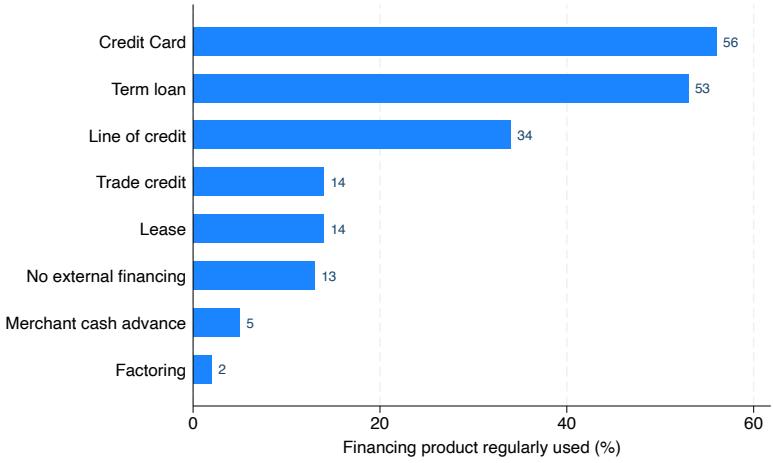
Revolving Credit to SMEs: The Role of Business Credit Cards

Matteo Benetton, Greg Buchak

May 16, 2025

Credit cards the most important source of small firm financing



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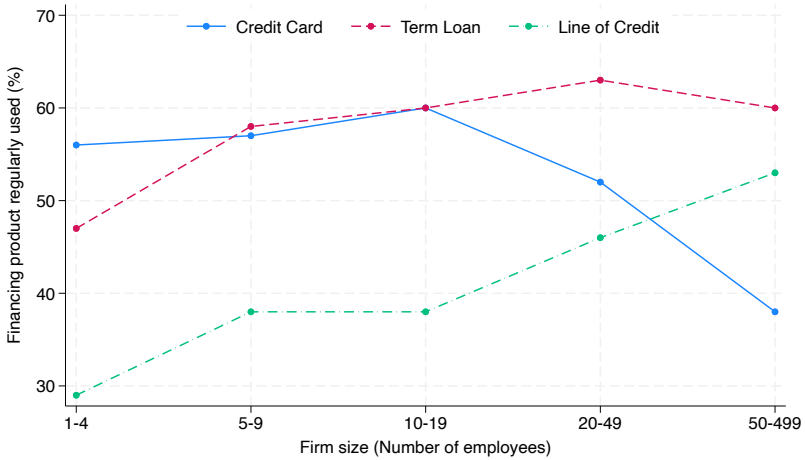

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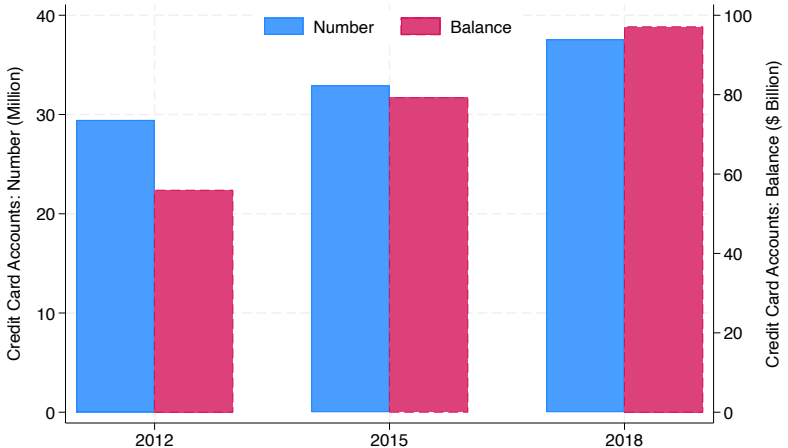

