Heterogeneous UIP Deviations Across Firms: Spillovers from U.S. Monetary Policy Shocks

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The views expressed in this paper are those of the authors and do not represent those of the Central Bank of Chile or its Board, nor those of the the Bank of Spain or the Eurosystem.

Motivation

- Dollar debt is cheaper: $UIPD_{i,t} = i_{i,t} - i^*_{i,t} - \frac{E_t(e_{t+1} - e_t)}{e_t} > 0$
  - UIP failure (using government rates differentials): DiGiovanni, Kalemli-Ozcan, Ulu and Baskaya (2020), Salomao and Varela (2019), Richers (2019)...
  - Dollar deposit discount $\rightarrow$ Ivashina, Salomao and Gutierrez (2020), Bocola and Lorenzoni (2020), Dalgic (2020), Gopinath and Stein (2018)

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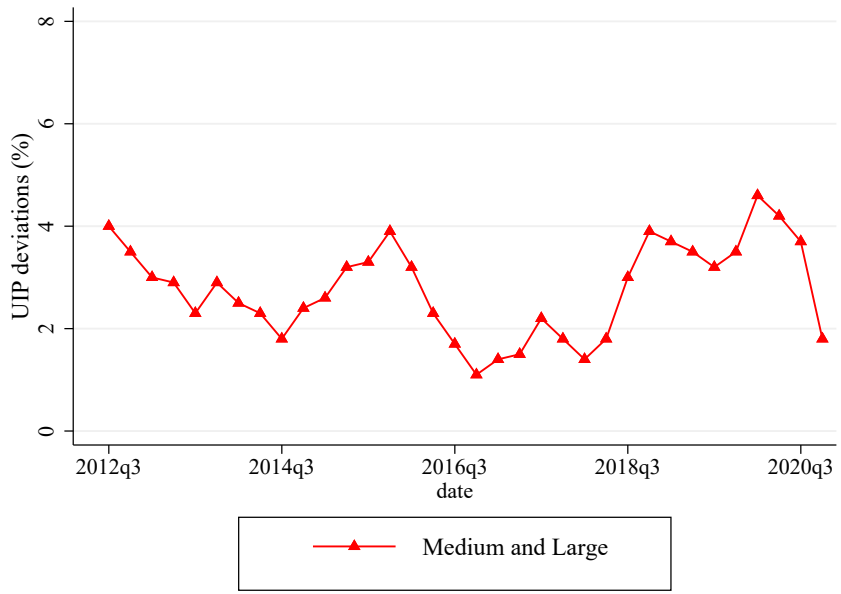
- Chile: avg. loan level UIP dev: 3 pp.
- For Medium/Large firms: 2.7 pp



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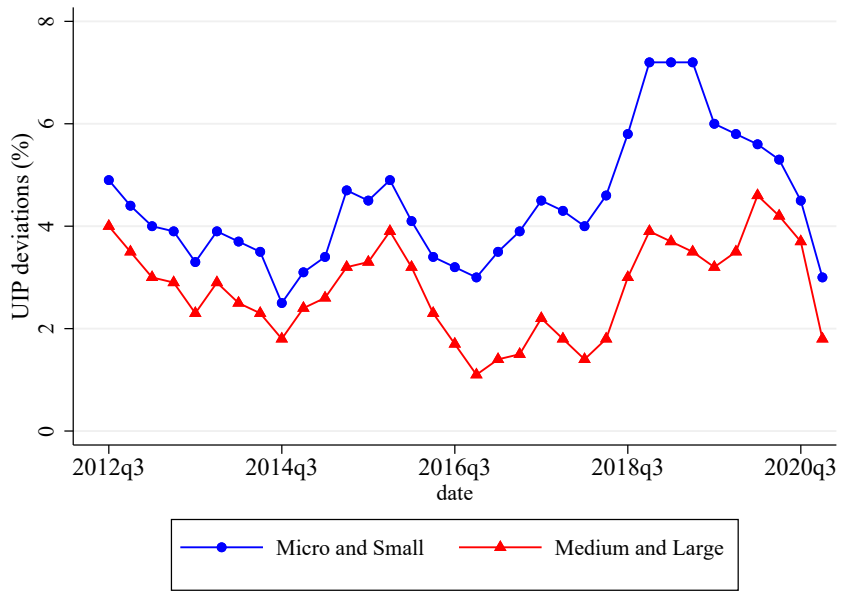

