Financial Frictions and the Market for Firms

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Motivation

- Markets are the predominant allocation mechanism of modern economies

  - Input markets (capital and labor) well-studied
  - Less is known about the market where firms themselves can be bought and sold

- The *market for firms* might be especially important in economies with financing frictions

  - Who owns the firms matters for allocations and real outcomes
  - Constrained entrepreneurs might want to sell their firms to other parties with more resources
  - Allocative efficiency implications: firms reallocated from constrained $\rightarrow$ unconstrained

- Questions

  - What are the characteristics of the market for firms?
  - Can financial frictions motivate trade?
  - How important is the role of this market for the aggregate economy?

This Paper

- Document novel cross-sectional and longitudinal facts regarding the market for firms
  - ▶ Cross-section: younger, smaller, higher ARPK have the highest trading rates
  - ▶ Post-trade dynamics: both output and capital grow, capital increasing more, reducing ARPK over time

- Develop a GE heterogeneous agents model of entrepreneurship with a market for firms
  - ▶ Decentralized market with search frictions where firms can be bought and sold
  - ▶ Gains from trading firms arise from 1) credit constraints, 2) incomplete markets, 3) preference shocks

- Main prediction from theory: the trade of firms alleviates financial constraints
  - ▶ We show that cross-sectional facts and post-trade firm dynamics in data are consistent with prediction

- Quantify macroeconomic implications
  - ▶ Better capital allocation due to trade of firms accounts for 9% of entrepreneurial Y, 2% of TFP
  - ▶ Improving the functioning of market for firms is especially beneficial for less fin-developed economies

Outline

Cross-Sectional Data

We use different surveys about private firms, their characteristics, and their owners in U.S.

- i. Survey of Business Owners (SBO)
  - ▶ Owner and firm-level survey, business owners' type of acquisition and reason for exit
  - ▶ 2007 Public Use Micro Data Sample

- ii. Survey of Consumer Finances (SCF)
  - ▶ Household-level survey, income and wealth, business owners' type of acquisition
  - ▶ Nine waves between 1989 to 2016

- iii. Kauffman Firm Survey (KFS)
  - ▶ Firm-level survey, with balance sheet information and reason for exit
  - ▶ Eight-year panel of firms started operations in 2004

Cross-Sectional Facts About the U.S. Market for Firms

Def. *Entrepreneur*: self-employed, business owner, actively manages its firm, with at least one employee

1. In the U.S., **26%** of entrepreneurs acquired their firm by a purchase, annual trade rate **3%** ▸ Details
   - ▸ Relative to 65% founded their firm, and 9% that inherited or other

2. From all buyers, **66%** have never been entrepreneurs before purchasing their business ▸ Details
   - ▸ Buying an existing firm is a relevant way to enter into entrepreneurship

3. Recent buyers are **3.8** times wealthier than the average household ▸ Details

4. Younger, smaller, and higher ARPK (y/k) firms have the highest trading rates ▸ Details

Longitudinal Data

- Orbis Historical (Moody's Bureau van Dijk)

- Large panel with annual balance sheet and income statements for private firms from 1995 to 2019

- Ownership data from 2007 to 2019

- Baseline results for eleven high-income European countries most similar to U.S. ▸ DStats ▸ Scatter

  ▸ Additional results for middle-income European countries

- We use the ownership data to identify trades in the market for firms

  ▸ Define trade episodes as years in which firms' majority shareholder (equity>50%) changes

  ▸ String similarity algorithm excludes spurious changes or family-related transfers

Firm Dynamics After Trade (1/2)

- Event analysis regression

$$\log x_{it} = \beta_0 + \sum_{h \in \mathcal{T}} \beta_h D_{it}^h + \gamma \mathbf{c}_{it} + \epsilon_{it},$$

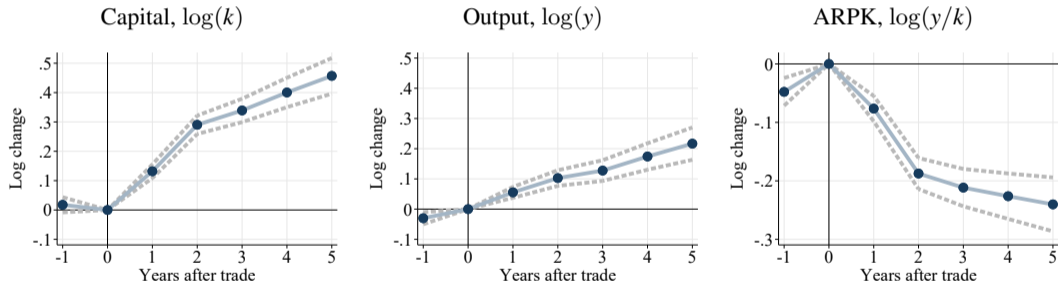where $\mathcal{T} = \{-1, 1, \ldots, 5\}$ and D_{it}^h equals 1 for each h around the trading episode

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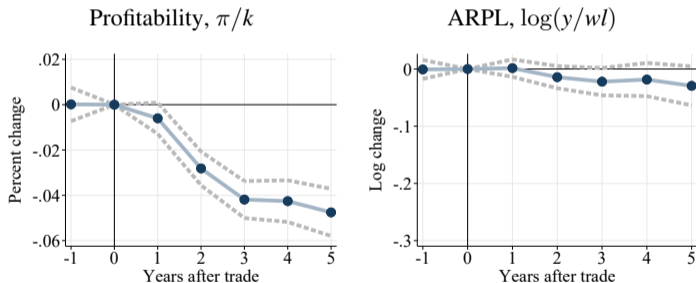Capital, $\log(k)$ Output, $\log(y)$ ARPK, $\log(y/k)$

Source: Orbis Historical. *Notes*: Estimated coefficients $\hat{\beta}_h$. The dashed lines correspond to 99% confidence intervals considering firm-level clustered standard errors. Controls $\mathbf{c}_{it}$ include: country, NACE 4-digit sector, year fixed effects, and firms' age when traded.

▸ Descriptive Stats   ▸ Middle-Income Countries

Firm Dynamics After Trade (2/2)

- Event analysis regression

$$\log x_{it} = \beta_0 + \sum_{h \in \mathcal{T}} \beta_h D_{it}^h + \gamma \mathbf{c}_{it} + \epsilon_{it},$$

where $\mathcal{T} = \{-1, 1, \ldots, 5\}$ and D_{it}^h equals 1 for each h around the trading episode

Profitability, π/k — ARPL, $\log(y/wl)$

Source: Orbis Historical. *Notes*: Estimated coefficients $\hat{\beta}_h$. The dashed lines correspond to 99% confidence intervals considering firm-level clustered standard errors. Controls $\mathbf{c}_{it}$ include: country, NACE 4-digit sector, year fixed effects, and firms' age when traded.

▸ Dynamics π

Outline

Overview

- Incomplete markets GE model with heterogeneous agents [Quadrini 2000; Cagetti De Nardi 2006]

  ▶ Uninsurable idiosyncratic income risk

  ▶ Households can be workers or entrepreneurs

  ▶ Entrepreneurs face credit constraints

+ Decentralized market for firms

  ▶ Search frictions

  ▶ Gains from trade due to credit constraints, incomplete markets, and preference shocks

Environment

Time

- Discrete and infinite
- Each period is divided into two: 1) the market for firms (DM), and 2) the production stage (CM)

Commodity space and financial markets

- Final consumption good c
- Risk free asset a, for savings and as a medium of exchange in the market for firms
- Credit constraints and incomplete financial markets

Agents and technology

- Continuum of households in $[0, 1]$, preferences $u(c_{it}) = c_{it}^{1-\sigma}/(1-\sigma)$
- Private firms (DRS), owned by a single household, can be traded in the market for firms
- Public firm (CRS) and a financial intermediary

Households' Endowments and Occupations

Firm owners

- Are endowed with a private firm of quality z_{it}, tradable, indivisible, and evolves according to

$$z_{it+1} = \begin{cases} z_{it} & \text{w/ pr } \gamma \\ z' \sim \mathcal{P}(z_{min}, \eta_z) & \text{w/ pr } (1-\gamma) \end{cases}$$

