

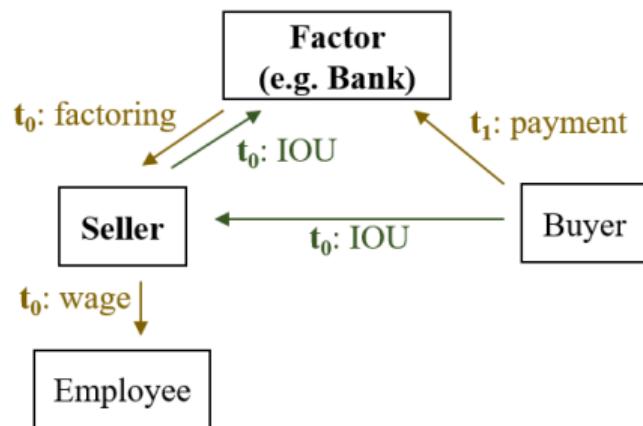
Firm-Level and Aggregate Effects of Cheaper Liquidity: Evidence from Factoring

Victor Orestes (MIT)
Thiago Christiano Silva (BCB)
Henry Zhang (MIT)

March 22, 2025

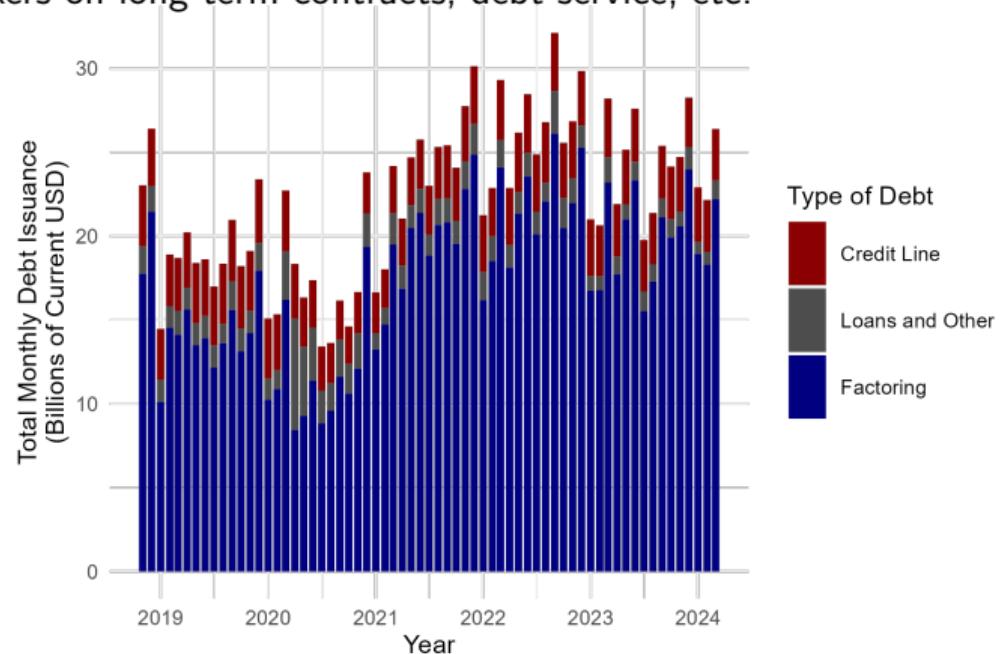
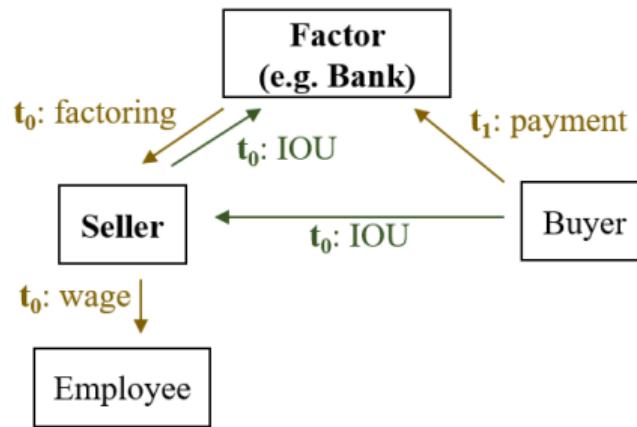
Factoring is the Sale of Accounts Receivable Arising from Trade Credit

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Factoring is the Main Type of Intermediated working capital financing

Cash flow volatilities

By credit score

With trade credit

Worldwide

Trade finance

Overview of this Paper

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IV local projection → dynamic responses to a 1 pct pt decrease in the factoring interest rate:

- ① Large increases in revenue (6.1 log pts) and input expenditure (3.6 log pts) that taper to 2 log pts after several months
- ② Substitution with input expenditure flexibility: Firms use fewer temporary employees (2.1 log pts) and more permanent employees (1.1 log pts) in short run, more of both in long run
- ③ Small effects on trade credit terms, with limited supply chain spillovers: maturity transmission to suppliers (0.7 fewer days) and trade credit to customers (0.4 more pct pts)

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Model → macro-responses to a 1 pct pt decrease in the aggregate factoring spread are 0.3 to 0.5 for output and wage outcomes

Contribution: First Causal Estimate of the Impacts of Factoring Supply

Empirical estimates of real effects of credit supply shocks: Chodorow-Reich (2014); Zwick, Mahon (2017); Huber (2018); Greenstone et al (2020); Alfaro et al (2021)

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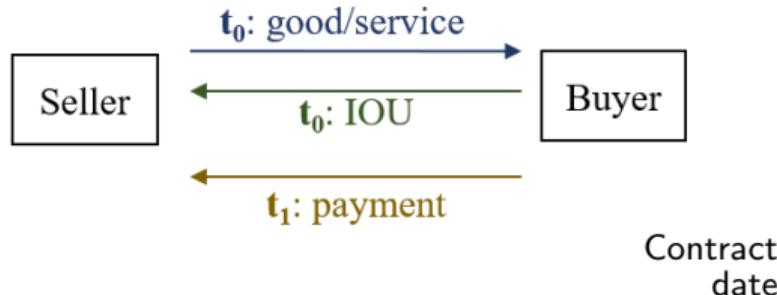
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Nonbank credit supply: Fleckenstein et al (2021); Gopal, Schnabl (2022); Chernenko, Erel, Prilmeier (2022); de Fiore, Gambacorta, Manea (2023) Fund flows: Coval, Stafford (2007); Edmans, Goldstein, Jiang (2012); Wardlaw (2020); van der Beck (2022); Dou, Kogan, Wu (2023); Darmouni, Siani, Xiao (2023)

- Receivables fund flows shift firms' factoring price since funds directly purchase receivables from firms; in aggregate, fund growth has coincided with lower spreads.

Background on Trade Credit in Brazil

In Brazil, most firm-to-firm transactions use boletos, the invoice payment rail, specifying the amount, the *contract* date, and the *due* date of payment from the buyer to the seller



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Pagador				
[shopperName] [socialSecurityNumber]				

Be the difference. Mine.

FICHA DE COMPENSACÃO

Trade Credit, Payments, Factoring, and Bank Credit Data

We construct a comprehensive transaction-level dataset of boletos from the Central Bank of Brazil (BCB), from November 2018 to March 2024

- 21.4 billion transactions, 204 thousand sellers to firms, 470 thousand buyers

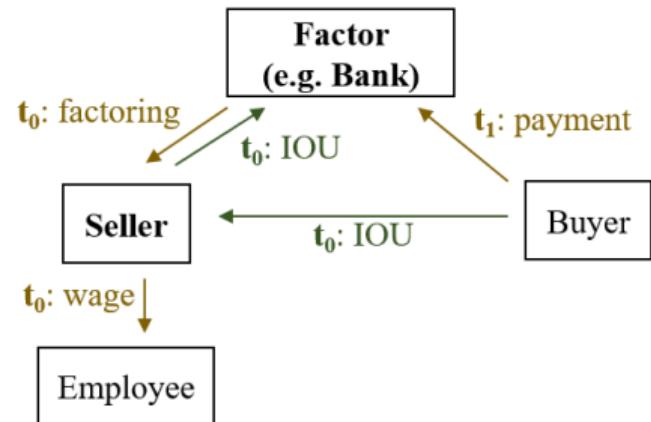
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Along with comprehensive transaction-level data for bank transfers (TED), instant payments (PIX), and credit operations (SCR), also from the BCB

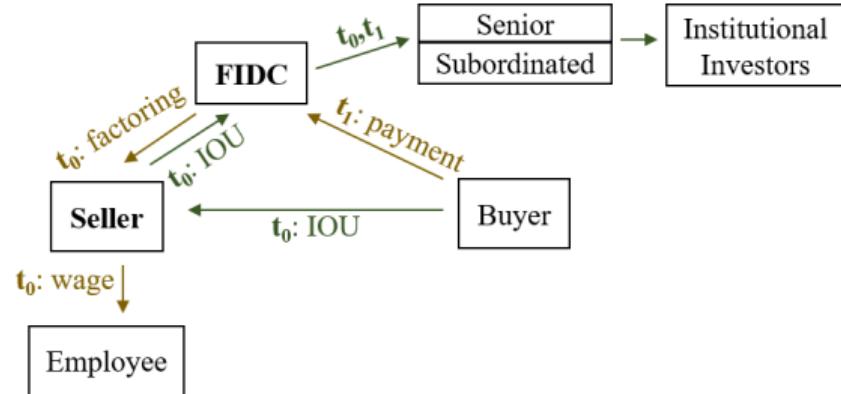
- We are the first to correctly use the factoring data from the BCB, given the challenging structure of how factoring is recorded in its relational databases
- **We are the first to use comprehensive data on factoring for all firms in an economy**



Why Brazil? Receivables Funds (FIDCs)

FIDCs are mutual funds whose primary assets are receivables purchased directly from firms.

- 73% of assets are receivables, most of the remainder are Brazilian T-bills
- 762 FIDCs, mostly multi-sector, buy receivables from 251k firms



FIDC spreads have decreased over time

FIDC vs banks summary table

FIDC size

FIDC diversification

FIDC IV construction

Monetary policy response

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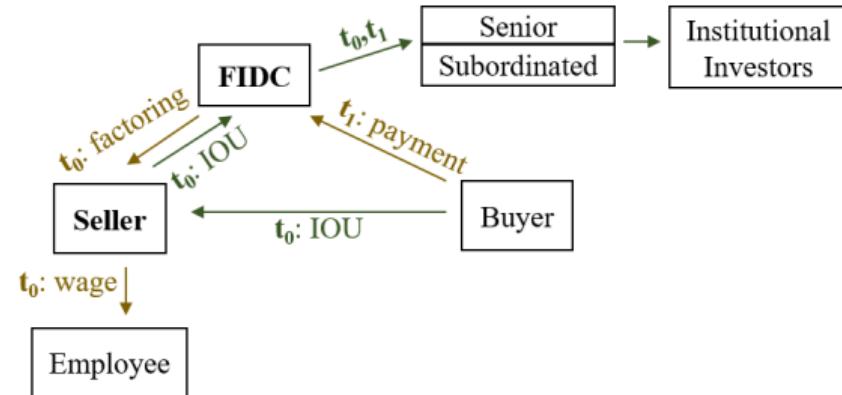
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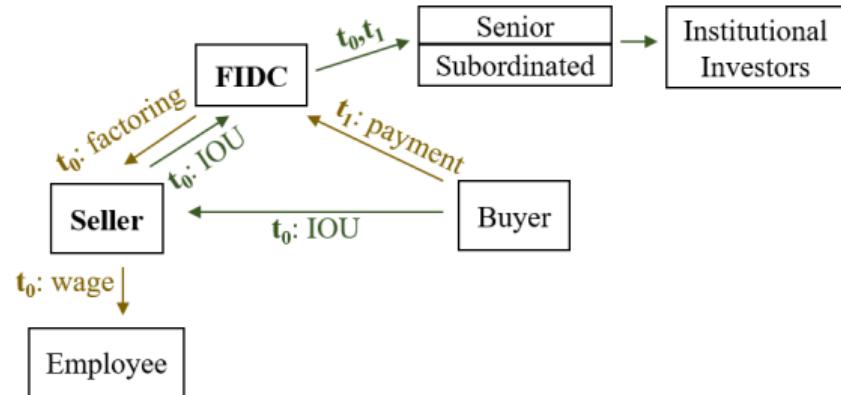
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We construct flows to FIDCs, and firms' exposure, using:

- Fund by share class by month data on returns and NAV from CVM
- Transaction-level fund operations from BCB

[FIDC spreads have decreased over time](#)

[FIDC vs banks summary table](#)

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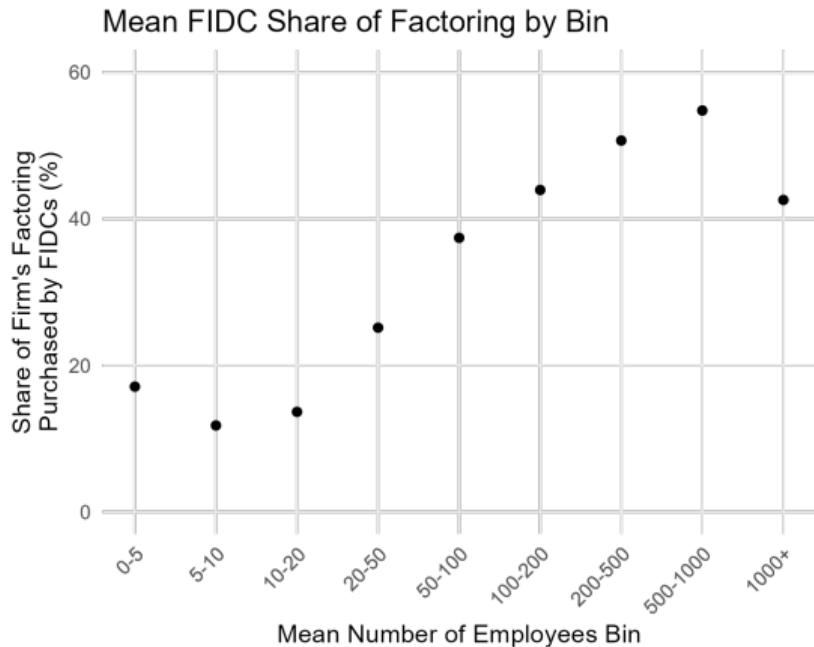
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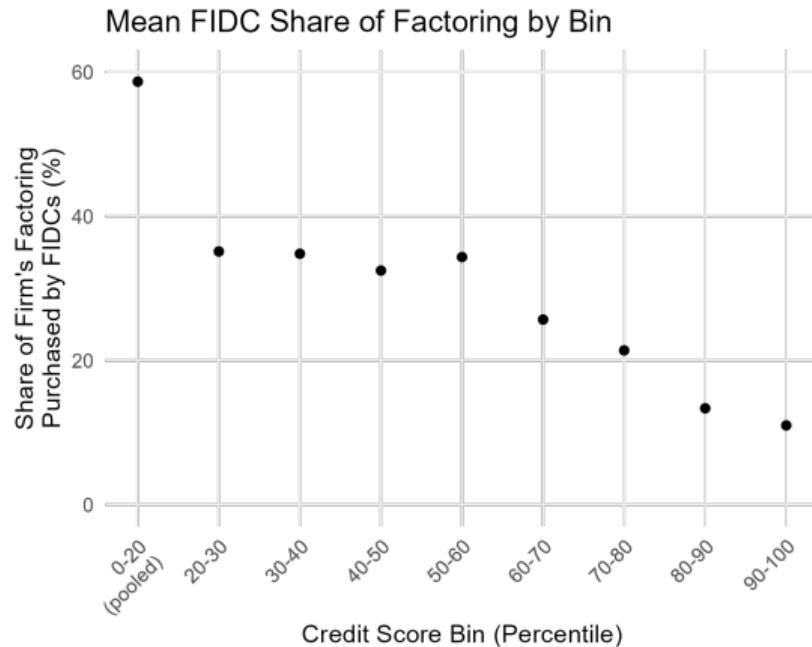
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FIDCs' Receivables Acquisition

FIDCs tend to purchase receivables from *larger* firms (left) with *low credit score* (right)



(a) FIDC Share by Number of Employees



(b) FIDC Share by Credit Score

Estimation: IV Regression on the Firm-Month Panel

How does a supply shock to working capital financing, through the factoring interest rate, impact firms' trade credit terms, production decisions, and firm performance?

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Causal equation: β_1 is the effect of a 1 pct pt increase in factoring interest rate $r_{j,t}^{\text{Fac}}$ on firm j 's outcomes $y_{j,t}$ in month t :

$$y_{j,t} = \alpha_j + \alpha_t + \beta_1 r_{j,t}^{\text{Fac}} + \varepsilon_{j,t}.$$

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Shift-share IV: FIDC flow driven expected purchases $e_{j,t}$ of receivables FIDC flows

- Quasi-exogenous flows (e.g. from liquidity-driven asset reallocation by institutional investors)
- Endogenous exposure, sticky across time

Constructing the Shift-Share IV: Flow-Induced Purchases

Since FIDCs' assets have short maturity, we use flow-induced purchases and “issuance” rather than trading (literature uses bond or equity funds)

- $x_{j \rightarrow f, t}$ is fund f 's purchases of firm j 's receivables
- $X_{f, t}$ is fund f 's total purchases of assets
- $F_{f, t}$ is the net inflow to fund f : $F_{f, t} := \frac{\text{NAV}_{f, t} - \text{NAV}_{f, t-1}}{\text{NAV}_{f, t-1}} R_{f, t}$

Fund by factoring type by month exposure $e_{j, t}$ to funds' flows is

$$e_{j, t} := \sum_f \underbrace{\frac{x_{j \rightarrow f, t}}{X_{f, t}}}_{\text{Shares}} \underbrace{F_{f, t}}_{\text{Shifts}}$$

where \underline{t} denotes the cumulative mean until time t

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[Return to FIDC Diagram](#)

[Pre-Trend Test](#)

First Stage: Seller firm's factoring interest rate $r_{j,t}^{\text{Fac}}$ on normalized exposure $e_{j,t}$ to fund flows

$$r_{j,t}^{\text{Fac}} = \alpha_j + \alpha_t + \gamma_1 e_{j,t} + \varepsilon_{j,t}$$

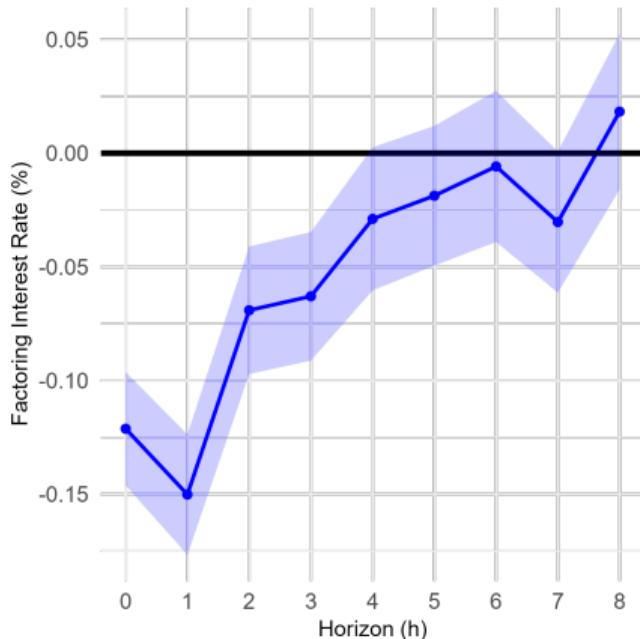
First Stage	
IR Factoring Issuance (All)	
(1)	
$e_{j,t}$	-0.1212*** (0.0127)
Num. Obs.	3,956,731
Num. Firms	322,087
Num. Months	65

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

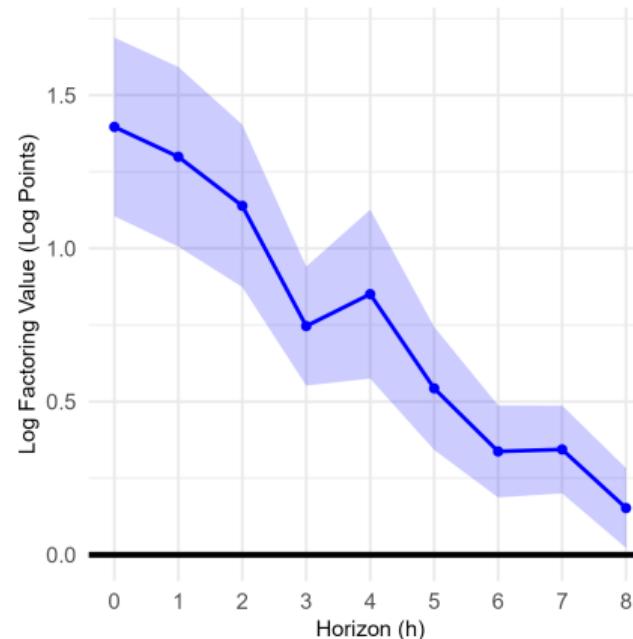
Notes: These regressions use data from the Central Bank of Brazil. The dataset is at the firm by month level, with firm and month fixed effects, and **standard errors clustered at the firm level are in parentheses**. If a firm does not factor in a given month, then there is no interest rate, and the observation is dropped from the regression.

