From Macro Shocks to Firm Responses: Financial and Real Spillovers of the Global Financial Cycle*

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Abstract

This paper studies the effect of the Global Financial Cycle (GFC) on firms' borrowing conditions and their employment and investment decisions. We use a rich dataset from Chile, merging the *universe* of firms' international and domestic debt transactions with tax administrative records on their investment and labor decisions. We find that a shock to the GFC tightens external financing conditions of banks and non-financial firms borrowing in international markets. Banks pass through about half of their increased borrowing costs to firms in the domestic credit market. The increase in foreign borrowing costs due to a shock to the GFC has a negligible effect on employment, but it leads non-financial firms to lower their investment. This effect is larger for firms directly borrowing abroad, underscoring the tradeoff faced by firms: borrowing abroad at lower interest rates due to a positive UIP deviation characteristic of emerging markets vs. facing higher vulnerability to foreign shocks.

Keywords: Global Financial Cycle, Foreign Borrowing, Credit Conditions, Real Effects

JEL Codes: F32, F41

1 Introduction

Capital flows are crucial for the growth and development of emerging market economies, as they provide access to financing that may not be available domestically. However, the volatility of these flows—particularly in response to global financial conditions—can pose significant challenges. Emerging markets are especially vulnerable to abrupt shifts in global risk sentiment, as external financing conditions can change rapidly. This phenomenon, often referred to as the Global Financial Cycle (GFC), has been a focal point of research highlighting that global capital flows are influenced by the cycle of global risk and liquidity (Rey, 2015). While capital inflows can fuel economic growth, their volatility can exacerbate financial instability and lead to negative consequences for firms' borrowing conditions and broader economic performance.

Despite the growing body of literature on the GFC and its impact on emerging markets, several important questions remain unanswered. While much has been written about how global financial shocks affect the overall economy, less attention has been paid to the specific mechanisms through which these shocks are transmitted to firms. For example, how do changes in the GFC influence borrowing costs for firms that rely on international debt markets? To what extent do financial institutions that borrow abroad pass on the increased costs to domestic borrowers in emerging economies? And, perhaps most importantly, how do firms respond to these external shocks in terms of their investment and employment decisions?

This paper seeks to address these gaps by investigating the effects of the GFC using a unique dataset from firms in Chile that permits the most granular analysis of how the GFC impacts firms. We focus on how shocks to the GFC affect investment and employment decisions of firms through its effect over external financing costs of firms and financial institutions.[1]

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[1]Disclaimer: This study was developed within the scope of the research agenda conducted by the Central Bank of Chile (CBC) in economic and financial affairs of its competence. The CBC has access to anonymized information from various public and private entities, by virtue of collaboration agreements signed with these institutions.

Our unique dataset combines detailed administrative records from the *universe* of financial and non-financial firms in Chile. The data include all firms' debt contracts on cross-border inflows —both bonds and loans—, which we merged with the credit registry on domestic debt issuance. We further merged these datasets with administrative information from tax records that provide monthly firm-level information on employment and investment decisions spanning from 2012 to 2020 at a monthly frequency.

Using a combination of panel regressions and local projection methods, the richness of our dataset allows us to explore the effects of global financial shocks, controlling for various observable and unobservable factors that influence both the demand and supply of credit. In particular, to quantify how global shocks affect firms and banks borrowing directly abroad, we regress spreads on debt issued in international markets on a commonly used proxy for the GFC, the VIX, while controlling for firm-level observables, firm fixed effects, and macro controls. Next, when examining the passthrough of the GFC to domestic borrowing costs, we exploit the variation in banks' borrowing costs abroad to estimate how increases in external spreads translate into higher domestic interest rates. For this, we use the credit registry portion of our data, which allows us to control for firm (demand) and bank (supply) observable characteristics, firm-bank pair fixed effects, and macro controls. Lastly, to explore the real effects of these financial shocks on firm-level investment and employment, we use local projections methods (Jordà, 2005), estimating dynamic responses of firm investment and labor to shocks in borrowing costs. We separately analyze firms borrowing abroad and those relying on domestic credit, capturing the real effects of foreign financial shocks on firms borrowing directly abroad and the real effects on firms exposed to these shocks indirectly through the banking sector.

Our empirical analysis yields the following findings. A tightening of the GFC, proxied by a 1% increase in the VIX, increases by 0.32 percentage points (pp) the spread faced by the average Chilean firm borrowing directly abroad. The average masks some heterogeneity:

banks see their spreads increase by 0.26 pp, while non-financial firms face a 0.45 pp increase in their spread for the same increase in the VIX.

In the domestic credit market, we find that a 1 pp increase in the foreign spread faced by a bank abroad–explained by a shock to the GFC–leads to a 0.6 pp rise in the domestic borrowing rates the bank charges to firms. This result suggests that the pass through of banks' increased financing costs abroad as a result of the GFC shock is incomplete.

Regarding the real effects of shocks to the GFC, the analysis differentiates between firms borrowing directly abroad and those borrowing domestically and exposed to the GFC through their banks. Firms that borrow directly from international markets experience the largest impact, as a 1% shock to the VIX leads, through an increase in their foreign-debt spread, to a 2.68 pp decline in annual investment, with this effect being remarkably persistent. In contrast, firms that rely on domestic banks for financing also experience investment declines, but to a much lesser extent—a 1 pp increase in the VIX, leads to a 0.27 pp persistent reduction in investment. This last effect is mediated through the increase in foreign spreads face by banks, which in turn partially pass through this increase in their funding costs to domestic lending rates. The employment responses to the GFC are generally negligible, with no statistically significant short-term effect for either group.