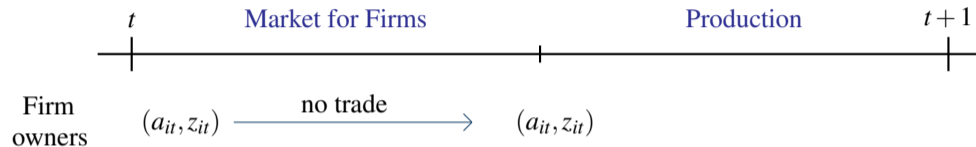 with which they can produce the consumption good with technology $z_{it} f(k_{it}, l_{it})$

- What is z_{it}? Firm's organizational capital or intangible assets (customer base, trademarks, patents)

Workers

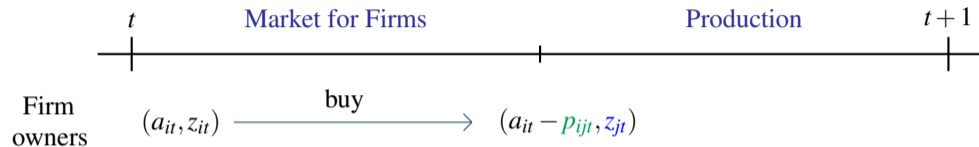- Are endowed with one unit of labor and a labor efficiency ε_{it} which follows

$$\log \varepsilon_{it+1} = \rho_\varepsilon \log \varepsilon_{it} + \sigma_\varepsilon u_{it+1}, \quad u_{it+1} \sim \mathcal{N}(0, 1)$$
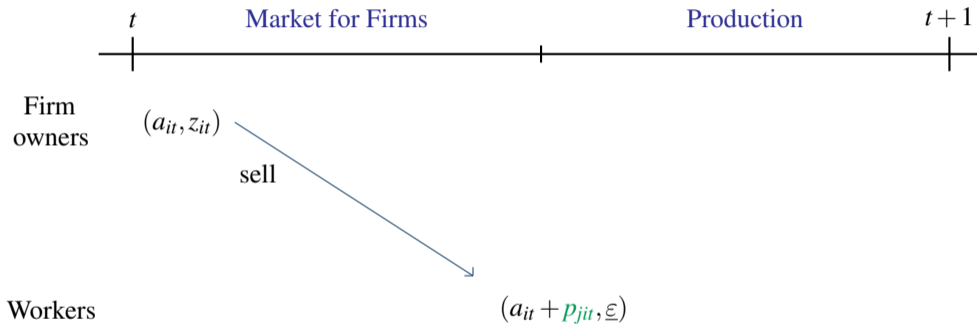
Timing and Transitions Between Occupations

Firm owners: t — Market for Firms — Production — $t+1$

(a_{it}, z_{it}) $\xrightarrow{\text{no trade}}$ (a_{it}, z_{it})
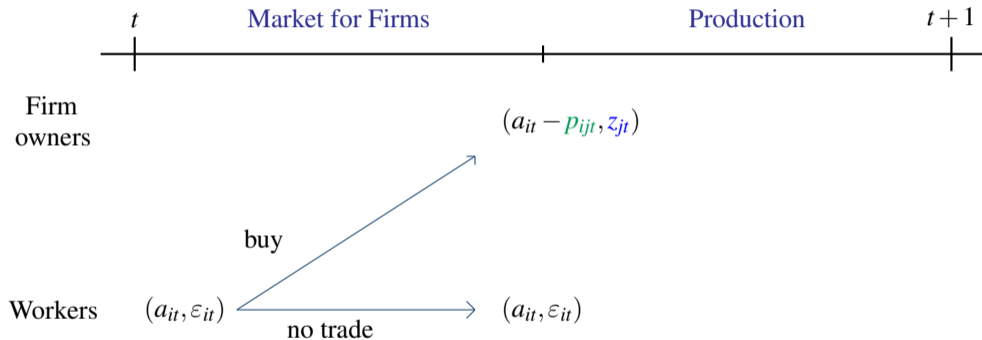
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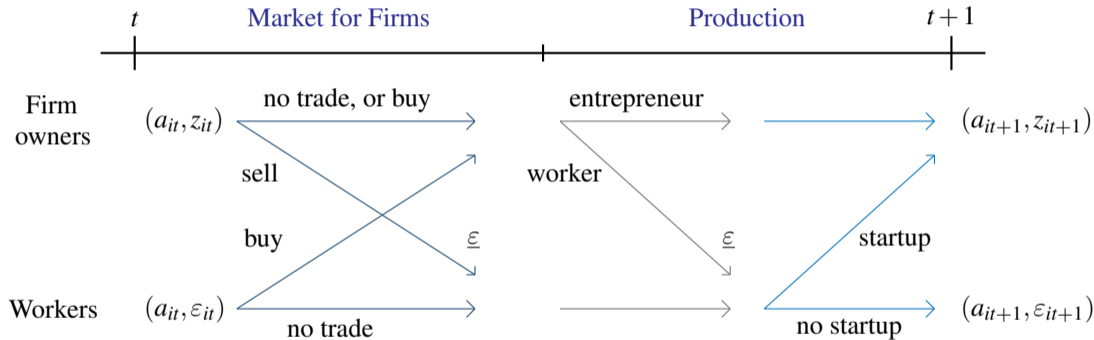
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Firms and Financial Intermediary

- If business owner j decides to produce, the profits of the *private firm* are given by

$$\pi(a_{jt}, z_{jt}) = \max_{k_{jt}, l_{jt}} \ z_{jt} \left(k_{jt}^{\eta} \ l_{jt}^{(1-\eta)} \right)^{\Upsilon} - (r + \delta) k_{jt} - w l_{jt}$$

$$\text{s.t.} \quad k_{jt} \leq \lambda a_{jt}$$

where $\Upsilon < 1$, and $\lambda \geq 1$, implies that $\pi(a_{jt}, z_{jt}) \leq \pi(a_{it}, z_{jt})$ when $a_{jt} < a_{it}$

- Besides private firms, there is a representative *public firm* with a CRS technology

$$Y_{pt} = K_{pt}^{\eta} L_{pt}^{1-\eta}$$

which faces no credit constraints

- There is a competitive *financial intermediary*, takes deposits from HHs and rent capital to firms

▸ Resource Constraint

A Market for Firms

- Firms are hard to valuate and price

    ▶ *Search-theoretic* approach with bilateral random matching and quid pro quo trade

- Two types of meetings: *owner-owner* and *owner-worker*

    ▶ Meeting probabilities given by endogenous distribution of agents and search frictions: (α_o, α_w)

- Exchanges are voluntary, heterogeneous valuations for firms are a necessary condition for trade

- Motives to trade firms arise from three sources:

    1. Credit constraints: firms' profits are weakly increasing in owners' wealth
    2. Incomplete financial markets: wealthier agents better suited to bear risk
    3. Preference shocks: other motives to trade not directly modeled in our theory

- If gains from trade are positive, buyer and seller *Nash bargain* over the firm's price

Outline

Calibration Strategy

- Annual frequency

- Assign parameters to standard values

- Parameters governing income and wealth distributions, private firms, and the market for firms

  ▶ Calibrated to minimize distance between moments in data and model

  ▶ Focus on the year 2007 (SBO and SCF data)

Parameters

Assigned Parameters

	Value	Description
σ	1.5	CRRA
δ	0.06	Capital depreciation rate
η	1/3	Capital elasticity
$\overline{\kappa}$	3	Preference shock, UB

Calibrated Parameters

	Value	Description
β	0.898	Discount factor
Υ	0.724	Curvature private firms technology
$(\lambda-1)/\lambda$	0.397	Collateral constraint, max. leverage
γ	0.930	Persistence private firm value
ζ	0.939	$1-$ startup shock
z_{min}	1.118	Scale, z distribution
η_z	2.419	Shape, z distribution
ρ_ε	0.953	AR(1) parameter, ε distribution
σ_ε	0.240	Std. Deviation, ε distribution
$\mathbb{E}[\kappa]$	1.354	Preference shock, mean*
α_o	0.803	Owner-owner | meeting prob.
α_w	0.459	Owner-worker | meeting prob.
χ	0.436	Buyers' bargaining power

