From Macro Shocks to Firm Responses: Financial and Real Spillovers of the Global Financial Cycle[1]

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On the Use of Microdata in International Finance Research

[1]Disclaimer: views do not correspond to those of the Central Bank of Chile, the IMF, or their board members.

Background

- Negative shocks to the global financial cycle (GFC) worsen local credit conditions (Di Giovanni et al. 2022)
- Few–mostly large–firms borrow abroad; most borrow from local banks exposed to the GFC
- Are there **differences** in the effects of the GFC on borrowing conditions for firms borrowing abroad directly or domestically through banks?
- There is a negative relationship between adverse shocks to foreign borrowing conditions and economic activity (Caballero, Fernandez, and Park, 2019)
- What are the **real effects** of shocks to the GFC on firms' investment and employment?

Research questions

Using a rich dataset from Chile we answer:

1. How do shocks to the GFC affect the borrowing conditions of firms and banks borrowing **directly** abroad? A1: 1 % $\uparrow$ VIX $\rightarrow \uparrow Spread_{non-banks}$ by 32 bp

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2. How do banks pass through shocks to the GFC to borrowing conditions in the **domestic loan market**? A2: 1% $\uparrow VIX$ $\rightarrow$ $\uparrow Spread_{banks}$ by 26 bp $\rightarrow \uparrow i_{f,b}$ by $\approx$ 16 bp

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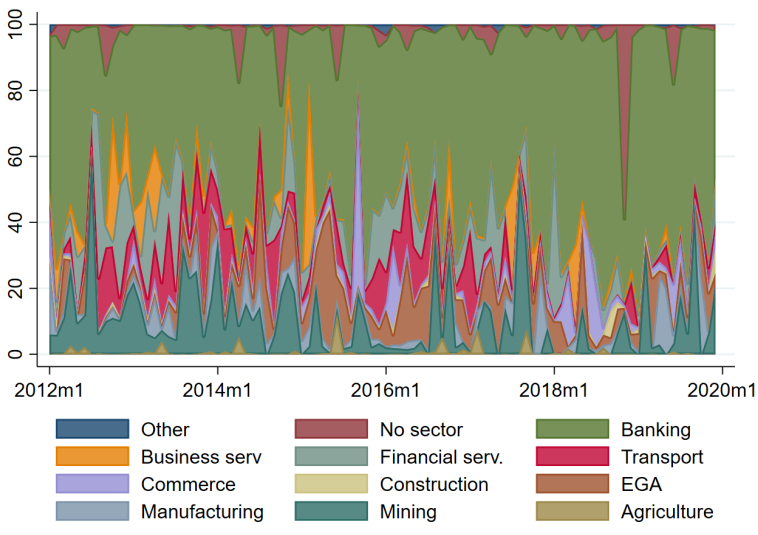
4. What are the **real** effects of shocks to the GFC over firms that borrow **domestically** from banks? $\uparrow Spread_{banks} \rightarrow \uparrow \hat{i}_{f,b} \rightarrow$ $\downarrow ln(k_{f,t}/k_{f,t-12})$ ($<$ Q3)