Dynamic Effects: Local Projection First Stage

Dynamic first stage: how does the receivable demand shock $e_{j,t}$ pass through to the factoring interest rate and quantity? $r_{j,t+h}^{\text{Fac}} = \alpha_{j,h} + \alpha_{t,h} + \beta_h e_{j,t} + \varepsilon_{j,t+h}$



(a) Factoring Interest Rate



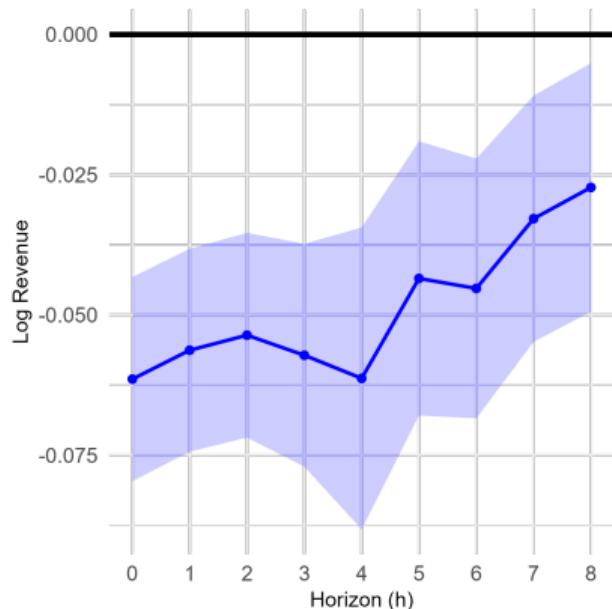
(b) Factoring Quantity

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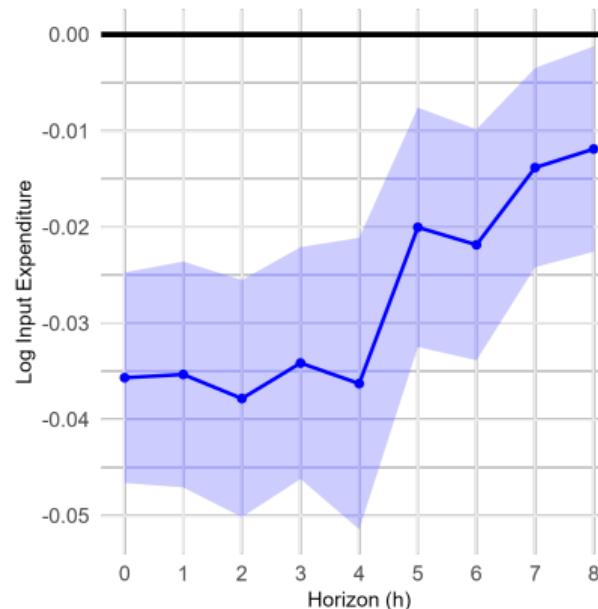
Dynamic Effects: IV Local Projection for Revenue and Expenditure Outcomes

Dynamic IV regressions: how do firms' revenue and input expenditure respond to the receivable demand shock, scaled by the contemporary impulse on the factoring interest rate?

$$y_{j,t+h} = \alpha_{j,h} + \alpha_{t,h} + \beta_h r_{j,t}^{\text{Fac}} + \varepsilon_{j,t+h}$$



(a) Log Revenue (IV)

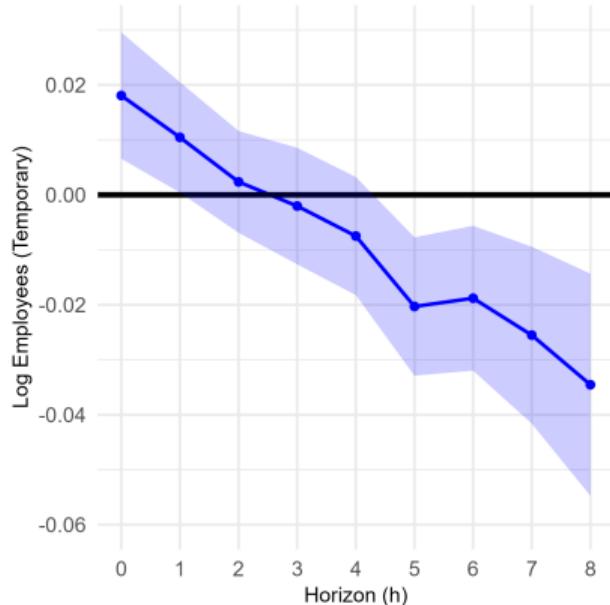


(b) Log Input Expenditure (IV)

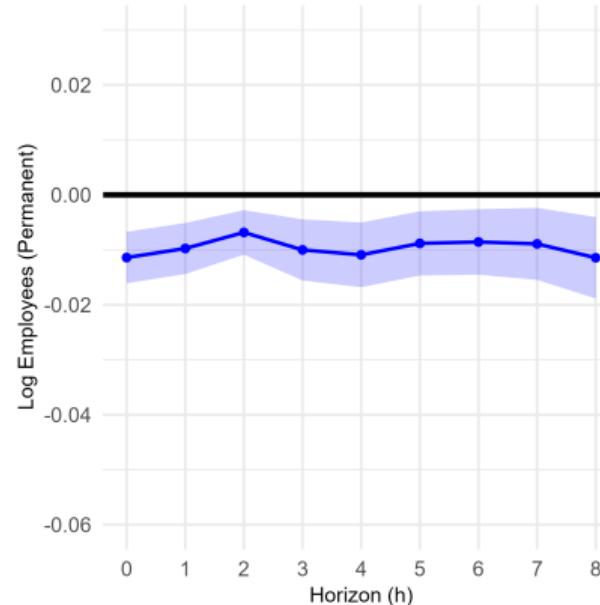
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Dynamic Effects: IV Local Projection for Labor Demand Outcomes

Dynamic IV regressions: how do firms' labor demand respond to the receivable demand shock, scaled by the contemporary impulse on the factoring interest rate? $y_{j,t+h} = \alpha_{j,h} + \alpha_{t,h} + \beta_h r_{j,t}^{\text{Fac}} + \varepsilon_{j,t+h}$



(a) Log Temporary Labor (IV)



(b) Log Permanent Labor (IV)

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[Trade Credit LP](#)

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IV Regression, Main Outcomes

$$y_{j,t} = \alpha_j + \alpha_t + \beta_1 \hat{r}_{j,t}^{\text{Fac}} + \varepsilon_{j,t}$$

	(1)	(2)	(3)	(4)	(5)
	Log Revenue	Log Expenditure	Log Wage Bill	Log Hours (Permanent)	Log Hours (Temporary)
$r_{j,t}^{\text{Fac}}$	-0.0614*** (0.0093)	-0.0357*** (0.0056)	-0.0056* (0.0023)	-0.0110*** (0.0023)	0.0212*** (0.0064)
Num. Obs.	2,668,026	4,076,721	2,543,940	2,545,958	607,036
Num. Firms	217,956	476,418	287,108	287,201	93,156
Num. Months	65	65	50	50	50

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level in parentheses. The predictor variable is the firm-level interest rate on factoring in percentage points, instrumented by the expected change in receivables purchases driven by fund flows. The response variables are the log revenue proxied by payment inflows, log intermediate input expenditure proxied by payment outflows to firms, log wage bill, log labor demand for permanent workers, and log labor demand for temporary workers

Heterogeneity Overview

We test two dimensions of firm heterogeneity:

- IV regressions with interactions of firm type (size, credit score, HHI) θ_k

$$y_{j,t} = \alpha_j + \alpha_t + \sum_k \beta_k \hat{r}_{j,t}^{\text{Fac}} \theta_{j,k} + \varepsilon_{j,t}.$$

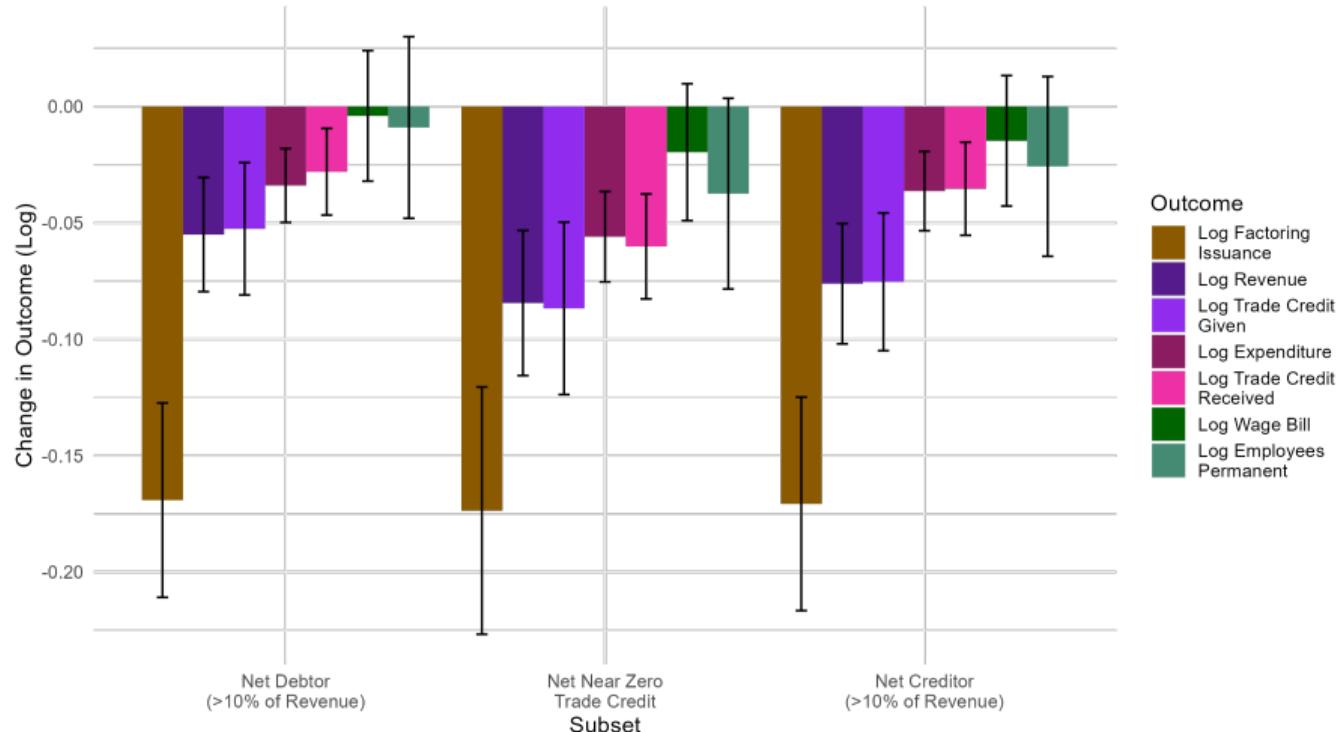
- IV quantile regressions: how do firms at different points in the outcome distribution respond to the factoring interest rate?

$$Q_{\tilde{y}_{j,t}}(\tau | \tilde{\hat{r}}_{j,t}^{\text{Fac}}) = \beta(\tau) \tilde{\hat{r}}_{j,t}^{\text{Fac}} + \varepsilon_{j,t}(\tau)$$

where \tilde{y} and $\tilde{\hat{r}}$ are de-meaned on firm and month FE

We find no significant heterogeneity except in the quantile regressions for revenue and input purchase, where the bottom quantiles had larger effects

Heterogeneity By Firm Type: Interaction with Trade Credit Position



Maturity

Size

Sector

Credit Score

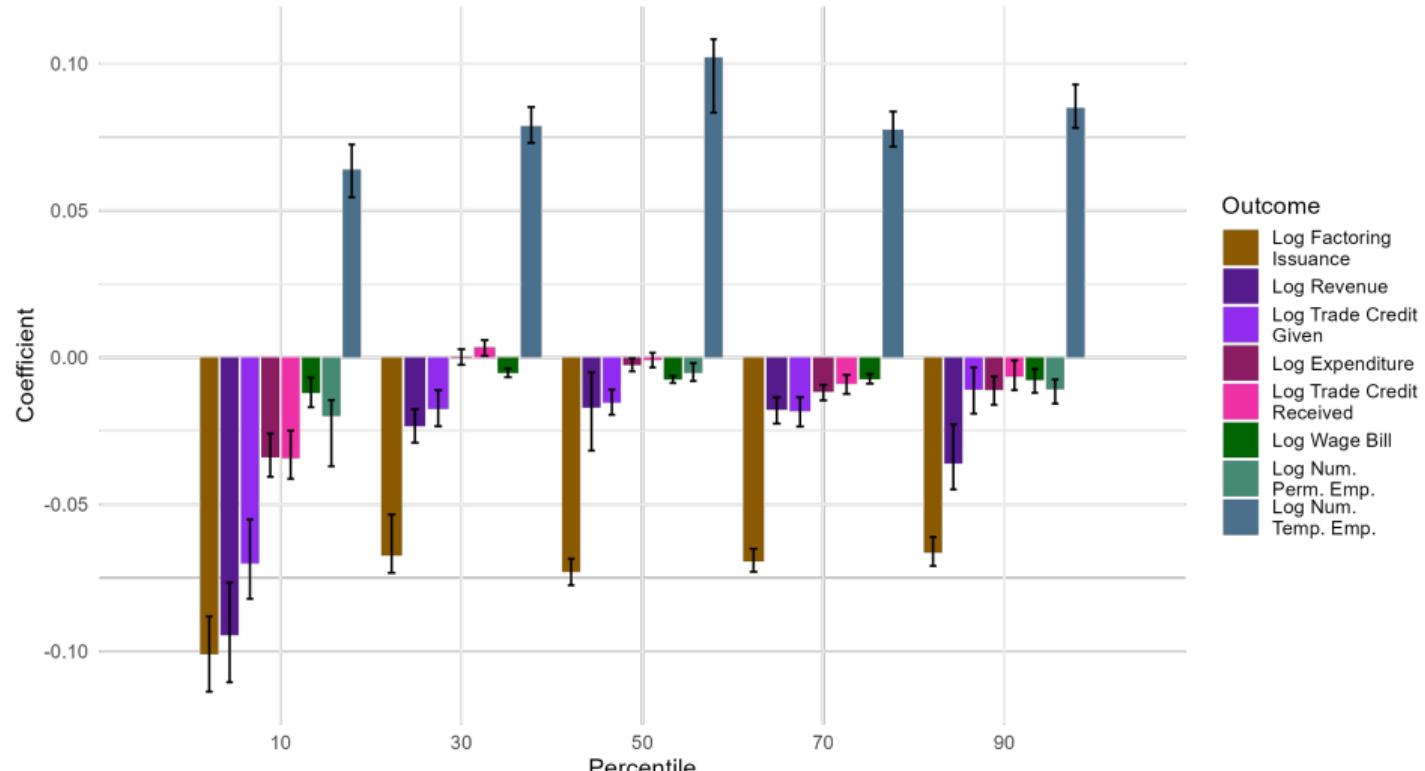
Trade Credit

HHI

Bilateral HHI

Buyer Risk

Quantile Regression: Main Outcomes



This graph uses Koenker (2005) rank inversion for SEs.

Canay (2011) SE

Maturity

Hours Worked

Summary of Empirical Results and Overview of Model

One percentage point decrease in factoring interest rate causes

- Large increases in factoring (15.4 log pts), revenues (6.1 log pts), and intermediate input expenditure (3.6 log pts).
- Wage bill rises by 0.56 log pts, decomposed into differential changes across labor contracts: permanent labor increases by 1.1 log pts, and temporary labor decreases by 2.1 log pts.
- *Heterogeneity:* Estimates are similar across all metrics of firm heterogeneity, except that net creditors of trade credit have larger effects compared to net debtors

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The purpose of the model is to

- ① Rationalize the micro-level empirical estimates
- ② Compute responses of aggregate outcomes to a change in the aggregate factoring spread
 - Trends in digital technology (e.g. receivables tokenization), central bank policy (e.g. registries), and investor demand for receivables continued decrease in factoring spreads

Model Setup: Firm Block

- **Firms:** A unit continuum of monopolistically competitive firms producing differentiated goods across two periods, morning (0) and afternoon (1)
- **Production Function:** Firms use a Cobb-Douglas production function over labor ℓ and intermediate inputs x with labor share α

$$\text{Aggregation: } Y_t = \left(\int_{j=0}^1 y_{jt}^{\frac{s-1}{s}} dj \right)^{\frac{s}{s-1}}, \quad P = \left(\int_{j=0}^1 p_j^{-(s-1)} dj \right)^{-\frac{1}{s-1}} \equiv 1.$$

- **Payments:** Wages are always upfront, so are afternoon sales
 - Morning sales: Trade credit with payment in afternoon
- **Liquidity Shocks:** ϵ_j share of morning receivables y_{j0} does not arrive, with firm type $\zeta_j = \mathbb{E}_0 \epsilon_j$

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Model Setup: Labor and Financing

- **Labor Types:**

- Permanent labor ℓ^P : Fixed for both periods, more productive by ψ in afternoon.
- Temporary labor ℓ_t^T : Adjustable at each period t .

