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How Do Credits Dollarize? The Role of Firm's Natural Hedges, Banks' Core and Non-Core Liabilities

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How Do Credits Dollarize? The Role of Firm's Natural Hedges, Banks' Core and Non-Core Liabilities[*]

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Abstract. We show that firms' natural hedges (e.g., export revenues) and banks' foreign currency (FX) liabilities strongly dollarize credits. In particular, banks' non-core FX liabilities (e.g., syndications) in average feed credit dollarization almost three times more than their core FX liabilities (e.g., deposits). More importantly, these channels are affected differently by local and global macroeconomic conditions.

    Keywords: Credit Dollarization, Liability Dollarization, Deposit Dollarization

    JEL Classification: G21, G32

Özet. Bu çalışmada, firmaların doğal korumalarının (örneğin, ihracat gelirleri) ve bankaların yabancı para (YP) yükümlülüklerinin kredileri güçlü bir şekilde dolarize ettiğini göstermekteyiz. Özellikle, bankaların çekirdek dışı YP yükümlülüklerinin (örneğin, YP sendikasyonlar) çekirdek YP yükümlülüklerinden (örneğin, YP mevduatlar) neredeyse üç kat daha fazla kredileri dolarize ettiği görülmekte. Daha da önemlisi, bu kanallar yerel ve küresel makroekonomik koşullardan farklı şekillerde etkilenmektedir.

    Anahtar Kelimeler: Kredi Dolarizasyonu, Yükümlülük Dolarizasyonu, Mevduat Dolarizasyonu

    JEL Sınıflandırması: G21, G32

Non-Technical Summary

Dollarization of credits is a vital financial stability concern in many emerging economies that is mainly driven by firm and bank tendencies. Relying on their natural hedges (e.g., export revenues), firms prefer FX credits due to their lower cost advantages and longer-term maturity availability. Dollarization of bank liabilities, on the other hand, either via non-core FX liability channel (e.g., FX syndications) or via core FX liability channel (e.g., FX deposits) induces them to transfer the FX risk to borrowers. Using a rich micro data from Turkey, we study how strongly these three channels dollarize firm-bank credits and how they are affected by local and global macroeconomic conditions in this paper.

We find that both firm natural hedges and bank FX liabilities derive credit dollarization strongly. When we decompose banks' total FX liabilities into core and non-core liabilities, we find that banks' non-core FX liabilities in average feed credit dollarization almost three times more than their core FX liabilities. Differences in the maturity structure between the two sources (e.g., the average maturity of FX deposits is significantly lower than FX syndications) could be one explanation for this result. We also show that the impact of these channels varies depending on the local and global macroeconomic conditions. An increase in the effective Fed funds rate (e.g., tightening of the global liquidity) weakens the effect of non-core FX liability channel on credit dollarization. We also observe a weakening in both non-core FX liability and natural hedge channels during times of high exchange rate volatility in the local currency, while the core FX channels seems to gain some strength. In contrast, during times of positive GDP growth, all the three channels become stronger, although the effect of the core FX channel is moderate.

Our results provide an important insight for macroprudential policies aiming to combat credit dollarization. In particular, macroprudential policies may target disciplining deposit dollarization during times of tight global liquidity conditions and/or high exchange rate volatility in the local currency. In contrast, during times of softer global liquidity conditions and/or positive GDP growth, prudential policies can be designed to focus more on natural hedge and non-core FX liability channels.

1 Introduction

Dollarization of credits is a vital financial stability concern in many emerging economies. Especially during times of large currency depreciations, foreign currency (FX) liabilities of firms and banks disrupt their balance sheets and can even lead to systemic events. Despite its importance, we have very little empirical evidence on how firm and bank behaviors derive credit dollarization. In particular, firms and banks have different motivations for engaging in such a risky credit relation. Relying on their *natural hedges* (e.g., export revenues), firms prefer FX credits due to low cost and long-term maturity advantages. For instance, in the case of Turkey, the average interest rate for TL denominated corporate credits is usually almost three times higher than FX credits (Figure 1), while FX credits' average maturity is significantly longer than TL denominated credits (Figure 2). Dollarization of bank liabilities, on the other hand, either via *non-core FX liability* channel (e.g., FX syndications, bonds) due to the original sin phenomenon (Eichingreen et. al., 2003) or via *core FX liability* channel (e.g, FX deposits) induces them to transfer the FX risk to borrowers.[1] Overall, such tendencies of firms and banks determine the level dollarization of firm-bank credit relations at the equilibrium.

Using a rich micro data from Turkey, we provide empirical evidence on how these three channels, firms' natural hedges and banks' core and non-core FX liabilities, dollarize firm-bank credits in this paper. Turkey, as a major emerging economy, provides an ideal laboratory to study credit dollarization. Compare to many other emerging markets, Turkish non-financial corporates carry a relatively higher level of FX credit share (Figure 3), which has been an important concern to financial stability (GFSR, 2018).[2] For the analysis, we match the Turkish Credit Registry with firm and bank financial statements. The Credit Registry provides us the currency denomination of firm-bank credit relations, while from financial statements, we observe firms' natural hedges and banks' core and non-core FX liabilities. In our main specification, we exploit the heterogeneity in firm-bank credit relations with a large set of controls and fixed effects. In a similar fashion to Khwaja and Mian (2008), we then focus on the firms with multiple bank relations to strengthen the identification.