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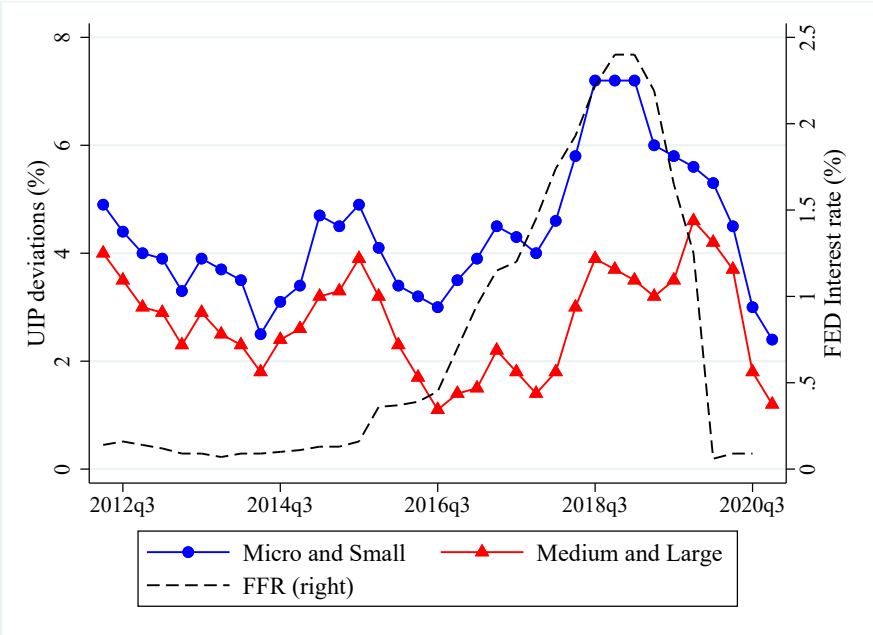
- Differential of UIP deviations larger during US MP tightening



This Paper

Research questions/What we do

- How do U.S. monetary policy shocks affect firm-level borrowing conditions in **domestic** and **foreign currency** in emerging markets?
- What are the features underlying these effects of U.S. monetary policy spillovers?
  - We use a rich data set from Chile with detailed information about (1) foreign loans taken by banks, (2) the domestic credit registry, (3) and firm-level characteristics.
  - We estimate the effect of a FFR shock over firm-level UIP deviations via its effect on the cost of bank's foreign currency
  - We identify this effect with a rich battery of time-variant firm and bank fixed effects
- What are the mechanisms that explain the empirical findings?
  - We build a two-period model of corporate default in both foreign and domestic currency with heterogeneous firms and risk-neutral banks
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Main Findings

- Empirical analysis
  - A shock to the FFR generates an increase in the cost of foreign borrowing by banks
  - This leads to to a differential increase of the UIPD in micro and small firms
  - **Puzzle: differential response of rates in domestic currency** and not in dollars
  - Demand ($\uparrow$) and supply ($\downarrow$) of credit have an active role

- Theoretical framework
  - $\uparrow r^* \rightarrow$ **Sufficiently high-productivity firms** optimally always repay debt in both currencies
  - $\uparrow r^* \rightarrow$ **Lower-productivity firms with ex-ante full repayment** could fall into optimally defaulting in domestic currency
  - **Banks price this**, leading to differential increase in domestic interest rates for low-productivity firms
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Data

- **Impact of fluctuations in FFR on borrowing behaviour of banks**
  - Deudex: foreign debt transactions (stock and flows)→ Loan specific characteristics: interest rates, spreads, debt maturity, currency denomination
- **Impact on credit supplied by domestic banks to firms**
  - Chilean credit registry (D32):→ new loans extended from domestic banks to firms, terms and conditions of financial transactions: interest rates/sizes/currency
  - Firm-Level information from tax records: → monthly sales/leverage/age/size from tax records

Data

- Sample: Merged databases from April 2012 to December 2019
- Size definition:
  - Micro: yearly sales of up to 70000 USD
  - Small: 70000 to 1 million USD
  - Medium: 1 to 4 million USD
  - Large: sales over 4 million USD
- For subsequent analysis we pool firms in two categories: Micro/Small and Medium/Large

Empirical Analysis

Panel two-stages least squares:

- 1^{st} **stage: U.S. Monetary Policy and Banks Cost of Foreign Credit**

$$i^{\star}_{b,l,m} = \alpha_b + \lambda Trend_m + \Psi FFR_{m-1} + \delta FX_{b,l,m} + \theta_1 i_{m-1} + \theta_2 \Delta log(GDP_{m-1}) + \theta_3 Inflation_{m-1} + \Theta_4 \Delta log(XR_{m-1}) + \Theta_5 Bank_{b,m-1} + \epsilon_{b,l,m}$$

- FFR_{m-1}: Shocks to the FFR from an estimated Taylor Rule
- $i^{\star}_{b,l,m}$: interest rate faced by the domestic bank b on credit l–at either U.S. dollar or Chilean peso–in month m.
- Credits: bonds issued in foreign financial markets or loans taken directly from foreign financial institutions located abroad.
- Coefficient of interest: $\Psi \rightarrow$ pass-through of the FFR to the foreign cost of credit of local banks.
- $FX_{b,l,m}$ is 1 if the credit is in dollars and zero in pesos.$\rightarrow \delta$: **avg. UIP dev** faced by domestic banks in foreign credit markets
- α_b: bank FE. $Trend$: time trend.
- Lagged domestic macro controls: MP rate i_{m-1}, $\Delta log(GDP_{m-1})$, $Inflation_{m-1}$, and the yearly nominal exchange rate depreciation rate, $\Delta log(XR_{m-1})$.