- **Labor Composite:** Constant elasticity of substitution $\sigma > 1$ with share ς on permanent labor:

$$\ell_{jt} = \left(\varsigma (\psi_t \ell_j^P)^{\frac{\sigma-1}{\sigma}} + (1 - \varsigma) (\ell_{jt}^T)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}.$$

- **Factoring:**

- Firms factor B_j^F in the morning with credit limit equal to morning receivables y_{j0} minus interest
- Factoring interest rate R_j^F is based on the share of shocked inflows:

$$R_j^F = \frac{\beta^{-1} \mu^F}{1 - \zeta_j}.$$

Model Setup: Firm Problem in Morning

Taking as given wages $\{w^P, w_t^T\}$ and factoring interest rate R_j^F , choose ℓ_j^P and B_j^F along with other inputs to maximize expected firm value subject to cost of default η :

$$\max_{\{y_{jt}, x_{jt}, \ell_j^P, \ell_{jt}^T, B_j^F\}} \pi_j := \beta \mathbb{E}_0 [\pi_{j1} + \eta \mathbb{1}\{\pi_{j1} < 0\}] + B_j^F - \ell_j^P w^P - \ell_{j0}^T w_0^T,$$

$$\text{s.t. } B_j^F \leq \frac{p_j y_{j0}}{R_j^F},$$

$$B_j^F \geq \ell_j^P w^P + \ell_{j0}^T w_0^T,$$

$$\pi_{j1} := p_j y_{j1} - \ell_j^P w^P - \ell_{j1}^T w_1^T - P x_{j1} + \tilde{m}_{j1},$$

$$\tilde{m}_{j1} := (1 - \epsilon_j) (p_j y_{j0} - R_j^F B_j^F) - P x_{j0}.$$

where \tilde{m}_{j1} is a firm's residual cash in the afternoon from the morning, net of factoring and input purchase

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Model Setup: Firm Problem in Afternoon

Taking as given wages $\{w^P, w_t^T\}$, decisions made in morning $\{y_{j0}, x_{j0}, \ell_j^P, \ell_{j0}^T, p_j, B_j^F\}$, and shock realization ϵ_j , maximize residual profits

$$\begin{aligned} & \max_{x_{j1}, \ell_{j1}^T} \pi_{j1} := p_j y_{j1} - \ell_j^P w^P - \ell_{j1}^T w_1^T - P x_{j1} + \tilde{m}_{j1}, \\ & \text{s.t. } y_{j1} = \tilde{\ell}_{j1}^\alpha x_{j1}^{1-\alpha}, \\ & \quad \tilde{\ell}_{j1} = \left(\omega (\psi \ell_j^P)^{\frac{\sigma-1}{\sigma}} + (1-\omega) (\ell_{j1}^T)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \\ & \quad \frac{p_j}{P} = \left(\frac{y_{jt}}{Y_t} \right)^{-\frac{1}{s}}, \\ & \quad \ell_{j1}^T, x_{j1} \geq 0. \end{aligned}$$

where the $\frac{p_j}{P}$ equation is the standard CES FOC from the aggregator firm's objective function

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Model Setup: Household

Representative household, disutility $\xi > 1$ from labor, relative preference $\nu \in \mathbb{R}$ for permanent vs temporary labor

$$u_t(c_t, \ell_t^T) = \log(c_t) - \sum_{t=0}^1 \left[\frac{1}{\xi} (\ell^P + \ell_t^T)^\xi - \nu(\ell^P - \ell_t^T) \right].$$

Household problem:

$$\begin{aligned} & \max_{\{c_0, c_1, \ell^P, \ell_0^T, \ell_1^T\}} \log(c_0) + \beta \log(c_1) - \sum_{t=0}^1 \left[(\ell^P + \ell_t^T)^\xi + \nu (\ell^P - \ell_t^T) \right], \\ \text{s.t. } & c_0 + c_1 = 2\ell^P w^P + \sum_t \ell_t^T w_t^T, \\ & 1 = 2\ell^P + \ell_0^T + \ell_1^T. \end{aligned}$$

Model Equilibrium

Given model parameters, firms optimize in morning and afternoon, households optimize, and markets clear in each period:

$$Y_t = \left(\int_{j=0}^1 y_{jt}^{\frac{s-1}{s}} \right)^{\frac{s}{s-1}} = c_t + \int_{j=0}^1 x_{jt} \, dj,$$

$$\int_{j=0}^1 \ell_j^P \, dj = \ell^P,$$

$$\int_{j=0}^1 \ell_{jt}^T \, dj = \ell_t^T.$$

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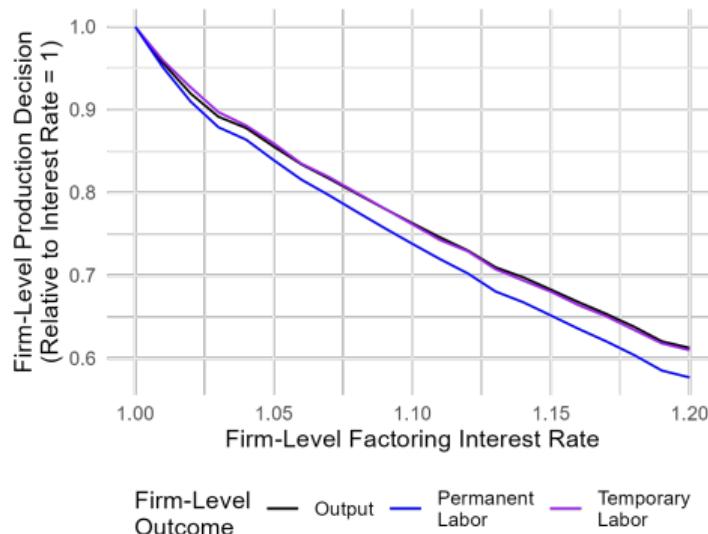
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Model Calibration

Parameter	Value	Description	Method
α	0.43	Cobb-Douglas labor	Data: Expenditure share
ψ	1.31	Gain to experience	Data: Ratio of existing to new hire wage for permanent vs temporary
μ^F	1.13	Factoring markup	Data: IR minus (default rate + 3-month T-bill)
σ	1.80	EoS permanent vs temporary labor	Data: Regression
ω	0.89	CES share parameter on permanent employees	Data: σ and model-derived moment
ν	0.009	Relative labor preference term	Data: model-derived moment
ξ	5.48	Exponential disutility of labor supply, equiv. to a Frisch elasticity of 0.22	BCB SAMBA DSGE
s	11	EoS across differentiated goods	BCB SAMBA DSGE
β	0.979	Discount rate between morning and afternoon	Data: 3-month T bill
η	0.25	Cost of default	Glover (JFE 2016).

Model Results: Firm-Level (PE) vs Aggregate (GE)

On the left is the partial equilibrium, changing R_j^F while holding equilibrium outcomes constant



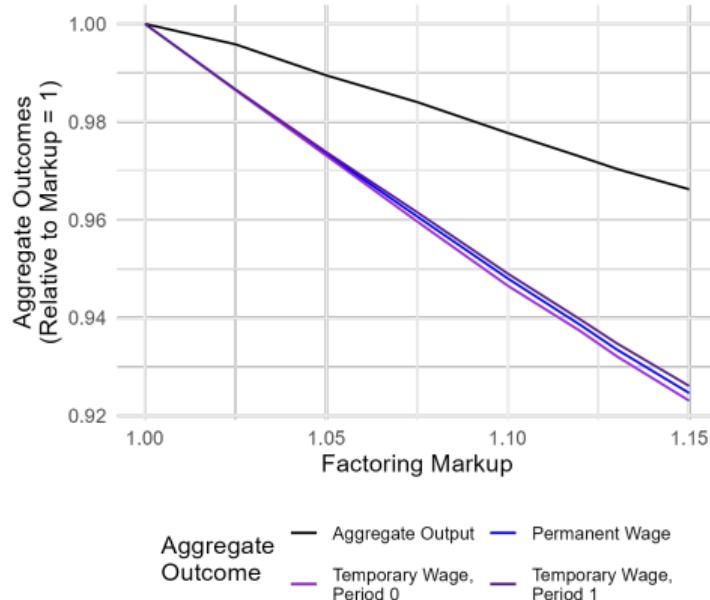
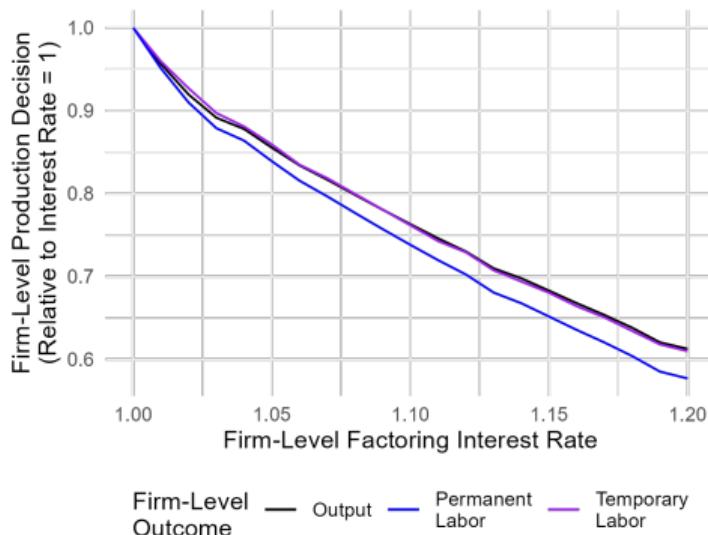
Factoring share

Heterogeneity

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Model Results: Firm-Level (PE) vs Aggregate (GE)

On the left is the partial equilibrium, changing R_j^F while holding equilibrium outcomes constant
On the right is the general equilibrium, changing the economy-wide factoring markup μ^F



Factoring share

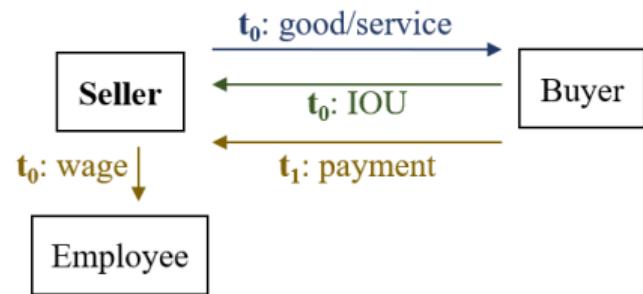
Heterogeneity

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Conclusion

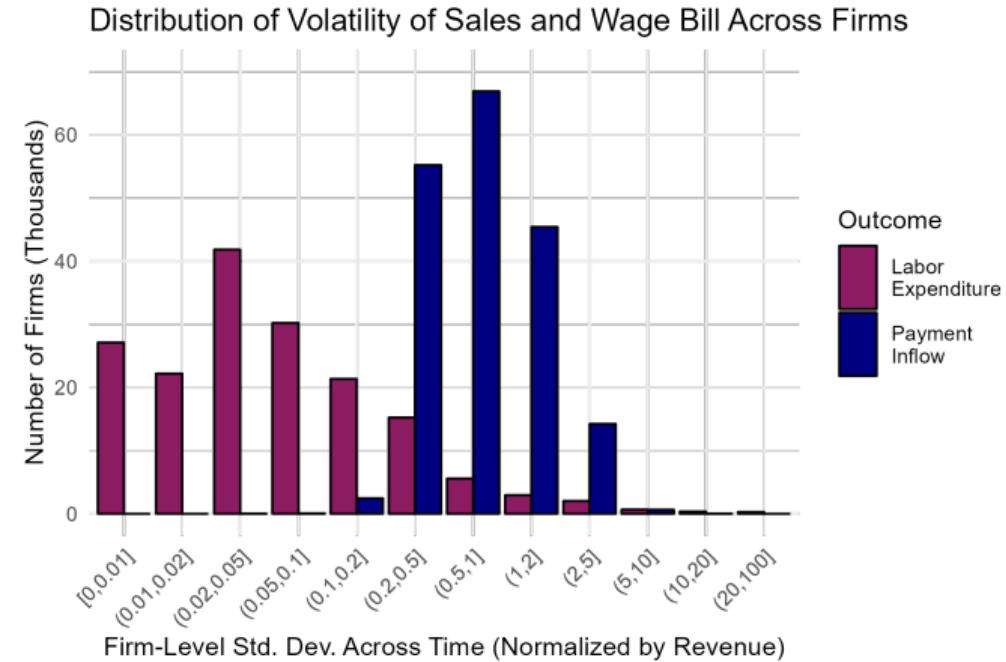
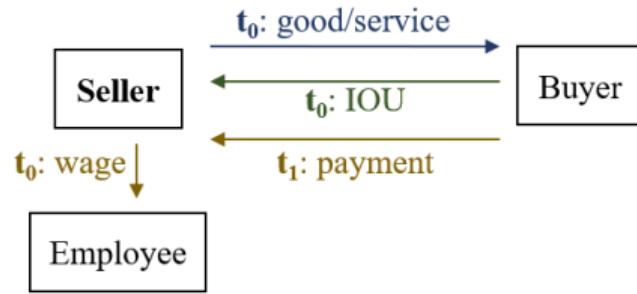
- Factoring is an important type of working capital financing for firms, especially small and credit-constrained firms
 - Factoring mitigates cash flow volatility and supports firms in extending trade credit despite financial constraints
- Regressions: A decrease in the firm-level factoring interest rate leads to large increase in firms' sales, with smaller increases in input purchases and substitution from temporary to permanent labor demand
- Model: Comparably large partial equilibrium effects to the regression estimates
 - General equilibrium effects of a decrease in the aggregate factoring spread are an order of magnitude smaller
- Future research will explore how ongoing policy reforms and fintech innovations affect the supply and demand of working capital financing

Firms' Demand for Liquidity Arises from Cash Flow Volatility Mismatch



Firms' Demand for Liquidity Arises from Cash Flow Volatility Mismatch

Firms' cash inflows are volatile due to timing of sales and payment conditional on sales, but cash outflows have a large inertial component: wage bill for "permanent" workers

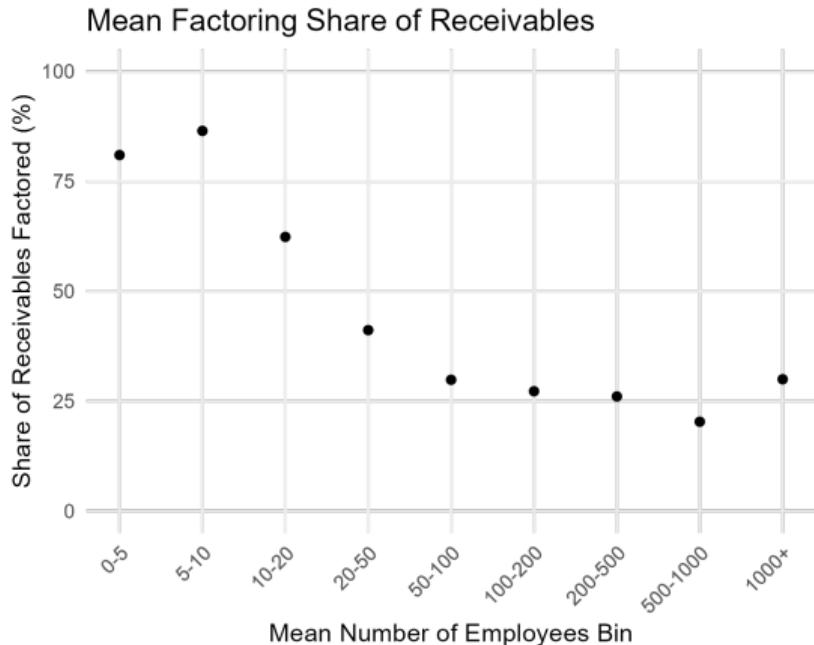


Firms use working capital financing (WCF) to resolve this demand for liquidity

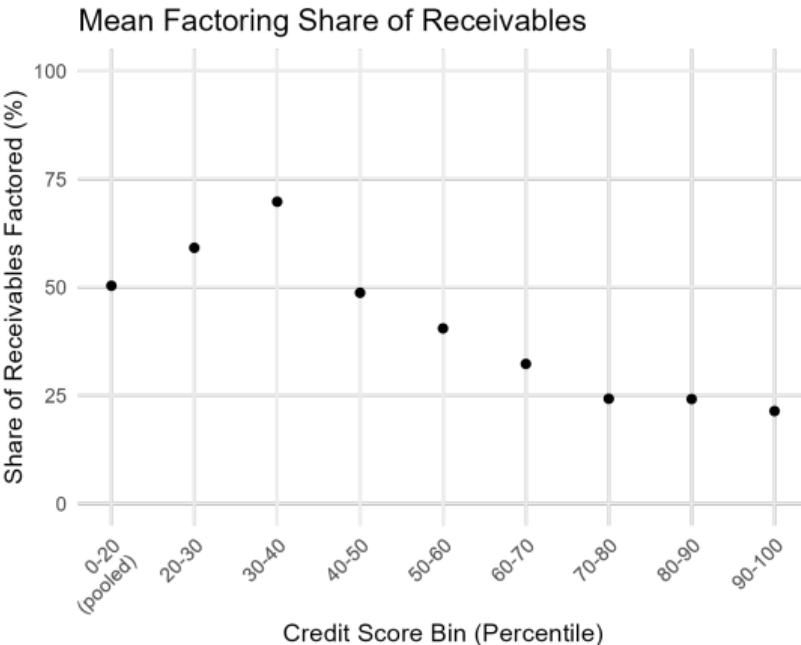
Working capital financing

Small and Low Creditworthiness Firms Factor the Most

Factoring shares by firm size (left) and credit score (right)



(a) by decile of firm size proxied by wage bill



(b) by decile of firm credit score

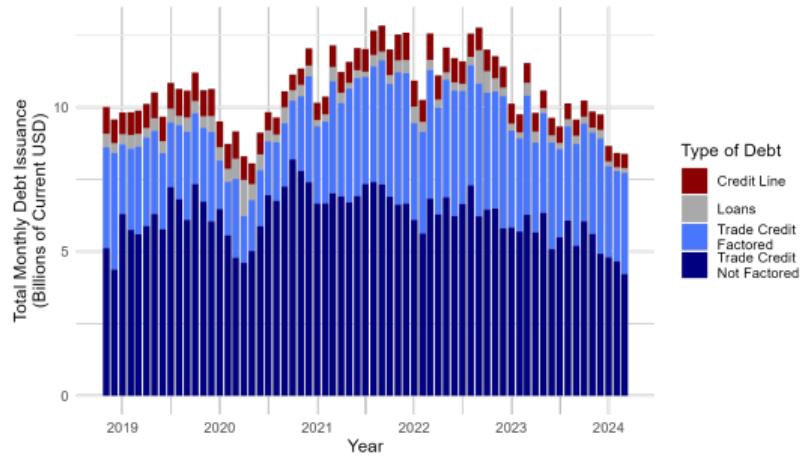
Factoring and Trade Finance

- Factoring differs from **letters of credit** (LoC), a guarantee from the buyer's bank without upfront payment
- In Hong Kong, receivables-backed loans and reverse factoring (buyer-initiated) are also common
- Factoring is well-suited to tokenization and programmable payments
- In international trade, trade insurance and LoC (intermediated through ex-im banks) are more popular than factoring, although this could change with cross-border payment interoperability and standardization of contract enforcement

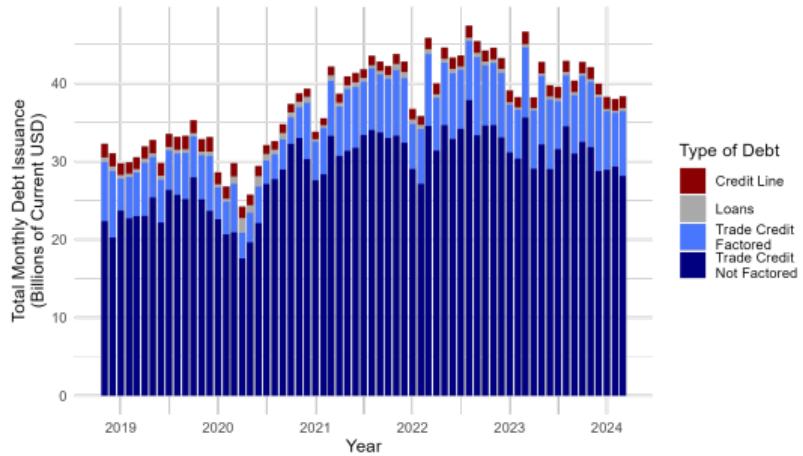
[Return to Factoring Definition](#)

Working Capital Financing Trend by Firm Credit Score

Firms with low credit score (left) factor a larger share of trade credit than firms with high credit score (right)



(a) Low Credit Score



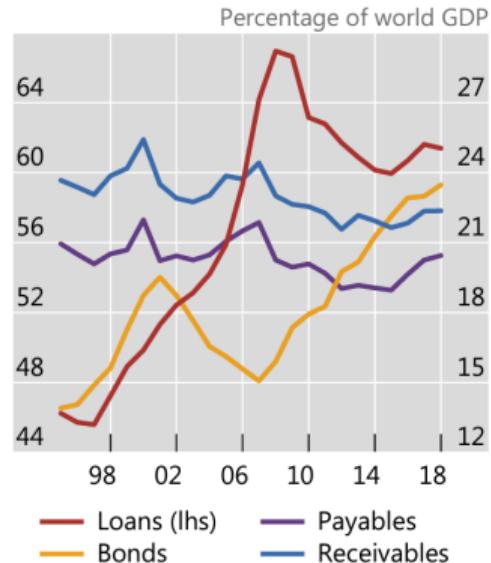
(b) High Credit Score

But all firms heavily rely on trade credit and factoring the receivables from trade credit

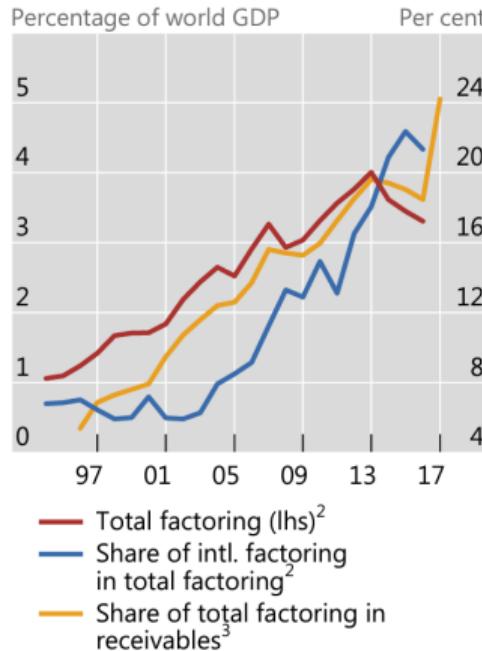
[Return to Overall Factoring Trend](#)