*Implies an average discount of $\mathbb{E}[1-\kappa^{-1}]=0.23$

Model Fit

		Data	Model
Entrepreneurs	Fraction of entrepreneurs	0.06	0.06
	Income share of entrepreneurs	0.20	0.21
	Wealth share of entrepreneurs	0.33	0.38
Income and Wealth Distribution	Gini income, all households	0.62	0.61
	Gini wealth, all households	0.82	0.83
	Gini income, entrepreneurs	0.67	0.77
	Gini wealth, entrepreneurs	0.74	0.81
	Gini income, workers	0.58	0.56
	Gini wealth, workers	0.78	0.79
Private and Public Firms	Capital to output ratio	3.0	3.0
Private firms	Output share	0.50	0.45
	Leverage	0.35	0.35
	Exit rate	0.09	0.09
Trade of private firms	Trade rate, all firms	0.030	0.031
	Trade rate, largest firms	0.017	0.013
	Share purchased by workers	0.66	0.67
	Median price/profits	3.5	3.3

Outline

Motives for Trading Firms

- Comparative statics relative to baseline parameterization show that
  - Preference shocks account 31% of trades

    Credit constraints explain the bulk, 68%, of the trades in the market for firms

    Risk and incomplete markets account for 13% of the transactions

Trade Rate Decomposition

	All Firms	
	Trade rate	Relative
Baseline	3.1%	1.00
No preference shocks	2.1%	0.69
No collateral constraint	1.0%	0.32
No preference, no collateral	0.4%	0.13

Notes: Steady-state comparisons under different parameterizations. Relative is the ratio of each trade rate to the Baseline model. No preference shocks sets $\mathbb{E}[\kappa] = 1$ and $Var[\kappa] = 0$. No collateral constraint assumes $\lambda \to \infty$.

▸ Analytical   ▸ No κ, Cross-section

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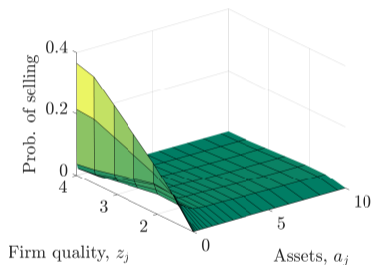
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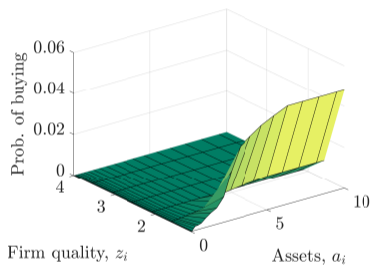
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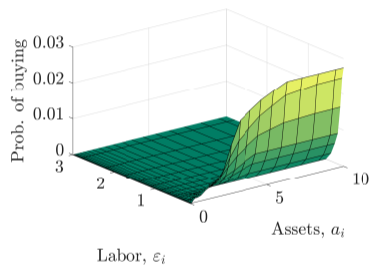# Who Buys and Who Sells Firms?

(a) Probability of selling   (b) Probability of buying, owners   (c) Probability of buying, workers
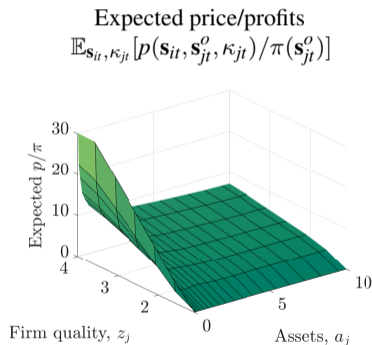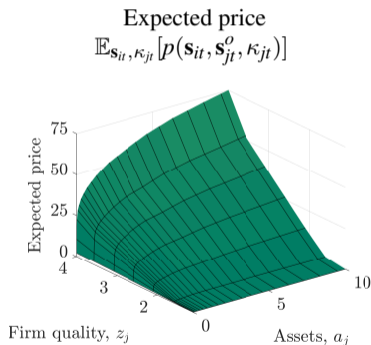

Typical seller: low wealth and high quality business owner

Typical buyer: wealthy low quality (efficiency) owner (worker)

Pricing of Private Firms

- Business prices are increasing in quality z_j

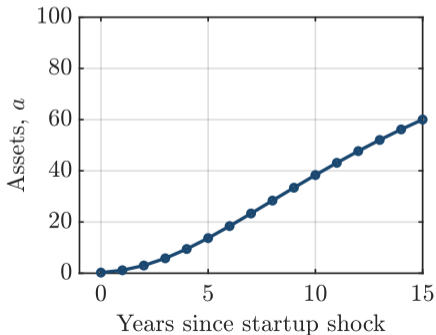- Due to financial frictions, holding z_j fixed, prices are increasing in owners' wealth a_j

Expected price
$\mathbb{E}_{\mathbf{s}_{it}, \kappa_{jt}}[p(\mathbf{s}_{it}, \mathbf{s}_{jt}^o, \kappa_{jt})]$

Expected price/profits
$\mathbb{E}_{\mathbf{s}_{it}, \kappa_{jt}}[p(\mathbf{s}_{it}, \mathbf{s}_{jt}^o, \kappa_{jt})/\pi(\mathbf{s}_{jt}^o)]$

Notes: Expected price in owners' state space, $\mathbf{s}_{jt}^o = (z_{jt}, a_{jt})$, after integrating over preference shocks, κ_{jt}, and trading counterparts, $\mathbf{s}_{it} \in \{\mathbf{s}_{it}^o, \mathbf{s}_{it}^w\}$.
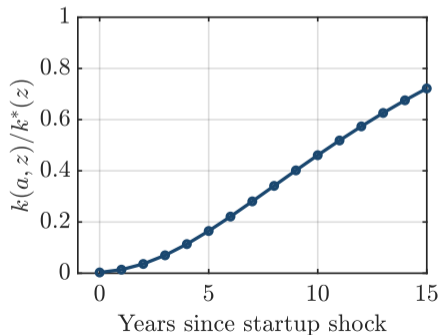
Firm Dynamics and Trade

- Illustrative example

  - Initial owner assets = median worker in the economy

  - Firm quality z is constant across t and equal to the 3rd best firm in grid

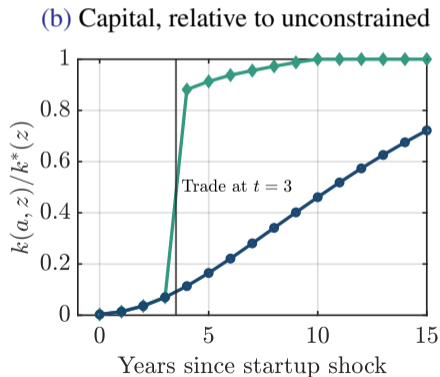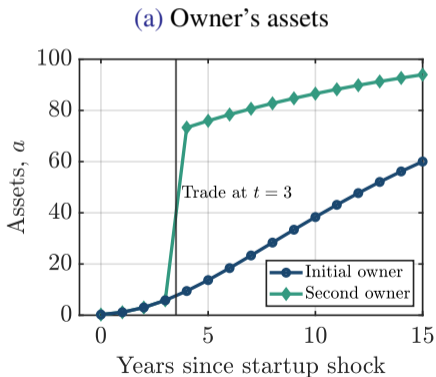(a) Owner's assets   (b) Capital, relative to unconstrained

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(a) Owner's assets

(b) Capital, relative to unconstrained
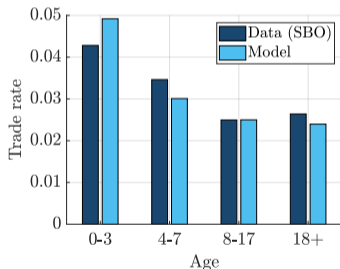
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Trade Rate and Firms' Characteristics in Data and Model

- *Prediction*: credit-constrained firms are more likely to be traded

Trade Rate and Firms' Characteristics in Data and Model

- *Prediction*: credit-constrained firms are more likely to be traded
  - Younger, smaller, and higher ARPK firms have the highest trading rates in data and model

(a) Trade vs. Firm Age (b) Trade vs. Firm Size (c) Trade vs. ARPK
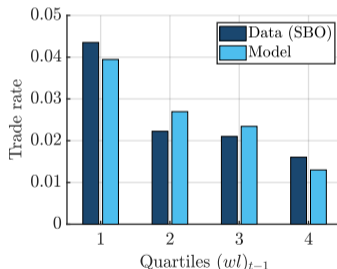
Notes: Trade rate by firms' characteristics in the data and data simulated from the model. Model (KFS) restrict to a sample of firms of age less or equal to 7.