Dataset combines 7 confidential microdatasets

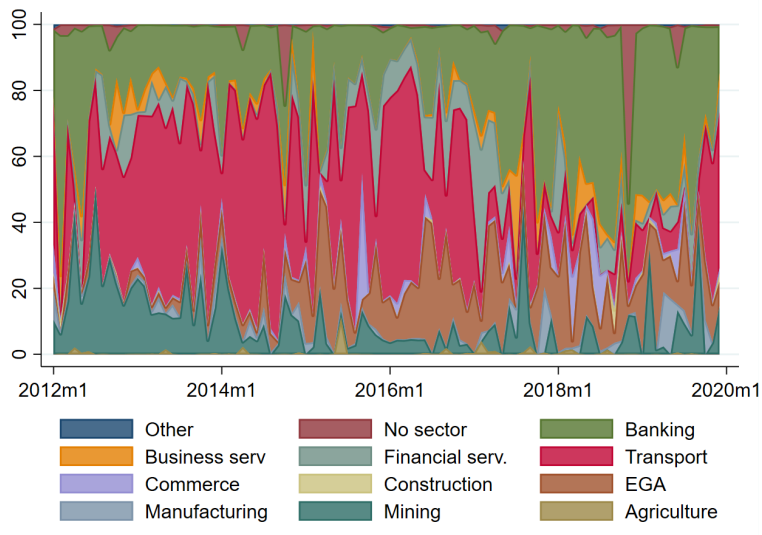
1. Capital Inflows: universe of borrowing transactions (bonds & loans) between firms and foreign lenders (spreads, loan amounts, currency, maturity, etc.)
2. Credit registry: universe of domestic stock and flows of firms' bank debt (rates, loan amounts, etc.)
3. Bond Issuance: universe of firms' bond issuance in the domestic financial market
4. Production: tax forms for the universe of firms, includes sales, expenditures, value-added
5. Labor: employer-employee dataset with hiring decisions
6. Balance sheet data: debt and capital stock of domestic firms
7. Capital stock: capital-stock data

Descriptive statistics - Sectoral foreign borrowing

- Time coverage: April 2012 to December 2019 at a monthly frequency
- Banks are the main foreign borrowers
- Among non-financial firms, the main foreign borrowers belong to capital-intensive sectors (mining, transportation, energy)