Trade Credit is Widely Used Worldwide, with Increasing Factoring Share

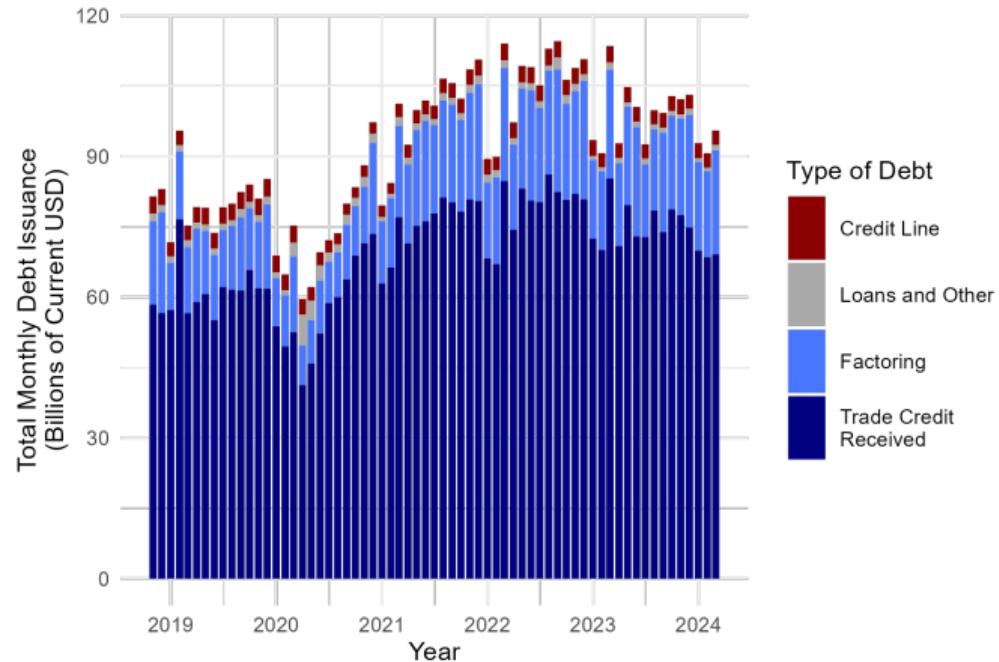
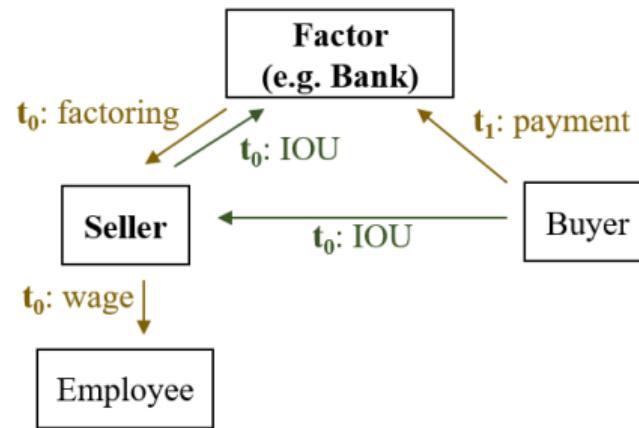
Trade credit, corporate loans and bonds¹



Evolution of factoring over time



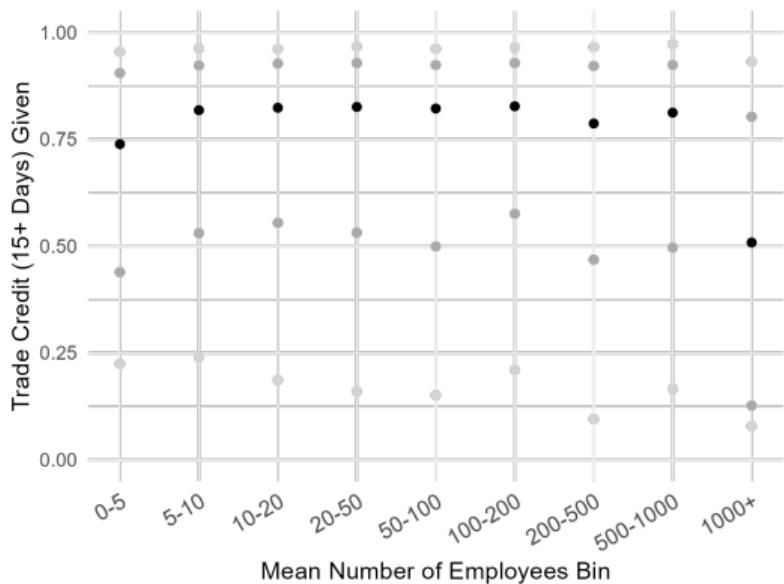
Factoring is the Sale of Accounts Receivable Arising from Trade Credit



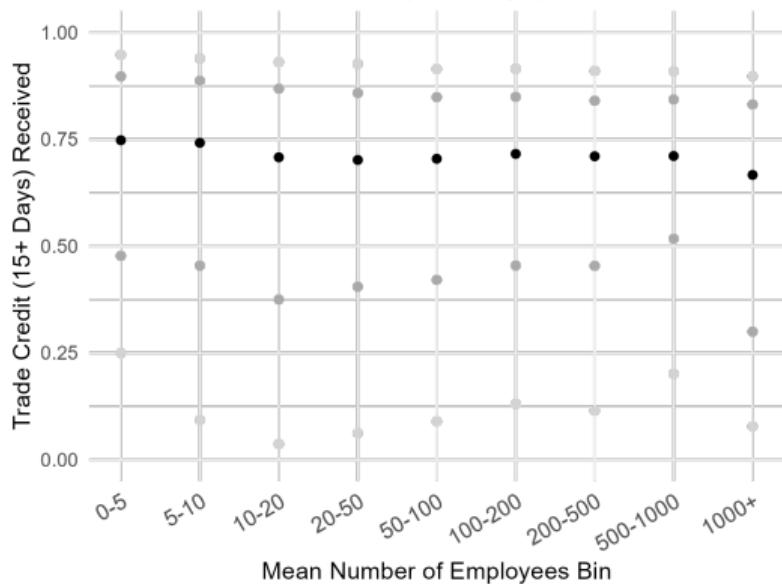
[Return](#)

Most Firms Across the Size Distribution Give and Receive Trade Credit

Dot Plot of Trade Credit (15+ Days) Given

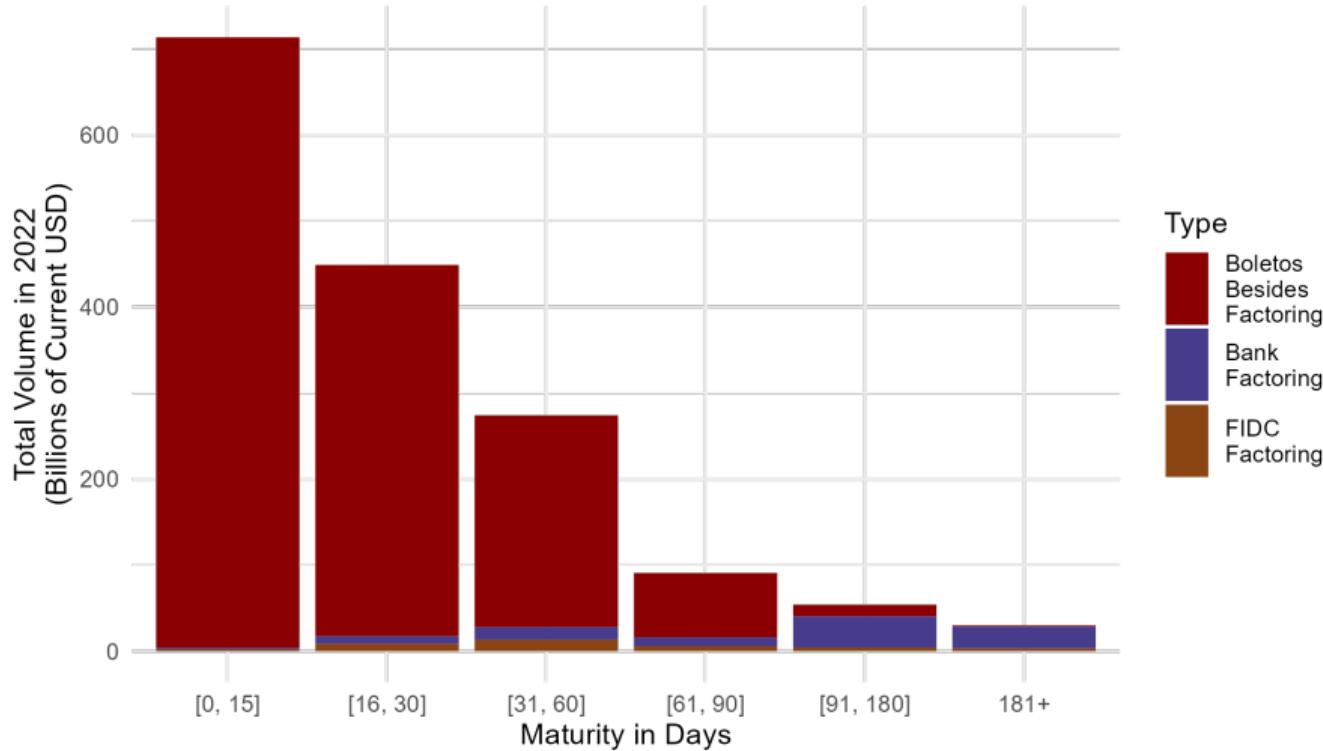


Dot Plot of Trade Credit (15+ Days) Received



Notes: These figures show the median (black), 25th and 75th percentiles (dark gray), and 10th and 90th percentiles (light gray) of the firm-level proportion of payments with maturity of 15+ days, aggregated by bin of firm-level employment.

Longer Maturity Receivables are More Likely to be Factored



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Annual means of trade credit and factoring:

	Mean Overall	Mean Small Firms	Mean Medium Firms	Mean Large Firms
<i>Panel A: Trade Credit Received</i>				
Volume (Million USD)	1.32	0.42	6.17	44.32
Maturity (Days)	30.36	33.99	29.67	28.22
<i>Panel B: Recourse Factoring</i>				
Volume (Million USD)	0.13	0.08	0.56	1.97
Interest Rate (%)	19.42	18.35	21.58	19.52
Maturity (Days)	121.19	138.49	95.77	105.06
<i>Panel C: Non-Recourse Factoring</i>				
Volume (Million USD)	0.15	0.01	0.50	9.12
Interest Rate (%)	13.04	15.54	12.50	13.07
Maturity (Days)	79.86	94.81	86.48	77.17

For the 627k firms with labor data, we observe an annual average of 1.7 billion trade credit contracts and 56.6 million factoring contracts

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Annual means of other working capital financing:

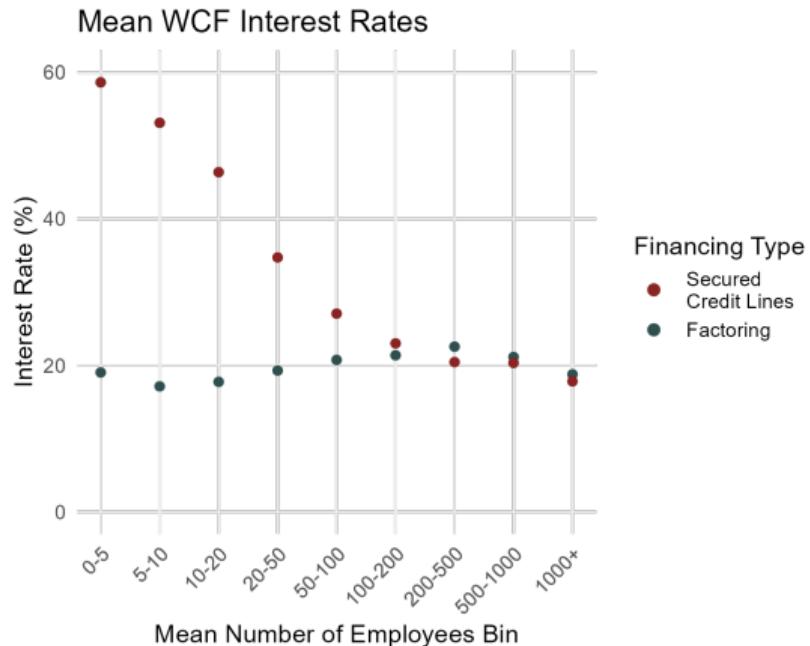
	Mean Overall	Mean Small Firms	Mean Medium Firms	Mean Large Firms
<i>Panel D: Secured Credit Lines</i>				
Volume (Million USD)	0.04	0.02	0.26	0.72
Interest Rate (%)	30.63	45.13	23.24	18.67
Maturity (Days)	66.10	57.22	72.86	69.14
<i>Panel E: Unsecured Credit Lines</i>				
Volume (Million USD)	0.02	0.01	0.07	0.17
Interest Rate (%)	332.07	356.74	316.49	206.32
Maturity (Days)	42.20	41.01	44.82	43.89
<i>Panel F: Other Short-Term Debt (Maturity under 1 year)</i>				
Volume (Million USD)	0.03	0.00	0.13	1.20
Interest Rate (%)	7.04	22.24	10.09	6.65
Maturity (Days)	187.61	181.17	176.71	188.82

For the 627k firms with labor data, we observe an annual average of 1.72 million uses of secured credit line, 7.64 million uses of unsecured credit line, and 3.57 million contracts of other short-term debt

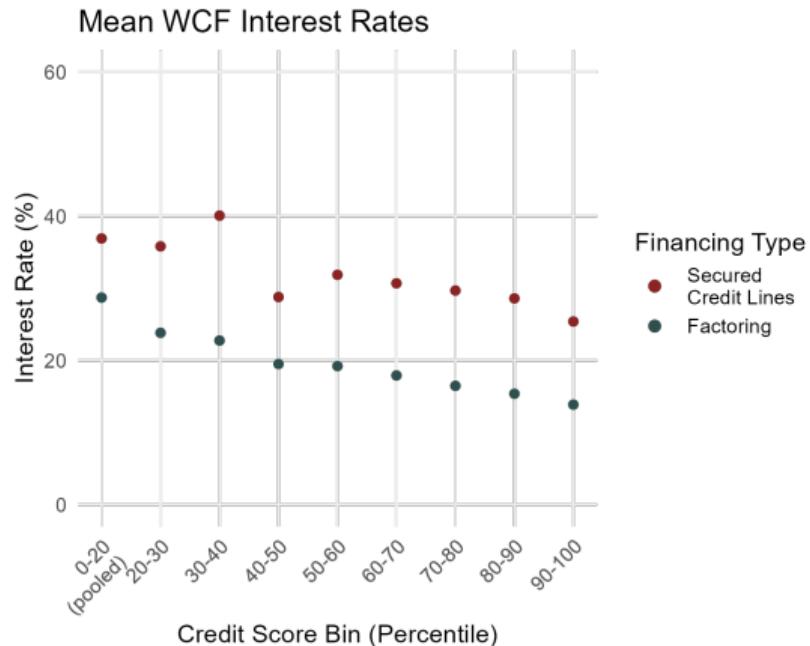
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Interest Rates for Factoring vs Secured Credit Lines

Interest rates over the distribution of firm size (left) and credit score (right)

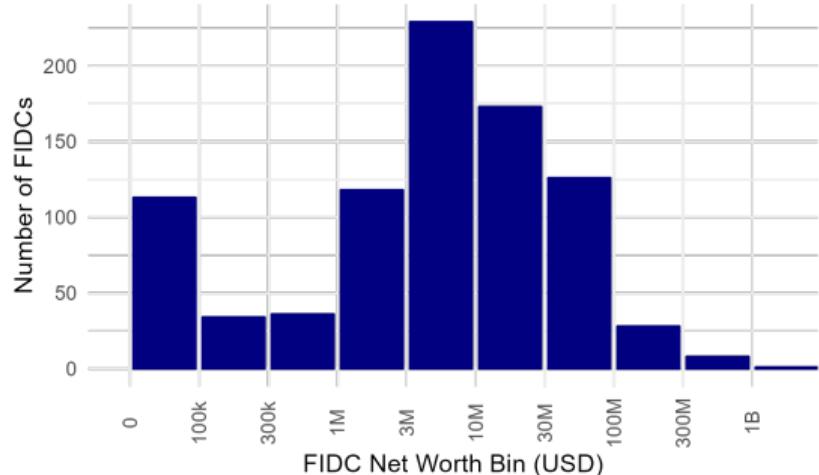


(a) by decile of firm size proxied by wage bill

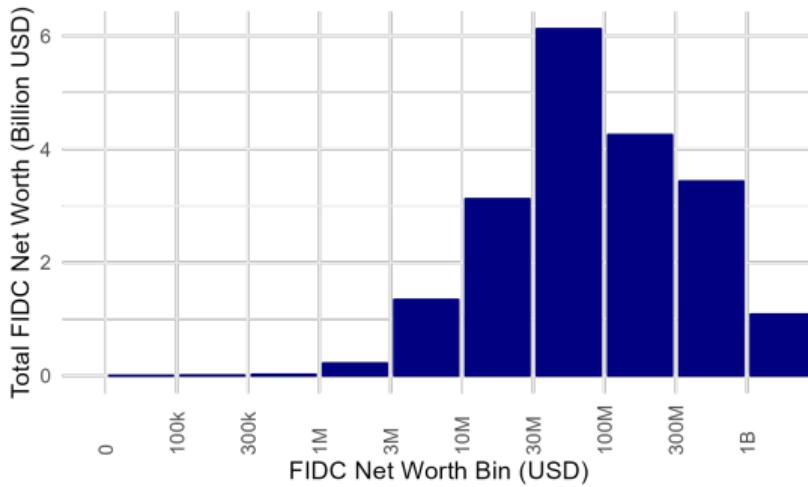


(b) by decile of firm credit score

Distribution of FIDC Net Asset Value (NAV)



(a) Number of FIDCs by NAV Bin



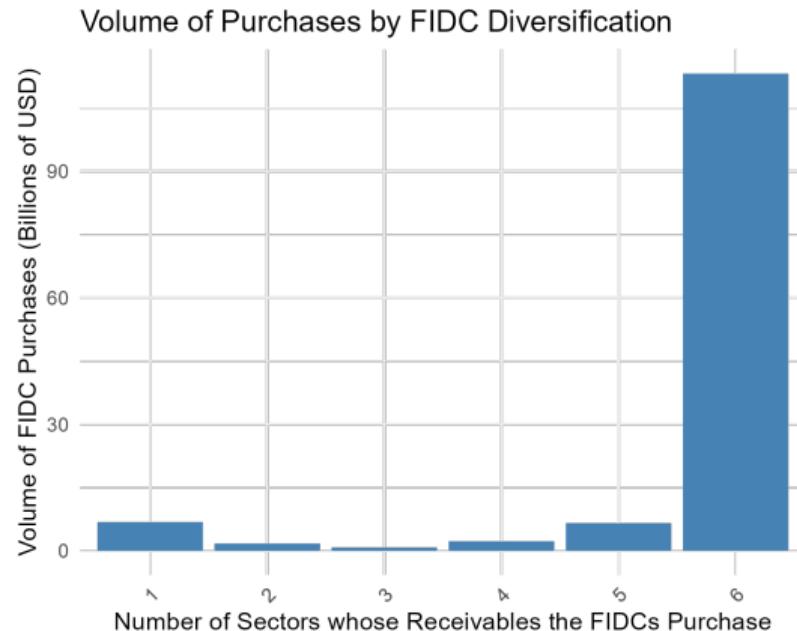
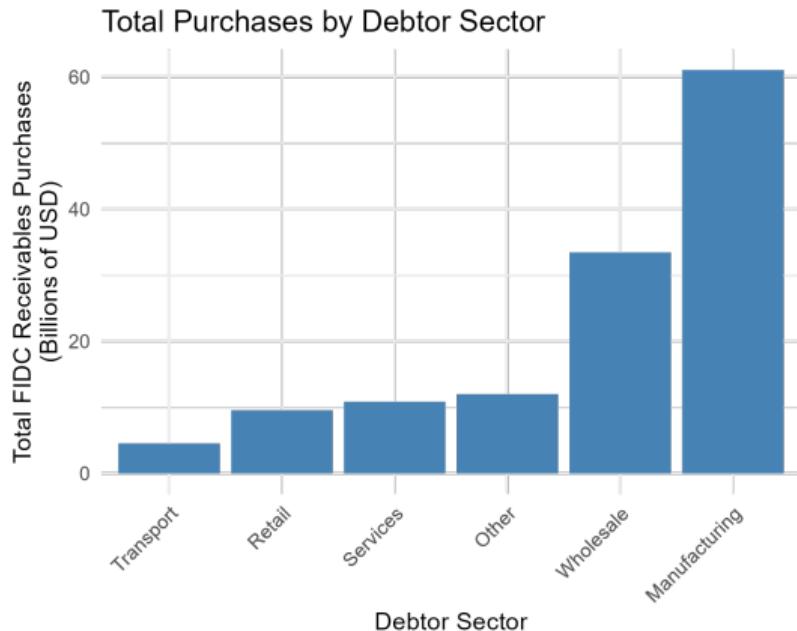
(b) Total FIDC NAV by NAV Bin