Our results show that both firm natural hedges and bank FX liabilities derive credit dollarization strongly. However, banks' non-core FX liabilities feed credit dollarization almost three times more than their core FX liabilities. We also show that the impact of these channels varies depending on the local and global macroeconomic conditions. An increase in the effective Fed funds rate (e.g., tightening of the global liquidity) weakens the effect of non-core FX liability channel on credit dollarization. We observe a weakening in both non-core FX liability and natural hedge channels during times of high exchange rate volatility in the local currency. In contrast, during times of positive GDP growth, all three channels become stronger, although the effect of the core FX channel is moderate. These results are robust to different identification techniques,

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[1]Banks' net FX open position is highly regulated and cannot exceed certain limits in many emerging economies, including Turkey.

[2]It is also worth noting that during the time of this study there was not any major policy change for lending and borrowing of FX funds in Turkey.

additional controls and consideration of sub-samples.

These results provide an important insight for macroprudential policies aiming to combat credit dollarization. In particular, macroprudential policies may target disciplining deposit dollarization during times of tight global liquidity conditions and/or high exchange rate volatility in the local currency. In contrast, macroprudential policies, on the other hand, may focus more on natural hedge and non-core liability channels during times of softer global liquidity conditions and/or positive GDP growth.

This paper contributes to the literature on drivers of credit dollarization by bringing robust empirical evidence from firm-bank level micro data. Most of the papers in this literature provides suggestive evidence from macro data. For instance, Luca and Petrova (2007) presents a simple theoretical framework to identify the role of the aforementioned three channels in deriving credit dollarizaiton at firm-bank level. Yet, they can only test their theoretical findings with aggregated data. Limited number of micro studies in the literature, on the other hand, focuses on only one side of the story at a time, firms' or banks' perspectives, separately, which weakens their identification. For instance, Gelos (2003) shows that firms with natural hedges tend to prefer FX credits and similarly, Ozsoz et. al (2015) finds that banks match the currency denomination of their liabilities with their assets. By bringing direct evidence on channels deriving credit dollarization, our paper also complements the recent micro studies looking at the effect of global macroeconomic shocks and monetary policy shifts on banks' lending decisions (e.g., currency choice) - e.g., Brown et. al. (2014) on Bulgaria and Ongena et. al. (2018) on Hungary.

In the next section, we present the details of our micro data. Our estimation procedure is explained in Section 3. In section 4, main research findings are presented and Section 5 concludes. For brevity, we present only the main results in the paper, while the full set of results is available in the Appendix.

2   Data and Descriptive Statistics

The firm-bank level monthly Credit Registry is from the Banks Association of Turkey. The annual company balance sheets and income statements are obtained from the Central Bank of Republic of Turkey (CBRT)'s firm data base; monthly bank balance sheets and income statements come from the Banking Regulation and Supervisory Association (BRSA).

Manufacturing firms[3] with at least 10,000 TL (2,850 USD) average annual real asset value and report financial data at least two consecutive years over the sample period are kept in the analysis. Only the deposit taking banks are employed, as we would like to consider core FX (e.g., deposits) and non-core FX (e.g., syndications) liability channels separately.[4] Lastly, we take

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[3]We can only observe the natural hedges (e.g.,export revenues) of the firms in manufacturing sector.

[4]Additionally, other bank types (e.g., investment and development banks) may also have different motivations (e.g., financing exports, financing development, etc.) in their lending decisions that is beyond the scope of this analysis.

firm-bank relations that are above 1000 TL (285 USD). [5]

Overall, our analysis contains an average number of 20,000 firm-bank credit relations in a given month for an unbalanced panel of 4,396 manufacturing firms with 26 major deposit banks over the period of November 2006 - December 2016. Our sample represents 71 percent of total credits granted to firms in manufacturing sector by deposit banks in Turkey over the sample period (Table 1).[6] The average coverage is about 61 percent for total TL credits and 78 percent for total FX credits. Descriptions and summary statistics of key variables are reported in Table 2, while the detailed summary statistics and descriptions of all the variables included in the analysis are available in Table A1 of the Appendix.

3   Estimation

Following Luca and Petrova (2007), we estimate a model of credit dollarization at firm-bank level. The model presumes that both banks and firms are risk averse and hence, adopt a minimum variance portfolio (MVP) method in their borrowing and lending decisions. According to this, firms with natural hedges (e.g., export revenues) tend to prefer FX loans to minimize their cost of finance, while banks with FX liabilities are more inclined towards issuing FX loans in order to match the currency denomination of their assets and liabilities:

$$
\begin{aligned}
\left[\frac{\text{FX Credits}}{\text{Total Credits}}\right]_{ijt} = {} & \alpha_1 \left[\frac{\text{Export Revenues}}{\text{Total Revenues}}\right]_{it-1y} + \alpha' [\text{Firm Controls}]_{it-1y} \\
& + \beta_1 \left[\frac{\text{FX Liabilities}}{\text{Total Liabilities}}\right]_{jt-1m} + \beta' [\text{Bank Controls}]_{jt-1m} \\
& + \theta' [\text{Firm-Bank Credit Relation Controls}]_{ijt-1m} + f_i * b_j + d_t + e_{ijt} \quad (1)
\end{aligned}
$$

The dependent variable, referred as the firm-bank level credit dollarization, is the ratio of FX credits to total credits of firm i with bank j at time t. Firm i's share of exports in total sales captures natural hedges. Bank j's FX liabilities are further decomposed into core FX (i.e., share of FX deposits in total liabilities) and non-core FX liabilities (e.g., share of FX securitizations and syndications in total liabilities).