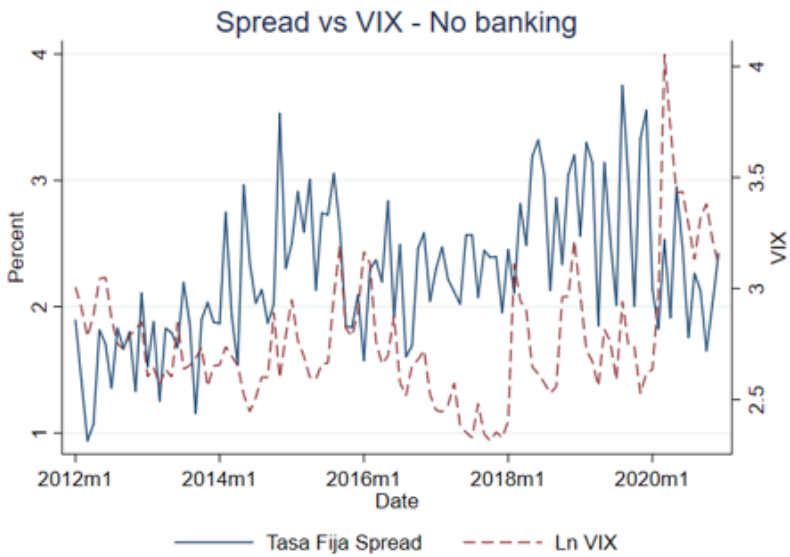
(a) Flows

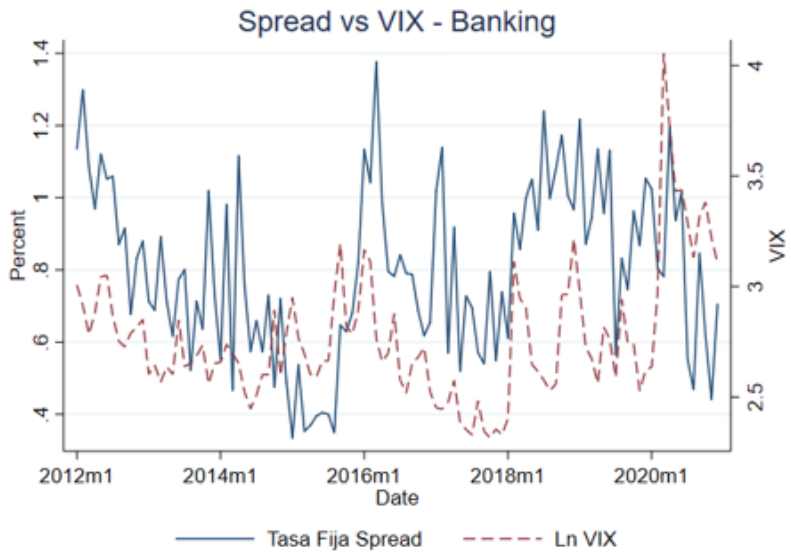


(b) Stock

Descriptive statistics - Sectoral foreign borrowing

- Foreign-debt spreads non-financial and financial firms comove with the VIX
- As in Di Giovanni et al. (2021) for Turkey, our Chilean data arguably a driver of foreign financing costs in EMEs





Q1: GFC shocks $\rightarrow$ firms borrowing abroad

- Proxy the GFC with the *VIX* index and estimate:

$$\begin{aligned} s^{\star}_{f,d,l,m} = \alpha_f + \lambda Trend_m + \Psi log(VIX_{m-1}) + \delta FX_{f,d,l,m} + \Theta_1 i_{m-1} \\ + \Theta_2 \Delta log(GDP_{m-1}) + \Theta_3 Inflation_{m-1} \\ + \Theta_4 \Delta log(XR_{m-1}) + \Theta_5 Copperprice_{m-1} \\ + \Theta_6 Firm_{f,m-1} + \epsilon_{f,d,l,m} \end{aligned} \quad (1)$$

- $s^{\star}_{f,m,d}$: spread faced by firm f at period m on type-l bonds issued at currency d
- $Firm_{f,m-1}$: vector of firm-level controls (value added, market share, debt-to-revenue ratio)

A1: spread ↑ by 32 bp

	(1) All	(2) Banking Variable	(3) NonBanking	(4) NonMinning
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

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

Q2: Pass through to domestic loan market

- Use 2SLS
- Second Stage:

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

- Where $\hat{s^\star}_{b,m} = \sum_l w_l \sum_d w_d \hat{s^\star}_{b,d,l,m}$

A2: Banks pass through ≈ 0.62 of increased costs

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	

Q3: Real effects of GFC shocks for firms borrowing abroad

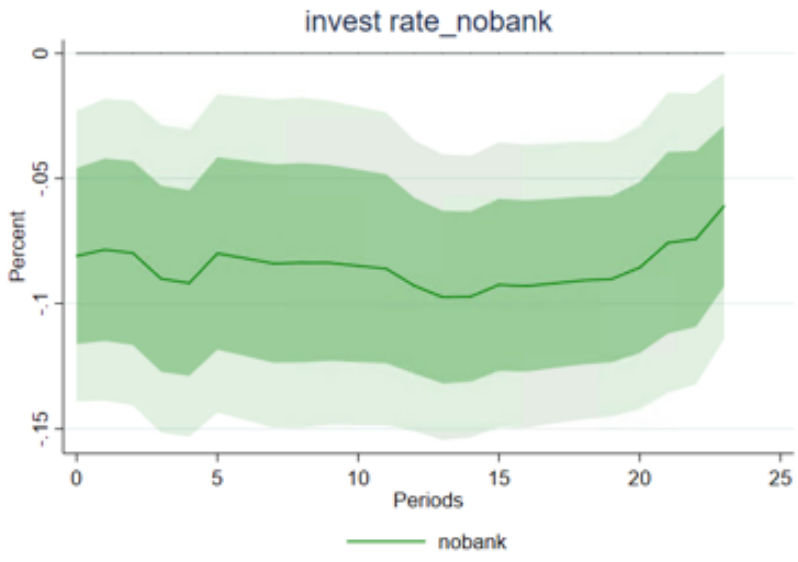
- Again, use 2SLS. Second stage:

$$\begin{aligned} logZ_{f,m} = \alpha_f + \lambda Trend_m + \beta \hat{s^\star}_{f,m} + \Theta_0 logZ_{f,m-12} + \Theta_1 i_{m-1} \\ + \Theta_2 \Delta log(GDP_{m-1}) + \Theta_3 Inflation_{m-1} + \Theta_4 \Delta log(XR_{m-1}) \\ + \Theta_5 Pricecopper_{m-1} + \Theta_6 Firm_{f,m-1} + \epsilon_{f,m} \quad (3) \end{aligned}$$