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[Return to FIDC overview](#)

[Return to model overview](#)

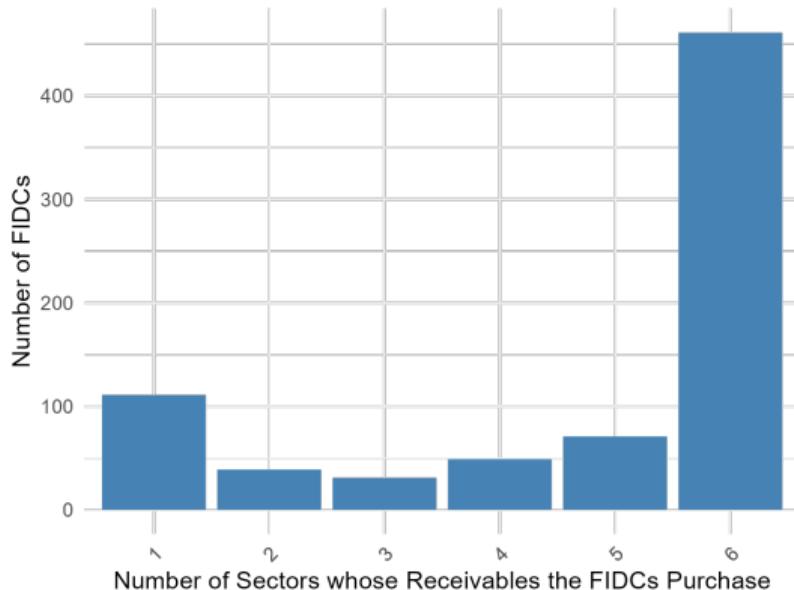
FIDC Portfolio Diversification



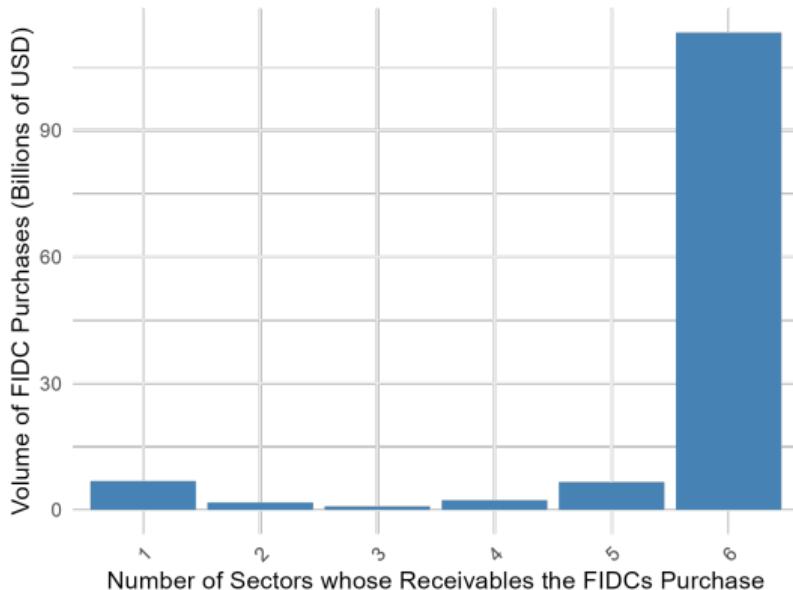
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FIDC Portfolio Diversification

Count of FIDCs by FIDC Diversification

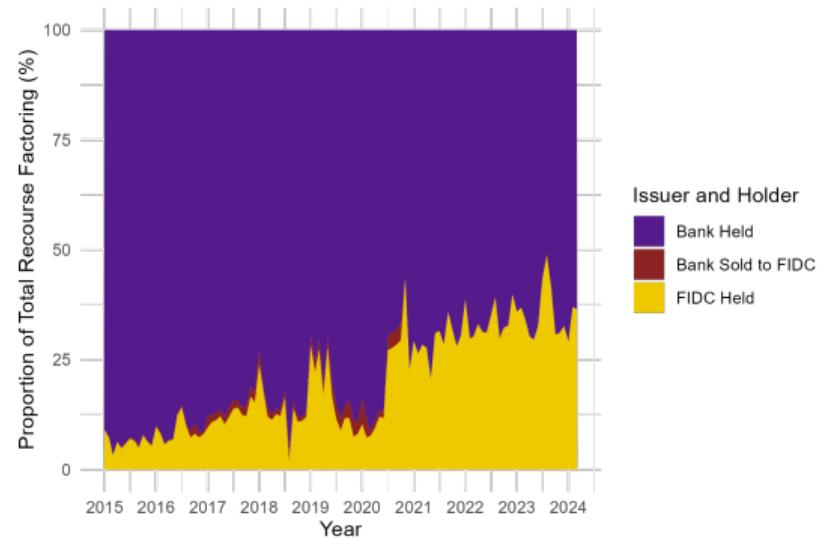


Volume of Purchases by FIDC Diversification

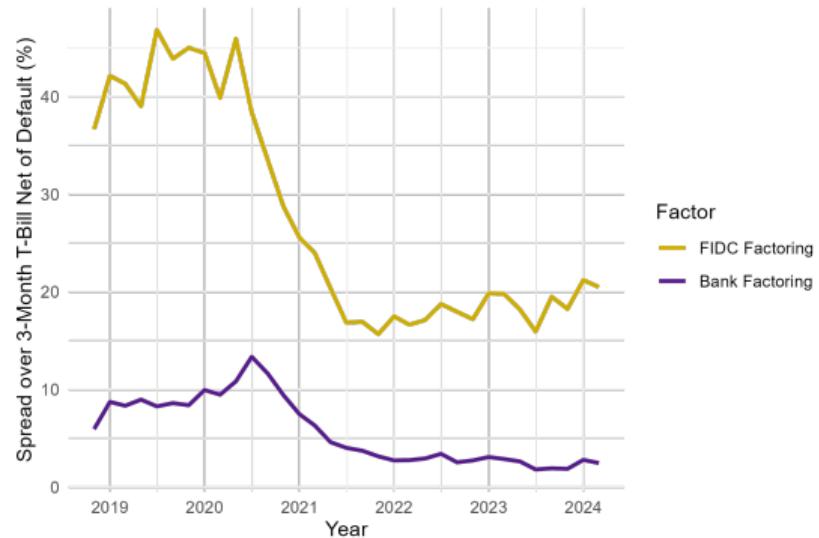


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FIDC Share of Factoring Increased as Spreads Decreased



(a) FIDC Share of Factoring



(b) Spreads

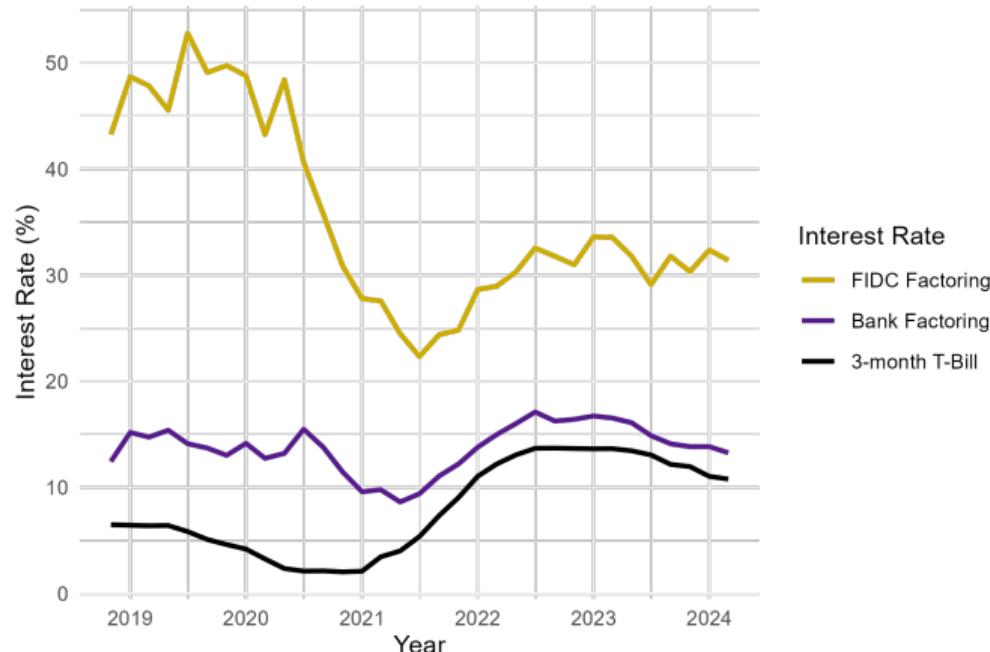
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[Interest rates](#)

Comparison of Interest Rates



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FIDC vs Bank Factoring Summary Statistics

	Banks			FIDCs		
	Mean Small Firms	Mean Medium Firms	Mean Large Firms	Mean Small Firms	Mean Medium Firms	Mean Large Firms
1	2	3	4	5	6	
Mean Issuance (Million USD / Year)	0.07	0.32	1.07	0.01	0.24	0.89
Mean Interest Rate (%)	15.09	13.73	11.11	34.68	31.91	29.59
Mean Maturity (Days)	155.22	121.25	134.27	54.64	62.20	70.05

[Return to FIDC figures](#)

[Return to FIDC overview](#)

First Stage: Seller firm's factoring interest rate $r_{j,t}^{\text{Fac}}$ on normalized exposure $e_{j,t}$ to fund flows

$$r_{j,t}^{\text{Fac}} = \alpha_j + \alpha_t + \gamma_1 e_{j,t} + \varepsilon_{j,t}$$

First Stage		Decomposition	
IR Factoring Issuance (All)		IR Factoring Issuance (Funds)	IR Factoring Issuance (Banks)
	(1)	(2)	(3)
$e_{j,t}$	-0.1212*** (0.0127)	-0.1957*** (0.0172)	-0.0530*** (0.0068)
Num. Obs.	3,956,731	1,734,458	2,424,888
Num. Firms	322,087	251,391	123,581
Num. Months	65	65	65

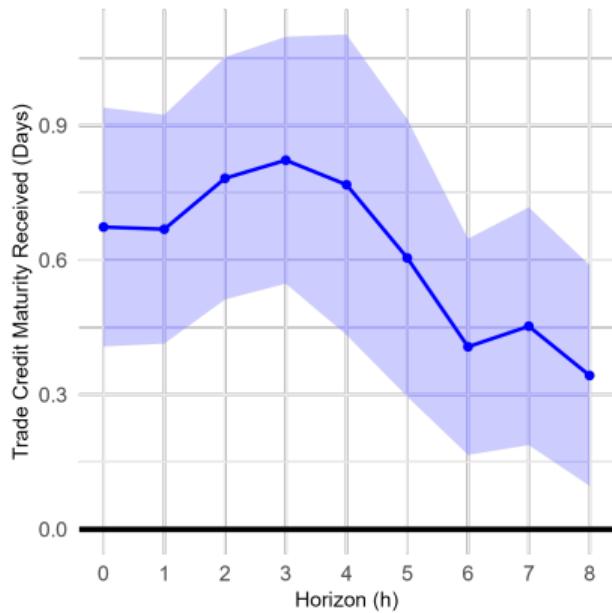
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: These regressions use data from the Central Bank of Brazil. The dataset is at the firm by month level, with firm and month fixed effects, and *standard errors are clustered at the firm level and shown in parentheses*. **The first stage coefficient is in column 1.** This is equal to a receivables value weighted average of interest rates from fund issuance (column 2) and bank issuance (column 3), where factoring issuance is the purchase of receivables.

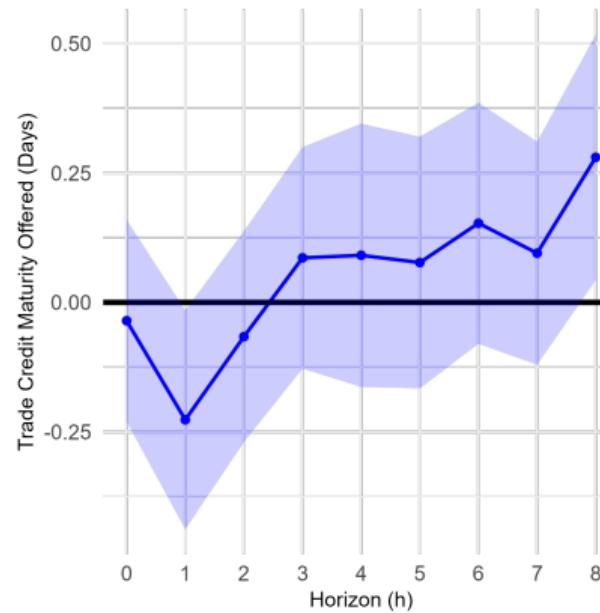
Dynamic Effects: IV Local Projection for Trade Credit Outcomes

Dynamic IV regressions: how do firms' trade credit terms respond to the receivable demand shock, scaled by the contemporary impulse on the factoring interest rate?

$$y_{j,t+h} = \alpha_{j,h} + \alpha_{t,h} + \beta_h r_{j,t}^{\text{Fac}} + \varepsilon_{j,t+h}$$



(a) Log Trade Credit Received (IV)



(b) Log Trade Credit Offered (IV)

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[Regression Tables](#)

IV Regression, Weekly Wage and Log Hours Worked

	Log Wage (Hourly)	Log Employment (Hours Worked)	Log Employment (Hours Worked by New Hires)	Log Employment (Hours Worked by Existing Emp.)
$r_{j,t}^{\text{Fac}}$	0.0037 [·] (0.0020)	-0.0045* (0.0020)	-0.0135** (0.0045)	-0.0057** (0.0020)
Num. Obs.	2,543,608	2,554,459	1,124,594	2,526,986
Num. Firms	287,082	288,331	183,930	284,845
Num. Months	50	50	50	50

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables come from restricted access month-level RAIS data. An employee is defined as new if the employee first began working at the firm in the given month.

IV Regression, Hours Worked Decomposition

	Hours Worked (New Hire, Perm.)	Hours Worked (Existing, Perm.)	Hours Worked (New Hire, Temp.)	Hours Worked (Existing, Temp.)
$r_{j,t}^{\text{Fac}}$	-436.3*** (96.4)	-41.8** (15.2)	157.3*** (32.2)	48.3597*** (11.2)
Num. Obs.	2,479,680	2,479,680	2,479,680	2,479,680
Num. Firms	288,112	288,112	288,112	288,112
Num. Months	50	50	50	50

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables are **total labor hours per month per firm**, from restricted access month-level RAIS data. An employee is defined as new if the employee first began working at the firm in the given month.

[Return to Main Regressions](#)

IV Regression, Employment Outcomes

$$y_{j,t} = \alpha_j + \alpha_t + \beta_1 \hat{r}_{j,t}^{\text{Fac}} + \varepsilon_{j,t}$$

	(1)	(2)	(3)	(4)
	Log Number of Employees (Total)	Log Number of Employees (New Hire)	Log Number of Employees (Permanent)	Log Number of Employees (Temporary)
$r_{j,t}^{\text{Fac}}$	-0.0047* (0.0021)	-0.0141** (0.0045)	-0.0114*** (0.0024)	0.0181** (0.0059)
Num. Obs.	2,556,738	1,126,587	2,548,410	608,088
Num. Firms	288,507	184,070	287,381	93,219
Num. Months	50	50	50	50

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables come from restricted access month-level RAIS data. An employee is defined as new if the employee began working at the firm this month and not in the previous year.

IV Regression, Default Outcomes

$$y_{j,t} = \alpha_j + \alpha_t + \beta_1 \hat{r}_{j,t}^{\text{Fac}} + \varepsilon_{j,t}$$

	Default Rate Rec. Factoring (to Banks, %)	Default Rate Other (to Banks, %)	Default Rate Rec. Factoring (to FIDCs, %)	Default Rate Other (to FIDCs, %)
$r_{j,t}^{\text{Fac}}$	0.2772* (0.1174)	-0.1945 (0.2567)	1.6804** (0.5329)	0.0098 (0.0558)
Num. Obs.	2,739,575	2,739,575	1,435,934	1,435,934
Num. Firms	234,524	234,524	243,683	243,683
Num. Months	65	65	64	64

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables are the default rates on recourse factoring and other debt issued by banks and FIDCs. The default rate is defined to be the percentage of debt that was not paid on its due date; note that this is lower than the percentage of debt that the creditor eventually collects. The issuance-weighted default rate for recourse factoring to banks is 0.40% and the issuance-weighted default rate for recourse factoring to FIDCs is 10.3%.

IV Regression, Trade Credit Outcomes

$$y_{j,t} = \alpha_j + \alpha_t + \beta_1 \hat{r}_{j,t}^{\text{Fac}} + \varepsilon_{j,t}$$

	Maturity Offer (Days)	Percentage Offer (%)	Log Value Offer	Maturity Receive (Days)	Percentage Receive (%)	Log Value Receive
$r_{j,t}^{\text{Fac}}$	-0.0354 (0.0996)	-0.3885** (0.1274)	-0.0591*** (0.0102)	0.6737*** (0.1358)	0.0272 (0.0379)	-0.0316*** (0.0061)
Num. Obs.	4,146,540	4,146,540	2,538,086	4,146,540	4,146,540	4,015,309
Num. Firms	511,896	511,896	203,995	511,896	511,896	469,959
Num. Months	65	65	65	65	65	65

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables are the firm by month level mean maturity of trade credit, offered and received, as well as the share of receivables with at least 15 days maturity, the effective lower bound for factoring.

IV Regression, Summary of Debt Outcomes

	Log Debt Issuance All Debt	Log Debt Issuance Factoring	Log Debt Issuance Besides Factoring
$r_{j,t}^{\text{Fac}}$	-0.1548*** (0.0161)	-0.1617*** (0.0167)	-0.0241 (0.0204)
Num. Obs.	3,094,560	3,094,560	788,450
Num. Firms	420,586	420,586	124,513
Num. Months	65	65	65

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. Note that 72.5% of all debt issuance has maturity under 1 year, and 49.9% of all debt issuance is factoring.

[Return to Main Regressions](#)

IV Regression, Debt Outcomes

	(1)	(2)	(3)	(4)	(5)
	Log Debt Issuance (Debt Under 1 Year)	Log Debt Issuance (Debt Over 1 Year)	Log Debt Issuance Factoring All Issuance	Log Debt Issuance Credit Line (Unsecured)	Log Debt Issuance Credit Line (Secured)
$r_{j,t}^{\text{Fac}}$	-0.1627*** (0.0174)	0.0163 (0.0259)	-0.1692*** (0.0180)	0.0167 (0.0170)	-0.0319 (0.0654)
Num. Obs.	4,146,540	508,179	4,146,540	829,816	410,208
Num. Firms	511,896	130,522	511,896	123,370	57,997
Num. Months	65	65	65	65	65

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables are log debt issuance by category of debt.