Our paper is closest to the growing literature that empirically explores the effects and mechanisms behind the transmission of the GFC to emerging economies using granular data (Baskaya et al. 2017, Morais et al. 2019, di Giovanni et al. 2021, Epure et al. 2024). Owing to our data availability, we extend this literature by studying the effects of the GFC on firms' real decisions (employment and investment) and financial institutions' passthrough of the GFC shocks to the domestic credit market.

Closest to this paper, is the work of di Giovanni et al. (2021) that studies how the GFC transmits to local credit markets using the domestic credit registry from Turkey. We validate their findings that local borrowing costs fall (increase) in response to an ease (tighten) in

global financial conditions, underscoring the role of local banks exposed to foreign debt in transmitting the GFC locally. We expand this work along several dimensions. First, our external-debt data for the universe of bank and firms on the conditions of loans taken from international lenders and bonds issued abroad, allow us to identify how shocks to the GFC *directly* affect foreign borrowing costs. This first step allow us to focus on a specific channel through which the GFC affects domestic economic conditions, which is the increase in the cost of capital, our main contribution to the literature. Second, we are able to identify how an increase in the cost of foreign debt due to a tightening in global financial conditions, passes through to domestic borrowing conditions. In this aspect, our empirical strategy differs from di Giovanni et al. (2021) in that we use a two-stages identification. This is, we identify how the GFC affects local borrowing conditions through its direct effect over spreads on foreign debt. Third, we can estimate the firm-level real effects over investment and employment of shocks to the GFC passed through the external financing channel. Finally, not only we identify the direct effects that shocks to the GFC have over firms' investment and employment. We also consider the indirect effects of these shocks, transmitted through banks that lend to domestic firms, which ultimately affects their investment and employment as well.

Our results support the hypothesis of a GFC-induced trade off faced by firms. This is, borrowing directly in international markets vs. borrowing domestically. Borrowing abroad allows firms to access cheaper credit due to the well documented UIP deviation in emerging markets (Kalemli-Ozcan and Varela 2021, Gutierrez et al. 2023, di Giovanni et al. 2021, Albagli et al. 2021, Acosta-Henao et al. 2024, among others). This, however, comes at the risk of having more exposure to global shocks since banks act as partial shock absorbers. This result is in line with the work of Salomao and Varela (2022), where only firms with sufficiently high productivity select into borrowing abroad. Furthermore, our results suggest that the characteristics of firms borrowing abroad, other than TFP, are relevant. The fact that, confronted with a similar increase in borrowing costs, firms that borrow abroad see a

larger fall in investment, suggests that more capital-intensive sectors select more into foreign borrowing. This is indeed supported by our findings.

The rest of the paper is organized as follows: the second section explains the data and main descriptive statistics, the third section analyses how shocks to the GFC affect the cost of credit of banks and firms, the fourth section estimates the real effects of these shoks over firm-level investment and employment, and the last section concludes.

2 Descriptive Statistics

2.1 Administrative Data

We merge five confidential administrative datasets for the universe of firms in Chile. Those are: 1) Deudex: the external debt dataset from the Central Bank of Chile documenting each transaction in the balance of payments. 2) D32: the domestic-credit registry from the Chilean Financial Markets Comission, documenting the flow of all loans between firms and banks as well as the characteristics of each loan (interest rate, amount, currency, maturity). 3) D10: a dataset from the Chilean Financial Markets Commission containing the records of the stock of debt each firm has with respect to all banks every period. 4) F29: this dataset, from the Chilean IRS, records the monthly tax-returns of each firm, containing data on sales, costs, and capital expenditure. It allows for the construction of a capital stock series at the firm level. 5) DJ1887: each firms' labor administrative records, from the Chilean IRS, which allows to build an employment series at the firm level.[2] Our data have a monthly frequency and cover the April of 2012 to December of 2019 period.[3]

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[2]Disclaimer: Officials of the Central Bank of Chile processed the disaggregated data from the Chilean IRS and the Chilean Financial Markets Commission. The information contained in the databases of the Chilean IRS is of a tax nature originating in self-declarations of taxpayers presented to the Service; therefore, the data's veracity is not the Service's responsibility.

[3]Disclaimer: To secure the privacy of workers and firms, the CBC mandates that the development, extraction and publication of the results should not allow the identification, directly, indirectly, of natural or legal persons. Officials of the Central Bank of Chile processed the disaggregated data. All the analysis was implemented by the authors and did not involve, nor compromise the Chilean IRS or the Chilean Financial Markets Commission.

Our rich merged dataset provides a complete view of firms financing in both international and domestic markets. More importantly, being able to merge these data with administrative tax records, allow us to uncover how firms behave in terms of investment and labor as a response to changing financial conditions. Being able to thoroughly map how changes in external financial conditions transmit via foreign and domestic credit to both financial and non-financial firms and to their economic actions is a unique feature of our dataset.

To study the transmision of shocks to the GFC via external borrowing conditions, the external debt data base (Deudex) is crucial. It records all financial transactions of every agent in the economy in the balance of payments. We keep only foreign loans and bonds issued abroad, filtering out other types of flows such as FDI or trade credit, for these are arguably less sensitive to the GFC.