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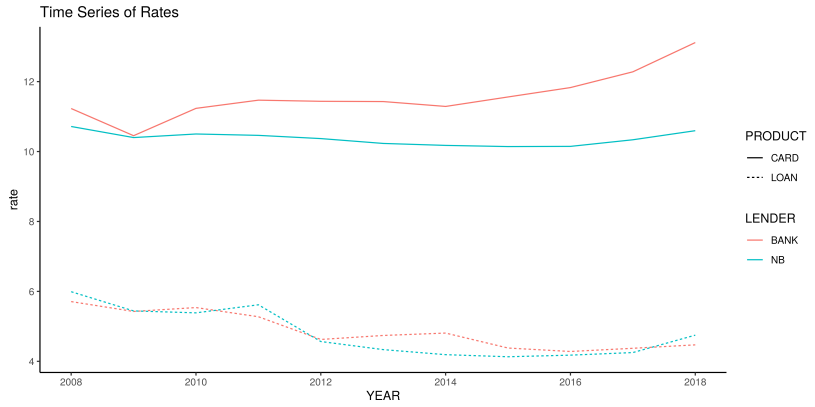

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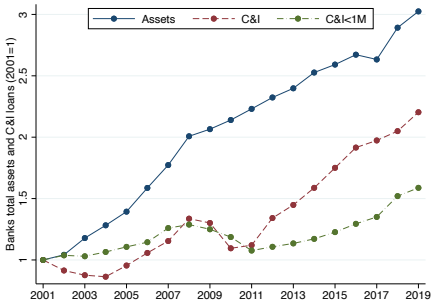
Bank small business lending (call reports)



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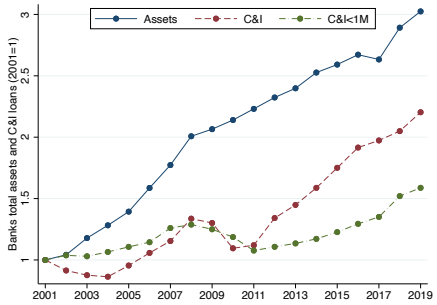

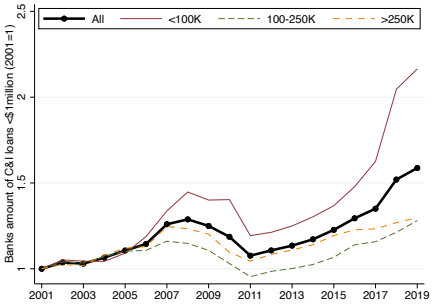

"In 2019, there was $368 billion in small business commercial and industrial loans outstanding, and over 46 percent of this amount was for loans less than $100,000. The majority of loans in this size category were small business credit cards" (U.S. Small Business Administration, 2020)

Motivation and Results

Basic facts:

- Business credit cards are a major (growing) credit source for small firms
  - Runs counter to trend of "banks exiting small business lending", more of a products substitution story
- Business credit cards are a very expensive source of borrowing

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2. Why are rates so high—markups or marginal costs? Nature of borrowing contract is particularly expensive to provide (ex-ante committed limit, ex-post uncertain utilization), but markups explain most of the high rates

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2. Why are rates so high—markups or marginal costs? Nature of borrowing contract is particularly expensive to provide (ex-ante committed limit, ex-post uncertain utilization), but markups explain most of the high rates
3. Do lenders lose from systematic credit card drawdowns? Only with large, contemporaneous funding shock costs; interaction drawdowns (liquidity risk) & capital requirements (solvency risk)

Outline

- Data and 4 Facts
- Structural model of credit card lending
- Estimation and Results
- Counterfactuals
- Conclusions

Data and Facts

Data

- **Experian small business credit panel**
  - Observation: firm-lender type-product type panel
  - Snapshot every six months in 2014-2019
  - Variables:
    - Firms level: industry, location, size, age, proprietary risk-score ($\sim$ FICO for consumers)
    - Bank level: type (top 4, other banks, non-banks)
    - Contract level: type (card, loan, credit line), balances, limits, delinquencies

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- **Strengths:** coverage of very small firms, include non-banks, (relatively) rich contract information and linked performance data

- **Weaknesses:** no information on revolving credit and interest paid
  - Use utilization = balance/limit as measure of borrowing

    We confirm our qualitative findings with industry reports/data
  - Rate from Ratewatch at the lender-time-product type-location level
  - Follow up projects using FY-14M and Chase data to address these issues

Product: Business Credit Cards

- **Regulation:**
  - Business credit cards do NOT benefit from the same level of borrower protection as do personal credit cards
    - e.g., Credit Card Accountability Responsibility and Disclosure Act (CARD) of 2009 does not cover small business credit cards
  - Limited liability against the business owner, however business credit cards will often require a personal guarantee
  - 2017 Basel framework: risk-weight if transactor 55%, if revolver 85%
    - Ongoing proposal for 10% credit conversion factor on undrawn credit (we study equilibrium effect with our model)