IV Regression, Interest Rate Outcomes

	IR (Debt Under 1 Year)	IR (Debt Over 1 Year)	IR Credit Line (Unsecured)	IR Credit Line (Secured)	IR (Loans Over 1 Year)
$r_{j,t}^{\text{Fac}}$	1.5021*** (0.2217)	-2.0535* (0.9247)	6.9139** (2.2363)	-3.5990 (3.9875)	-0.0787 (0.1800)
Num. Obs.	4,146,540	508,179	829,816	410,208	438,844
Num. Firms	511,896	130,522	123,370	57,997	123,553
Num. Months	65	65	65	65	65

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

Notes: All regressions use data from the Central Bank of Brazil. All regressions use firm and month fixed effects, with standard errors clustered at the firm level. The predictor variable is the firm-level interest rate on factoring in percentage points. The instrumental variable is the expected change in receivables purchases driven by fund flows. The response variables are the interest rates by category of debt. Column 1 is the subset with maturity of up to 365 days. Columns 2 and 3 are unsecured and secured credit lines, where issuance is defined as any drawdown of the credit line, not a change in the credit limit. Column 4 is loans with maturity of over 365 days.

$$y_{j,t-1} = \alpha_j + \alpha_t + \beta_{\text{pre}} e_{j,t} + \varepsilon_{j,t},$$

Table: Pre-Trend Falsification Test: Regressions of Lagged Outcomes on Current Flows

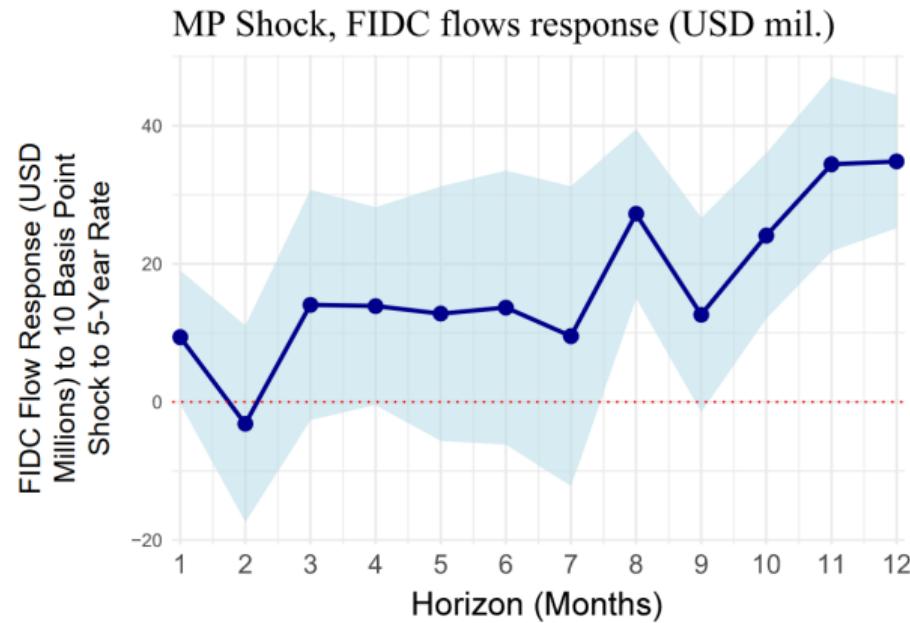
	(1) Factoring Interest Rate	(2) Log Revenue	(3) Log Expenditure	(4) Log Temporary Labor	(5) Log Permanent Labor
$e_{j,t}^{\text{Fac}}$	-0.501 (1.287)	0.074 (0.089)	0.052 (0.061)	-0.056 (0.095)	0.033 (0.040)

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; · $p < 0.1$

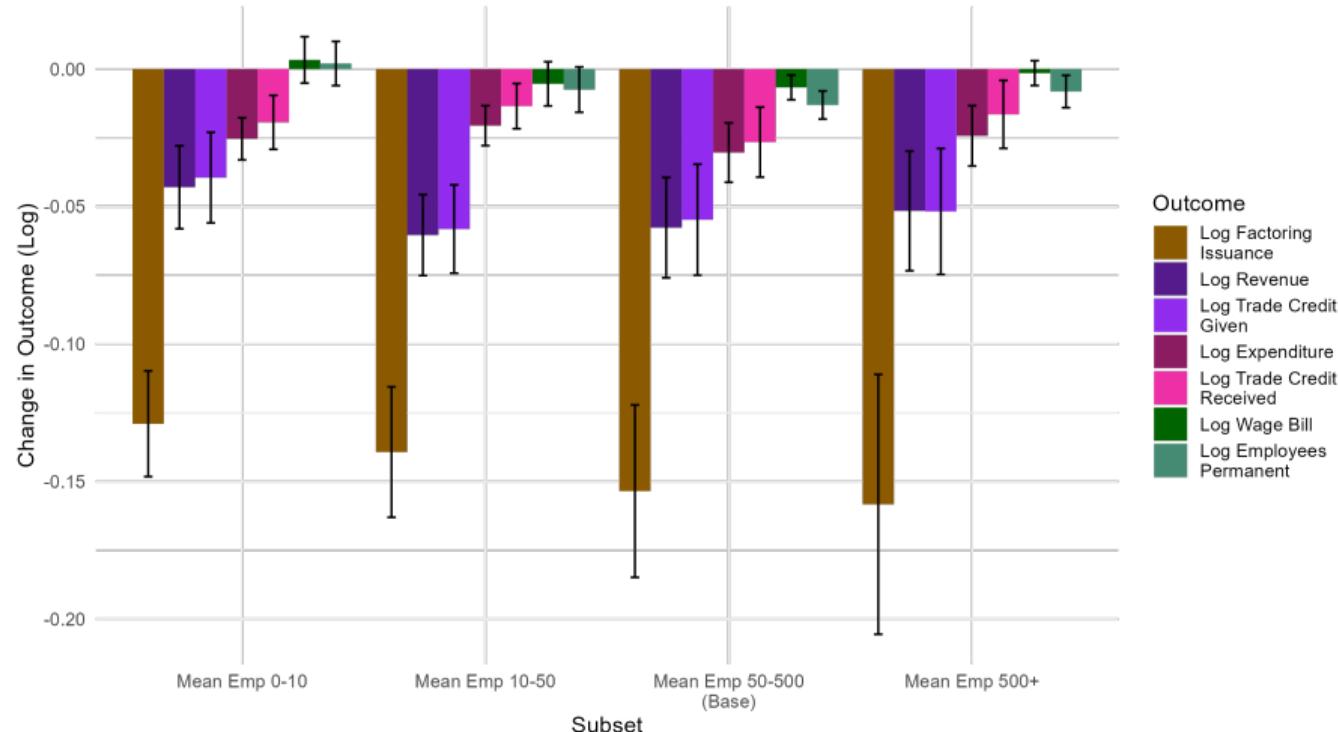
Notes: These regressions use data from the Central Bank of Brazil. The dataset is at the firm by month level. Standard errors are clustered at the firm level and shown in parentheses. Each column is a separate regression with a different outcome variable. Column (1) corresponds to the first stage, while columns (2) through (5) correspond to the reduced form. All results are shown in log points for readability.

FIDCs' monetary policy exposure is similar to money market funds, dissimilar to most other funds

Monetary tightening is associated with increased inflows into FIDCs, whose assets' short maturities allows for immediate pass-through



Heterogeneity By Firm Type: Interaction with Firm Size



Maturity

Trade Credit

Sector

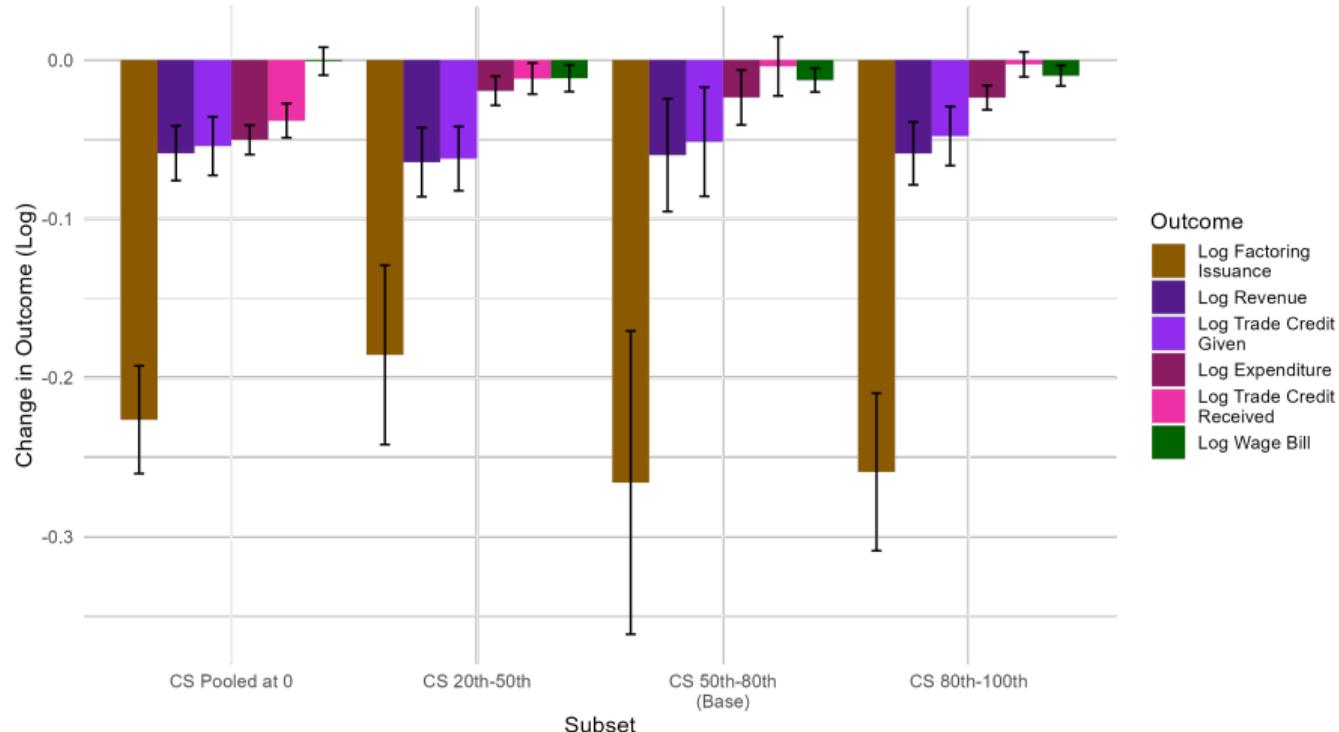
Credit Score

HHI

Bilateral HHI

Buyer Risk

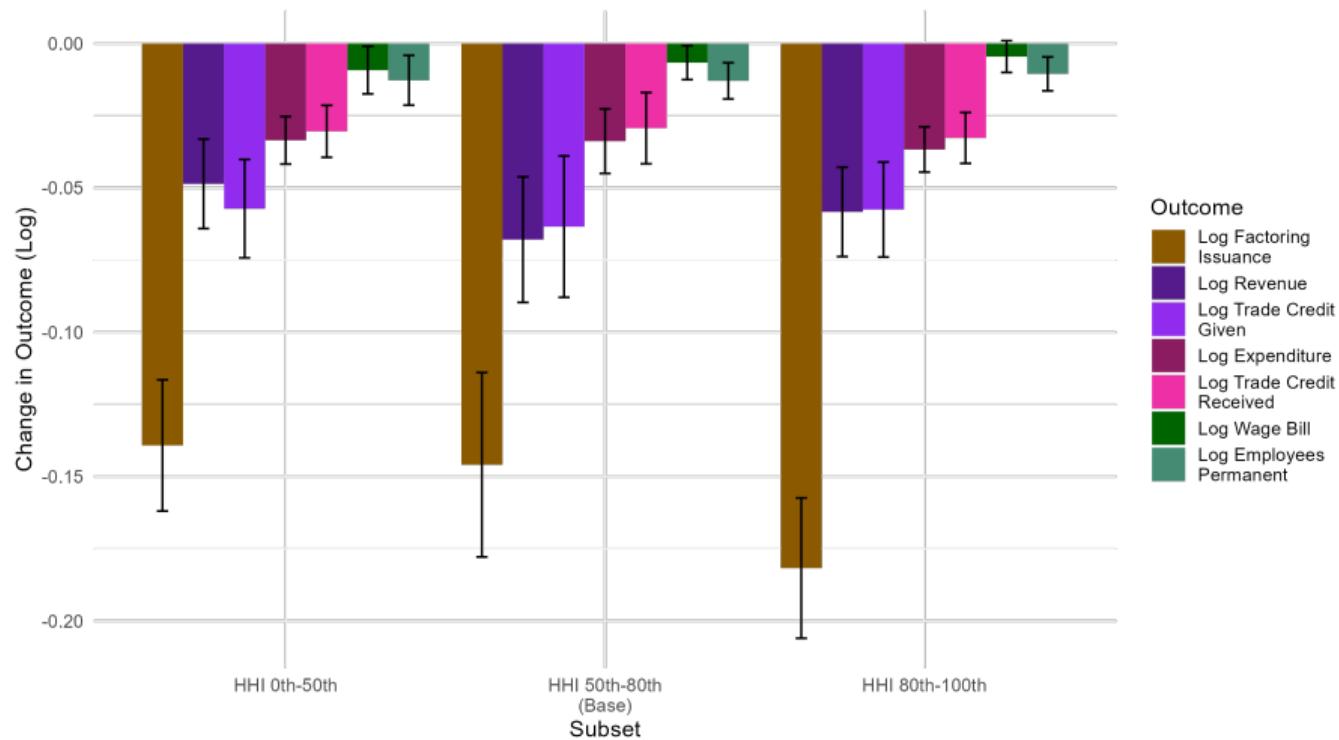
By Firm Type: Interaction with Credit Score