▸ No κ, Cross-section

Buyers' Wealth in Data and Model

- *Prediction*: business buyers are, on average, wealthier than business sellers

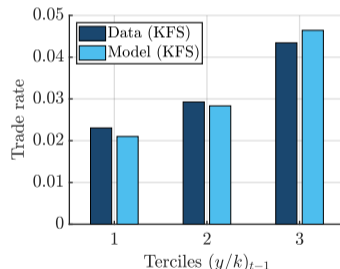# Buyers' Wealth in Data and Model

- *Prediction*: business buyers are, on average, wealthier than business sellers

  ▸ Avg. buyer in the model is 3.1 times wealthier than avg. household, consistent with the data

  ▸ Model is also consistent with avg. buyer wealth relative to the avg. entrepreneur

Wealth Ratio of Firm Buyers' to Households and Entrepreneurs

	Data	Model
Firm Buyers to Average Household		
Wealth $(a+p)$	3.83	3.09
Wealth Excluding Business Wealth (a)	2.71	2.74
Firm Buyers to Average Entrepreneur		
Wealth $(a+p)$	0.69	0.54
Wealth Excluding Business Wealth (a)	0.79	0.75

Source: 1989-2016 SCF. *Notes*: We define firm buyers, in the SCF, as those entrepreneurs who purchased their primary business in the year of the survey or the previous one. We compute the ratio as the average wealth of firm buyers divided by the average wealth of all households or entrepreneurs.

Firm Dynamics After Trade in Data and Model

- *Prediction*: after a trade, capital increases more than output, reducing the firms' ARPK over time

Firm Dynamics After Trade in Data and Model

- *Prediction*: after a trade, capital increases more than output, reducing the firms' ARPK over time
  - Dynamics in the model are faster, as firms immediately jump closer to optimal scale
  - Firms' ARPK falls by **26** log points five years after trade in model, and **24** log points in data

	Capital, $\log(k)$		*Output*, $\log(y)$		*ARPK*, $\log(y/k)$	
Years After Trade	(1) Data	(2) Model	(3) Data	(4) Model	(5) Data	(6) Model
$t = 3, \hat{\beta}_3$	0.350 (0.015)	0.550 (0.005)	0.134 (0.013)	0.273 (0.003)	-0.216 (0.012)	-0.277 (0.002)
$t = 5, \hat{\beta}_5$	0.470 (0.023)	0.527 (0.005)	0.230 (0.021)	0.271 (0.003)	**-0.240** (0.018)	**-0.256** (0.003)
Controls	✓		✓		✓	
R^2	0.355	0.165	0.443	0.084	0.375	0.187
N	187,599	147,021	187,599	147,021	187,599	147,021

Notes: Estimated coefficients $\hat{\beta}_h$ after 3 and 5 years from trade in Orbis and in model simulated data. Firm-level clustered standard errors are reported in parentheses. Controls include country, NACE 4-digit sector classifications, year fixed effects, and firms' age when traded.

Brief Discussion of Alternative Motives to Trade

- Preferences and owners' life cycle shocks

  - In our model these motives explain 1/3 of trades

    - Capture preferences (self-employed value) and owners' life cycle (health shocks or retirement)

  - Firm sales due to retirement $\rightarrow$ sellers are mostly old

  - *Data*: most firm sellers young to middle-aged ▸ Sellers' Age

- Differences in managerial ability

  - Buyers are better managers than sellers $\rightarrow$ profitability increases after trade

  - *Data*: profitability and ROA decrease after trade ▸ Dynamics π/k and ROA

- Differences in span of control

  - Buyers have greater span-of-control than sellers $\rightarrow$ ARPL and ARPK fall after trade

  - *Data*: ARPK sharply falls, but ARPL constant after trade ▸ Dynamics y/wl

Outline

Closing the Market for Firms

- Closing the market for firms leads to a fall in private firms' output of **9.1%**

  Extensive margin: the share of entrepreneurs falls by 4.5%, less entry/exit

  Intensive margin: poorer allocation of capital, resulting in TFP losses of **2.2%**

	Baseline Economy	Δ % Partial $(\alpha_o, \alpha_w)/2$	Δ % Total $(\alpha_o, \alpha_w) = \mathbf{0}$
Fraction of entrepreneurs	0.06	-2.4%	-4.5%
Exit rate	0.09	-10.2%	-27.5%
Private firms output	0.57	-4.8%	**-9.1%**
Private firms TFP	1.17	-1.2%	**-2.2%**
Public firms output	0.71	2.6%	5.1%
Total output	1.29	-0.7%	-1.3%
Interest rate	0.03	2.6%	4.4%
Wage	1.30	-0.4%	-0.7%

Closing the Market for Firms

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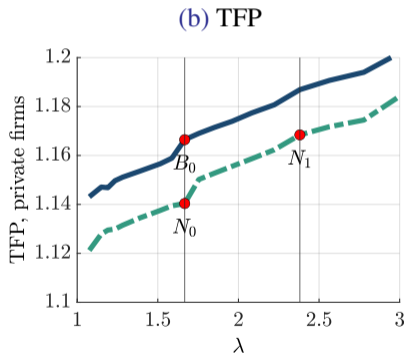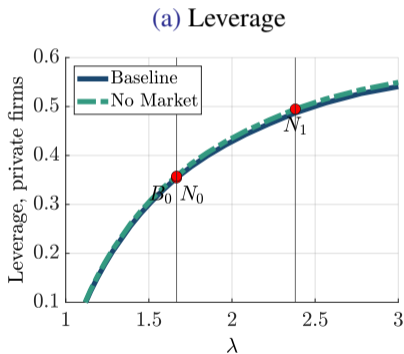|	Baseline Economy	Δ %	
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Baseline vs. No Market Economy

- What credit conditions the no market economy requires to match the TFP of baseline?
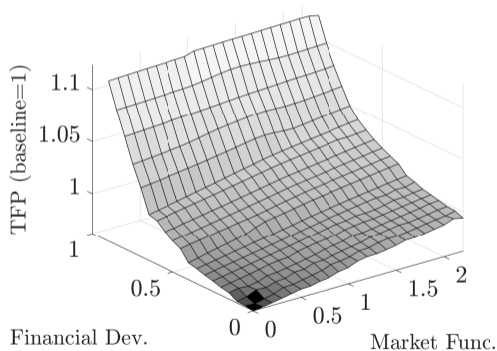 - No market economy requires increase in firms' leverage of **14 p.p.** ($N_0 = 35\%$ to $N_1 = 49\%$)

(a) Leverage   (b) TFP

NOTES: Steady-state values for the baseline and no market economy varying λ, which parameterizes firms' credit constraints (max. leverage is $(\lambda-1)/\lambda$). Panel (a) is private firms' mean leverage, $(k-a)/k$, weighted by capital k. Panel (b) is private firms' TFP.

Financial Development and the Market for Firms

- TFP is increasing in financial development and the functioning of the market for firms

No-credit economy can attain US-credit through a better-functioning market for firms

(a) TFP   (b) TFP and Market Functioning

Notes: Financial Development is defined by firms' maximum leverage, $(\lambda - 1)/\lambda$. Market Functioning is parameterized by ω multiplying the search frictions in the market for firms $\alpha_o(\omega) = \min\{\omega\alpha_o\}, \alpha_w(\omega) = \min\{\omega\alpha_w, 1\}$. High-credit, US-credit, and No-credit correspond to $(\lambda - 1)/\lambda$ equal to 0.75, 0.397, and 0.