The information on the interest rate in each cross-border flow transaction in our dataset allows us to decompose the rate into a benchmark (e.g. LIBOR) and a spread. We drop all credits with a zero spread as they are associated with resource transfers from parent companies (mostly banks). We also keep only credits in U.S. dollars, euros, Japanese yens, and Chilean pesos (albeit they are all reported in dollars), which account for 97% of these credits. In total, we end up with 40% of the country's external debt after applying these filters. Finally, due to our focus on the transmission of shocks to banks and firms via direct or indirect credit channels, we drop the public administration sector.

Table 1 provides a snapshot at the dataset on the dimensions of for foreign borrowing in loans and bonds, the sectorial share of firms, the number of loans, and loan amounts in January 2019. Banks account for almost half of the loan amounts taken abroad. Aside from banks, all sectors have access to foreign funds, but with heterogeneity across them.

Figure 1 shows the evolution of the share of total external debt–in the form of loans taken from abroad and internationally issued bonds–by sector. The upper panel shows the flow of loans each period, and lower panel shows the stock of debt. In terms of flows, banks account

Table 1: External Debt Statistics by Sector - January 2019

Sector	Firms (%)	Loans (%)	Loan amount (%)
Other	0.75	3.28	0.22
Agriculture	1.71	5.76	0.64
Mining	3.54	2.96	12.06
Manufacturing	4.73	10.56	3.92
EGA	6.39	8.56	6.64
Construction	2.76	5.92	0.59
Commerce	7.85	16.08	4.87
Transport	4.40	4.96	6.91
Financial Serv.	8.41	18.64	8.38
Business Serv.	4.90	9.52	4.13
Banking	52.60	5.04	48.35
No Sector	1.96	8.72	3.29
Total No.	10,721	1,250	318,967,083 USD

for the lion share of across the whole sample, with also a preponderant role of mining, energy (EGA), transportation, and commerce. In terms of stocks, Banking is also the most relevant sector, specially in more recent years, while transport, energy and mining play also a relevant role.

In terms of firm size and foreign borrowing, Table 2 shows the same statistics ad Table 1 for firms grouped by their size.[4] Large firms account for about 80% of loan flows in January of 2019, leaving the rest for micro, small, and medium firms. While it certainly calls attention that micro firms are the second group with the largest amounts of foreign borrowing, this is mainly due to the fact that there are significantly more firms of this group than of small and medium in the economy.

Akin to Figure 1, Figure 2 shows the evolution of the share of foreign debt by sector, both in terms of flows (upper panel) and stocks (upper panel). The figure confirms that, along the whole sample, large firms account for the considerable majority of external financing. Yet, firms of all sizes access to foreign funds.

These findings suggest that large firms are those more affected by shocks to foreign financial

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[4]For completeness, we include those firms without a specified size, which is given by the Chilean IRS.

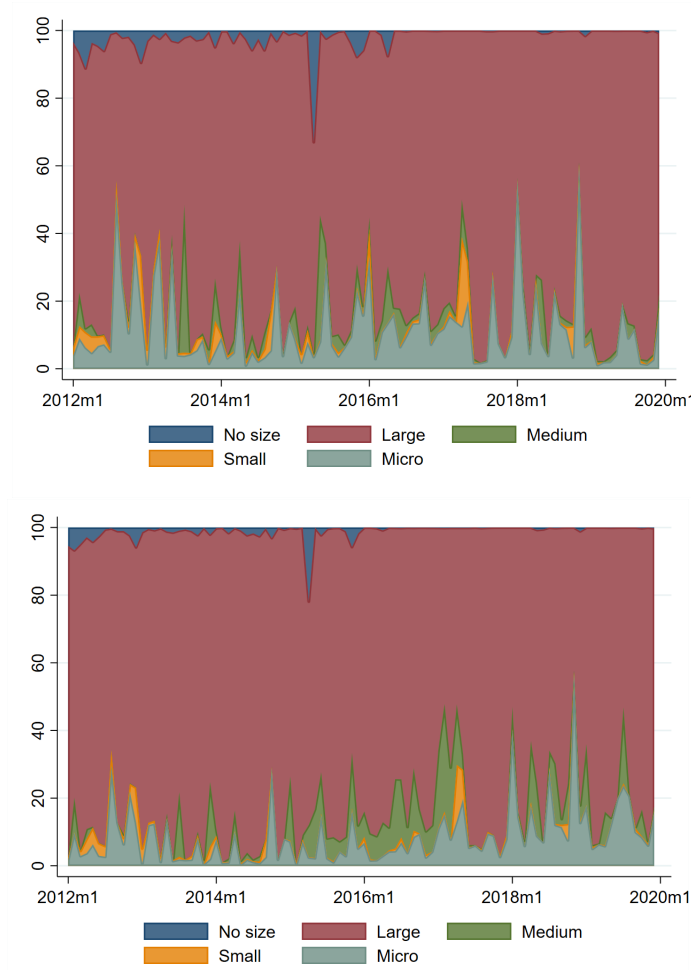Figure 1: External Debt (Loans and Bonds) Dynamics by Sector

Table 2: External Debt Statistics by Size - January 2019

Size	Loan (%)	Firm (%)	Loan amount (%)
Micro	13.42	34.00	12.61
Small	2.79	7.44	1.91
Medium	3.91	8.40	2.99
Large	76.33	44.24	80.55
No Size	3.55	5.92	1.95
Total	10,721	1,250	318,967,072

conditions. However, other firms other than those borrowing abroad–mainly micro, small, and medium firms–are also likely to be affected by foreign shocks through banks, which account for roughly half of foreign borrowing.