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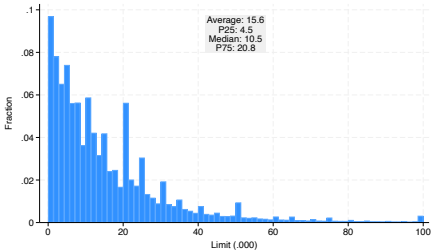
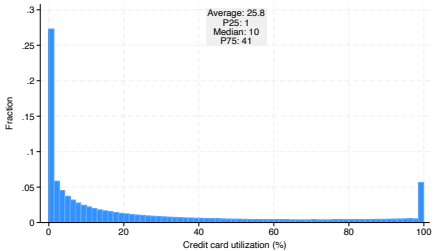
- **Financing:**
  - Most lenders finance credit cards using a combination of on-balance sheet financing and securitization
    - JPMorgan Chase, Bank of America, and Wells Fargo, hold significant portion on balance sheet; Citigroup, Capital One, and Discover more extensive use of securization of credit card receivables

Fact #1: Credit Cards as Borrowing Products





- Bimodal distribution of utilization in line with dual function of credit card: payment (utilization $=0$) & borrowing (utilization >0)
- Average utilization 26% ($>$ 17% for credit lines) $\rightarrow$ smaller firms less alternative sources of external finance
- In the paper: largest variation across firms, higher utilization for small, risky firms with high cash-flow volatility

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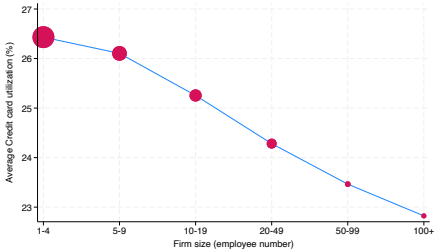
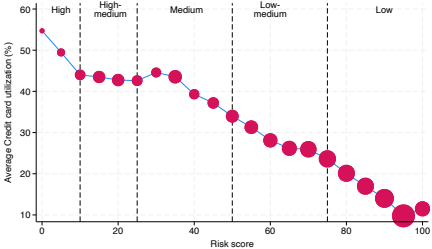




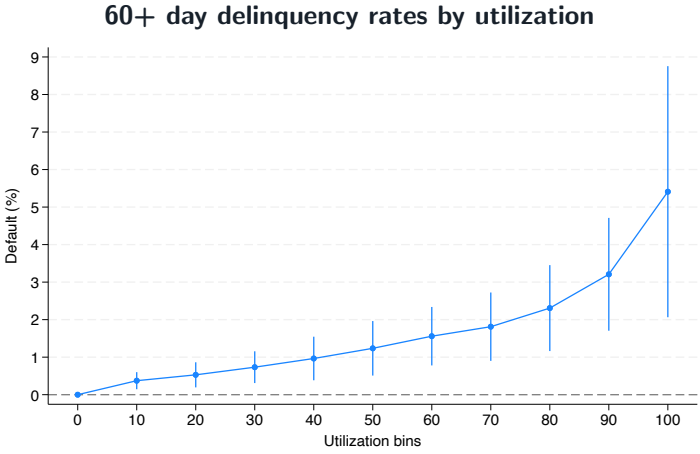
- Utilization higher for smaller firms
- Utilization higher for riskier firms

Fact #1: Credit Cards as Borrowing Products

	Dependent variable: $\Delta Balance$						
	All	Utilization		Risk		Size	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		>= 80	<= 20	High	Low	Small	Large
$\Delta Limit$	0.386***	1.060***	0.249***	0.552***	0.292***	0.430***	0.318***
	(0.031)	(0.018)	(0.020)	(0.048)	(0.022)	(0.033)	(0.024)
Average Utilization	42.03	93.25	8.34	57.46	33.38	43.21	38.28
Firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dep. Var. (mean)	0.71	-0.23	1.85	0.73	0.77	0.71	0.64
Dep. Var. (Sd)	7.88	7.90	5.30	9.00	7.12	7.43	8.98
Observations	460,873	54,499	126,495	38,599	286,615	237,841	47,520