Empirical Analysis

1^{st} stage: FFR Resid and Banks

	(1) Interest	(2) Interest
FFR Taylor Resid	0.326**	0.327**
	(0.118)	(0.120)
FX	-2.584***	-2.599***
	(0.132)	(0.132)
Trend	0.0207***	0.0204***
	(0.00556)	(0.00557)
Fixed Effects	Bank	Bank & Creditor
Bank Characteristics	YES	YES
Macro controls	YES	YES
Observations	5,258	5,256
R-squared	0.649	0.653
Cluster obs	26	26

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

- a 1pp ↑ FFR shock increases the interest rate of credits taken by banks abroad by 0.33 pp

Empirical Analysis

Panel two-stages least squares:

- 2^{nd} **stage: FFR, banks cost of foreign credit and UIP Dev.**

$$\begin{aligned} i_{f,b,l,m} = \alpha_{f,b} + \lambda Trend_m + \beta_1 \hat{i^\star}_{b,m} + \beta_2 DX_{f,b,l,m} + \beta_3 \hat{i^\star}_{b,m} \cdot DX_{f,b,l,m} \\ + \beta_4 \hat{i^\star}_{b,m} \cdot MS_f + \beta_5 \hat{i^\star}_{b,m} \cdot MS_f \cdot DX_{f,b,l,m} + \beta_6 MS_f \cdot DX_{f,b,l,m} \\ + \gamma_1 i_{m-1} + \gamma_2 \Delta log(GDP_{m-1}) + \gamma_3 Inflation_{m-1} + \gamma_4 \Delta log(XR_{m-1}) \\ + \Gamma_5 Firm_{f,m-1} + \Gamma_6 Bank_{b,m-1} + \epsilon_{f,b,l,m} \end{aligned}$$

- $i_{f,b,l,m}$: interest of a loan l taken by firm f from bank b during month m.
- $\hat{i^*}_{b,m} = \sum_l w_l \hat{i^*}_{b,l,m}$, using $\hat{i^*}_{b,l,m}$ from 1^{st} stage. Where w_l is the share of each bank foreign loan l
- $Firm_{f,m-1}$: Time-varying firm-level controls: value added, market share within its sector, and leverage.
- $DX_{f,b,l,m}$: takes the value of 1 if the loan is denominated in domestic currency and 0 if it is in dollars.
- MS_f takes the value of 1 if the firm is either micro or small and zero if it is medium or large.

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+ \Gamma_5 Firm_{f,m-1} + \Gamma_6 Bank_{b,m-1} + \epsilon_{f,b,l,m}
\end{aligned}
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- Coefficient of interest: $\beta_5 \rightarrow$ size-differential effect of the shock to banks' cost of foreign funding, on UIP deviation using firm's loan rates.

Empirical Analysis

2^{nd} stage: FFR, banks cost of foreign credit and UIP Dev.

	(1) Interest Rate	(2) Interest Rate	(3) Interest Rate	(4) Interest Rate	(5) Interest Rate
Rate	2.478***	1.982***			2.225***
	(0.256)	(0.324)			(0.331)
Rate × MS × DX	1.160***	1.943***	1.934***	2.102***	1.321***
	(0.166)	(0.382)	(0.356)	(0.349)	(0.210)
Rate × MS	-0.781***	-0.986**	-0.479		-0.889***
	(0.111)	(0.428)	(0.364)		(0.153)
Rate × DX	-1.920***	-2.320***	-2.362***	-2.647***	-1.923***
	(0.155)	(0.234)	(0.257)	(0.301)	(0.165)
MS × DX	0.588	-1.187	-1.214	-1.533	0.0698
	(0.471)	(0.834)	(0.865)	(1.008)	(0.550)
DX	5.959***	6.761***	6.850***	7.404***	5.834***
	(0.432)	(0.553)	(0.603)	(0.703)	(0.465)
Fixed effects	Firm-bank	Firm-bank & firm-month	Firm-bank firm-month & bank-month	Firm-bank-month	Firm-bank
Firm Characteristics	YES	NO	NO	NO	YES
Bank Characteristics	YES	YES	NO	NO	YES
Macro controls	YES	NO	NO	NO	YES
Observations	5,832,530	5,130,236	5,130,236	4,981,143	5,130,236
R-squared	0.871	0.927	0.927	0.932	0.867
Cluster obs	148842	42786	42786	42325	42786

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

- On average, loans in Pesos are 5.96-7.40 pp more expensive than loans in USD.