Figure 2: External Debt (Loans and Bonds) Dynamics by Size

2.2 The GFC and Macroeconomic Data

We follow di Giovanni et al. (2021) and use the VIX index as a proxy for the GFC –arguably exogenous for an emerging small open economy like Chile–, which we obtain from FRED. We also add a series of relevant macroeconomic controls, which are the domestic monetary policy rate, the monthly leading indicator of economic activity in Chile (IMACEC), the inflation rate, the nominal exchange rate with respect to the U.S. dollar, and the international price of copper.[5] We take all these series from the Central Bank of Chile, and aggregate them at a monthly frequency by taking daily averages for those that are available at a higher frequency.

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[5]We consider the price of copper as a control due to the fact that Chile is the main producer of this commodity in the world.

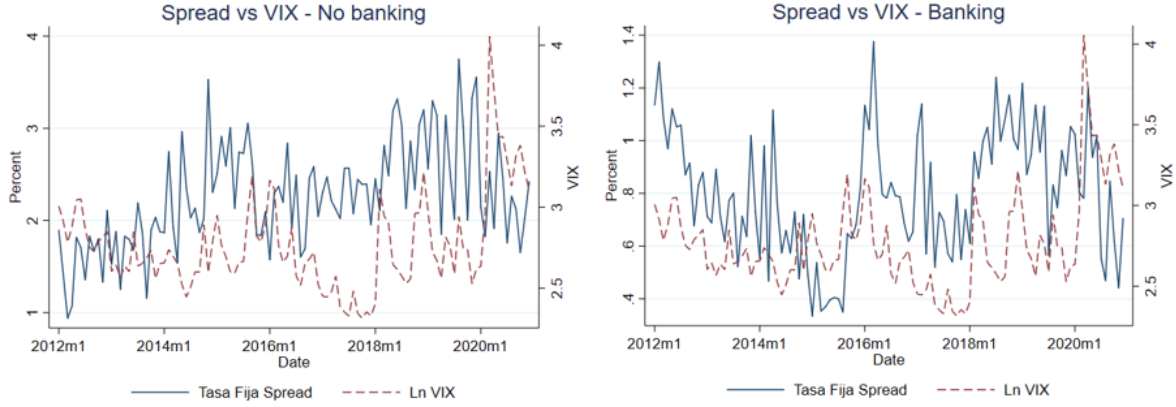Figure 3: VIX and Foreign Spreads - Banking and Non Banking Firms

[Figure 3](#) shows in the left panel the behavior of the VIX index (in logs) and the average firm-level spread on foreign debt of non-financial firms. The right panel shows the VIX along with the average yearly spread on foreign debt faced by banks. From the figure, we can observed that the VIX and spreads comove, but not symmetrically across non-financial firms and banks, also exhibiting stronger correlation in different subperiods of our sample.

In the next section, we uncover the relationship between the GFC proxied by the VIX index, credit conditions, and real variables, exploiting our rich dataset. Specifically, we study how shocks to the GFC affect the cost of credit of banks and non-bank firms borrowing abroad, and how this change in foreign credit conditions transmits to domestic credit and firms' investment and labor.

3 Financial Spillovers of the GFC

Our main focus is the study of how the GFC affects credit conditions faced by firms –banks and non-financial firms–, and their spillovers to the domestic economy. This is, how changes in the cost of foreign borrowing due to changes in the GFC affect domestic credit conditions, as well as the demand for investment and labor of firms that either borrow abroad directly or borrow domestically from internationally exposed banks.

3.1 Shocks to the GFC and Foreign Spreads

We start by estimating how the GFC affects the interest rates faced by firms borrowing directly abroad. Since the interest rate of foreign credit–either loans with international financial institutions or bonds issued abroad–is usually set as a dollar benchmark rate plus a spread, we study how shocks to the GFC affect foreign credit spreads of each firm. Thus, we estimate the following regression:

$$s^{\star}_{f,d,l,m} = \alpha_f + \lambda Trend_m + \beta log(VIX_{m-1}) + \delta FX_{f,d,l,m} + \theta_1 i_{m-1} + \theta_2 \Delta log(GDP_{m-1})$$
$$+ \theta_3 Inf_{m-1} + \theta_4 \Delta log(XR_{m-1}) + \theta_5 Cop_{m-1} + \Gamma Firm_{f,m-1} + \epsilon_{f,d,l,m} \quad (1)$$

where $s^{\star}_{f,d,l,m}$ is the spread with respect to a benchmark interest rate (usually the LIBOR), of a foreign credit l that firm f takes in currency d (either U.S. dollar or Chilean peso) at month m. We control for firm-level fixed effects, α_f, and a time trend.[6] As mentioned before, the (lagged) VIX_{m-1} is our proxy for the GFC and the estimate of β, its coefficient, allows us to analyze how a one percent shock to the GFC affects the foreign spread. The variable $FX_{f,d,l,m}$ is a dummy that takes the value of one if the loan is in dollars. As mentioned by di Giovanni et al. (2021), the coefficient of this variable–δ–is the estimate of the average UIP deviation at the firm level. The control variables, i_{m-1}, Inf_{m-1}, $\Delta log(XR_{m-1})$, and Cop_{m-1}, are lagged macroeconomic controls. These are, respectively, the domestic monetary policy rate, the inflation rate, the growth rate of the peso-dollar nominal exchange rate, and the copper price deflated at 2019 prices. The vector $Firm_{f,m-1}$ contains a set of firm-level characteristics. These are: value added, market share (firms' sales divided by the total sales of the sector), and leverage (debt to sales ratio).