- Exploit variation within firm over time credit card in limit and balance: $\frac{\Delta B}{\Delta L}$
- Increase in balance \$0.38 for \$1 increase in limit ($\sim$ Aydin and Kim, 2024, for SMEs in Turkey)
- Stronger for small and high risk firms with high utilization (more likely to be revolvers)
  - $\approx$ 80% of people with utilization $>$ 30% report revolving (Fulford and Schuh, 2023)

Fact #2: Correlation between Utilization and Delinquencies



- Low delinquencies (1.5%), but steep increase with utilization

Fact #2: Correlation between Utilization and Delinquencies

Seemingly unrelated regression (SUR):

$$Utilization_i = X_i'\beta_U + FE + \epsilon_i^u$$
$$Delinquency_i = X_i'\beta_D + FE + \epsilon_i^d$$
$$Corr(\epsilon_i^u, \epsilon_i^d) = ??$$

	Intensive Margin: Credit Card Limit		Intensive Margin: Credit Card Utilization	
	(1)	(2)	(3)	(4)
Correlation between unobservables	-0.02	-0.03	0.11	0.15
Breusch-Pagan chi-squared	190	411	5774	10265
Time f.e.	Yes	Yes	Yes	Yes
Bank f.e.	Yes	Yes	Yes	Yes
Firm size f.e.	Yes	Yes	Yes	Yes
Firm location f.e.	Yes	Yes	Yes	Yes
Firm industry f.e.	Yes	Yes	Yes	Yes
Firm risk f.e.	Yes	No	Yes	No
Dep. Var. (mean)	15.72	15.72	25.95	25.95
Observations	478,621	478,621	478,621	478,621

- Correlated ϵ's suggest selection on unobservables (e.g., common shocks/adverse selection)
- Greater correlation without risk control ("screening" doing some work)

Fact #3: High Rates; "Uniform Pricing" for Cards

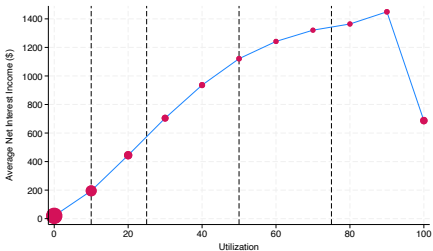
Interest rates

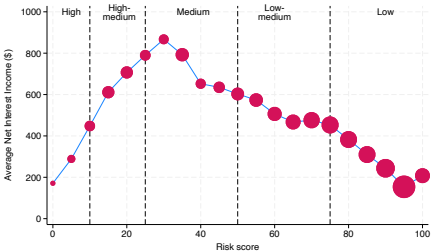
	All	Credit Cards					Term Loans				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Credit card (dummy)	6.40***										
	(0.36)										
Bank (dummy)						0.57*					0.64**
						(0.32)					(0.25)
Lender f.e.	Yes	Yes	No	No	No	No	Yes	No	No	No	No
State f.e.	Yes	No	Yes	No	No	Yes	No	Yes	No	No	Yes
Year-month f.e.	Yes	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Lender × Year-month f.e.	No	No	No	No	Yes	No	No	No	No	Yes	No
R^2	0.87	0.71	0.09	0.10	0.91	0.19	0.65	0.18	0.05	0.54	0.24
R^2 adjusted	0.86	0.70	0.08	0.10	0.87	0.18	0.63	0.17	-0.01	0.14	0.18
Y mean	12.11	12.52	12.52	12.52	12.68	12.52	5.42	5.42	5.42	5.17	5.42
Y sd	2.83	2.34	2.34	2.34	2.22	2.34	0.91	0.91	0.91	0.79	0.91
Observations	16,306	15,356	15,379	15,381	5,715	15,379	944	952	952	106	952

- Credit card rates $\approx 2x$ term loan rates; Banks higher rates than non-banks
- Lender × year FE explain most variation (more so for "standardized" credit card relative to "personalized" term loans)

Fact #4: Net Interest Income

$$NII_i = r_i \times Balance_i \times (1 - Delinquent_i) - f_i \times Balance_i$$





- Average net interest income increases with utilization, decreases with full utilization
- Average net interest income is positive but low for the highest- and lowest-risk borrowers and peaks for middle risk borrowers ($\sim$ Agarwal et al. (2015) for consumer credit cards)
  - Highest risk have high deliquencies; lowest risk have low utilization