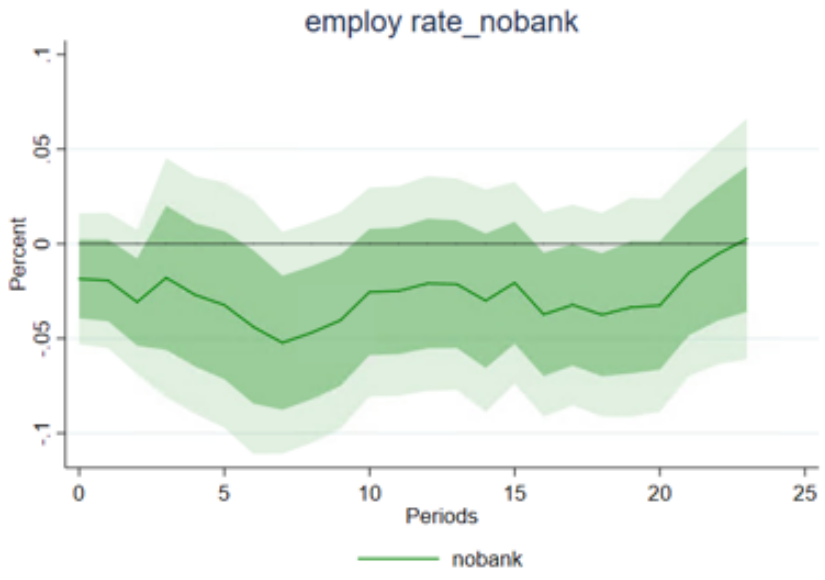
- Where $Z_{f,m} = \{k_{f,m}, n_{f,m}\}$ and $\hat{s^\star}_{f,m} = \sum_l w_l \sum_d w_d \hat{s^\star}_{f,d,l,m}$
- We estimate the local projections up to 24 months
- Include $logZ_{f,m-12}$ (see Montiel Olea and Plagborg-Moller, 2021)

Investment ↓, no effect on employment

- Local projection for firms that directly borrow abroad:



(a) Investment



(b) Employment

Q4: Real effects of GFC shocks for firms borrowing domestically

- Use 3SLS. Third stage:

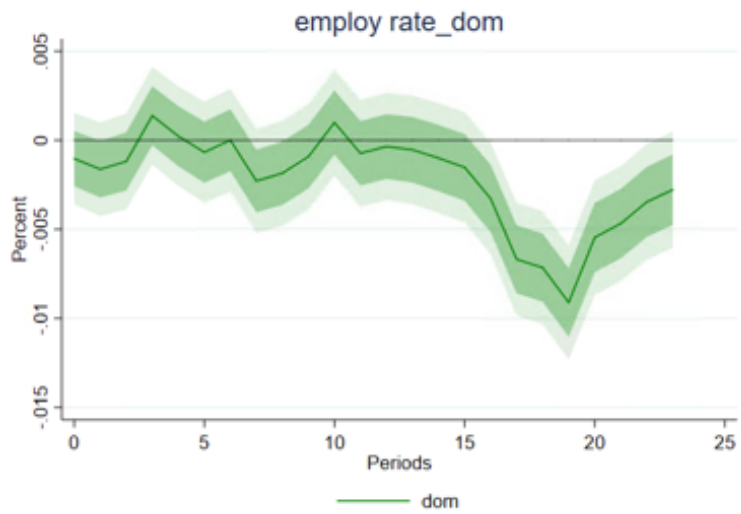
$$logZ_{f,m} = \alpha_f + \lambda Trend_m + \beta \hat{i^\star}_{f,m} + \Theta_0 logZ_{f,m-1} + \Theta_1 i_{m-1} + \Theta_2 \Delta log(GDP_{m-1}) + \Theta_3 Inflation_{m-1} + \Theta_4 \Delta log(XR_{m-1}) \Theta_5 PriceCopper_{m-1} + \Theta_6 Firm_{f,m-1} + \epsilon_{f,m} \quad (4)$$

