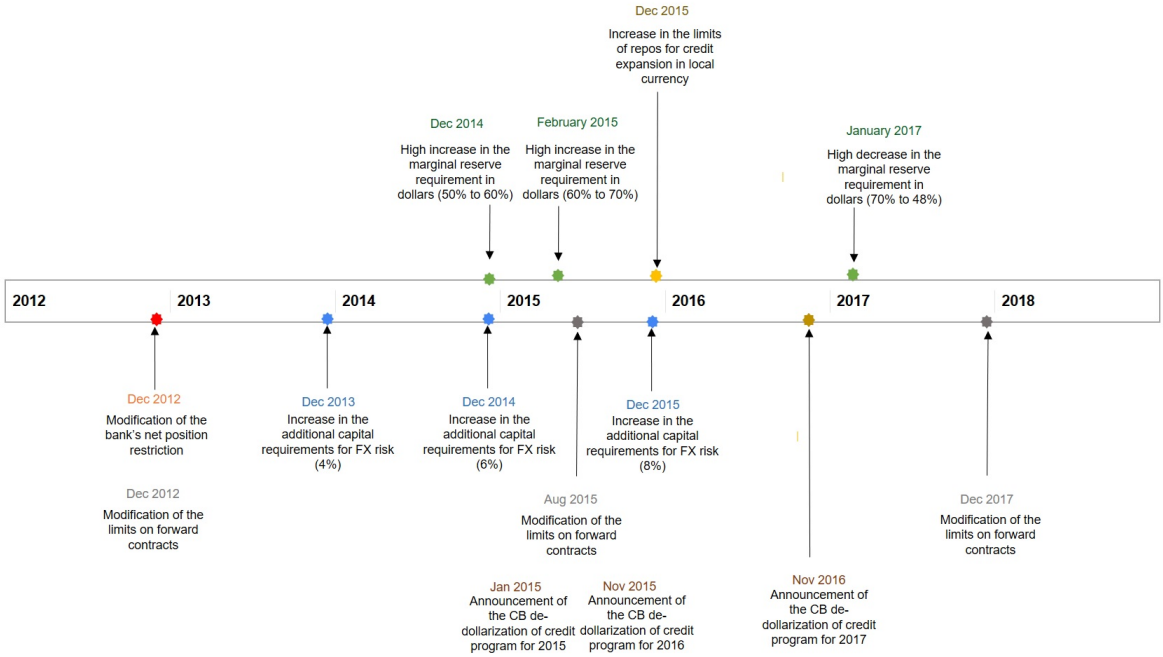


Table A.1: Interest rate decomposition accounting for UIP using forward exchange rates

Each observation used for the analysis reported in this table is a separate loan. The dependent variable is the synthetic interest rate of the loan originated by a bank L to a firm j in a quarter t (in levels). To compute the dependent variable we use the forward rate as a proxy of the expected exchange rate. Columns (1)-(3) show the estimates controlling for different fixed effects. Column (4) replicates Column (2), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (4) also add an interaction of the exposed to FX dummy with the dollar loan dummy. Column (5) replicates Column (2), but includes a dummy variable for exporters and its interaction with the dollar loan dummy. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)	(4)	(5)
Dollar Loan	-2.131***	-1.989***	-2.133***	-2.073***	-1.779***
	(-11.50)	(-13.98)	(-11.42)	(-13.84)	(-13.19)
Ln(Loan Size)	-0.0986***	-0.265***	-0.100***	-0.264***	-0.257***
	(-5.97)	(-5.84)	(-6.13)	(-5.80)	(-5.67)
Ln(Loan Term)	0.132***	0.181***	0.126***	0.181***	0.190***
	(5.92)	(3.78)	(5.70)	(3.73)	(4.11)
Ln(Firm Age)	0.102	-0.650***	0.161	-0.644***	-0.641***
	(0.50)	(-13.65)	(0.74)	(-13.66)	(-13.18)
Ln(Outstanding Balance)	-0.103*	-0.462***	-0.106*	-0.462***	-0.456***
	(-2.53)	(-13.67)	(-2.56)	(-13.19)	(-13.73)
Small Corporate Firm	0.0848	0.352***	0.0633	0.345**	0.307**
	(1.23)	(3.42)	(0.79)	(3.06)	(3.08)
Ln(Number of Bank Relationships)	-0.0587	0.0695	-0.0588	0.0589	0.107
	(-1.09)	(1.13)	(-1.08)	(0.91)	(1.69)
Ln(Internal Credit Rating)	1.381***	2.199***	1.325***	2.184***	2.274***
	(7.22)	(7.26)	(7.70)	(7.27)	(7.46)
Ln(Collateral)	0.00877	0.0254***	0.00786	0.0259***	0.0242***
	(1.35)	(5.05)	(1.20)	(5.38)	(4.95)
Dollar Loan × Exposed to FX				0.195*	
				(2.15)	
Exposed to FX				0.0726	
				(0.68)	
Dollar Loan × Exporter					-0.359**
					(-2.87)
Exporter					-0.258**
					(-3.31)
Fixed Effects:					
Firm	Yes	No	Yes	No	No
Industry-Quarter	No	Yes	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes	Yes
Observations	87,426	87,773	87,402	87,773	87,773
R-squared	0.794	0.470	0.798	0.471	0.474