Structural Model

Structural model outline

- Why a structural model:
  - Decompose high rates into markups vs. marginal costs
  - "Stress test" around firm liquidity shocks ("COVID without PPP")
  - Impact of Basel III proposed credit conversion factor for undrawn balances

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  - Firms choose among differentiated lenders
  - Key additions: (Similar to Crawford et al., 2018)
    1. Endogenous credit utilization and default choice
    2. Utilization and default potentially correlated (i.e., receives negative shocks)

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  - Standard random-coefficient logit approach (deposit rates as instrument for credit card rates) + MLE for demand/default
  - Invert firm FOCs to recover firm MC

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  - Invert firm FOCs to recover firm MC
- Use estimated model for decomposition/counterfactuals

Firm Credit demand

Firm i chooses among N cards, utilization, and delinquency:

$$u^D_{ijmt} = \alpha^D r_{jmt} + \beta^D X^D_{jmt} + \xi^D_{jmt} + \eta^D Y^D_{ijmt} + \epsilon^D_i + \varepsilon^D_{ijmt} \quad \text{(Extensive margin demand)}$$

$$u^U_{ijmt} = \alpha^U r_{jmt} + \beta^U X^U_{jmt} + \eta^U Y^U_{ijmt} + \epsilon^U_i \quad \text{(Utilization)}$$

$$u^F_{ijmt} = \alpha^F r_{jmt} + \beta^F X_{jmt} + \eta^F Y^F_{ijmt} + \epsilon^F_i \quad \text{(Default)}$$

Where:

- r_{jmt}: interest rate on credit cards
- X_{jmt}: non-price characteristics (e.g., lender fixed effect, number of branches, etc)
- Y_{ijmt}: observable determinants of firm-level demand, utilization, default (e.g., size, risk-score, industry, etc)
- ϵ_i: unobservable (to the bank & econometrician) determinants of firm-level demand, utilization, default
- ε^D_{ijmt}: taste-specific logit shocks

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Where:

$$\begin{pmatrix} \epsilon^D_i \\ \epsilon^U_i \\ \epsilon^F_i \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma^2_D & 0 & 0 \\ 0 & \sigma^2_U & \rho_{UF}\sigma_U \\ 0 & \rho_{UF}\sigma_U & 1 \end{pmatrix} \right),$$

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Solution to utility maximization implies:

- Extensive margin demand for credit
- Intensive margin demand for credit (utilization)
- Likelihood of delinquency, allowing for correlation with utilization (ρ_{UF})

Lender Credit supply

Monopolistically competitive firms set rates to maximize profits:

$$\Pi_{jmt} = \sum_{i \in I_{mt}} q_{ijmt} \left[r_{jmt}(1 - f_{ijmt}) - (1 - \omega) f_{ijmt} - mc_{jmt} \right],$$

- q_{ijmt} capture both discrete demand and continuous utilization
- Our focus is profits from "revolvers" (Always transactor $q_{ijmt} = 0$)
  - For consumer credit cards, credit function make 70-80% of profitability
- ω recovery rate. $\omega = 1$ means full recovery of balance when default

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Firm profit maximization implies:

$$\overbrace{\sum_{i \in I_{mt}} q_{ijmt}(1 - f_{ijmt})}^{\text{1. Higher profit from inframarginal}} + \overbrace{\sum_{i \in I_{mt}} \frac{\partial q}{\partial r_{ijmt}} \left(r_{jmt}(1 - f_{ijmt}) - (1 - \omega) f_{ijmt} - mc_{jmt} \right)}^{\text{2. Lower quantities}}$$

$$- \overbrace{\sum_{i \in I_{mt}} \frac{\partial f}{\partial r_{ijmt}} q_{ijmt} \left(r_{jmt} + (1 - \omega) \right)}^{\text{3. Higher delinquencies}} = 0$$