In the main specification, besides the main variables of interest, we also control for firm, bank and firm-bank credit relation variables that are lagged for one period.[7] Time trend is captured by time fixed effects and unobserved time invariant firm-bank credit relation heterogeneity is saturated with firm-bank fixed effects. Similar to Khwaja and Mian (2008), we re-do the main

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[5]This is to exclude insignificantly small or zero firm-bank credit relations, which are in total less then 0.005 percent of total firm credits in a given month.

[6]The analysis covers only the TL, FX and FX indexed loans that are granted by deposit banks to manufacturing firms. Cross-border lending of foreign financial institutions to non-financial Turkish firms and non-performing loans are excluded.

[7]List of key variables is presented in Table 2, while the complete list is available in Table A1 of the Appendix.

estimates with firm-time fixed effects that identifies bank supply relying only on firms with multiple bank relations. This does not cost much to our data, as only 3 percent of our sample contains firms with single bank relations. The same idea, bank-time fixed effects, is also applied to identify firm demand, while holding bank supply constant. The robustness of our main estimates is also further tested with sub-samples, additional controls and time structure (e.g., quarterly).

We are also interested in how firm and bank tendencies may change depending on local and global macroeconomic conditions. Following the related literature[8], we interact the afore-mentioned three channels with increase in the effective Fed funds rate, positive real economic growth and the level of exchange rate volatility. The effective Fed funds rate increase is a dummy variable that is equal to one for all increases above 5 basis points, otherwise zero; positive real economic growth is also a dummy variable that is equal to one for years of positive GDP growth in Turkey, otherwise zero and finally, exchange rate volatility is in levels.

4 Results

The main results are presented in Table 3, where Column (1) shows the baseline results; bank FX liabilities are further decomposed into core and non-core FX liabilities in Column (2) and this specification is interacted with macroeconomic variables in columns (3)-(5). Only the main variables of interest are presented here, while the full version is available in Table A2 of the Appendix.

According to the baseline estimates, firms' natural hedges and banks' FX liabilities significantly dollarize firm-bank credits. One standard deviation increase in firm natural hedges (in bank total FX liabilities) is associated with about 2.2 (1.5) percentage point increase in firm-bank level credit dollarization. More importantly, when we decompose banks' total FX liabilities, we find that one standard deviation increase in core FX liabilities is associated with a 0.6 percentage point increase in credit dollarization that is estimated to be almost three times more for non-core FX liabilities, 1.6 percentage point. One explanation for this result may be the differences in maturity structure between the two sources. For instance, the average maturity of FX deposits held at Turkish banks is less than 3 months, while this number is as high as 68 months for syndicated loans, obtained by Turkish banks from global financial markets.[9]

Results also show that these tendencies may shift due to local and global macroeconomic conditions. In particular, an increase in the effective Fed funds rate (i.e, tightening of the global liquidity) weakens the non-core FX liability channel significantly, while the core FX liability and firm natural hedge channels do not seem to be affected much. During times of high exchange rate volatility in local currency, we observe similar trends along with a mild reduction in the natural hedge channel. Core liability channel shows some weak tendency towards strengthening

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[8]For a detailed literature review on macro determinants of credit dollarization, see Hake et. al. (2014).

[9]See the Chart IV.2.10 in May Financial Stability Report (2019) by the CBRT for average syndication maturity and for the deposit maturity, see the BRSA Monthly bulletin in 2017.

during high volatility times, although it is statistically insignificant. In contrast, during time of positive growth of GDP (Column 4) , we observe a feed to credit dollarization from core and non-core FX channels, while the natural hedge channel seems to also increase, moderately.

These results are robust to different considerations. More specifically, the main model is re-estimated with firm-time fixed effects and also, with bank-time fixed effects (Table 4). These estimations are further repeated with sub-samples such as "at least once" (i.e., received FX credit at least once), "exported 50 percent or more" (i.e., exported more than 50 percent of the time during the sample period), "HH FX deposits only" (i.e., employing on household FX deposits only instead of total FX deposits) and finally, "quarterly" (i.e., quarterly data instead of monthly) (Table 5). The baseline estimates remain mostly statistically significant and economically important across all these considerations.

5 Conclusions

Our results show that firms' natural hedges and banks' liability-asset matching tendencies significantly drive credit dollarization. Among bank FX liabilities, the effect of non-core FX liabilities on credit dollarizaiton appears to be almost three times larger than core FX liabilities. More importantly, these channels are adversely affected by local and global macroeconomic conditions. During times of tight global liquidity conditions, the non-core FX channel is weakened. Similarly, besides the non-core FX channel, high exchange rate volatility in local currency also weakens the natural hedge channel. During times of positive economic growth, all three channels become stronger.