Empirical Analysis

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- On average, the relative cheapness of dollar loans is not statistically different for large firms than for small firms

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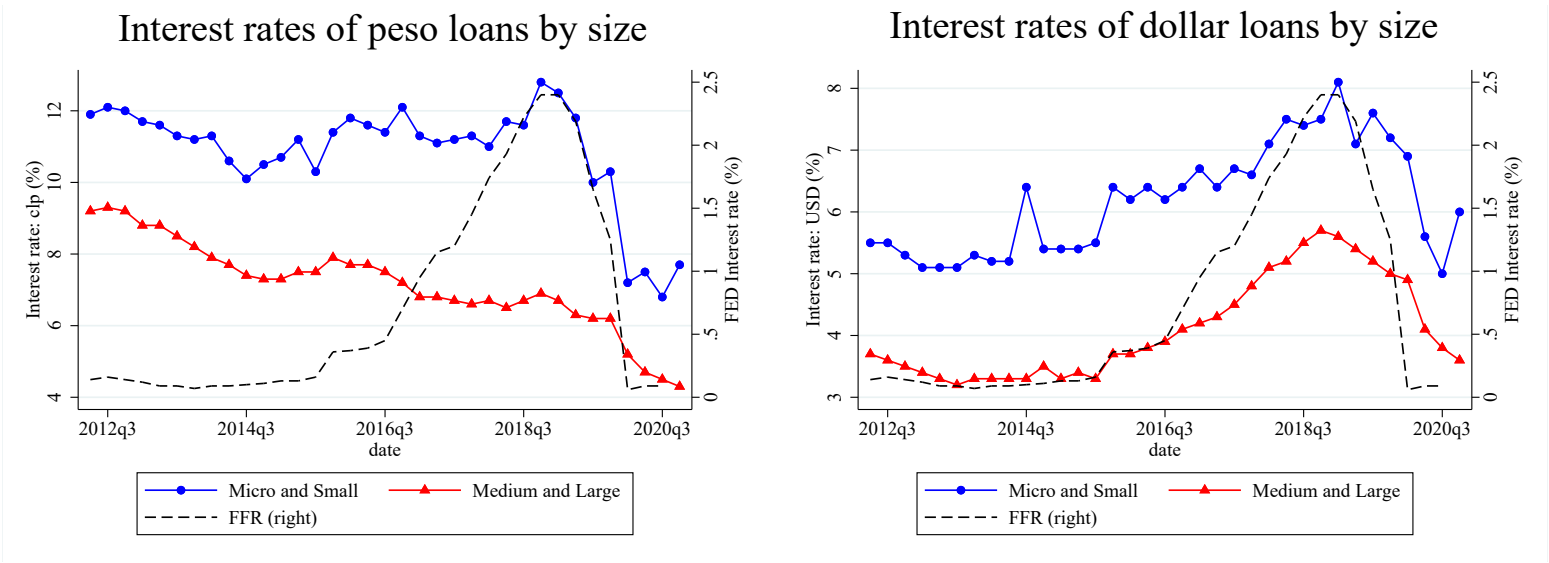
- **↑ 1 pp in the interest rate faced by banks on foreign debt due to a FFR shock → ↑ 1.16 pp in the UIP dev. of micro/small firms relative to medium/large firms.**
  - Robust to selection concerns → firm-bank-time FE

Empirical Analysis

Which specific rates are driving the results?

- Fact 1: Most debt issued by domestic banks abroad is denominated in dollars
- Fact 2: Banks balance sheets are matched → no currency mismatch
  - Puzzle: We should expect a pass-through of the FFR to dollar loan rates, that is higher for riskier firms (micro/small) and no pass-through to peso loan rates → **Contradicts previous findings**



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- Coefficient of interest: $\beta_4 \rightarrow$ size-differentiated estimated effect of shocks to the FFR on dollar loans

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- No evidence of a size-asymmetric response of dollar-denominated loans once controlling for selection concerns (col. 3.)

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Robust standard errors in parentheses
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- From col 3 and 4: Size-differentiated effect on peso loans ≈ coefficient of triple interaction → **The heterogeneous effect over the UIP deviation by firm size is driven only by the differential effect over the interest rate in pesos → puzzle**

Credit Supply and Demand Shifters

- Preferred specification: We are tracking bank-firm pairs across time and observing (dollar/peso) interest rate differentials within each pair
- Therefore, we are ruling out any selection concern $\rightarrow$ supply and/or demand shifters are playing a role in driving the observed patterns
- We look into loan amounts to assess the relative importance of supply or demand shifts in explaining our results

Credit Supply and Demand Shifters

Second stage –Log(Loan Amount)–

	(1) log(Loan amount)	(2) log(Loan amount)	(3) log(Loan amount)	(4) log(Loan amount)
Rate	-0.123	-0.227		
	(0.0808)	(0.203)		
Rate × MS × DX	-0.0227	-0.0681	-0.0978	-0.177
	(0.0656)	(0.320)	(0.264)	(0.304)
Rate × MS	-0.00288	-0.157	-0.0855	
	(0.0586)	(0.336)	(0.282)	
Rate × DX	0.125**	0.461*	0.401*	0.467*
	(0.0562)	(0.255)	(0.207)	(0.243)
MS × DX	0.708	0.975	0.926	1.205
	(0.444)	(0.901)	(0.774)	(0.906)
DX	-0.833***	-1.358**	-1.242**	-1.578***
	(0.258)	(0.606)	(0.507)	(0.583)
Fixed effects	Firm-bank	Firm-bank & firm-month	Firm-bank firm-month & bank-month	Firm-bank-month
Firm Characteristics	YES	NO	NO	NO
Bank Characteristics	YES	YES	NO	NO
Macro controls	YES	NO	NO	NO
Observations	5,832,530	5,130,236	5,130,236	4,981,143
R-squared	0.806	0.827	0.828	0.823
Cluster obs	148842	42786	42786	42325