Results

Estimation Results: Baseline

	Demand	Utilization	Default
	(1)	(2)	(3)
Interest rate	-10.889	-0.708	
	(1.431)	(0.011)	
Risk: Very high	-0.732	0.155	1.165
	(0.056)	(0.009)	(0.045)
Risk: High	-0.260	0.045	0.373
	(0.035)	(0.005)	(0.030)
Risk: Low	-0.270	-0.136	-0.332
	(0.021)	(0.003)	(0.027)
Risk: Very low	0.172	-0.273	-0.558
	(0.021)	(0.002)	(0.029)
Employee: 5-9	-0.362	-0.012	0.002
	(0.024)	(0.003)	(0.032)
Employee: 10-19	-0.410	-0.027	-0.154
	(0.029)	(0.004)	(0.045)
Employee: 20-49	-0.519	-0.037	-0.160
	(0.036)	(0.005)	(0.050)
Employee: 50-99	-0.540	-0.044	-0.164
	(0.067)	(0.010)	(0.086)
Employee: 100+	-0.549	-0.060	-0.444
	(0.077)	(0.011)	(0.147)
Cash-flow volatility: High	0.187	0.006	0.022
	(0.020)	(0.002)	(0.029)
Cash-flow volatility: Low	0.117	0.006	0.028
	(0.022)	(0.003)	(0.027)
Covariance Matrix			
	$\sigma_D = 0.909$		
	(0.029)		
		$\sigma_U = 0.307$	
		(0.001)	
		$\rho_{UF} = 0.062$	$\sigma_F = 1.000$
		(0.004)	
Fixed effects			
Time × Market	Yes	Yes	Yes
Time × Lender Type	Yes	Yes	Yes
Observations	1175887	38936	38936

- Downward sloping demand, relative low firm own-elasticity ≈ 1.2
  - In line with previous work (e.g., Crawford et al. 2018)
- Large and significant unobservable determinants of credit card demand (σ_D) and utilization (σ_U)
- Positive correlation between utilization and delinquency, but quantitatively small ($\rho_{UF} \approx 0.06$)
  - When removing credit risk control ρ_{UF} doubles (credit scoring helps!)
  - Highest risk firm has 2x ρ_{UF} in baseline
- Other firm characteristics (risk, size, cash-flow volatility) sensible effects
  - Utilization increase with firm risk and cash-flow volatility, decreases with firm size

Estimation Results: Model Fit and Marginal Costs

	Data	Model
	(1)	(2)
Demand	4.06	4.06
	(19.73)	(7.43)
Utilization	32.80	32.80
	(33.47)	(13.31)
Default	1.54	1.54
	(12.30)	(3.69)
Marginal Cost		3.83
		(2.58)
Marginal Cost (effective)		4.76
		(1.92)
Markup		7.71
		(0.61)
Markup (naive)		8.65
		(1.71)

- Model predicts means well and some of the large dispersion observed in the data

Estimation Results: Model Fit and Marginal Costs

	Data	Model
	(1)	(2)
Demand	4.06	4.06
	(19.73)	(7.43)
Utilization	32.80	32.80
	(33.47)	(13.31)
Default	1.54	1.54
	(12.30)	(3.69)
Marginal Cost		3.83
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Marginal Cost (effective)		4.76
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- Average marginal costs 3.8%, increase by about 90bps when accounting for default
- Large markups $\approx$ 7.5% (higher without accounting for delinquency)
  - higher cost due to adverse selection / correlation shocks is true, but quantitative impact is small
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  - credit card rate is high, delinquency rate is low even for high-utilization firms
- What if utilization and delinquencies spike when lenders cost are high?

Counterfactuals

Counterfactual I: Utilization shock

Objective: Simulate "small firm crisis"

- GFC: Modest utilization increase, large bank funding increase, large increase in info-asymmetry
- COVID: Large utilization increase, modest bank funding increase, limited increase in info-asymmetry

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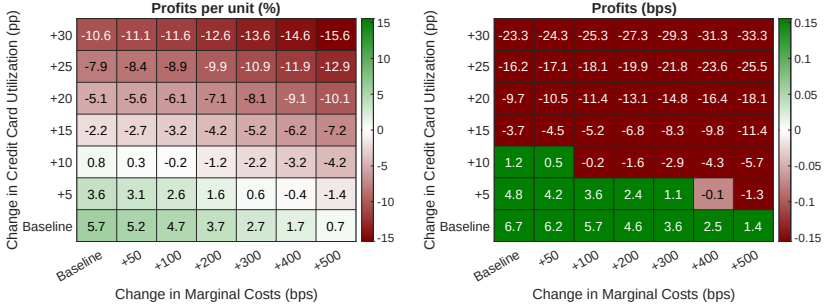
In the model: Simulate counterfactual economy where:

- Contracts held fixed (e.g., extensive margin & pricing)
- Match observed utilization increases (increase intensive margin demand)
- Match observed delinquency increases (increase ρ)
- Match observed bank funding cost increases (increase mc)

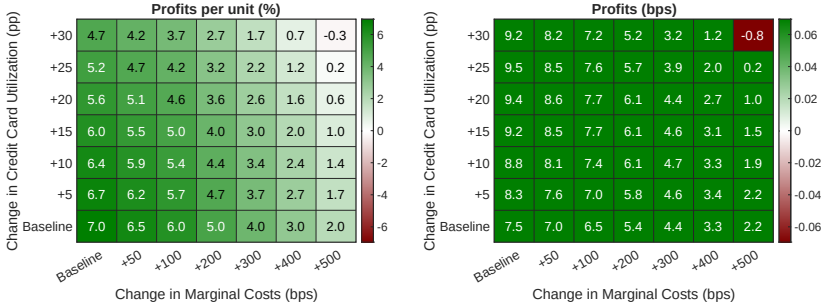
Counterfactual I: "GFC" shock



GFC: Util $+5pp$, MC $+300bps$

- Utilization increase modestly
- Defaults and (especially) MC increase dominates
- Bank per unit and total profits still positive, but large decrease ($\approx$ -80%)

Counterfactual I: "COVID" shock



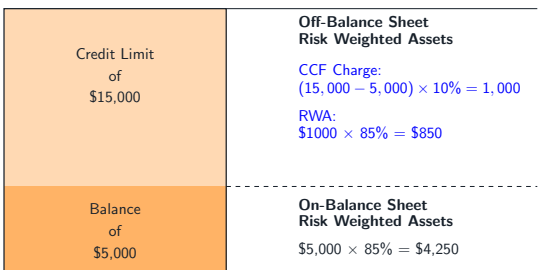
COVID: Util $+15pp$, MC $+100bps$

- Defaults and marginal costs increase modestly
- Bank per-unit profits decrease (default and mc channels), but total profit increase (utilization effect dominates)

Lenders' MC would have to increase by $\approx$ 200bps for profits to decline

Counterfactual II: Capital Regulation of Undrawn Credit

- Proposal (Basel III "Endgame"): better link capital risk weights to customers use the credit cards
  - Transactor 55% risk weight; revolver 85% risk weight
  - 10% credit conversion factor (CCF) for undrawn balances
    $\rightarrow$ Example: 20% increase in Risk Weighted Assets (RWA)



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Objective: Simulate equilibrium impact in business credit card market of credit conversion factor (CCF) implementation to quantify costs and relative incidence

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In the model:

- Adjust bank profit:

$$\Pi_{jmt} = \sum_{i \in I_{mt}} [\overbrace{q_{ijmt}\left(r_{jmt}(1-f_{ijmt}) - (1-\omega)f_{ijmt} - mc_{jmt}\right)}^{\text{Profits as in baseline}} \overbrace{- CCF \times mc_{jmt} s_{ijmt}(1-u_{ijmt})}^{\text{Regulation of undrawn commitments}}]$$

  - s_{ijmt} and u_{ijmt} capture discrete demand and continuous utilization

- Banks (and non-banks) reoptimize rates given new regulatory environment
- Firms reoptimize demand, utilization, default given new rates

Counterfactual II: Capital Regulation of Undrawn Credit

	Baseline	Regulation: CCF	
		Only banks	
		Δ %	
	(1)	(2)	
Rates	12.05	3.09	
Banks	12.44	5.12	
Non-banks	11.51	0.06	
Demand	3.18	-0.80	
Banks	3.26	-3.33	
Non-banks	3.06	2.91	
Utilization	33.67	-0.78	
Banks	33.93	-1.33	
Non-banks	33.30	-0.01	
Default	1.71	0.58	
Banks	1.50	1.13	
Non-banks	1.99	0.02	
Lender Profit	0.08	-3.24	
Banks	0.08	-7.25	
Non-banks	0.07	2.93	
Firm Surplus	1051.24	-2.96	
1-4	1200.72	-3.00	
5-9	956.34	-2.92	
10-19	915.05	-2.84	
20-49	894.19	-2.86	
50-99	903.04	-2.92	
100+	905.89	-2.93	