These results call upon a more focused macroprudential policy consideration to combat credit dollarization. During times of tight global liquidity conditions and/or high exchange rate volatility in local currency, macroprudential policies may focus more on disciplining deposit dollarization. During times of softer global liquidity conditions and/or positive GDP growth in the domestic economy, the focus may be diverted towards disciplining the effect of natural hedge and non-core liability channels on credit dollarization.

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Figure 1: Average Insterest Rate for Non-Financial Corporate Credits by Currency Denomination
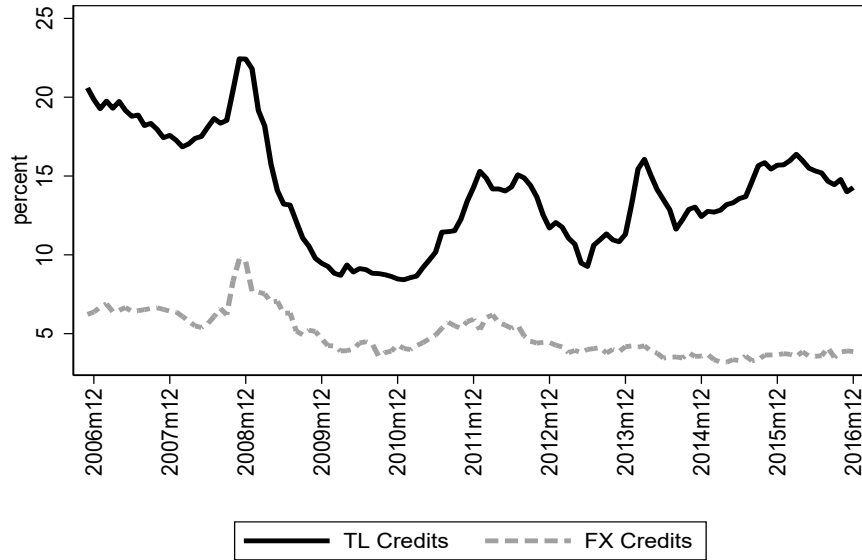
Source: Central Bank of Republic of Turkey

Figure 2: Share of Long-term Credits (≥1 year) for Non-Financial Corporate Credits by Currency Denomination
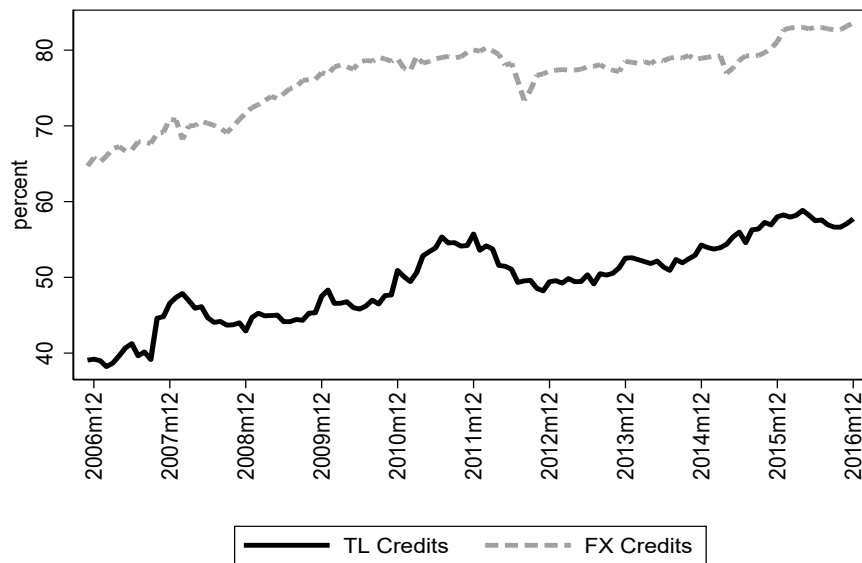
Source: Author's calculation from Credit Registry

Figure 3: Non-Financial Corporate FX Debt to Total Debt Ratio for Emerging Economies
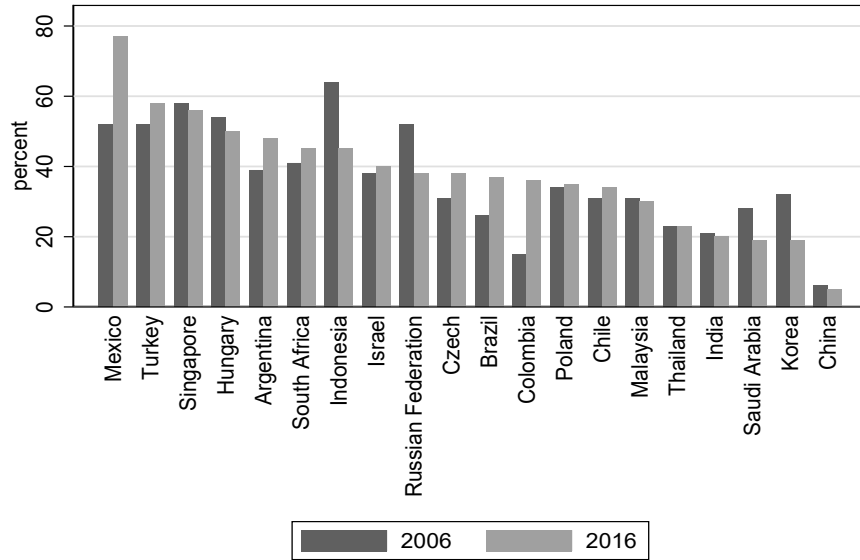
Source: Author's calculation from Institute of International Finance (IIF)