Table A.2: Interest Rate Discount on Dollar-Denominated Loans: Within Firm Analysis

In this table we re-examine the results in Table 3 Panel B but only for the sub-sample of firms which have new loans issued in the same quarter in both currencies and hold financial hedge. The difference is that, in this sample, we can include firm-quarter fixed effects in addition to bank-quarter fixed effects. The adjusted interest rate using the future exchange rate reported obtained from individual hedge data.Column (1) show the estimates controlling for firm-bank-time fixed effects. Column (2) replicates Column (1), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (2) also add an interaction of the exposed to FX dummy with the dollar loan dummy. Column (3) replicates Column (1), but includes a dummy variable for exporters and its interaction with the dollar loan dummy. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

	(1)	(2)	(3)
Dollar Loan	-2.303***	-2.393***	-2.118***
	(-10.80)	(-10.46)	(-7.91)
Ln(Loan Size)	-0.0621*	-0.0610*	-0.0602*
	(-2.07)	(-1.99)	(-2.00)
Ln(Loan Term)	0.284***	0.282***	0.287***
	(4.74)	(4.63)	(4.74)
Ln(Collateral)	0.0167	0.0167	0.0142
	(1.12)	(1.12)	(1.01)
Ln(Outstanding Balance)	-0.376*	-0.375*	-0.349*
	(-2.10)	(-2.12)	(-2.04)
Dollar Loan × Exposed to FX		0.213*	
		(2.18)	
Dollar Loan × Exporter			-0.433
			(-1.82)
Fixed Effects:			
Firm-Quarter	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes
Observations	4,265	4,265	4,265
R-squared	0.712	0.713	0.712

Appendix B

TABLE B.1: What Drives Interest Rates?

Each observation used for the analysis reported in this table is a separate loan. Panel A displays the results for the interest rate of the loan; Panel B for adjusted interest rate using the expected exchange rate as reported by LatinFocus. *Dollar Loan* is a dummy for the loan being denominated in U.S. dollars. *Loan Size* is the total loan amount. *Loan Term* is the number of months in which the loan should be repaid. *Firm Age* is the number of years elapsed since the incorporation of the firm. *Outstanding Balance* is the total outstanding debt, in the same currency of the loan issued, of firm j with bank L in quarter t. *Small Corporate Firm* is a dummy indicating if the firm is a small corporate firm or not. *Number of Bank Relationships* is the total number of banks in which the firm has debt. *Internal Credit Rating* is one plus the internal rating in bank L. *Collateral* is one plus the total collateral amount, in the same currency of the loan, of firm j with bank L in quarter t. *Exposed to FX* is a dummy variable equal to one if bank L identifies firm j as exposed or very exposed to FX in quarter t. Industry fixed effects are computed according to the divisions of the Standard Industrial Classification of All Economic Activities (ISIC). Columns (1)-(3) show the estimates controlling for different fixed effects. Column (4) replicates Column (2), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (4) also add an interaction of the exposed to FX dummy with the dollar loan dummy. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

Panel A. Interest Rates

	(1)	(2)	(3)	(4)
Dollar Loan	-2.221***	-2.177***	-2.200***	-2.240***
	(-9.47)	(-11.65)	(-9.22)	(-9.75)
Ln(Loan Size)	-0.112***	-0.0730***	-0.109***	-0.0726***
	(-5.94)	(-4.19)	(-5.98)	(-4.23)
Ln(Loan Term)	-0.427**	-0.475**	-0.434**	-0.474**
	(-2.69)	(-3.30)	(-2.70)	(-3.28)
Ln(Firm Age)	-2.365***	-0.675***	-1.640**	-0.673***
	(-3.62)	(-8.17)	(-3.05)	(-8.31)
Ln(Outstanding Balance)	-0.291***	-0.403***	-0.282***	-0.403***
	(-6.95)	(-9.84)	(-6.95)	(-9.82)
Small Corporate Firm	0.0854***	0.0376	0.0943***	0.0363
	(4.78)	(0.32)	(4.28)	(0.31)
Ln(Number of Bank Relationships)	0.202	0.533***	0.160	0.529***
	(1.85)	(7.41)	(1.46)	(7.59)
Ln(Internal Credit Rating)	1.343***	0.517	1.148***	0.510
	(5.17)	(1.48)	(4.62)	(1.43)
Ln(Collateral)	-0.00182	-0.0014*	-0.00415	-0.00135*
	(-0.42)	(-2.15)	(-0.90)	(-2.07)
Dollar Loan × Exposed to FX				0.175*
				(2.17)
Exposed to FX				-0.0285
				(-0.20)
Fixed Effects:				
Firm	Yes	No	Yes	No
Industry-Quarter	No	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes
Observations	1,636,270	1,636,555	1,636,257	1,636,555
R-squared	0.405	0.245	0.417	0.245