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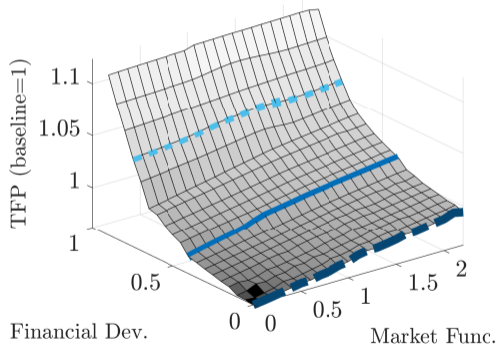
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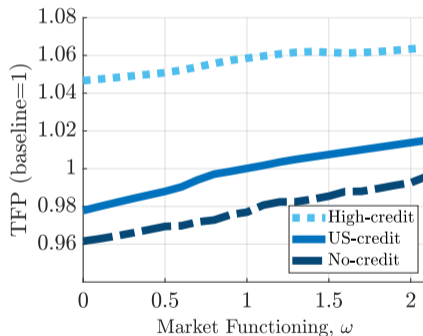
Outline

Conclusions

- We provide novel cross-sectional and longitudinal facts about the trade of firms

  ▶ In the cross-section, younger, smaller, and higher ARPK firms have the highest trading probabilities

  ▶ Over time, firms' capital and output grow significantly after trade, ARPK decreases sharply

- We develop macro GE model with a market for firms consistent with micro empirical patterns

  ▶ Gains from trade arise *endogenously* from financial frictions, exogenously from preference shocks

  ▶ Accounts for cross-section, as these firms are more likely to be financially constrained in the model

  ▶ Explains post-trade firm dynamics, b/c firms' trade relieves financial constraints

- We find that the trade of firms significantly improves allocative efficiency in the economy

  ▶ Better allocations due to trade of firms account for 9% of entrepreneurial Y, 2% of TFP

  ▶ The market for firms delivers a level of TFP of an economy with no trade and 14 p.p. higher leverage

  ▶ It can play a more important role in less financially developed economies ▶ High- vs Middle-Income Dynamics

Appendix

Related Literature and Contribution

- *Trade of Firms and the (Re)Allocation of Productive Resources*
    - Match b/t managers and businesses: Holmes Schmitz 1995; Calvacanti Erosa 2007
    - Owners' life cycle or taste shocks: Caselli Gennaioli 2013; Gaillard Kankanamge 2020; Mahone 2023
    - M&A: complementarities David 2021; intangibles accumulation Bhandari Martellini McGrattan 2022

- *Finance and Misallocation*
    - Buera Kaboski Shin 2011; Midrigan Xu 2014; Moll 2014

- *Financial Frictions and M&A*
    - Liao 2014; Erel Jang Weisbach 2015

- *Entrepreneurship in Macroeconomics*
    - Quadrini 2000; Cagetti De Nardi 2006; Peter 2021

- *Aggregate Implications of the Market for Ideas*
    - Silveira Wright 2010; Akcigit Celik and Greenwood 2016

Our paper: novel empirics and model to quantify the role of trade of firms under fin. frictions ◂

How do Entrepreneurs Acquire Their Firms?

Def. *Entrepreneur*: self-employed, business owner, actively manages its firm, with at least one employee

- In 2007, **23-26%** of the entrepreneurs acquire their business by purchasing an existing firm
  - ▸ Annual trade rate of **3%** (vs. 5% for housing)

Share of Entrepreneurs by Business Acquisition

	Founded	**Purchased**	Inherited/Other
SBO	65.2%	**25.5%**	9.3%
SCF	65.3%	**22.7%**	12.0%

SOURCE: 2007 Survey of Business Owners (SBO) and 2007 Survey of Consumer Finances (SCF).

Buyers' Characteristics

- From all buyers in SBO, **66%** have never been entrepreneurs before purchasing their business

  ▸ Buying an existing firm is a relevant way to enter into entrepreneurship ▸ Robustness

- Recent buyers in SCF are wealthier than the average household

Wealth Ratio of Firm Buyers

Relative to	Total Wealth	Without Business
Average Household	**3.83**	**2.71**
Average Entrepreneur	0.69	0.79

Source: 1989-2016 Survey of Consumer Finances (SCF).
Notes: We define firm buyers, in the SCF, as those entrepreneurs who purchased their primary business in the year of the survey or the previous one. Without Business excludes business wealth from household's total wealth.

Trade Rate and Firms' Characteristics

- Younger, smaller, and higher ARPK (y/k) firms have the highest trading rates

(a) Trade vs. Age   (b) Trade vs. Size   (c) Trade vs. ARPK
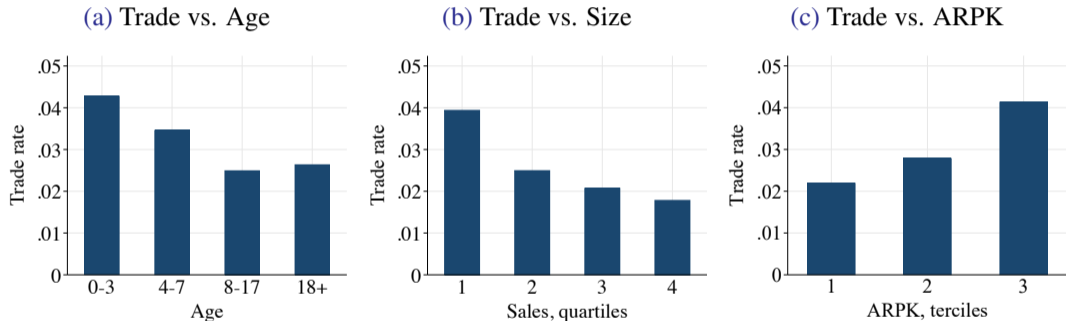
Source: SBO and KFS. *Notes*: Panels (a) and (b) use data from the 2007 SBO, and panel (c) uses data from the KFS. In panels (a) and (b) trade is computed using information from firms sold in or after 2007. Size is measured using firms' sales. Panel (c) uses data from KFS. Trade is computed using the firms sold during the years of the sample. We compute this every year and then take the average across time. Average revenue product of capital (ARPK) is measured by sales over capital of the previous year to the sale. Trade rates are normalized to match the aggregate of our baseline calculations.

Robustness

Share of Owners That Purchased Their Business

Sample	Purchased	N(weighted)	N
All owners	-	36,856,133	3,409,393
Respond acquisition	16.0%	20,302,192	2,164,541
Manage	17.0%	9,503,681	1,112,254
Employment >0	25.9%	5,507,460	1,255,134
Entrepreneurs	**25.5%**	3,167,718	698,651
Entrepreneurs and Equity share ≥50	24.0%	2,458,710	469,250
Entrepreneur and Hrs. Worked >40	26.0%	2,545,635	582,966
Equity share ≥50 and Employment>0	23.5%	3,884,071	745,431
Hrs. Worked >40 and Employment >0	25.6%	3,505,078	802,680

Notes: Entrepreneurs are defined as business owners who manage the firm and have a employment>0. *Source:* 2007 SBO

Share of Purchased Firms by Size

Percentile	Variable	Purchased	Average
Bottom 90	Receipts	24.6%	651
	Payroll	24.6%	153
	Employment	25.2%	8
Top 10\Top 1	Receipts	34.6%	8,624
	Payroll	34.5%	1,773
	Employment	37.9%	83
Top 1\Top 0.1	Receipts	43.8%	57,753
	Payroll	40.0%	9,220
	Employment	37.9%	248
Top 0.1	Receipts	39.0%	381,869
	Payroll	35.3%	49,760
	Employment	32.3%	1,374