Table 1: Sample Representation of the Relevant Population

	Total TL Share	Total FX Share	Total Share
2006	0.63	0.73	0.69
2007	0.59	0.83	0.73
2008	0.69	0.85	0.79
2009	0.81	0.86	0.84
2010	0.68	0.84	0.77
2011	0.64	0.80	0.73
2012	0.62	0.81	0.72
2013	0.57	0.79	0.69
2014	0.54	0.73	0.64
2015	0.50	0.72	0.61
2016	0.48	0.66	0.57
Overall	0.61	0.78	0.71

Share is the total credit amount covered in the sample/relevant population.
Relevant population is the credits received by manufacturing firms from deposit banks.

Table 2: Variable Descriptions and Summary Statistics of the Main Variables

Variable	Definition	Obs	Mean	Std. Dev.	Min	Max
Credit Dollarization$_t$	FX Credits/ Credits	2,503,040	0.35	0.45	0.00	1.00
Export Share (Natural Hedge)$_{t-1y}$	Export Sales/ Sales	48,359	0.22	0.29	0.00	1.00
FX Liability Share$_{t-1m}$	FX Liabilities/ Liabilities	2,965	0.45	0.11	0.15	0.87
FX Deposit Share$_{t-1m}$	FX Deposits/ Liabilities	2,965	0.28	0.09	0.10	0.86
Non-Core FX Liability Share$_{t-1m}$	Non-Core FX Liability/ Liabilitis	2,965	0.17	0.09	0.00	0.66
Effective Fed Funds Rate Increase$_t$	Equals to 1 if $\Delta>5$ basis points, otherwise 0	122	0.03	0.18	0.00	1.00
Positive GDP Growth Rates$_t$	Equals to 1 if growth is positive, otherwise 0	122	0.88	0.33	0.00	1.00
Exchange Rate Vollatility$_t$	Variance of changes in exchange rates in the last 12 months	122	0.09	0.09	0.01	0.36

Time span of the dependent variable is 2006m11-2016m12. Firm variables' time span is 2015 - 2015 and they are lagged for one year (y). Bank variables' (and firm-bank level variables) time span is 2006m11-2016m11 and they are lagged for one month (m). Non-core FX liabilities of banks cover all bank liabilities, excluding deposits. Deposits include firm and household deposits. Exchange rate is defined as the basket of 0.3*Euro+0.7*USD.

Table 3: Main Empirical Results

		1 Baseline	2 Bank Liab. Breakdown	3 X Effective Fed Funds Rate Increase	4 X Positive Real Economic Growth	5 X Exchange Rate Volatility
A Export Share $_{t-1y}$		0.0793***	0.0793***	0.0796***	0.0683***	0.0836***
		(0.0107)	(0.0107)	(0.0106)	(0.0118)	(0.0110)
FX Liability Share$_{t-1m}$		0.168***				
		(0.0164)				
B FX Deposit Share$_{t-1m}$			0.0930***	0.0944***	0.0520*	0.0835***
			(0.0207)	(0.0207)	(0.0286)	(0.0214)
C Non-Core FX Liability Share$_{t-1m}$			0.208***	0.211***	0.143***	0.227***
			(0.0196)	(0.0196)	(0.0257)	(0.0212)
A X Macro$_t$				-0.00885	0.0125**	-0.0476*
				(0.00540)	(0.00578)	(0.0265)
B X Macro$_t$				-0.0198	0.0458**	0.0929
				(0.0163)	(0.0201)	(0.0916)
C X Macro$_t$				-0.0792***	0.0748***	-0.205**
				(0.0147)	(0.0198)	(0.0815)
Firm Controls		YES	YES	YES	YES	YES
Bank Controls		YES	YES	YES	YES	YES
Firm - Bank Controls		YES	YES	YES	YES	YES
Firm X Bank Fixed Effects		YES	YES	YES	YES	YES
Time (year-month) Fixed Effects		YES	YES	YES	YES	YES
Observations		2,331,834	2,331,834	2,331,834	2,331,834	2,331,834
Adj. R-squared		0.786	0.786	0.786	0.786	0.786
Standard Deviations (STD) and Means (M) to Evaluate the Estimates						
A Export Share $_{t-1y}$	STD	0.27	0.27	0.27	0.27	0.27
	M	0.21	0.21	0.21	0.21	0.21
FX Liability Share$_{t-1m}$	STD	0.09				
	M	0.44				
B FX Deposit Share$_{t-1m}$	STD		0.06	0.06	0.06	0.06
	M		0.25	0.25	0.25	0.25
C Non-Core FX Liability Share$_{t-1m}$	STD		0.08	0.08	0.08	0.08
	M		0.18	0.18	0.18	0.18
A X Macro$_t$	STD			0.060	0.263	0.039
	M			0.007	0.189	0.018
B X Macro$_t$	STD			0.049	0.098	0.026
	M			0.009	0.226	0.022
C X Macro$_t$	STD			0.041	0.092	0.015
	M			0.007	0.166	0.014