Panel B. Exchange Rate Adjusted Interest Rates

	(1)	(2)	(3)	(4)
Dollar Loan	-2.154***	-2.105***	-2.133***	-2.160***
	(-10.01)	(-12.50)	(-9.72)	(-10.38)
Ln(Loan Size)	-0.113***	-0.0733***	-0.109***	-0.0729***
	(-6.06)	(-4.25)	(-6.09)	(-4.29)
Ln(Loan Term)	-0.454**	-0.500***	-0.461**	-0.500***
	(-2.83)	(-3.48)	(-2.84)	(-3.47)
Ln(Firm Age)	-2.370***	-0.673***	-1.655**	-0.672***
	(-3.64)	(-8.20)	(-3.09)	(-8.32)
Ln(Outstanding Balance)	-0.294***	-0.405***	-0.284***	-0.405***
	(-7.07)	(-9.94)	(-7.07)	(-9.92)
Small Corporate Firm	0.0877***	0.0380	0.0952***	0.037
	(4.62)	(0.32)	(4.19)	(0.31)
Ln(Number of Bank Relationships)	0.205	0.531***	0.162	0.528***
	(1.88)	(7.31)	(1.48)	(7.49)
Ln(Internal Credit Rating)	1.335***	0.514	1.134***	0.509
	(5.26)	(1.47)	(4.68)	(1.42)
Ln(Collateral)	-0.00120	-0.00138*	-0.00343	-0.00143*
	(-0.28)	(-2.22)	(-0.75)	(-2.14)
Dollar Loan × Exposed to FX				0.153*
				(2.19)
Exposed to FX				-0.0283
				(-0.20)
Fixed Effects:				
Firm	Yes	No	Yes	No
Industry-Quarter	No	Yes	Yes	Yes
Bank-Quarter	Yes	Yes	Yes	Yes
Observations	1,636,270	1,636,555	1,636,257	1,636,555
R-squared	0.404	0.244	0.416	0.244

TABLE B.2: Dollar Premium within Borrower-Bank-Quarter

Each observation used for the analysis reported in this table is a separate loan. The sample only considers the firms which have loans in both currencies in a given bank. Panel A displays the results for the adjusted interest rate using the the expected exchange rate as reported by LatinFocus; Panel B for the adjusted interest rate using the future exchange rate reported obtained from individual hedge data. Column (1) show the estimates controlling for firm-bank-time fixed effects. Column (2) replicates Column (1), but includes a dummy indicating if the firm was identified as exposed or very exposed to FX by the bank. Column (2) also add an interaction of the exposed to FX dummy with the dollar loan dummy. t-statistics are in parentheses. Standard errors clustered at the bank-quarter level. Significance at the 1%, 5%, and 10 % levels is indicated by ***, **, and *, respectively.

Panel A. Exchange Rate Adjusted Interest Rates

	(1)	(2)
Dollar Loan	-1.984***	-2.059***
	(-8.33)	(-8.10)
Ln(Loan Size)	-0.0846**	-0.0851**
	(-2.97)	(-2.97)
Ln(Loan Term)	-0.597*	-0.599*
	(-2.25)	(-2.25)
Ln(Outstanding Balance)	-0.0401	-0.0410
	(-0.77)	(-0.79)
Ln(Collateral)	-0.0106	-0.00967
	(-1.81)	(-1.62)
Dollar Loan × Exposed to FX		0.192*
		(2.24)
Fixed Effects:		
Firm-Bank-Quarter	Yes	Yes
Observations	98,987	98,987
R-squared	0.610	0.610

Panel B. Exchange Rate Adjusted Interest Rates using individual hedging data

	(1)	(2)
Dollar Loan	-2.482***	-2.265***
	(-5.87)	(-5.95)
Ln(Loan Size)	-0.0856**	-0.0838**
	(-3.08)	(-3.08)
Ln(Loan Term)	-0.180*	-0.190*
	(-2.20)	(-2.24)
Ln(Outstanding Balance)	-0.165	-0.161
	(-1.71)	(-1.80)
Ln(Collateral)	-0.0129	-0.0114
	(-0.93)	(-0.95)
Dollar Loan × Exposed to FX		0.196*
		(-2.29)
Fixed Effects:		
Firm-Bank-Quarter	Yes	Yes
Observations	35,332	35,332
R-squared	0.635	0.636