- Where $Z_{f,m} = \{k_{f,m}, n_{f,m}\}$ and $\hat{i^\star}_{f,m} = \sum_b w_b \sum_l w_b \hat{i^\star}_{f,b,l,m}$
- We estimate the local projections up to 24 months

A4: smaller ↓ in investment, no short-run change in employment

- Local projection for firms that borrow domestically from banks:

(a) Investment



(b) Employment

Conclusions

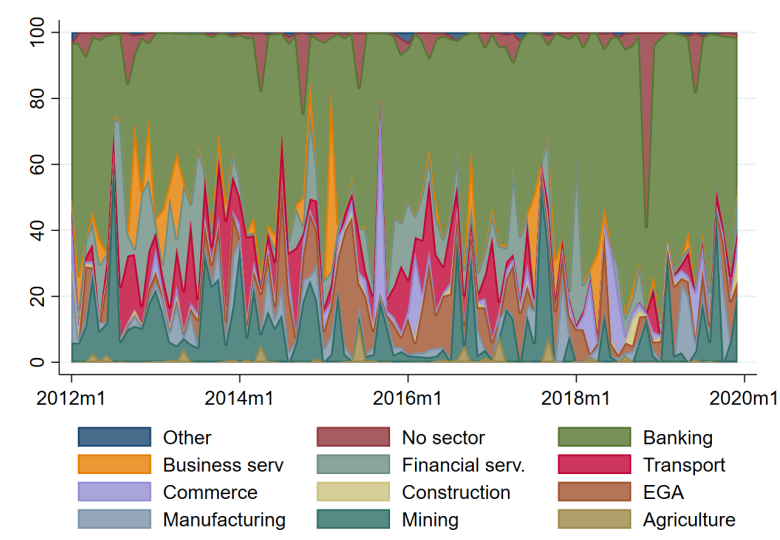
- The passthrough of shocks abroad affects firms borrowing abroad directly and firms borrowing domestically
- Banks emerge as shock-absorbers, as they only passthrough about half the shock to the domestic loan market
- Global shocks have real effects over investment
- These are larger for firms borrowing abroad directly
- Tradeoff: Borrowing abroad at cheaper rates (Kalemli-Ozcan & Varela 2024; Gutierrez, Ivashina, Salomao 2024) **vs** Borrowing domestically with less vulnerability to foreign shocks
- Relevant mechanism: Aside from TFP, **sectoral capital-intensity** likely matters for the transmission of foreign shocks

External debt Statistics: Sector

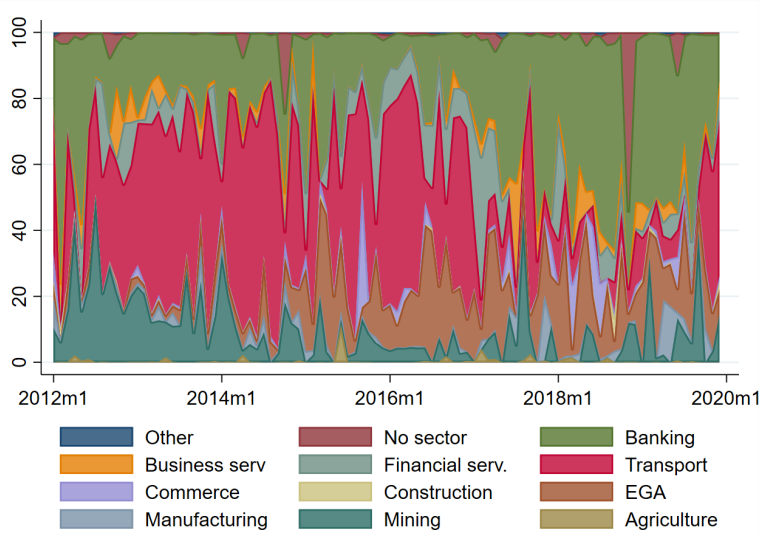
Sector	Firms (%)	Loans (%)	Loan amount (%)
Other	0.75	3.28	0.22
Agriculture	1.71	5.76	0.64
Mining	3.54	2.96	12.06
Manufacturing	4.73	10.56	3.92
EGA	6.39	8.56	6.64
Construction	2.76	5.92	0.59
Commerce	7.85	16.08	4.87
Transport	4.40	4.96	6.91
Financial Serv.	8.41	18.64	8.38
Business Serv.	4.90	9.52	4.13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