Clustered by firm id. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable is the share of FX credits in firm-bank outstanding credit balance. Firm controls include size (log of assets), leverage, profitability, liquidity and fixed asset ratio; bank controls include size (log of assets), leverage, profitability, liquidity and NPL ratio; firm-bank controls cover maturity, sector and the share of biggest sector of the credit relation. All the firm variables are lagged for one year (y). Bank and firm-bank controls are lagged for one month (m). Effective Fed funds rate increase is equal to one for 5 basis point and more increases, otherwise zero; Positive Real GDP Growth is equal to one for positive GDP growth, otherwise, zero and finally, Exchange Rate Volatility is in levels.

Table 4: Full Control of Firm and Bank Determinants

VARIABLES	1 Bank Liability Breakdown	2 X Effective Fed Funds Rate Increase	3 X Positive Growth	4 X Exchange Rate Volatility	5 Bank Liability Breakdown	6 X Effective Fed Funds Rate Increase	7 X Positive Growth	8 X Exchange Rate Volatility
A Export Share	0.0217***	0.0218***	0.0186***	0.0228***				
	(0.00289)	(0.00288)	(0.00319)	(0.00297)				
B FX Deposit Share					0.00369***	0.00378***	0.000261	0.00359***
					(0.00125)	(0.00125)	(0.00181)	(0.00132)
C Non-Core FX Share					0.0131***	0.0133***	0.00763***	0.0145***
					(0.00144)	(0.00145)	(0.00194)	(0.00157)
A X Macro		-0.000559*	0.00342**	-0.00171				
		(0.000324)	(0.00152)	(0.00104)				
B X Macro						-0.00108	0.00594***	0.000231
						(0.000779)	(0.00207)	(0.00251)
C X Macro						-0.00298***	0.00746***	-0.00300**
						(0.000598)	(0.00184)	(0.00125)
Firm Controls	YES	YES	YES	YES	NO	NO	NO	NO
Bank Controls	NO	NO	NO	NO	YES	YES	YES	YES
Firm - Bank Relation Controls	YES	YES	YES	YES	YES	YES	YES	YES
Firm X Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm X Time FE	NO	NO	NO	NO	YES	YES	YES	YES
Bank X Time FE	YES	YES	YES	YES	NO	NO	NO	NO
Observations	2,331,834	2,331,834	2,331,834	2,331,834	2,249,801	2,249,801	2,249,801	2,249,801
Adj. R-squared	0.788	0.788	0.788	0.788	0.857	0.857	0.857	0.857

Clustered by firm id. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Dependent variable is the share of FX credits in firm-bank outstanding credit balance. Standardized coefficients are reported, showing the effect of one standard deviation from mean.

Table 5: Full Control of Firm and Bank Determinants with Further Robustness

VARIABLES	1 At Least Once	2 Exported 50 % or More	3 Quarterly	4 At Least Once	5 Exported 50% or More	6 HH FX Deposits Only	7 Quarterly
A Export Share	0.0231***	0.0256***	0.0215***				
	(0.00309)	(0.00340)	(0.00304)				
B FX Deposit Share				0.00408***	0.00440***		0.00366***
				(0.00140)	(0.00168)		(0.00136)
C Non-Core FX Share				0.0144***	0.0165***	0.0128***	0.0125***
				(0.00160)	(0.00200)	(0.00141)	(0.00155)
FX Household Deposit Share						0.00513***	
						(0.00169)	
Firm Controls	YES	YES	YES	NO	NO	NO	NO
Bank Controls	NO	NO	NO	YES	YES	YES	YES
Firm - Bank Relation Controls	YES	YES	YES	YES	YES	YES	YES
Firm X Bank FE	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES
Firm X Time FE	NO	NO	NO	YES	YES	YES	YES
Bank X Time FE	YES	YES	YES	NO	NO	NO	NO
Observations	2,004,952	1,322,492	711,721	1,949,393	1,278,716	2,249,801	682,996
Adj. R-squared	0.765	0.755	0.790	0.842	0.834	0.857	0.861

Clustered by firm id. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Dependent variable is the share of FX credits in firm-bank outstanding credit balance. Standardized coefficients are reported, showing the effect of one standard deviation from mean.

Appendix

Variable descriptions and summary statistics of all the variables considered in the study are presented in Table A1. Full set of estimation results from the main specification can be found in Table A2.