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

- There is no size-differentiated effect of the shock over the amount of peso loans relative to dollar loans.
- There is no size-differentiated effect of the shock over loan amounts in dollars (third row)

Theoretical Model

- Environment
  - $t = 1 \rightarrow$ Firm with productivity z chooses how much to borrow in both domestic, l^d, and foreign currency, l^* to pay its wage bill, wl and produces at $t = 2$
  - Firm can default in either currency or both $\rightarrow$ Loans have an endogenous price q^d or q^* that depend on each default probability, δ^d and δ^*
  - Cost of default: h^d (domestic, PD), h^* (foreign, PD), h^T (total, FD)
  - $t = 2 \rightarrow$ Firm observes its productivity shock, Δ, and the realized shock of the (nominal) exchange rate, e, and make repayment/default decisions
  - Risk-neutral bank that funds its loans in both currencies at r^*

Theoretical Model

- Banks
  - The representative bank solves

$$\max_{l,l^*} \; (1-\delta^*)\mathbb{E}[e]l^* + (1-\delta^d)l^d - \left(l^* + l^d\right)$$

$$\text{s. t.} \quad \frac{l^* + l^d}{1+r^*} = q^d l^d + q^* l^*$$

  - Which optimally yield

$$q^d = \frac{1-\delta^d}{1+r^*}$$

$$q^* = \mathbb{E}[e]\frac{1-\delta^*}{1+r^*},$$

  - Which determine the interest schedule of the firm

Theoretical Model

- Firms
  - Loans in dollars finance k, and loans in pesos finance wn
  - Firms output in $t = 2$ is $y = \Delta z k^{\alpha} n^{1-\alpha}$
  - We assume that the cost of PD is at most the cost of PF, which is smaller than the cost of FD: $1 > h^d \geq h^* > h^T$
  - We assume that the marginal cost of PD is the same regardless of defaulting in dollars: $1 - h^d = h^* - h^T$
  - The firm solves

$$\max_{l^d, l^*} \quad \left[\max\left\{\Delta z y - l^d - e l^*, h^d \Delta z y - e l^*, h^* \Delta z y - l^d, h^T \Delta z y\right\}\right]$$

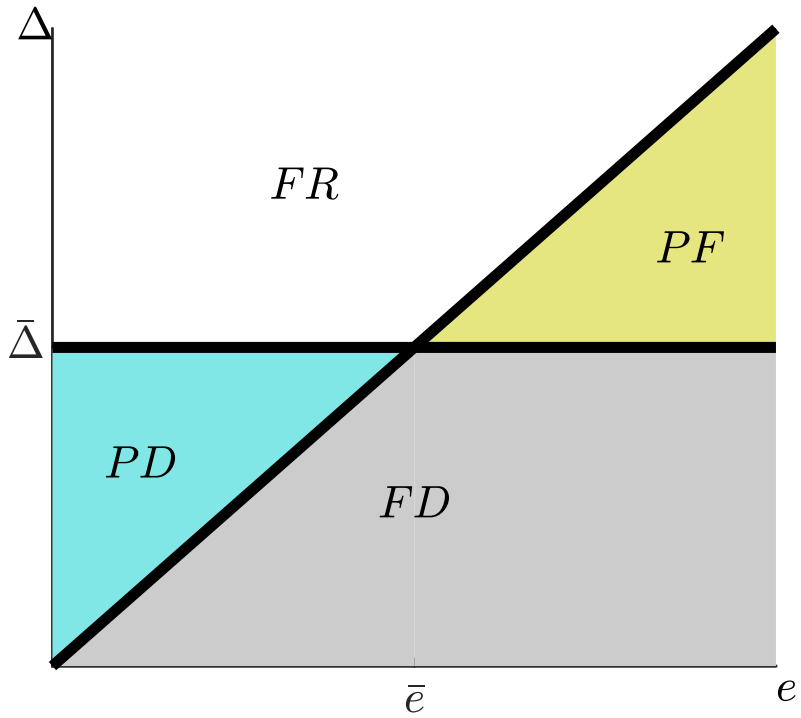
$$\text{s. t. } y = k^{\alpha} n^{1-\alpha}$$

$$k = q^* l^*$$

$$wn = q^d l^d.$$

Theoretical Model

- Optimal choice and firms' repayment
  - We depict the optimal repayment areas as a function of shocks Δ and e



  - Where

$$(\bar{e}, \bar{\Delta}) \equiv \left(\frac{l^d}{l^*} \frac{1-h^*}{1-h^d}, \frac{l^d}{zy} \frac{1}{1-h^d} \right).$$