Source: 2007 SBO

Franchises

Share of Owners That Purchased Their Business

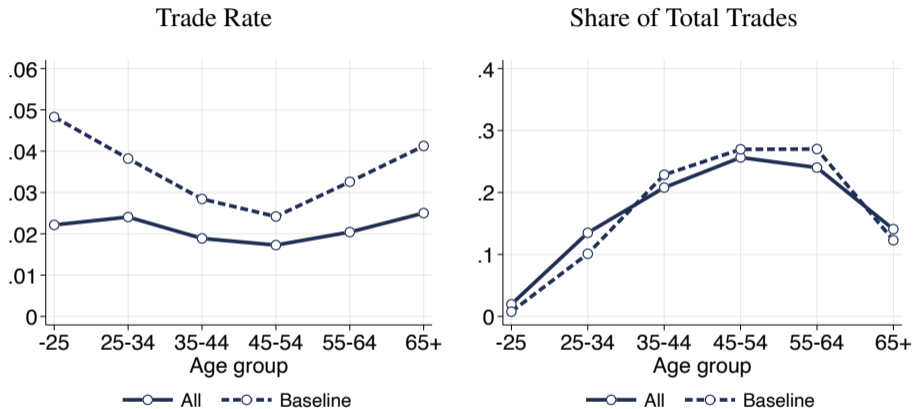|	W/o Employment> 0	Entrepreneurs
Baseline	17.0%	**25.5%**
W/o franchises	16.1%	24.1%
Franchises only	50.1%	51.8%
Franchise / Total	2.8%	4.8%

Source: 2007 SBO

Sector Heterogeneity

Share of Entrepreneurs that Purchased, by Sector
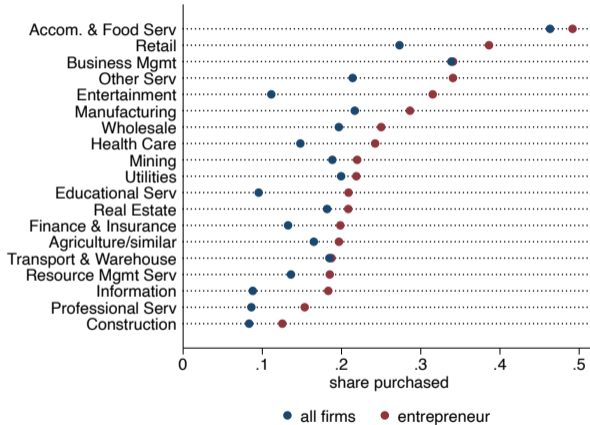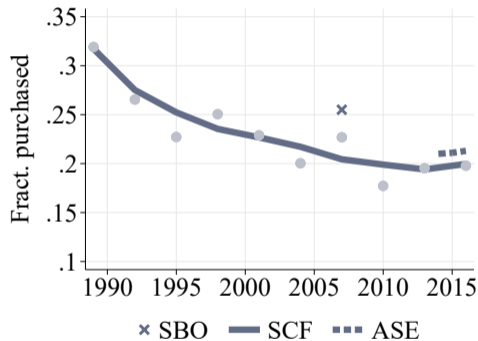

SOURCE: 2007 SBO.

Trade of Firms by Sellers' Age

SOURCE: 2007 SBO. NOTES: The trade rates in Panel (a) are normalized to match the total trade rate of 2 and 3%.

Trade of Firms Over Time

- The share of entrepreneurs that purchased their firm has decreased in the last 30 years
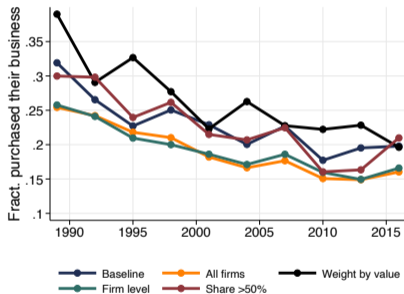
Robustness

Fraction of Entrepreneurs That Purchased Their Business

Alternative Samples

Sector Composition
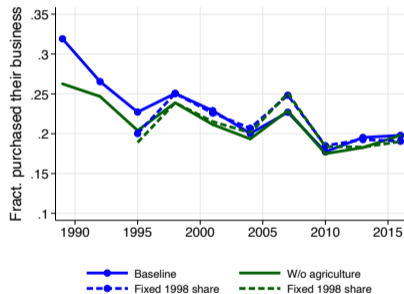
◄ Return

Robustness: Firm Buyers' Previous Occupation

Firm Buyers' Previous Occupation

Sample	Worker Before Purchasing	
	All firms	Employer firms
Baseline	62.0%	65.9%
Share> 50	61.2%	62.2%
Large Firms	66.9%	69.6%

Source: 2007 SBO. *Notes*: Share > 50 = majority shareholder; Large Firms = top quintile of the employment distribution.

Income and Financial Development in Europe (Kochen 2023)
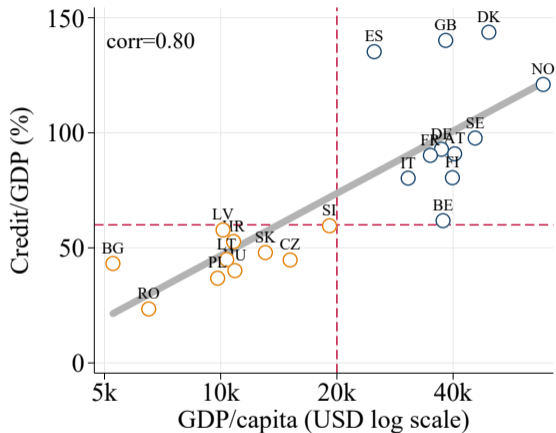
Notes: Country-level averages for the sample period 1996-2019.

◂ Return

Financial Intermediary

- The financial intermediary takes deposits from HHs and rent capital to firms at a price equal to the savings rate plus capital depreciation: $r + \delta$

- It operates in a perfectly competitive market and breaks even (zero profits)

- The resource constraint of the intermediary is given by

$$K_{pt} + \int k(a_{it}, z_{it}) \, \mathrm{d}N^e_{cm}(a_{it}, z_{it}) = \int a_{it} \, \mathrm{d}N^e_{cm}(a_{it}, z_{it}) + \int a_{it} \, \mathrm{d}N^w_{cm}(a_{it}, \varepsilon_{it})$$

Trading Surplus

- Consider a match between business owners $\mathbf{s}_{it}^o \equiv (a_{it}, z_{it})$ and $\mathbf{s}_{jt}^o \equiv (a_{jt}, z_{jt})$

- Firms' qualities determine direction of trade: if $z_{it} < z_{jt}$, i is potential buyer, j is potential seller

$$\text{Total surplus}_{ijt} \equiv \underbrace{W^o(a_{it} - p_{ijt}, z_{jt}) - W^o(\mathbf{s}_{it}^o)}_{\text{Buyer's surplus, } S_b} + \underbrace{W^w(a_{jt} + p_{ijt}, \underline{\varepsilon}) + T_{jt}(p_{ijt}) - W^o(\mathbf{s}_{jt}^o)}_{\text{Seller's surplus, } S_s}$$

  where W^o and W^w value of being an owner and a worker in the production stage

- $T_{jt}(p_{ijt}) \equiv T(p_{ijt}; \mathbf{s}_{jt}^o, \kappa_{jt})$ is a utility transfer capturing **preference shocks** κ_{jt} to sell   ‣ Def. T_{jt} ‣ $\Psi(\kappa_{jt})$

  ‣ $\frac{\partial T_{jt}}{\partial \kappa_{jt}} > 0$, higher values of preference shock imply a larger discount on full price $\kappa_{jt} p_{ijt}$

Trading Surplus: Owner-worker

Owner-worker meeting

- Consider a match between worker $\mathbf{s}_{it}^w \equiv (a_{it}, \varepsilon_{it})$ and owner $\mathbf{s}_{jt}^o \equiv (a_{jt}, z_{jt})$

- Worker i is potential buyer, owner j is potential seller

$$\text{Total surplus}_{ijt} \equiv \underbrace{W^o(a_{it} - p, z_{jt}) - W^w(\mathbf{s}_{it}^w)}_{\text{Buyer's surplus, } S_b} + \underbrace{W^w(a_{jt} + p, \underline{\varepsilon}) + T_{jt}(p) - W^o(\mathbf{s}_{jt}^o)}_{\text{Seller's surplus, } S_s}$$

where W^o and W^w value of being an owner and a worker in the production stage

- $T_{jt}(p_{ijt}) \equiv T(p_{ijt}; \mathbf{s}_{jt}^o, \kappa_{jt})$ is a utility transfer capturing preference shocks κ_{jt} to sell