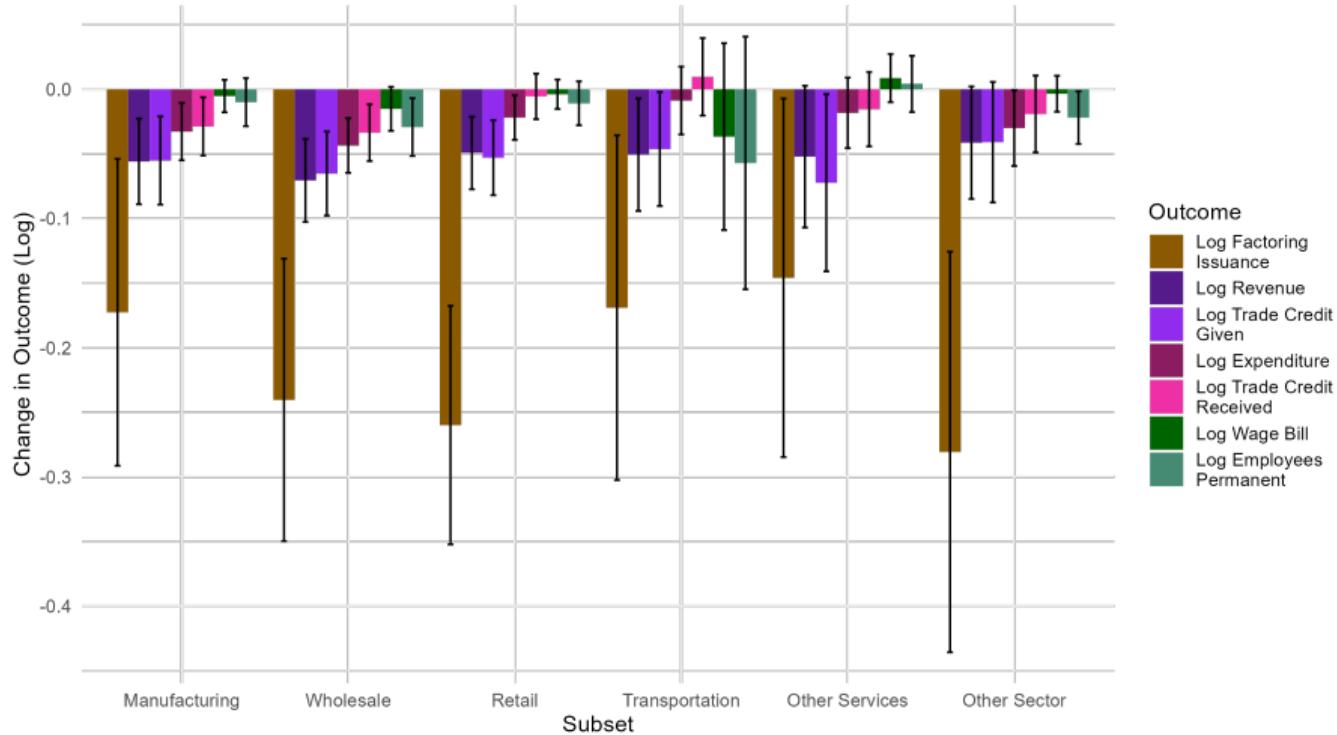
Maturity

Return

By Firm Type: Interaction with HHI



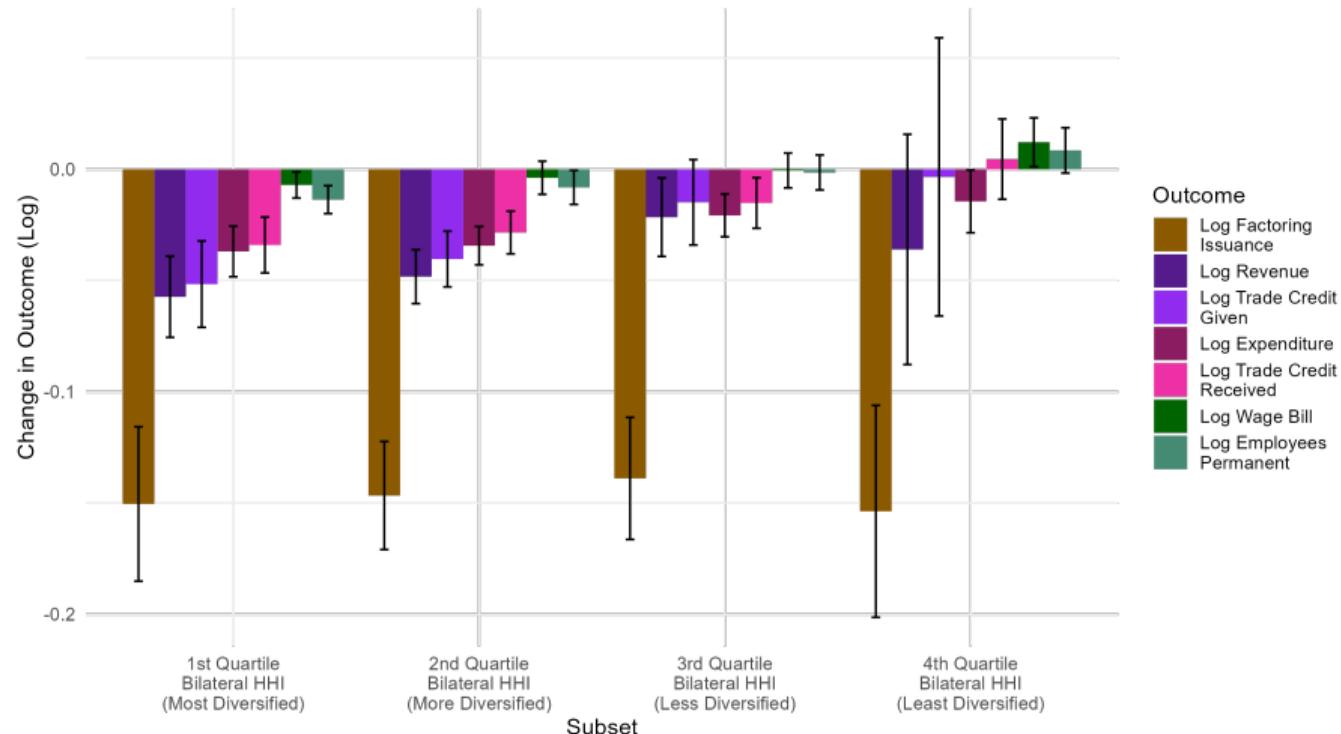
By Firm Type: Interaction with Sector



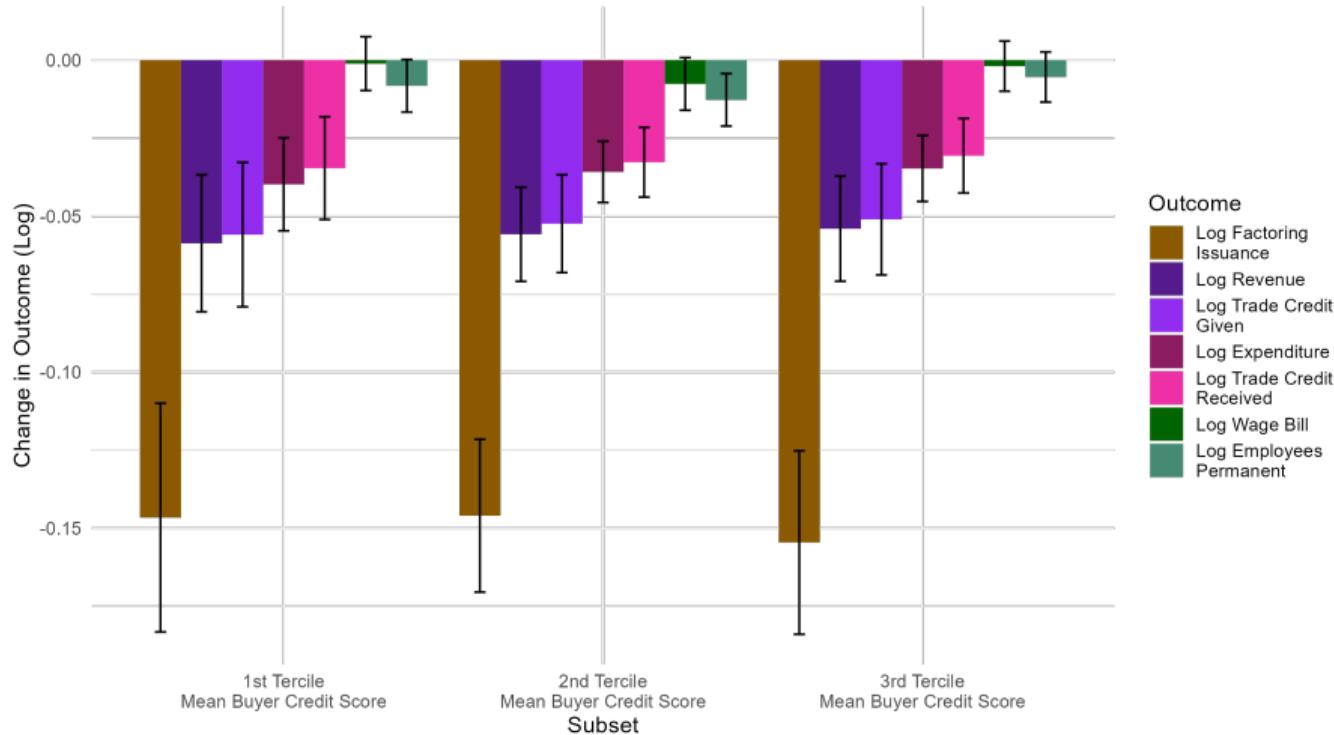
Maturity

Return

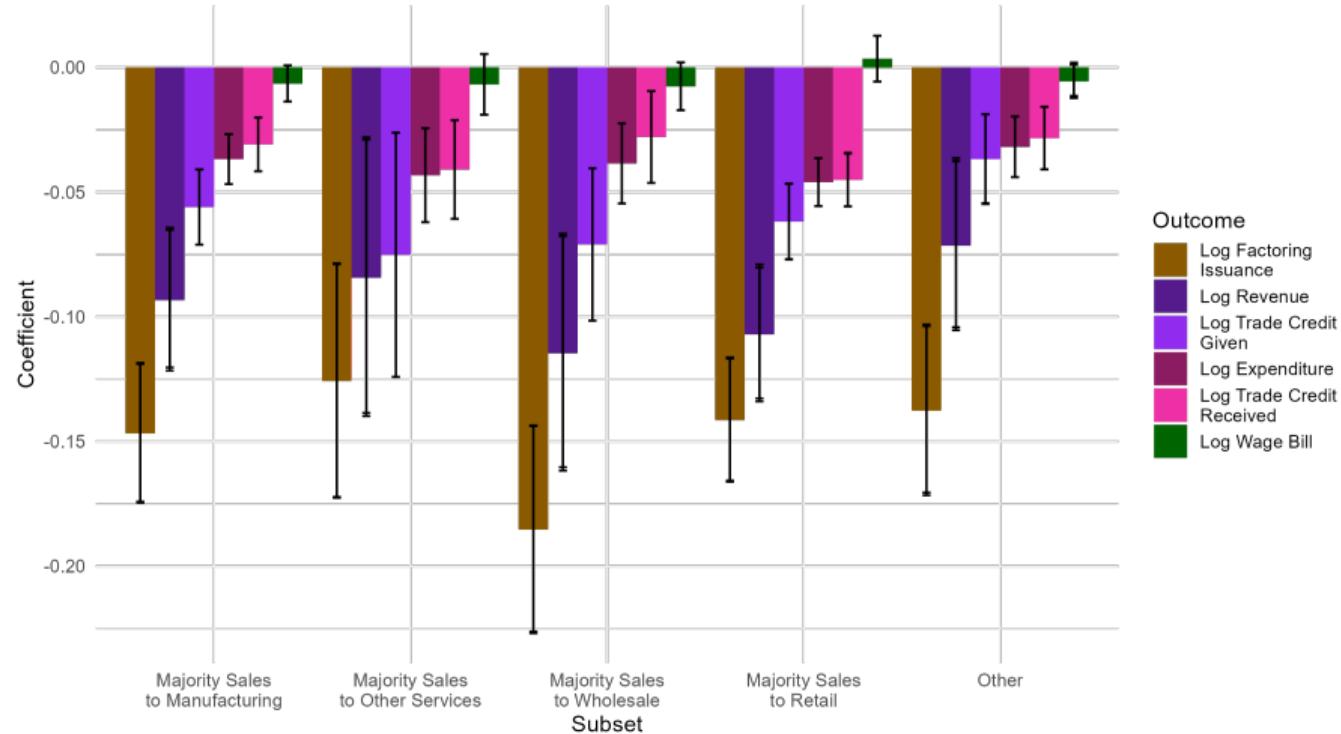
By Firms' Buyer Portfolio: Interaction with Bilateral HHI



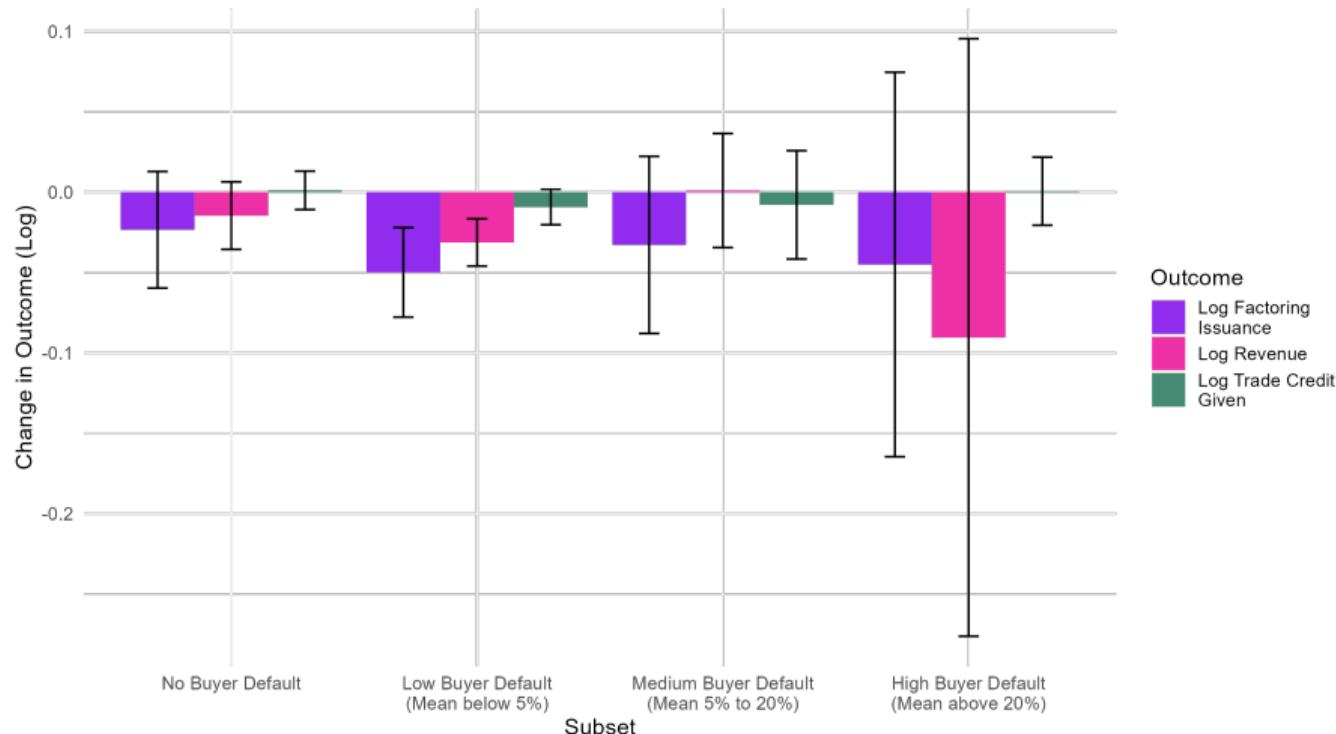
By Firms' Buyer Portfolio: Interaction with Buyer Credit Score



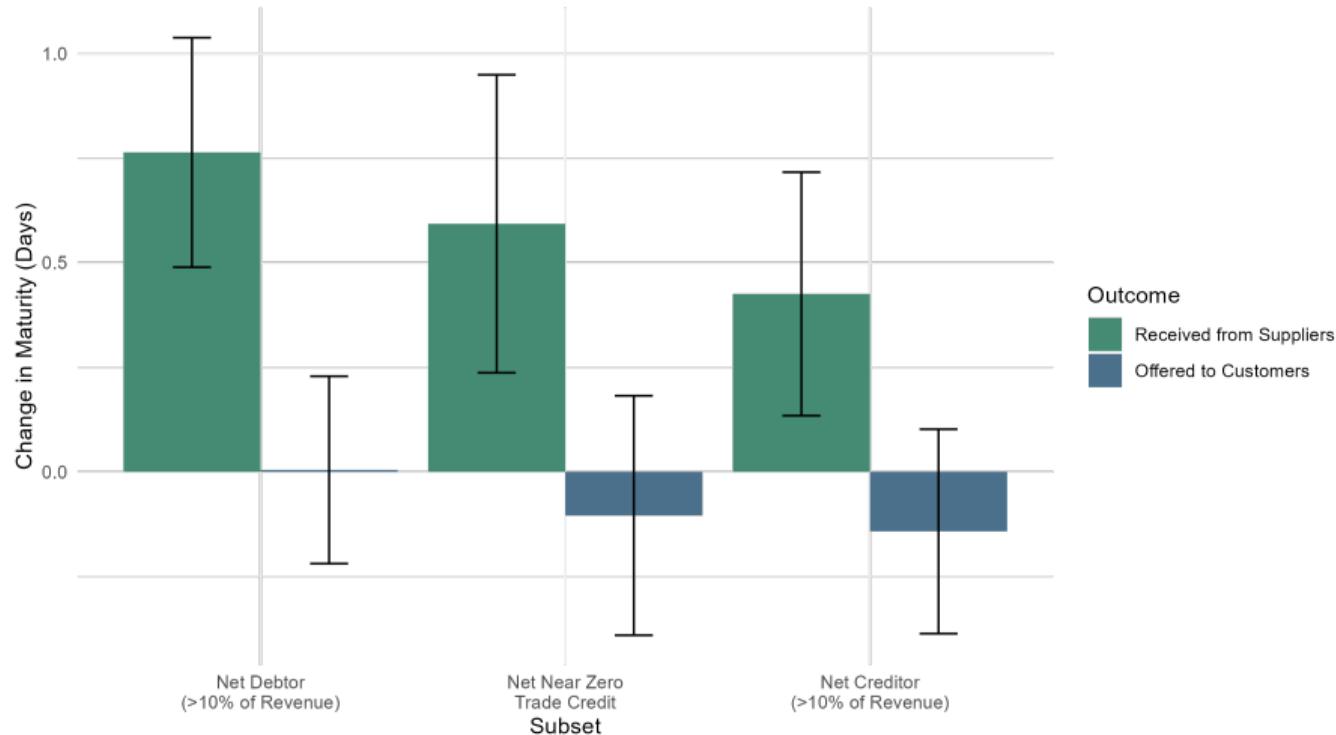
By Firms' Buyer Portfolio: Interaction with Main Buyer Sector



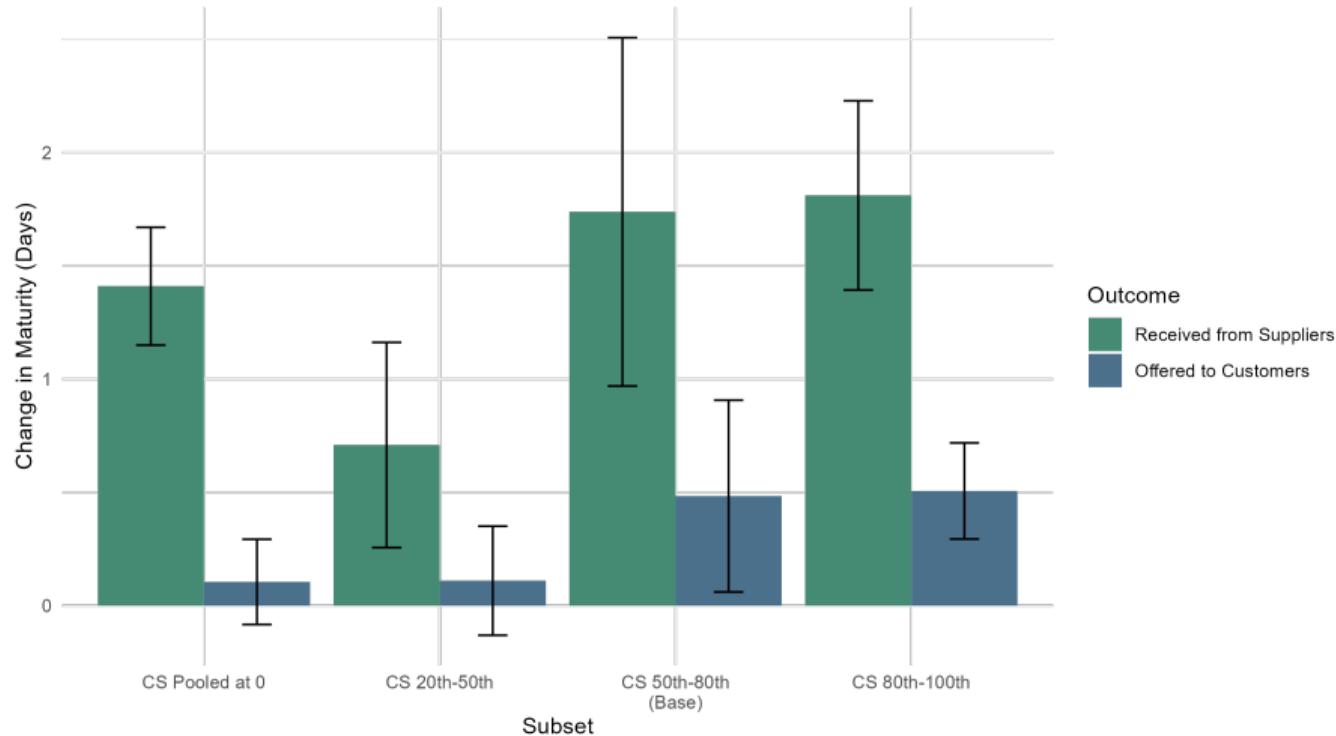
By Firms' Buyer Portfolio: Interaction with Weighted Mean Buyer Default Rate



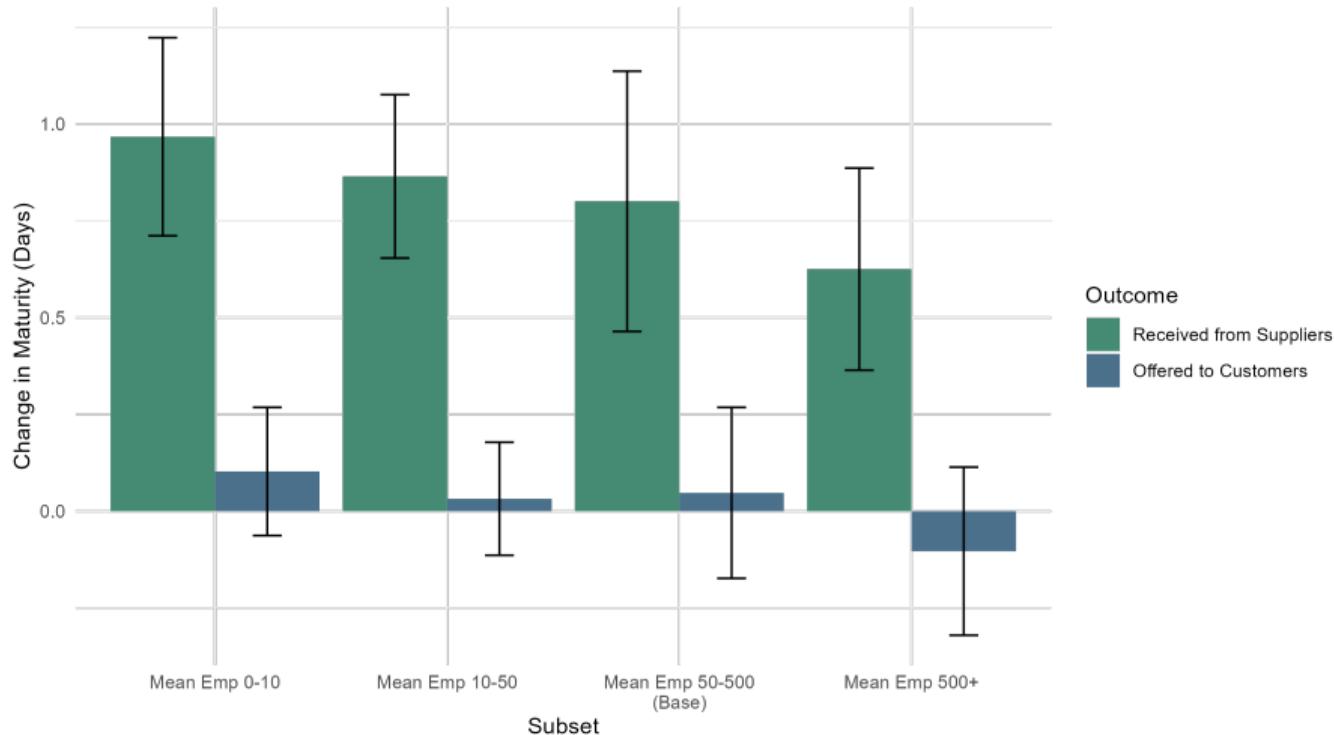
By Firm Type: Interaction with Trade Credit Position