Table A1: Variable Descriptions and Summary Statistics

Firm - Bank Credit Relation Variables	Definitions	Obs	Mean	Std. Dev.	Min	Max
Credit Dollarization$_t$	FX Credits/ Credits	2,503,040	0.35	0.45	0.00	1.00
Number of Financing Sector$_{t-1m}$	Number sectors that firm i received credit from bank j	2,334,267	1.22	0.44	1.00	10.00
Biggest Financing Sector Share$_{t-1m}$	Share of biggest financing sector that firm i received from bank j	2,334,267	0.98	0.03	0.26	1.00
Original Maturity (12-24 Months)$_{t-1m}$	Credits with medium-term original maturity/Credits	2,334,267	0.16	0.32	0.00	1.00
Original Maturity (24+ Months)$_{t-1m}$	Credits with short-term original maturity/Credits	2,334,267	0.16	0.33	0.00	1.00
Firm Variables						
Export Share (Natural Hedge)$_{t-1y}$	Export Sales / Sales	48,359	0.22	0.29	0.00	1.00
Assets$_{t-1y}$	Log of Assets	48,359	16.94	1.43	8.87	23.75
Leverage$_{t-1y}$	Liabilities / Assets	48,345	0.60	0.23	0.00	1.97
Liquidity$_{t-1y}$	Short-Term Assets (less than 1 year) / Assets	48,359	0.65	0.20	0.00	1.00
Profitability$_{t-1y}$	(ROA) Operating Profits/Assets	48,349	0.07	0.09	-0.93	0.89
Capital Intensity$_{t-1y}$	Gross Fixed Assets/Assets	48,340	0.29	0.18	0.00	1.00
Bank Variables						
FX Liability Share$_{t-1m}$	FX Liabilities/ Liabilities	2,965	0.45	0.11	0.15	0.87
FX Deposit Share$_{t-1m}$	FX Deposits/ Liabilities	2,965	0.28	0.09	0.10	0.86
FX Household Deposit Share$_{t-1m}$	FX HH Deposits / Liabilities	2,965	0.16	0.07	0.00	0.69
Non-Core FX Share$_{t-1m}$	Non-Core FX Liabilities/Liabilitis	2,965	0.17	0.09	0.00	0.66
Assets$_{t-1m}$	Log of Assets	2,965	16.84	1.46	13.06	19.68
Liquidity$_{t-1m}$	Short-Term Assets (less than 1 year)/ Assets	2,965	0.06	0.05	0.00	0.34
Leverage$_{t-1m}$	Liabilities / Assets	2,965	0.88	0.03	0.69	0.96
Profitability$_{t-1m}$	Operating Profits/Assets	2,965	0.01	0.01	-0.02	0.06
NPL Ratio$_{t-1m}$	NPL/(Performing Loans + NPL)	2,965	0.04	0.02	0.00	0.17
Macro Variables						
Effective Fed Funds Rate Increase$_t$	Equals to 1 if Δ>5 basis points, otherwise 0	122	0.03	0.18	0.00	1.00
Positive GDP Growth Rates$_t$	Equals to 1 if real GDP growth is positive, otherwise 0	122	0.88	0.33	0.00	1.00
Exchange Rate Volatility$_t$	Variance of changes in exchange rate in the last 12 months	122	0.09	0.09	0.01	0.36

Time span of the dependent variable is 2006m11-2016m12. Firm variables' time span is 2015 - 2015 and they are lagged for one year (y). Bank variables' (and firm-bank level variables) time span is 2006m11-2016m11 and they are lagged for one month (m). Macro variables cover the period of 2006m11-2016m12. Non-core FX liabilities of banks cover all bank liabilities, excluding deposits. Deposits include firm and household deposits and household (HH) deposits include only household deposits. NPL stands for non-performing loans. Exchange rate is defined as the basket of 0.3*Euro+0.7*USD.

Table A2: Main Results (Full Version)