Sellers' Preference Shock Utility Transfer

- The utility transfer $T_{jt}(p) \equiv T(p; \mathbf{s}_{jt}^o, \kappa_{jt})$ that owner $\mathbf{s}_{jt}^o \equiv (a_{jt}, z_{jt})$ receives upon selling is defined by

$$W^w(a_{jt} + p, \underline{\varepsilon}) + T_{jt}(p) = W^w(a_{jt} + \kappa_{jt} p, \underline{\varepsilon})$$

where

- $\frac{\partial T_{jt}}{\partial \kappa_{jt}} > 0$

- κ_{jt} is an *iid* r.v. with domain in $[1, \overline{\kappa}]$ and $\overline{\kappa} > 1$

- Implying a discount of $1 - \kappa_{jt}^{-1}$ on full price $\kappa_{jt} p$
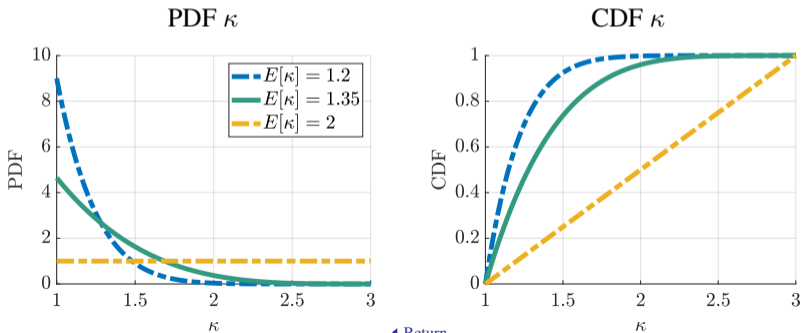
Preference Shocks Distribution

- Preference shocks follow

$$\kappa_{jt} = \underline{\kappa} + (\overline{\kappa} - \underline{\kappa})\xi_{jt}$$

where $1 \leq \underline{\kappa} < \overline{\kappa}$, and the r.v. ξ_{jt} is *iid* and drawn from Beta distribution with $\mathcal{B}(1, \beta_\kappa)$

- Given $\underline{\kappa}$ and $\overline{\kappa}$, directly use $\mathbb{E}[\kappa] = \underline{\kappa} + (\overline{\kappa} - \underline{\kappa})\mathbb{E}[\xi]$ for calibration as $\mathbb{E}[\xi] = \frac{1}{1+\beta_\kappa}$

Untargeted Moments

|	Data	Model		Data	Model
Income Distribution, All Households			*Wealth Distribution, All Households*		
Top 1	0.22	0.20	Top 1	0.33	0.40
Top 5	0.39	0.39	Top 5	0.60	0.62
Top 10	0.49	0.54	Top 10	0.72	0.75
Bottom 75	0.31	0.30	Bottom 75	0.13	0.07
Bottom 50	0.12	0.16	Bottom 50	0.02	0.01
Bottom 25	0.02	0.04	Bottom 25	0.00	0.00
Income Distribution, Entrepreneurs			*Wealth Distribution, Entrepreneurs*		
Top 1	0.23	0.36	Top 1	0.24	0.29
Top 5	0.44	0.67	Top 5	0.45	0.63
Top 10	0.57	0.81	Top 10	0.60	0.80
Bottom 75	0.24	0.15	Bottom 75	0.18	0.11
Bottom 50	0.10	0.11	Bottom 50	0.05	0.06
Bottom 25	0.03	0.07	Bottom 25	0.01	0.04

Trade Rate by Firms' Characteristics, Without Preference Shocks

- Qualitatively, cross-sectional predictions are independent of preference shocks
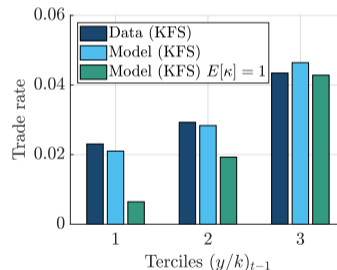 - Preference shocks especially important for the trade of large and unconstrained firms
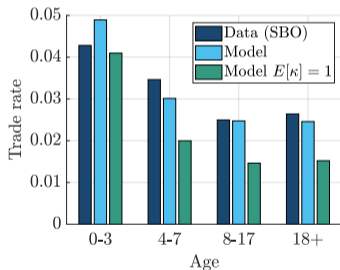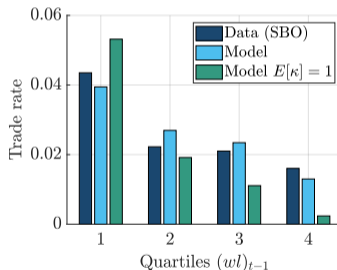
NOTES: Trade rate by firms' characteristics in the data and data simulated from the model. Model (KFS) restrict to a sample of firms of age less or equal to 7.

Motives for Trading Firms: Analytical

Given outside option, the three motives for trade are

1. Preference shocks: $p(\mathbf{s}_{it}, \mathbf{s}_{jt}^o, \kappa_{jt})$ decreasing in κ_{jt}

2. Credit constraints: $\pi(a_{it}, z_{it})$ weakly increasing in a_{it}

3. Risk and incomplete markets: $Cov\left(-u'(c_{it+1}), z_{it+1}\right)$ decreasing in a_{it+1}

Buyers' Wealth

- Buyers are 3.1 (2.7) times wealthier than avg. household in model, consistent with 3.8 (2.7) in data

Buyers' Wealth to Average Household's Wealth Ratio

	Data	Model
Wealth, total $(a+p)$	3.83	3.09
Wealth, excluding business (a)	2.71	2.74

SOURCE: 1989-2016 SCF. NOTES: We define firm buyers, in the SCF, as those entrepreneurs who purchased their main business in the year of the survey or the previous one. The ratio is computed as the average wealth of the firm buyers divided the average wealth of the average household. Entrepreneurs are defined as self-employed business owners who manage a business with at least one employee.

Nash Bargaining and Price Determination

Sufficient Condition for Trade

- $\underline{p}_{jt} \equiv \underline{p}(\mathbf{s}_{jt}^o, \kappa_{jt})$ denote the min. price at which seller j is willing to sell, implying $S_s = 0$

- $\overline{p}_{it} \equiv \overline{p}(\mathbf{s}_{it}, z_{jt})$ denote the max. price that buyer i is willing to pay for firm j, implying $S_b = 0$

- A sufficient condition for trade is that $\underline{p}_{jt} < \overline{p}_{it}$

Nash Bargaining

- If gains from trade are positive, $\underline{p}_{jt} < \overline{p}_{it}$, trading price p_{ijt} is determined by Nash bargaining protocol

$$p(\mathbf{s}_{it}, \mathbf{s}_{jt}^o, \kappa_{jt}) = \arg\max_p \left[S_b(\mathbf{s}_{it}, z_{jt}, p) \right]^\chi \left[S_s(\mathbf{s}_{jt}^o, \kappa_{jt}, p) \right]^{1-\chi}$$

$$\text{s.t.} \quad S_b(\mathbf{s}_{it}, z_{jt}, p) \geq 0, \ S_s(\mathbf{s}_{jt}^o, \kappa_{jt}, p) \geq 0$$

where $0 \leq \chi \leq 1$ parameterizes buyers' bargaining power

Value at the Market for Firms (DM)

- For business owners, the value at the beginning of DM is

$$V^o\left(a_{it}, z_{it}\right) = \mathbb{E}_{\kappa_{it}}\big[\,\Pr^o\left[\text{no trade} \mid a_{it}, z_{it}, \kappa_{it}\right]\, W^o\left(a_{it}, z_{it}\right) \qquad \text{(no trade)}$$

$$+ \alpha_o \int \int_{z_{it} < z_{jt}, \bar{p}_{it} > \underline{p}_{jt}} W^o\left(a_{it} - p_{ijt}, z_{jt}\right) \mathrm{d}N^o_{dm}\left(a_{jt}, z_{jt}\right) \mathrm{d}\Psi\left(\kappa_{jt}\right) \qquad \text{(buy)}$$

$$+ \alpha_o \int_{z_{it} > z_{jt}, \underline{p}_{it} < \bar{p}_{jt}} \left[W^w\left(a_{it} + p_{jit}, \underline{\varepsilon}\right) + T_{it}\left(p_{jit}\right)\right] \mathrm{d}N^o_{dm}\left(a_{jt}, z_{jt}\right) \qquad \text{(sell to owner)}$$

$$+ \alpha_w \int_{\underline{p}_{it} < \bar{p}_{jt}} \left[W^w\left(a_{it} + p_{jit}, \underline{\varepsilon}\right) + T_{it}\left(p_{jit}\right)\right] \mathrm{d}N^w_{dm}\left(a_{jt}, \varepsilon_{jt}\right)\big] \qquad \text{(sell to worker)}$$