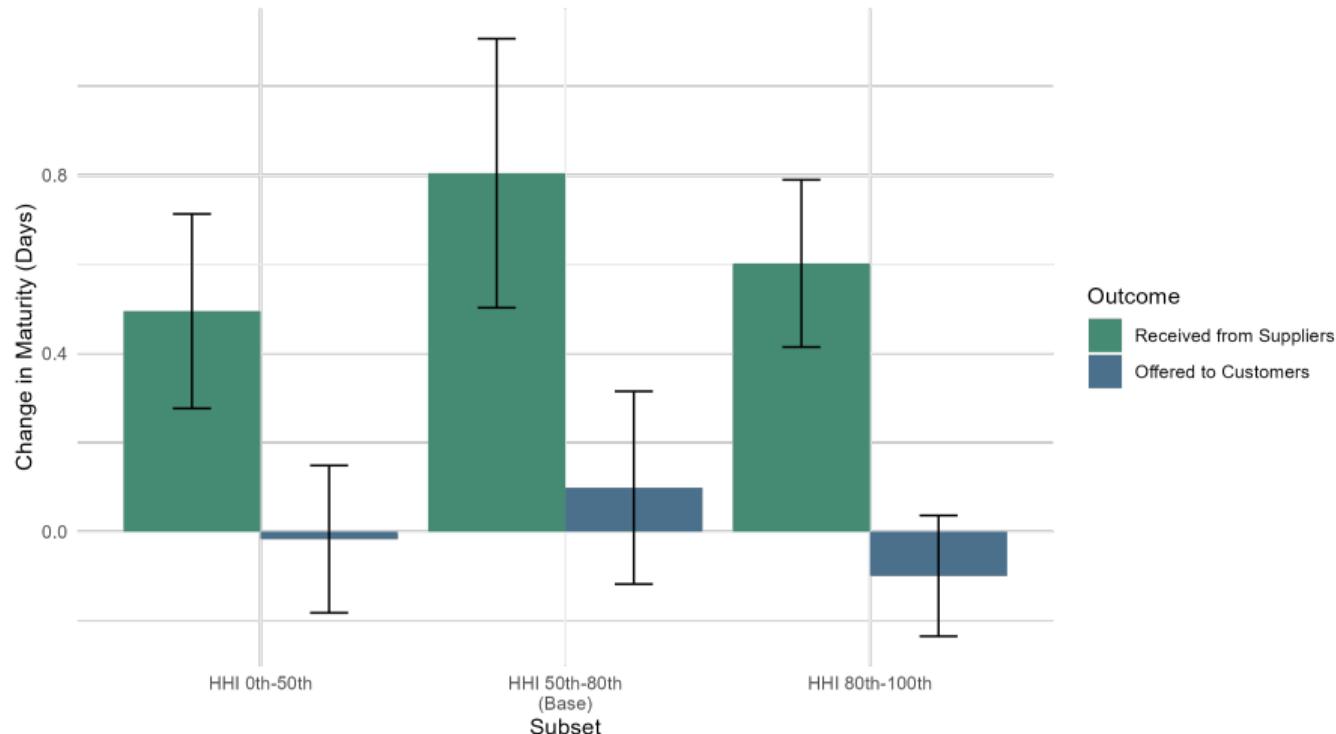
By Firm Type: Interaction with Credit Score



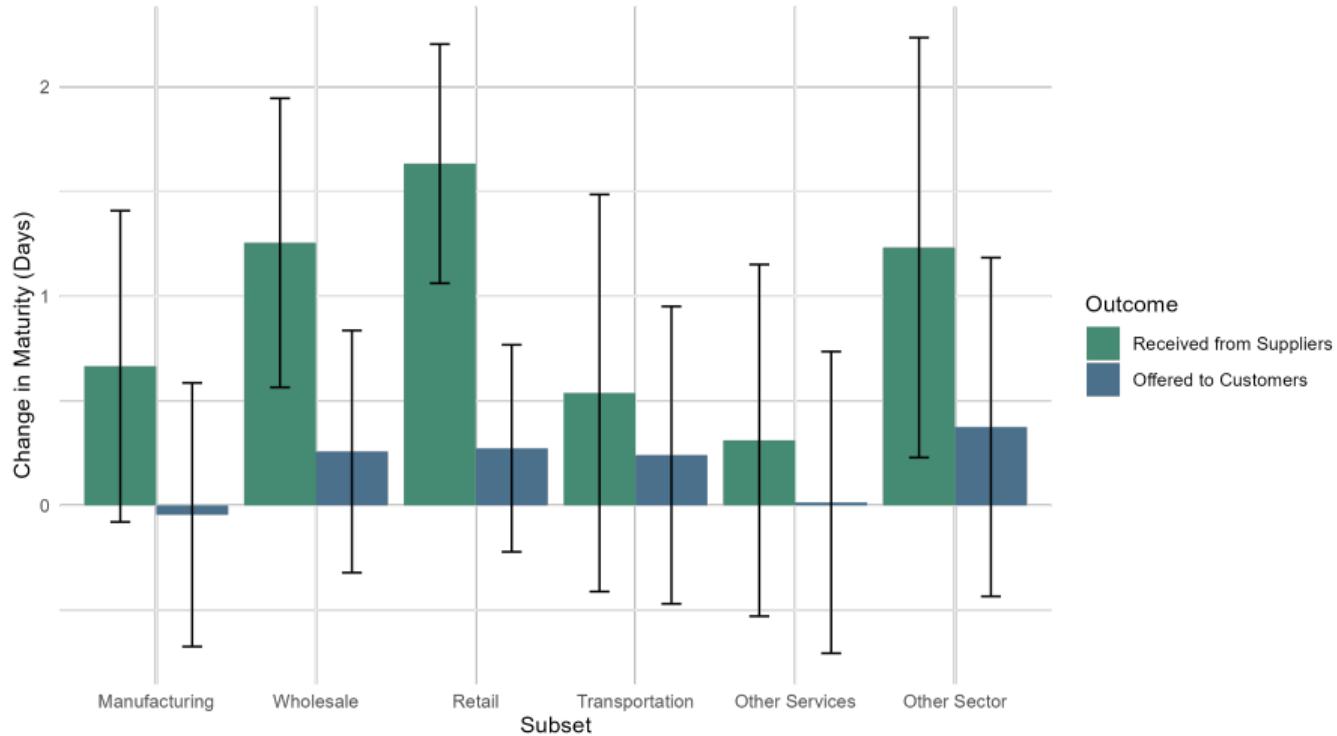
By Firm Type: Interaction with Firm Size



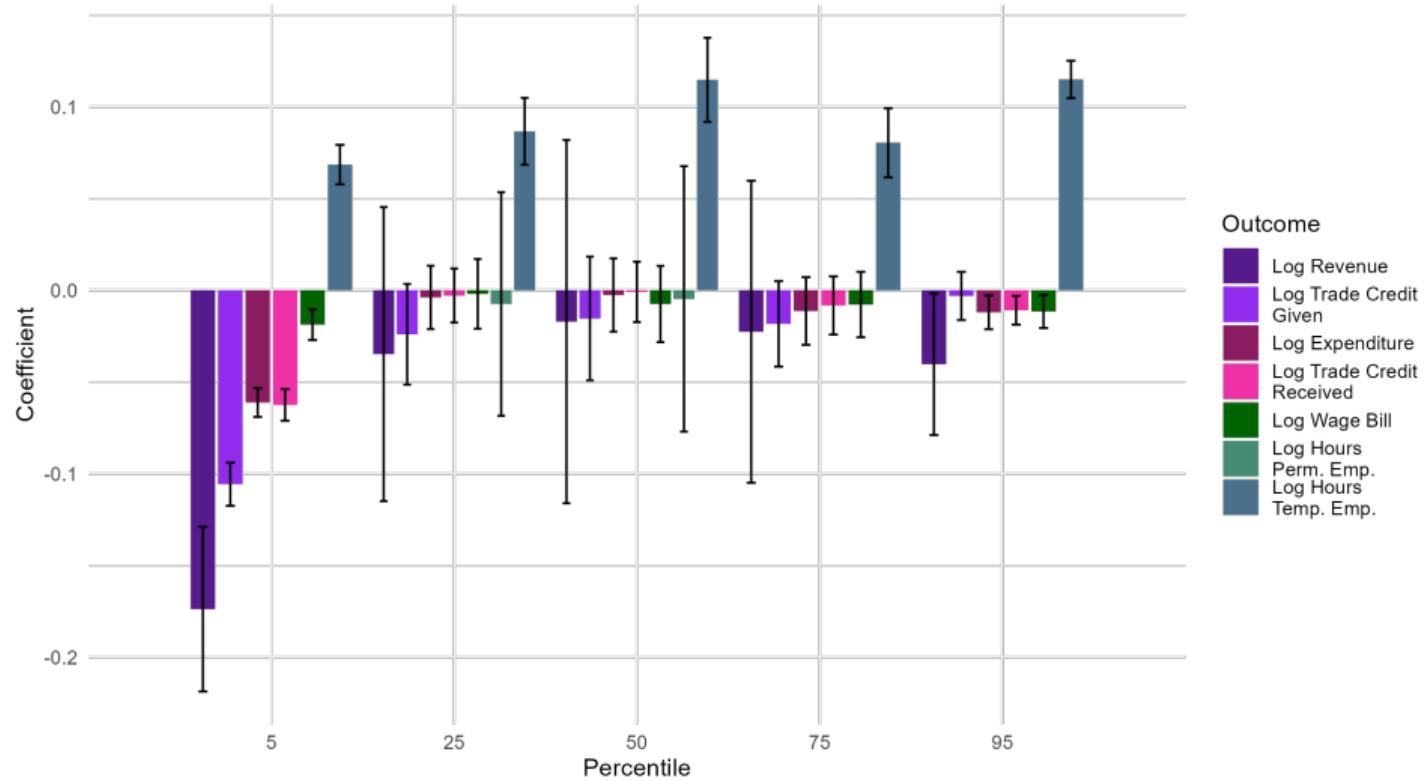
By Firm Type: Interaction with HHI



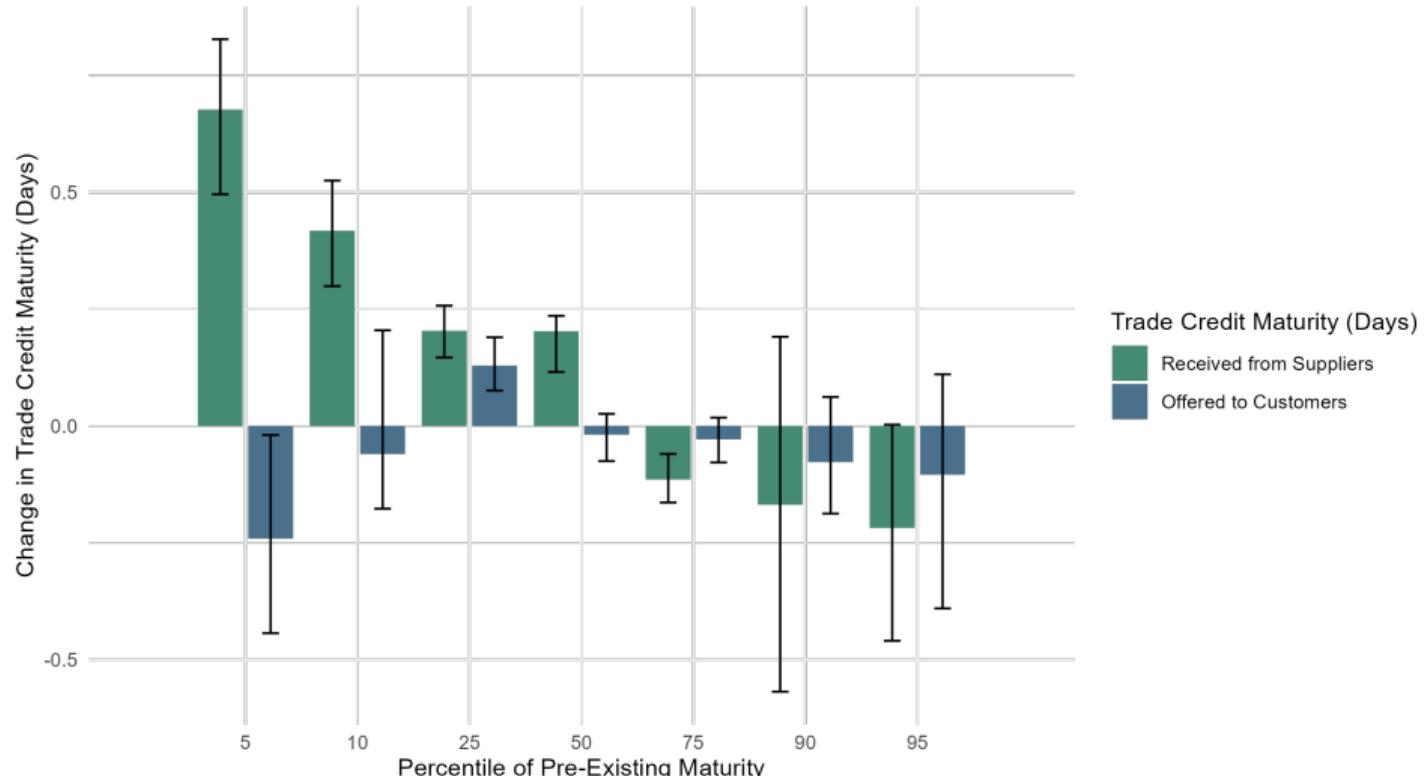
By Firm Type: Interaction with Sector



Quantile Regression

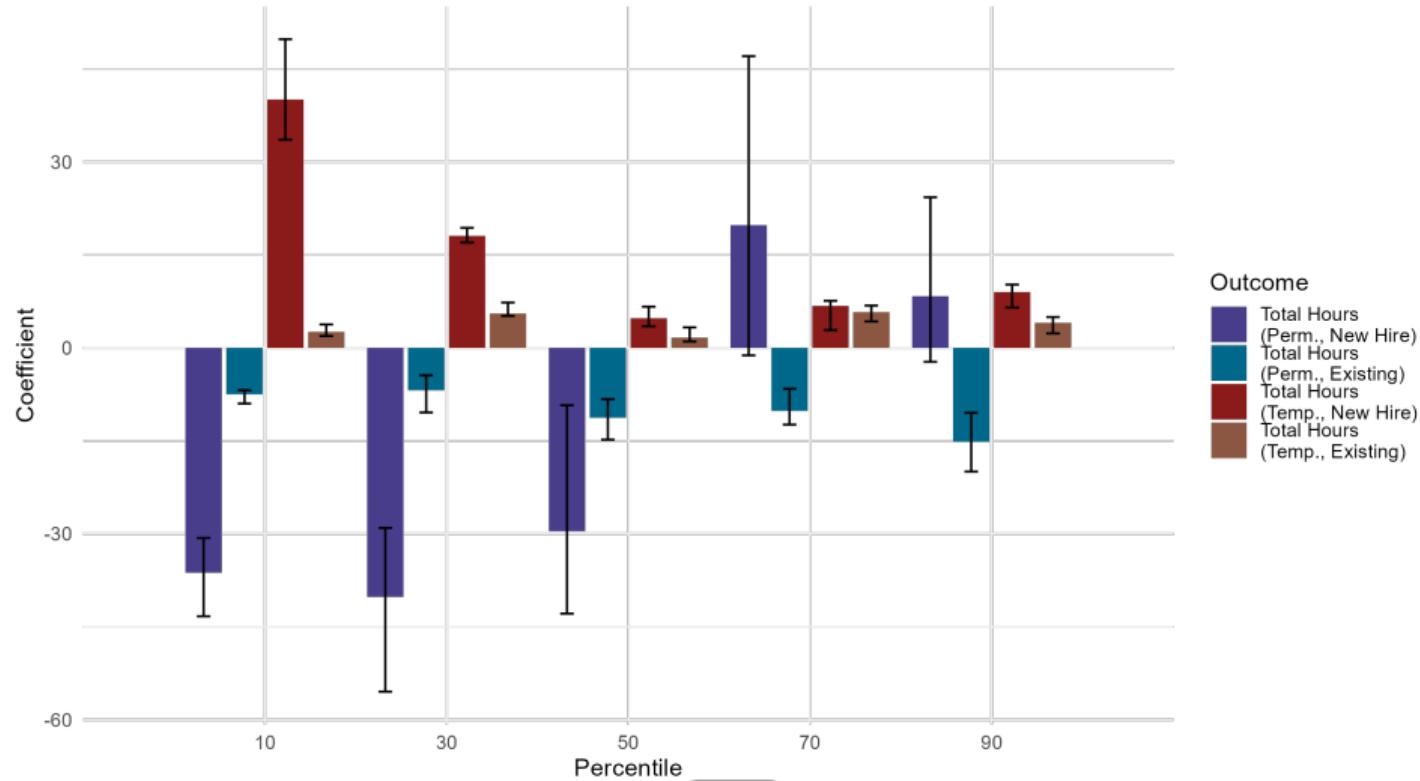


Quantile Regression: Maturity Outcomes



This graph uses Koenker (2005) rank inversion for SEs. [Return](#)

Quantile Regression: Hours Worked Outcomes



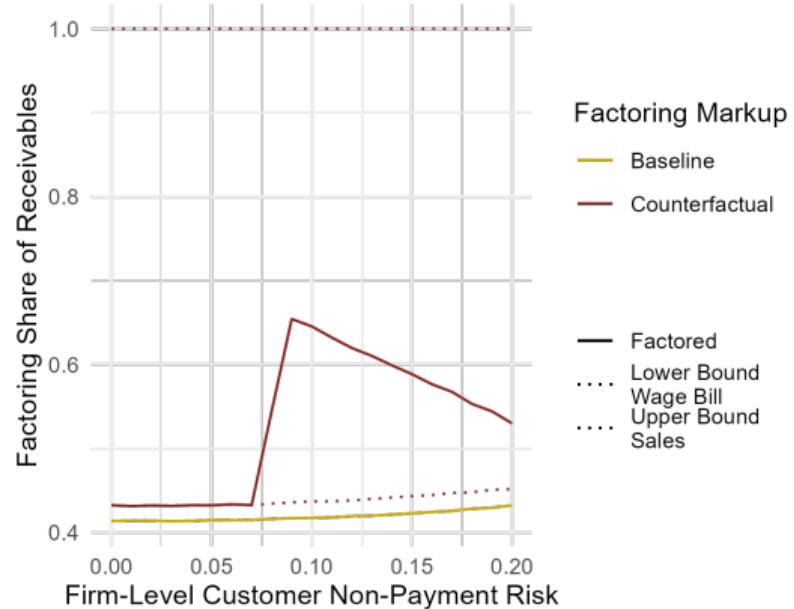
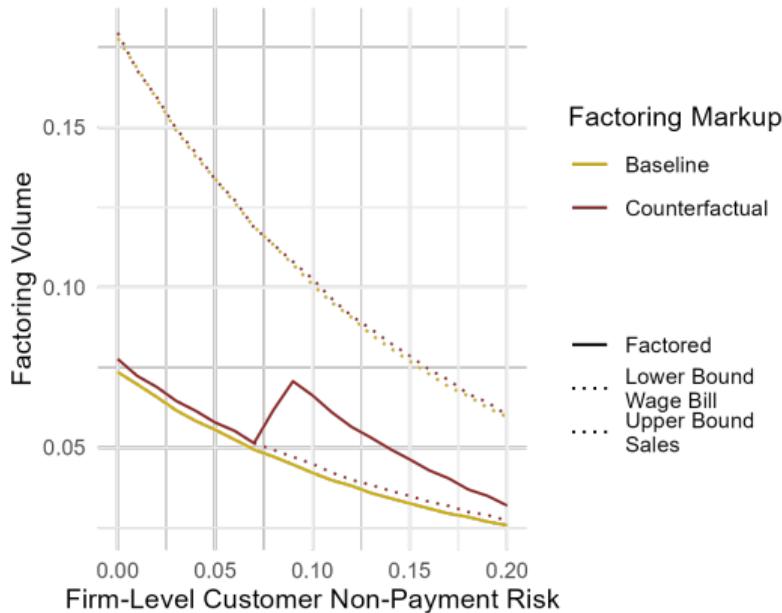
This graph uses Koenker (2005) rank inversion for SEs. [Return](#)

Model Intuition: Cash Flow Volatility

Cash flow volatility mismatch:

- Firms' cash outflows have a rigid component due to labor contracts and labor law
- Firms' cash inflows are more volatile, both due to timing of sales and timing of payment conditional on sales, as well as whether buyers fulfill payment
 - Factoring removes the payment dimension of cash inflow volatility
- Perfectly predictable cash inflows would lead firms to hire exclusively on long-term contracts, due to productivity gain from employee experience
- Volatility in cash inflows drives demand for temporary labor and factoring
- Decreasing factoring costs leads to
 - Less volatility (substitution) of production across time
 - More permanent employment and higher long-run productivity

Model Results: Factoring Share



[Return to model results](#)

Model Results: Heterogeneity

On the left is the ratio of outcomes between baseline markup = 1.13 and counterfactual markup = 1

On the right are permanent and temporary labor between baseline and counterfactual