  - The slanted line is given by

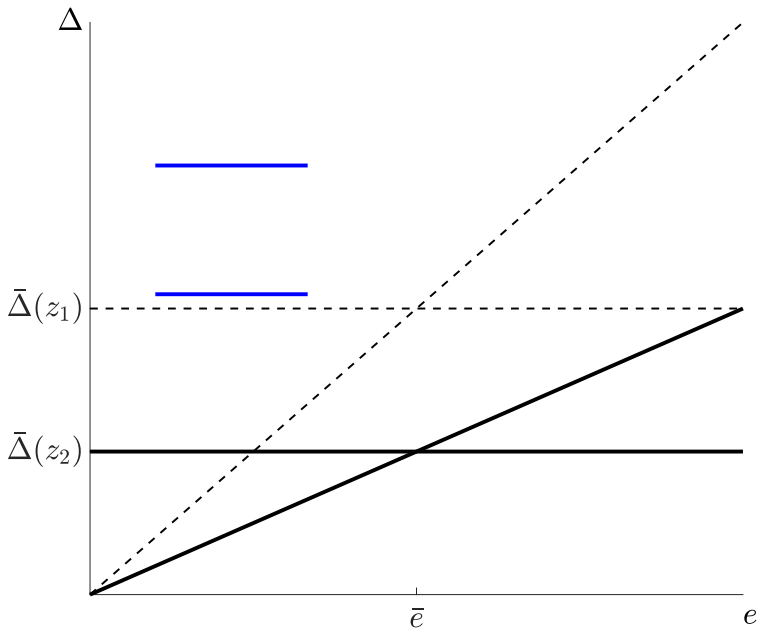
$$\Delta = e \frac{l^*}{zy} \frac{1}{1-h^*}.$$

Theoretical Model

- Shocks to r^* and heterogeneous UIPDs
  - Let us define the UIPD as

$$UIPD(z_i) = \frac{1}{q^d(z_i)} - \frac{1}{q^\star(z_i)}\mathbb{E}(e)$$

  - Let us consider two types of firms such that $z_2 > z_1$



  - High-productivity firms are more likely to optimally FR
  - If given any Δ they always FR $\rightarrow$ $UIPD(z_i) = 0$

Theoretical Model

- Characterization
  - For G_e assume a support $[e^d, e^u]$. For G_Δ assume

$$G_\Delta(\Delta) = \begin{cases} 1 & \Delta \geq \Delta^u \\ \frac{1}{2} & \Delta^d \leq \Delta < \Delta^u \\ 0 & \Delta < \Delta^d, \end{cases}$$

  - **Proposition 1.** *If*

$$\frac{z}{1+r^*} > \frac{1}{\Delta^d} w^{1-\alpha} \left(\frac{1-\alpha}{\alpha}\right)^\alpha \frac{1}{1-h^d}$$

$$\frac{z}{1+r^*} > \frac{e^u}{\Delta^d} \frac{w^{1-\alpha}}{\mathbb{E}[e]} \left(\frac{\alpha}{1-\alpha}\right)^{1-\alpha} \frac{1}{1-h^*}.$$

  Then, firm z_i finds it optimal not to default.

  - **Proposition 2.** *If*

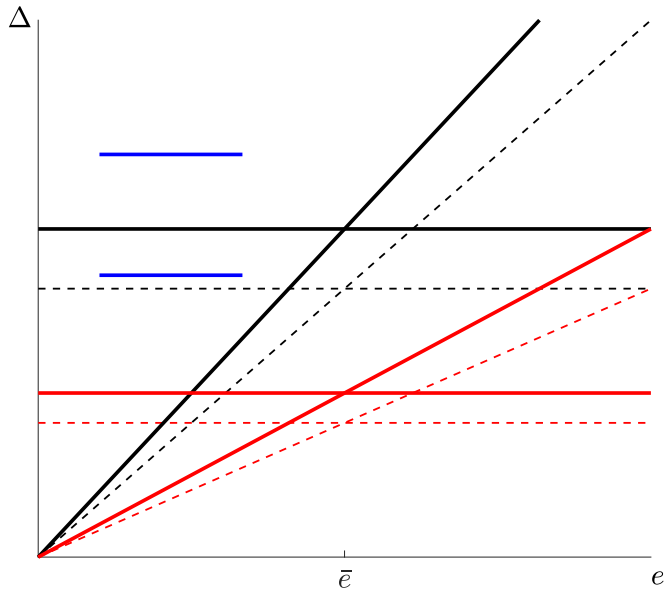
$$\frac{1}{\Delta^d} w^{1-\alpha} \left(\frac{1-\alpha}{\alpha}\right)^\alpha \frac{4^\alpha}{1-h^d} > \frac{z}{1+r^*} > \frac{1}{\Delta^u} w^{1-\alpha} \left(\frac{1-\alpha}{\alpha}\right)^\alpha \frac{4^\alpha}{1-h^d}$$

$$\frac{z}{1+r^*} > \frac{e^u}{\Delta^d} w^{1-\alpha} \left(\frac{\alpha}{1-\alpha}\right)^{1-\alpha} \frac{2^{2\alpha-1}}{1-h^*}.$$

  Then, it is optimal for firm z to default only in domestic currency.