We estimate Equation 1 for all firms in the sample, and for three subsamples: banks, non-financial firms, and non-financial firms that do not belong to the mining sector (non-mining).

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[6]We cluster the standard errors at the firm level.

Being Chile among the largest producers of cooper in the world, this last group is a robustness to check if our results hold even for non-mining firms.

Table 3 shows the results of estimating Equation 1 for all groups of firms. The first column shows that, on average, a shock of 1 pp to the VIX increases the credit spread of all firms by 0.32 pp. This effect is smaller for banks, with an increase in the spread of 0.24 pp, than for non-financial firms, for which the spread increases 0.44 pp. We obtain virtually the same result as for non-mining firms.

Therefore, a shock to the GFC tightens external credit conditions for firms. This effect is larger on average for non-financial firms than for banks. While we do not take a stance on what is behind the increase in the VIX, it is usually associated with retrenching capital flows. Either heightened global risk aversion, a contractionary shock to the federal funds rate, disappointing news about economic growth in the main global economies, are the typical drivers behind an increase in the VIX index. The results in Table 3 document a direct channel through which the GFC has spillovers to the economy: through an effect over the cost of foreign lending. More importantly, the literature has previously documented a direct effect of the GFC over domestic credit conditions via banks (di Giovanni et al., 2021). We uncover one first layer that affects directly two types of firms in international markets: non-financial firms that directly borrow from international lenders, and banks.

3.2 Passthrough of the GFC to Domestic Interest Rates

As documented in the previous section, shocks to the GFC affect all firms borring directly abroad. However, as Table 2 shows, firms borrowing abroad are mainly large firms. For those firms, there is likely to be a direct effect over investment and labor, as we show below. Notwithstanding this, the GFC may also have real effects through its effect over domestic credit conditions. Table 2 shows that roughly half of foreign credit is taken by banks, which in turn lend to domestic firms. Thus, even if a firm does not borrow abroad directly, its

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Table 3: The GFC and foreign credit spreads

	(1) All	(2) Banks	(3) Non-financial	(4) Non-mining
ln_vix	0.320***	0.260***	0.447**	0.462**
	(0.0815)	(0.0879)	(0.188)	(0.195)
date	0.0104**	0.0111**	0.00915	0.00979
	(0.00407)	(0.00500)	(0.00640)	(0.00673)
fx	-1.810***	-3.182***	-1.767***	-1.767***
	(0.312)	(0.115)	(0.325)	(0.323)
l_cobre	0.218*	0.236**	0.113	0.107
	(0.118)	(0.0850)	(0.304)	(0.315)
l_tpm	0.193***	0.219***	0.125	0.157
	(0.0665)	(0.0727)	(0.124)	(0.126)
l_imacec	0.0325**	0.0426***	0.00467	-0.000643
	(0.0129)	(0.0146)	(0.0195)	(0.0200)
l_inflacion	0.00357	0.00820	-0.0136	-0.0146
	(0.0213)	(0.0180)	(0.0492)	(0.0500)
l_tcm	-0.00173	-0.00121	-0.00238	-0.00348
	(0.00315)	(0.00293)	(0.00732)	(0.00756)
leverage	4.86e-08	1.05e-05	5.02e-08	-1.70e-08
	(5.87e-08)	(6.81e-06)	(5.83e-08)	(2.86e-08)
va	1.77e-07**	1.67e-07	1.05e-06	2.78e-07
	(8.78e-08)	(1.08e-07)	(1.70e-06)	(2.68e-06)
share_ventas	-0.0765**	-0.0773**	-0.397	-0.0154
	(0.0347)	(0.0351)	(0.594)	(0.885)
Constant	-5.555*	-5.190	-3.742	-4.361
	(3.098)	(3.900)	(4.841)	(5.088)
Observations	8,334	5,258	3,076	2,911
R-squared	0.734	0.295	0.726	0.717
Firms	385	26	359	341

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

credit conditions may be affected by the GFC through banks. In this section, we estimate how the increase of foreign credit spreads, explained by a shock to the GFC, affects the cost of domestic credit.

We first predict the spread faced by banks abroad described by Equation 1 using the estimates

from Table 3. Then, we estimate

$$i_{f,b,l,m} = \alpha_{f,b} + \lambda Trend_m + \beta \hat{s}^{\star}_{b,m} + \Theta_1 i_{m-1} + \Theta_2 \Delta log(GDP_{m-1}) + \Theta_3 Inflation_{m-1} + \Theta_4 \Delta log(XR_{m-1})$$
$$+ \Theta_5 Firm_{f,m-1} + \Theta_6 Cop_{m-1} + \Theta_7 Bank_{b,m-1} + \epsilon_{f,b,l,m} \quad (2)$$

where $i_{f,b,l,m}$ is the interest rate of the loan l between bank b and firm f, $\hat{s}^{\star}_{b,m} = \sum_l w_l \sum_d w_d \hat{s}^{\star}_{b,d,l,m}$ is the estimated spreads for banks aggregated at the bank-month level, $\alpha_{f,b}$ is the firm-bank relationship fixed effect, and $Bank_{b,m-1}$ and $Firm_{f,m-1}$ are vectors of (lagged) bank- and firm-level controls (value added, sectoral market share, and leverage).