- Interest rate increase by $\approx$ 3% (+5% for banks)
- Demand for credit cards (extensive margin) and utilization (intensive margin) decrease by $\approx$ 0.8%
  - Reallocation from banks (-3.3%) to non-banks (+2.9%)
- Default increase by $\approx$ 0.6%
  - With higher rates lower utilization, but selection of riskier firms
- Cost of regulation fall on both banks (-7% profits) and (via pass-through) firms (-3% surplus)
  - Larger losses for smaller firms

Counterfactual II: Capital Regulation of Undrawn Credit

	Baseline	Regulation: CCF	
		Only banks	All lenders
		Δ %	Δ %
	(1)	(2)	(3)
Rates	12.05	3.09	4.86
Banks	12.44	5.12	5.16
Non-banks	11.51	0.06	4.42
Demand	3.18	-0.80	-1.28
Banks	3.26	-3.33	-1.72
Non-banks	3.06	2.91	-0.63
Utilization	33.67	-0.78	-1.23
Banks	33.93	-1.33	-1.34
Non-banks	33.30	-0.01	-1.08
Default	1.71	0.58	1.23
Banks	1.50	1.13	1.14
Non-banks	1.99	0.02	1.32
Lender Profit	0.08	-3.24	-4.93
Banks	0.08	-7.25	-5.67
Non-banks	0.07	2.93	-3.80
Firm Surplus	1051.24	-2.96	-4.61
1-4	1200.72	-3.00	-4.68
5-9	956.34	-2.92	-4.54
10-19	915.05	-2.84	-4.44
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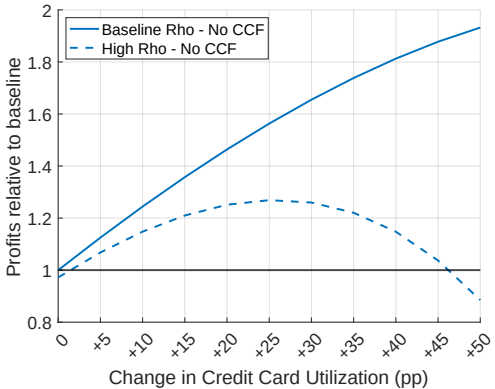
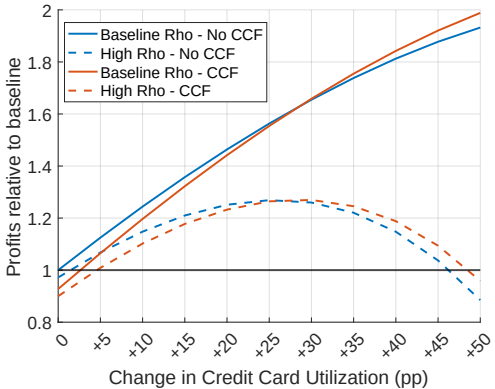
  - With higher rates lower utilization, but selection of riskier firms
- Cost of regulation fall on both banks (-7% profits) and (via pass-through) firms (-3% surplus)
  - Larger losses for smaller firms
- Regulating all lenders:
  - Prevent reallocation away/limit losses for banks
  - Higher losses for non-banks and larger decreases in firms surplus

Counterfactual I + II: Credit Conversion Factor + Utilization Shocks



- **No CCF:** horse-race between quantity channel (↑ profits) and default channel (↓ profits)

Counterfactual I + II: Credit Conversion Factor + Utilization Shocks



- **No CCF:** horse-race between quantity channel (↑ profits) and default channel (↓ profits)
- **With CCF:** lower profitability with no utilization shock, higher profitability with (very) large utilization shock (2 channels: "pre-pay" part of marginal costs of undrawn balances + higher equilibrium rates)

Conclusions

Conclusions

- Business credit cards are a large and growing share of small-firm borrowing
- Business credit cards are a very expensive source of credit
- Rates may be justified by strong selection in which firms carry balances and default on them
- Structural decomposition suggests no. Rather, markups are very high
- Counterfactual suggests lenders benefit from credit card drawdowns, unless large contemporaneous funding cost shock
- Increasing capital requirements on undrawn credit commitments lead to partial reallocation away from regulated banks to unregulated lenders; limited substitution (and higher rates) decreases (especially small) firm surplus