Theoretical Model

- Increase in r^*–from r^1 to r^2 and $r^2 > r^1$–and heterogeneous UIPDs
  - Recall from the data: $^* \rightarrow UIPD(z_1, r_2^*) - UIPD(z_1, r_1^*) > UIPD(z_2, r_2^*) - UIPD(z_2, r_1^*)$
  - Meaning that $\frac{q^d(z_1, r_2^*)}{q^d(z_1, r_1^*)} < \frac{q^d(z_2, r_2^*)}{q^d(z_2, r_1^*)}$
  - In the model, given the conditions in Proposition 1 and Proposition 2 (i.e. only two possible worlds), when $\uparrow r^*$



  - A higher r^* leads to firms with not sufficiently high productivity–smaller firms–being likely to fall into PD
  - Banks price this via higher default risk in domestic currency, generating heterogeneous UIPDs

Conclusions

- We use a rich administrative dataset from Chile to study the transmission of U.S. MP shocks to loan level UIP deviations in EMEs.
- An increase in the FFR leads to higher costs of foreign credit for banks
- This leads to differential increase in the relative UIP deviation of micro/small firms vs medium/large firms
- The latter is due only to a size-differential increase in peso loan rates $\rightarrow$puzzle
- Supply($\downarrow$) and demand($\uparrow$) play an active role
- A model with corporate default in both foreign and domestic currency and risk-neutral banks can rationalize our main finding
- This occurs when the conditions to only move from full repayment to only move to partial default in domestic currency are met
- Here, banks price that smaller firms may move from FR to PD via higher default risk in domestic currency, generating heterogeneous UIPDs in response to an increase in r^*

Related Literature

- International Bank Lending Channel: Cetorelli and Goldberg 2012a,b; Brauning and Ivashina 2020; Buch et al. 2019; Temesvary et al. 2018...
  - Contribution:
    1. Relevant even in the absence of foreign/global banks or if foreign banks do not engage in direct lending to local firms.
- International risk spillovers of U.S. monetary policy: Kalemli-Özcan (2019), De Leo et al. (2023)...
  - Contribution:
    1. We use granular bank loan-level data for the Chilean economy
    2. Additional source of disconnect that potentially limits the bank lending channel of domestic monetary policy $\rightarrow$ specific to small firms
- Drivers of the UIP premium (dollar deposit discount): Ivashina et al. (2023), Bocola and Lorenzoni (2020), Dalgic (2020), Gopinath and Stein (2018)
  - Contribution:
    1. We use the universe of Chilean bank loans
    2. We do find a significant connection between macro rates and *micro* loan-level UIP deviations.

Robustness

- An alternative measure of Fed MP shocks (Bu, Rogers and Wu, 2021)

Second Stage

	(1) Interest Rate	(2) Interest Rate	(3) Interest Rate	(4) Interest Rate	(5) Interest Rate
Rate	0.882***	-7.492***			0.819***
	(0.284)	(2.844)			(0.266)
Rate × MS × DX	0.968***	1.593***	1.584***	1.770***	0.700**
	(0.169)	(0.423)	(0.387)	(0.364)	(0.282)
Rate × MS	-0.447***	-0.732	-0.278		-0.526**
	(0.168)	(0.441)	(0.379)		(0.204)
Rate × DX	-1.092***	-1.696***	-1.738***	-2.032***	-1.085***
	(0.311)	(0.324)	(0.333)	(0.380)	(0.315)
MS × DX	1.070**	-0.502	-0.520	-0.862	1.098*
	(0.494)	(0.910)	(0.918)	(1.051)	(0.648)
DX	4.596***	5.684***	5.763***	6.305***	4.439***
	(0.664)	(0.675)	(0.702)	(0.808)	(0.694)
Fixed effects	Firm-bank	Firm-bank & firm-month	Firm-bank firm-month & bank-month	Firm-bank-month	Firm-bank
Firm Characteristics	YES	NO	NO	NO	YES
Bank Characteristics	YES	YES	NO	NO	YES
Macro controls	YES	NO	NO	NO	YES
Observations	5,832,530	5,130,236	5,130,236	4,981,143	5,130,236
R-squared	0.869	0.926	0.926	0.932	0.864
Cluster obs	148842	42786	42786	42325	42786