Table 4 shows the results of estimating Equation 2. A 1 pp increase in spread, due to a GFC shock, leads to an average increase of 0.6 pp the interest rates of domestic loans to firms. Since a 1 pp increase in the VIX, leads to a 0.26 pp increase in banks' foreign spreads (Table 3), the results from Table 4 imply that, on average, a 1 pp shock to the VIX, lead to an average increase in domestic commercial credit rates of 0.156 pp.

Therefore, tightening foreign credit conditions originated by the GFC generate tighter domestic credit conditions. However, this passthrough is not 1 to 1. In other words, banks absorb a fraction of a shock to the GFC, acting as a buffer for firms that borrow domestically.

4 Real Effects of Shocks to the GFC

We now turn to estimating the real effects on the cost of both foreign and domestic credit due to a GFC shock. Specifically, we estimate how this shock affects firms' labor and investment demand through foreign and domestic credit conditions. This means that we focus on the credit channel, and not on other possible mechanisms by which the GFC could affect the economy. For instance, if the GFC relates to a negative shock to economic activity in a large economy, domestic firms could face lower demand, affecting exports and the rest of the economy over the supply chain network. However, we abstract from these possible indirect

Table 4: Banks Passthrough of the GFC to the Cost of Domestic Credit

Variable	rate_bank
rate_bank	0.618***
	(0.218)
date	-0.0155***
	(0.00474)
l_cobre	-0.401***
	(0.107)
l_tpm	0.423***
	(0.0496)
l_imacec	0.00228
	(0.0128)
l_inflacion	0.0176
	(0.0250)
l_tcm	-0.00779
	(0.00558)
leverage_deudor	-5.33e-09**
	(2.25e-09)
va_deudor	-0***
	(0)
share_venta_deudor	262.9**
	(103.1)
leverage_bank	-0.0487***
	(0.0138)
va_bank	-0***
	(0)
share_venta_bank	36.14***
	(4.895)
Constant	16.49***
	(3.216)
Observations	5,832,708
R-squared	0.856
Firms	204879

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

effects of the GFC by estimating how it affects real outcomes through spreads faced by firms abroad, and domestic interest rates, as documented in the previous section.

4.1 Firms Directly Borrowing Abroad

Considering the well documented investment and labor adjustment costs of firms in the literature, we use local projection methods Jordà (2005) and estimate dynamic effects instead of just the contemporaneous impact of the shock. For $h = 0, 1, 2, .., 24$, we estimate

$$log(Z_{f,m+h}) = \alpha_f + \lambda Trend_m + \beta_h \hat{s}^\star_{f,m} + \Theta_0 log(Z_{f,m-12}) + \Theta_1 i_{m-1} + \Theta_2 \Delta log(GDP_{m-1})$$
$$+ \Theta_3 Inflation_{m-1} + \Theta_4 \Delta log(XR_{m-1}) + \Theta_5 Copp_{m-1} + \Theta_6 Firm_{f,m-1} + \epsilon_{f,m} \quad (3)$$

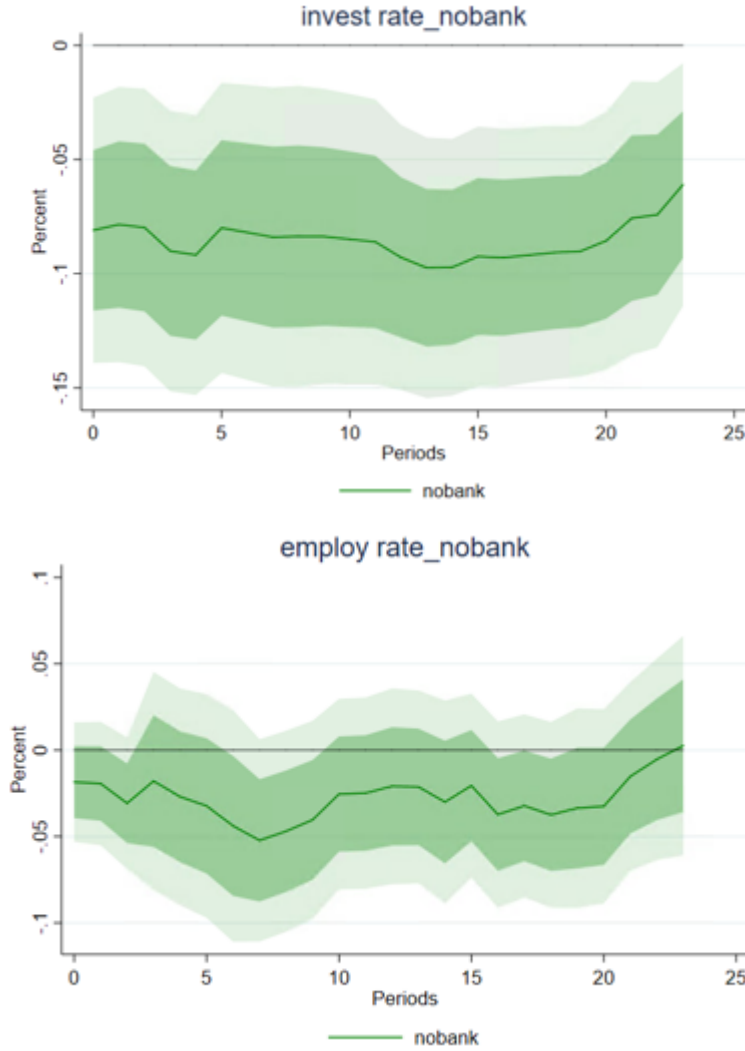where $Z_{f,m+h}$ is either firm f capital stock or number of employees in period $m + h$, and $\hat{s}^\star_{f,m} = \sum_l w_l \sum_d w_d \hat{s}^\star_{f,d,l,m}$ is the predicted foreign credit spread from the results of estimating Equation 1 shown in Table 3, aggregated at the firm level each month. Thus, for each horizon h, the coefficient β_h estimates the effect that shocks to firms' foreign spreads, explained by shocks to the GFC, have over both investment and labor.[7]