VARIABLES	1 Baseline	2 Bank Liability Breakdown	3 X Fed Rate Increase	4 X Positive Growth	5 X Exchange Rate Volatility	6 At Least Once FX	7 Exported 50% or More	8 Only HH FX Deposits	9 Quarterly
	Main Results					Robustness			
A Export Share$_{it-1y}$	0.0793***	0.0793***	0.0796***	0.0683***	0.0836***	0.0822***	0.0923***	0.0794***	0.0788***
	(0.0107)	(0.0107)	(0.0106)	(0.0118)	(0.0110)	(0.0111)	(0.0123)	(0.0107)	(0.0113)
FX Liability Share$_{it-1m}$	0.168***								
	(0.0164)								
B FX Deposit Share$_{it-1m}$		0.0930***	0.0944***	0.0520*	0.0835***	0.101***	0.0941***		0.0914***
		(0.0207)	(0.0207)	(0.0286)	(0.0214)	(0.0231)	(0.0281)		(0.0226)
C Non-Core FX Share$_{it-1m}$		0.208***	0.211***	0.143***	0.227***	0.231***	0.252***	0.198***	0.208***
		(0.0196)	(0.0196)	(0.0257)	(0.0212)	(0.0219)	(0.0273)	(0.0190)	(0.0214)
FX Household Deposit Share$_{it-1m}$								0.126***	
								(0.0358)	
A X Macro$_{it}$			-0.00885	0.0125**	-0.0476*				
			(0.00540)	(0.00578)	(0.0265)				
B X Macro$_{it}$			-0.0198	0.0458**	0.0929				
			(0.0163)	(0.0201)	(0.0916)				
C X Macro$_{it}$			-0.0792***	0.0748***	-0.205**				
			(0.0147)	(0.0198)	(0.0815)				
Firm Controls									
Log of Assets$_{it-1y}$	0.0258***	0.0257***	0.0257***	0.0258***	0.0258***	0.0301***	0.0301***	0.0258***	0.0259***
	(0.00426)	(0.00426)	(0.00426)	(0.00426)	(0.00426)	(0.00500)	(0.00660)	(0.00426)	(0.00441)
Leverage$_{it-1y}$	0.0170	0.0170	0.0170	0.0171	0.0171	0.0211	0.0191	0.0169	0.0148
	(0.0110)	(0.0110)	(0.0110)	(0.0110)	(0.0110)	(0.0129)	(0.0167)	(0.0110)	(0.0115)
Liquidity$_{it-1y}$	0.00450	0.00444	0.00444	0.00469	0.00474	0.00256	0.0126	0.00432	0.00345
	(0.0184)	(0.0184)	(0.0184)	(0.0184)	(0.0184)	(0.0209)	(0.0264)	(0.0184)	(0.0191)
Profitability$_{it-1y}$	-0.0157	-0.0160	-0.0159	-0.0156	-0.0151	-0.0124	-0.00684	-0.0161	-0.0144
	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0149)	(0.0171)	(0.0209)	(0.0149)	(0.0157)
Capital Intensity$_{it-1y}$	0.0381*	0.0379*	0.0379*	0.0381*	0.0382*	0.0414*	0.0602**	0.0378*	0.0411**
	(0.0198)	(0.0198)	(0.0198)	(0.0198)	(0.0198)	(0.0225)	(0.0283)	(0.0198)	(0.0207)
Bank Controls									
Log of Assets$_{it-1m}$	-0.0156**	-0.0215***	-0.0214***	-0.0214***	-0.0213***	-0.0233***	-0.0167	-0.0230***	-0.0200**
	(0.00747)	(0.00741)	(0.00741)	(0.00741)	(0.00741)	(0.00812)	(0.0102)	(0.00750)	(0.00803)
Leverage$_{it-1m}$	0.417***	0.383***	0.384***	0.370***	0.379***	0.423***	0.411***	0.396***	0.330***
	(0.0569)	(0.0568)	(0.0568)	(0.0571)	(0.0568)	(0.0633)	(0.0786)	(0.0573)	(0.0626)
Liquidity$_{it-1m}$	-0.106***	-0.0878**	-0.0891**	-0.0945**	-0.107***	-0.0891**	-0.139***	-0.0856**	-0.0911**
	(0.0380)	(0.0378)	(0.0378)	(0.0375)	(0.0376)	(0.0402)	(0.0536)	(0.0378)	(0.0388)
Profitability$_{it-1m}$	-0.427***	-0.363***	-0.374***	-0.364***	-0.373***	-0.389***	-0.402**	-0.373***	-0.441***
	(0.119)	(0.119)	(0.119)	(0.119)	(0.119)	(0.134)	(0.169)	(0.120)	(0.136)
NPL Ratio$_{it-1m}$	0.782***	0.747***	0.749***	0.753***	0.735***	0.856***	0.939***	0.720***	0.695***
	(0.0820)	(0.0813)	(0.0813)	(0.0812)	(0.0811)	(0.0902)	(0.110)	(0.0814)	(0.0866)
Firm-Bank Credit Relation									
Share of Medium-term Credits$_{it-1m}$	0.0542***	0.0545***	0.0545***	0.0545***	0.0545***	0.0625***	0.0610***	0.0547***	0.0502***
	(0.00348)	(0.00348)	(0.00348)	(0.00348)	(0.00348)	(0.00396)	(0.00503)	(0.00348)	(0.00330)
Share of Long-Term Credits$_{it-1m}$	0.0880***	0.0880***	0.0880***	0.0881***	0.0880***	0.101***	0.0906***	0.0880***	0.0835***
	(0.00479)	(0.00479)	(0.00479)	(0.00479)	(0.00479)	(0.00545)	(0.00711)	(0.00479)	(0.00464)
Number of Financing Sector$_{it-1m}$	0.156***	0.156***	0.156***	0.156***	0.156***	0.158***	0.153***	0.156***	0.122***
	(0.00317)	(0.00317)	(0.00317)	(0.00317)	(0.00317)	(0.00320)	(0.00398)	(0.00317)	(0.00294)
Biggest Financing Sector Share$_{it-1m}$	0.536***	0.538***	0.538***	0.538***	0.538***	0.552***	0.542***	0.539***	0.425***
	(0.0242)	(0.0243)	(0.0243)	(0.0243)	(0.0242)	(0.0278)	(0.0388)	(0.0243)	(0.0246)
FirmXBank FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	2,331,834	2,331,834	2,331,834	2,331,834	2,331,834	2,004,952	1,322,492	2,331,834	711,721
Ad. R-squared	0.786	0.786	0.786	0.786	0.786	0.763	0.752	0.786	0.788

Clustered by firm id. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable is the share of FX credits in firm-bank outstanding credit balance. Effective Fed funds rate increase is equal to one for increases (5 bp and more), otherwise zero; Positive Real Economic Growth is equal to one for positive GDP growth, otherwise, zero and finally, Exchange Rate Volatility is in levels. "At least once FX" refers to firms that received FX credit at least once and "Exported at least 50 % or more" refers to firms that exported at least 50% or more of the time during the sample period. "Quarterly" presents the results with quarterly data.

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