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

Robustness

- Shadow rates residuals

Second Stage

	(1) Interest Rate	(2) Interest Rate	(3) Interest Rate	(4) Interest Rate	(5) Interest Rate
Rate	2.653***	2.035***			2.437***
	(0.430)	(0.333)			(0.471)
Rate × MS × DX	1.189***	2.034***	2.015***	2.151***	1.382***
	(0.178)	(0.411)	(0.373)	(0.341)	(0.215)
Rate × MS	-0.870***	-1.160**	-0.584		-0.984***
	(0.117)	(0.494)	(0.384)		(0.162)
Rate × DX	-1.953***	-2.371***	-2.410***	-2.701***	-1.962***
	(0.171)	(0.248)	(0.270)	(0.302)	(0.180)
MS × DX	0.544	-1.304	-1.317	-1.589	-0.0172
	(0.481)	(0.850)	(0.870)	(0.977)	(0.555)
DX	6.023***	6.835***	6.920***	7.474***	5.908***
	(0.440)	(0.571)	(0.618)	(0.698)	(0.471)
Fixed effects	Firm-bank	Firm-bank & firm-month	Firm-bank firm-month & bank-month	Firm-bank-month	Firm-bank
Firm Characteristics	YES	NO	NO	NO	YES
Bank Characteristics	YES	YES	NO	NO	YES
Macro controls	YES	NO	NO	NO	YES
Observations	5,832,530	5,130,236	5,130,236	4,981,143	5,130,236
R-squared	0.869	0.926	0.926	0.932	0.864
Cluster obs	148842	42786	42786	42325	42786

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

Robustness

- FFR residuals: Tradable firms

Second Stage

	(1) Interest Rate	(2) Interest Rate	(3) Interest Rate	(4) Interest Rate	(5) Interest Rate
Rate	1.386***	0.823***			1.363***
	(0.203)	(0.177)			(0.212)
Rate × MS × DX	0.625	1.473***	1.463***	1.626***	0.549
	(0.420)	(0.265)	(0.262)	(0.307)	(0.680)
Rate × MS	-0.476***	-0.582*	-0.162		-0.530***
	(0.0833)	(0.322)	(0.291)		(0.123)
Rate × DX	-1.702***	-1.901***	-1.904***	-1.952***	-1.699***
	(0.0957)	(0.106)	(0.105)	(0.133)	(0.0977)
MS × DX	1.404**	0.192	0.194	0.0785	1.351
	(0.589)	(0.384)	(0.379)	(0.442)	(0.891)
DX	5.858***	5.846***	5.861***	5.972***	5.797***
	(0.308)	(0.266)	(0.264)	(0.345)	(0.339)
Fixed effects	Firm-bank	Firm-bank & firm-month	Firm-bank firm-month & bank-month	Firm-bank-month	Firm-bank
Firm Characteristics	YES	NO	NO	NO	YES
Bank Characteristics	YES	YES	NO	NO	YES
Macro controls	YES	NO	NO	NO	YES
Observations	1,239,707	1,164,746	1,164,746	1,104,267	1,164,746
R-squared	0.856	0.932	0.932	0.942	0.859
Cluster obs	8000	5208	5208	5156	5208

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

Robustness

- FFR residuals: Non-Tradable firms

Second Stage

	(1) Interest Rate	(2) Interest Rate	(3) Interest Rate	(4) Interest Rate	(5) Interest Rate
Rate	2.874***	2.663***			2.619***
	(0.294)	(0.470)			(0.387)
Rate × MS × DX	1.416***	2.132***	2.116***	2.213***	1.698***
	(0.223)	(0.514)	(0.415)	(0.291)	(0.292)
Rate × MS	-1.032***	-1.484**	-1.106**		-1.271***
	(0.172)	(0.632)	(0.428)		(0.245)
Rate × DX	-2.032***	-2.407***	-2.497***	-2.785***	-2.062***
	(0.187)	(0.172)	(0.207)	(0.197)	(0.193)
MS × DX	0.180	-1.866**	-1.935**	-2.088**	-0.610
	(0.634)	(0.897)	(0.927)	(0.896)	(0.722)
DX	5.899***	7.061***	7.258***	7.797***	5.680***
	(0.614)	(0.451)	(0.557)	(0.529)	(0.637)
Fixed effects	Firm-bank	Firm-bank & firm-month	Firm-bank firm-month & bank-month	Firm-bank-month	Firm-bank
Firm Characteristics	YES	NO	NO	NO	YES
Bank Characteristics	YES	YES	NO	NO	YES
Macro controls	YES	NO	NO	NO	YES
Observations	4,592,823	3,965,490	3,965,489	3,876,876	3,965,489
R-squared	0.865	0.922	0.922	0.927	0.862
Cluster obs	140842	37578	37578	37169	37578

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

Robustness

- Diff-in-Diff:

$$i_{f,b,l,m} = \alpha_{f,b} + \lambda Trend_m + \beta_1 Diff_m + \beta_2 DX_{f,b,l,m} + \beta_3 Diff_m \cdot DX_{f,b,l,m} + \beta_4 Diff_m \cdot MS_f + \beta_5 Diff_m \cdot MS_f \cdot DX_{f,b,l,m} + \beta_6 MS_f \cdot DX_{f,b,l,m} + \gamma_1 i_{m-1} + \gamma_2 \Delta log(GDP_{m-1}) + \gamma_3 Inflation_{m-1} + \gamma_4 \Delta log(XR_{m-1}) + \Gamma_5 Firm_{f,m-1} + \Gamma_6 Bank_{b,m-1} + \epsilon_{f,b,l,m}$$

Where $Diff_m$ is a dummy: 1 if $date \geq 2016m1$