Figure 4 shows the result of estimating Equation 4 at each horizon. The top panel shows the results for investment, and the bottom panel shows the results for employment. The solid line represents the estimated β_h, the dark shades correspond to the 90% confidence interval, and the light shades to the 95% confidence interval.

The effects of the shock over investment on impact is about 6 percent. In other words, a 1 pp increase in foreign spreads faced by firms that borrow abroad caused by a shock to the VIX, causes a yearly fall in investment of 6 percent. This effect remains about the same level during the subsequent months up to the tipping point in month 12, where investment starts to recover. This implies that, a 1 pp shock to the VIX implies a 2.68 pp fall in yearly investment. In the case of employment, while the estimates show a yearly fall in employment that lasts several periods, these effects are not significant. Thus, shocks to the GFC cause

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[7]Since we control for the log of lagged capital stock, the coefficients of beta represent the effect of the yearly percentage change in the stock of capital (i.e., investment). This control also allows us to obtain estimates that are more robust to serial autocorrelation problems and to larger horizons of the local projection (Montiel Olea and Plagborg-Møller, 2021).

Figure 4: Real Effects on Firms Borrowing Abroad

a fall in the investment of firms that borrow abroad. The mechanism behind this result is an increase in spreads of foreign debt, which increase de cost of capital and leads directly to lower accumulation of capital. Yet, there is no effect over employment.

4.2   Firms Domestically Borrowing from Banks

As shown in Section 3, even though a firm may not borrow directly from international lenders, the GFC affects is credit conditions because it affects banks' funding costs, which they in turn passthrough to firms. We now estimate how, as a consequence of this channel,

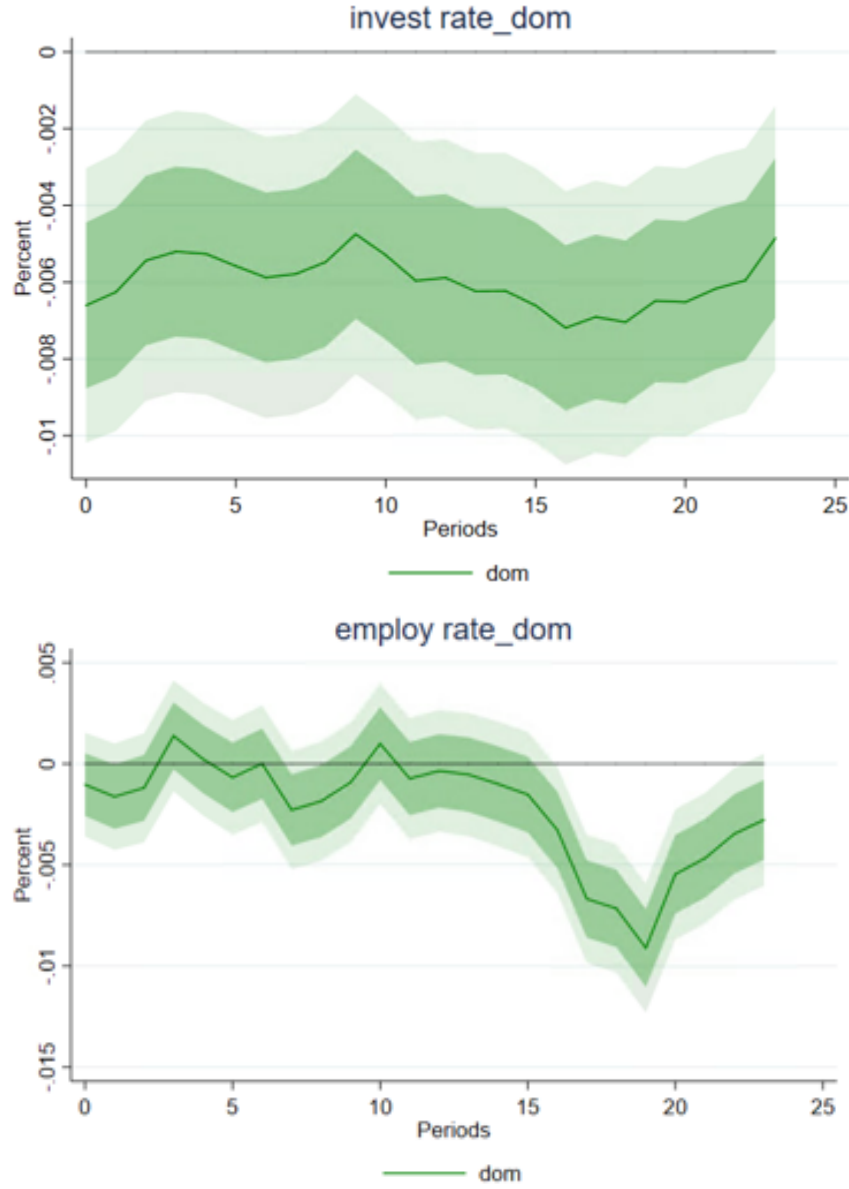investment and labor of firms borrowing domestically is affected. For $h = 0, 1, 2, .., 24$, we estimate