Note: Other: Real state and Personal services. Loan amount in January 2019 USD.

External debt Statistics: Sector



(a) Desembolsos



(b) Stock

Note: Other: Real state and Personal services. Loan amount in January 2019 USD.

External debt Statistics: Size

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

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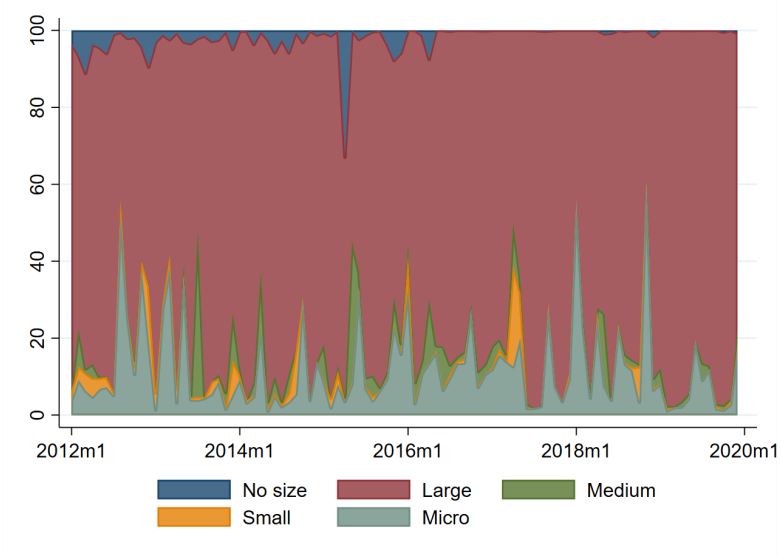

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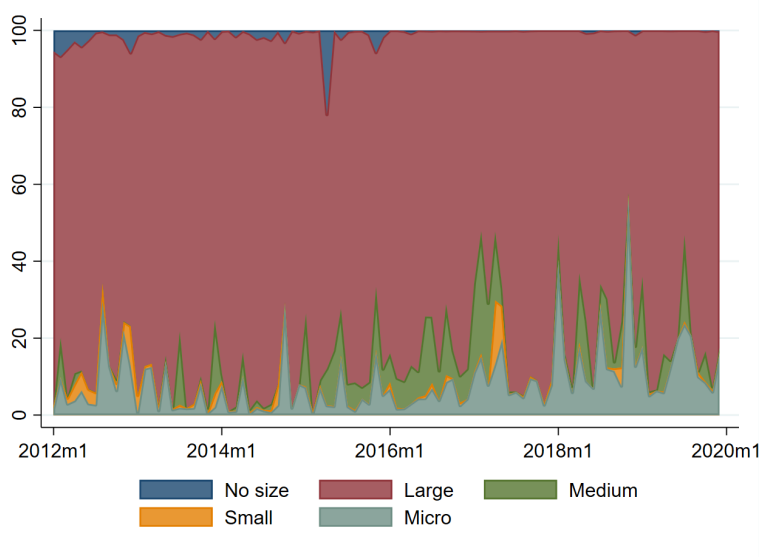

(b) Stock