$$log(Z_{f,m+h}) = \alpha_f + \lambda Trend_m + \beta_h \hat{i}_{f,m} + \Theta_0 log(Z_{f,m-12}) + \Theta_1 i_{m-1} + \Theta_2 \Delta log(GDP_{m-1})$$
$$+ \Theta_3 Inflation_{m-1} + \Theta_4 \Delta log(XR_{m-1}) + \Theta_5 Copp_{m-1} + \Theta_6 Firm_{f,m-1} + \epsilon_{f,m} \quad (4)$$

where $\hat{i}^{\star}_{f,m} = \sum_b w_b \sum_l w_b \hat{i}^{\star}_{f,b,l,m}$ is the is the predicted interest rate of firm-bank loans that results from estimating Equation 2, aggregated at the firm-month level. The estimated coefficient β_h, at each horizon, represents the effect of a 1 pp increase in average domestic interest rates of firm f in month m explained by an increase in foreign spreads faced by banks due to a shock to the GFC.

Figure 5 shows the results of estimating Equation 4 at each horizon. Similar to firms that borrow abroad, yearly investment falls on impact and has a persistent effect. However, the quantitative effect is one order of magnitude smaller. This implies that, a 1 pp shock to the VIX implies a fall in investment of about 0.27 pp. In the case of employment, the results are not significant for most of the horizons, yet between periods 15 and 23 there is arguable a small negative effect.

Taking stock on the real effects of global shocks. Our results in this session point out to two relevant financial channels by which the GFC affects firms' real decisions over investment and labor. First, the direct channel of the increase in the cost of foreign credit for firms that borrow abroad directly. For these firms, the annual fall in investment as a consequence of a 1 pp shock to the VIX is large–an average of 2.6 pp–and the effects over employment are statistically nil. Second, the indirect channel of increase in the cost of credit for firms that borrow domestically from banks, which in turn are directly exposed to the GFC through foreign borrowing. In this case, there is a significant, yet small, annual fall in investment–of about 0.27 pp–and the effect over labor is nil for over a year, but turns

Figure 5: Real Effects on Firms Borrowing Abroad

negative at longer horizons.

The considerably larger quantitative effect of the shock over the investment of firms that borrow abroad directly is likely to be explained by the fact that these are larger firms, as Table 2 shows, which tend to be more intensive in capital. Indeed, Table 1 shows that the most relevant sectors in foreign borrowing, aside from the financial sector, are mining, transportation, and energy, all with high capital intensities. Conversely, the majority of firms

that borrow only domestically are not large, and belong to more labor-intensive sectors.

The well documented UIP deviation in emerging markets (Gutierrez et al. 2023, di Giovanni et al. 2021, Acosta-Henao et al. 2024), means that loans in dollars are cheaper when correcting for expected currency depreciation. This generates an incentive to borrow abroad, specially for large firms with tend to be less risky and have more collateral. If firm size is proportional to firms' productivity, one could think that more productive firms select into borrowing abroad to enjoy cheaper credit, as in Salomao and Varela (2022). Our results point out in this direction. However, they also show that firms that are directly exposed to the financial spillovers of the GFC, are more vulnerable in terms of its investment, and hence their future growth. This highlights a relevant tradeoff: borrowing abroad at cheaper rates vs. being more exposed to the financial perils of negative shocks to the GFC.

5 Conclusion

In this paper we use a rich administrative dataset from Chile to show that a tightening of the global financial cycle leads to an increase in the cost of foreign borrowing by banks and firms. Banks, in turn, partially pass through this increase to higher domestic credit rates. Firms that borrow abroad, as a result of higher foreign borrowing costs, lower their investment for several periods ahead. Likewise, firms that borrow from domestic banks also lower their investment as a result of the effect of GFC shocks transmitted to their local borrowing costs via banks. Conversely, there are no relevant effects over employment in the short run.

Given the relative cheaper dollar-denominated loans–i.e., the positive UIP deviation–that we find in our data, in line with studies for other emerging markets, firms have an inherit incentive to borrow directly from international lenders. This however, leads them to face a tradeoff between this benefit and being more vulnerable to foreign shocks. This vulnerability emerges because, as we showed, banks act as partial shock absorbers, which is a benefit of borrowing domestically, at the expenses of higher average borrowing costs.

Our work however, also sheds light on relevant transmission channel of shocks to the GFC. The same increase in borrowing costs, explained by the GFC, affect more firms that borrow abroad directly than those than borrow domestically form internationally exposed banks. The data suggests that the former group of firms belongs to more capital-intensive sectors, for which an increase in the cost of capital is likely to affect their investment demand more. Therefore, not only firm-level TFP seems to be relevant as a mechanism through which firms select into borrowing abroad, as documented in previous literature (Salomao and Varela, 2022), but also firm-level capital intensity. For instance, for highly productive firms it could be optimal to still borrow only domestically–having lower exposure to global financial conditions risk–in spite of facing relatively more expensive borrowing costs, if they have low capital intensities. Further exploring these channels, both empirically and theoretically, are promising research avenues.

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