- For workers, the value at the beginning of DM is

$$V^w\left(a_{it}, \varepsilon_{it}\right) = \Pr^w\left[\text{no trade} \mid a_{it}, \varepsilon_{it}\right]\, W^w\left(a_{it}, \varepsilon_{it}\right) \qquad \text{(no trade)}$$

$$+ \alpha_w \int \int_{\bar{p}_{it} > \underline{p}_{jt}} W^o\left(a_{it} - p_{ijt}, z_{jt}\right) \mathrm{d}N^o_{dm}\left(a_{jt}, z_{jt}\right) \mathrm{d}\Psi\left(\kappa_{jt}\right) \qquad \text{(buy)}$$

- Parameters $(\alpha_o, \alpha_w) \in [0,1]^2$ govern *search frictions* in market for firms

Value in the Production Stage (CM)

- The value for business owners at the beginning of CM is

$$W^o(a_{it}, z_{it}) = \max_e \left\{ W^e(a_{it}, z_{it}), W^w(a_{it}, \underline{\varepsilon}) \right\}$$

where W^e is the value the of being an entrepreneur

$$W^e(a_{it}, z_{it}) = \max_{a_{it+1}, c_{it}} u(c_{it}) + \beta \left\{ \gamma V^o(a_{it+1}, z_{it}) + (1-\gamma) \mathbb{E}_{z_{it+1}} \left[V^o(a_{it+1}, z_{it+1}) \right] \right\}$$

$$\text{s.t.} \quad c_{it} = \pi(a_{it}, z_{it}) + (1+r)a_{it} - a_{it+1}$$

$$c_{it} \geq 0, \ a_{it+1} \geq 0$$

- The value of being a worker at CM is

$$W^w(a_{it}, \varepsilon_{it}) = \max_{a_{it+1}, c_{it}} u(c_{it}) + \beta \left\{ \zeta \mathbb{E}_{\varepsilon_{it+1}|\varepsilon_{it}} \left[V^w(a_{it+1}, \varepsilon_{it+1}) \right] + (1-\zeta) \mathbb{E}_{z_{it+1}} \left[V^o(a_{it+1}, z_{it+1}) \right] \right\}$$

$$\text{s.t.} \quad c_{it} = \varepsilon_{it} w + (1+r)a_{it} - a_{it+1}$$

$$c_{it} \geq 0, \ a_{it+1} \geq 0$$

where workers receive the *startup* shock with probability $(1-\zeta)$

Competitive Equilibrium

Def. A *stationary competitive equilibrium* consists of: (*i*) aggregate prices $\{r, w\}$; (*ii*) terms of trade in DM $\{p, \underline{p}, \bar{p}\}$; (*iii*) occupational choice of firm owners; (*iv*) consumption and savings decisions for households; (*v*) capital and labor choices of firms; and (*vi*) measures of agents over occupations and idiosyncratic states at DM and CM such that:

1. In DM, the terms of trade in bilateral meetings are solved by the Nash bargaining problem

2. In CM, given prices, households, private and corporate firms solve their optimization problems

3. Goods and labor market clears

4. The financial intermediary breaks even

5. The laws of motion of n_{dm} and n_{cm} are consistent with a recursive equilibrium mapping dictated by prices and trades in the market for firms, households' optimal choices, and the stochastic processes for firms' qualities, workers' labor efficiencies, and sellers' preferences shocks

Aggregate Credit Conditions and the Trade of Firms in the U.S.
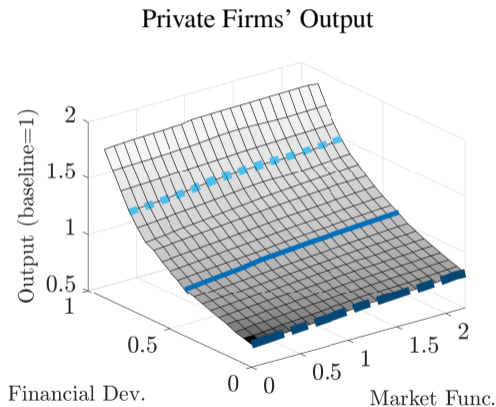
Privately held firms' leverage
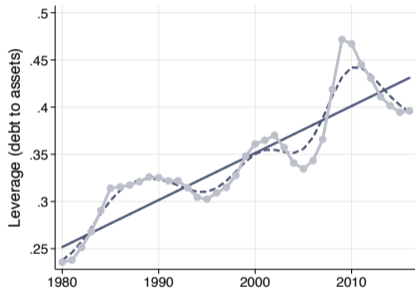
Share of firms purchased
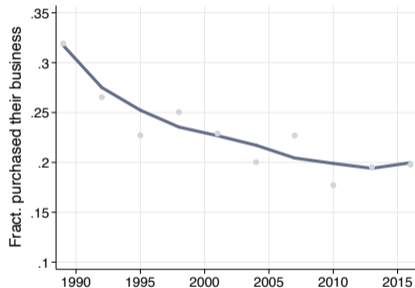
Source: Flow of Funds Accounts and Survey of Consumer Finances (SCF).

Financial Development and the Market for Firms, Output

- Private firms' output is increasing in financial development and functioning of the market for firms
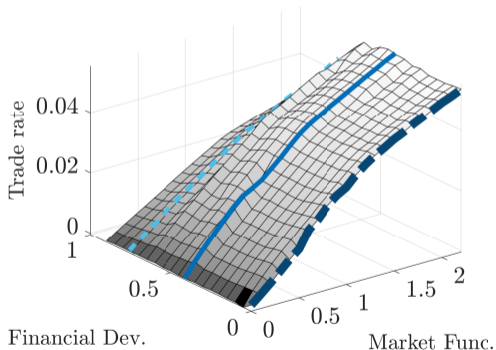
Private Firms' Output

NOTES: Financial Development is defined by firms' maximum leverage, $(\lambda - 1)/\lambda$. Market Functioning is parameterized by ω multiplying the search frictions in the market for firms $\alpha_o(\omega) = \min\{\omega\alpha_o\}, \alpha_w(\omega) = \min\{\omega\alpha_w, 1\}$. High-credit, US-credit, and No-credit correspond to $(\lambda - 1)/\lambda$ equal to 0.75, 0.397, and 0.

Financial Development and the Market for Firms, Trade Rate

- Trade rate is decreasing in financial development and increasing in market for firms functioning

Trade Rate in Market for Firms

NOTES: Financial Development is defined by firms' maximum leverage, $(\lambda - 1)/\lambda$. Market Functioning is parameterized by ω multiplying the search frictions in the market for firms $\alpha_o(\omega) = \min\{\omega\alpha_o\}, \alpha_w(\omega) = \min\{\omega\alpha_w, 1\}$. High-credit, US-credit, and No-credit correspond to $(\lambda - 1)/\lambda$ equal to 0.75, 0.397, and 0.

Orbis Historical Descriptive Statistics

|	High-Income		Middle-Income	
	Mean	SD	Mean	SD
All Firms				
Age	16.0	13.0	12.5	8.2
Output	2.9	54.4	1.5	14.5
$\Delta \log(k)$	0.043	0.58	0.073	0.61
Obs.	16,247,768		4,252,636	
Firms w/ Ownership				
Age	17.1	13.7	12.2	7.7
Output	4.4	72.1	1.5	12.4
$\Delta \log(k)$	0.046	0.59	0.072	0.59
Obs.	8,548,886		2,203,131	

Notes: 2006-2019, with available output and capital, and observed for at least five years. Firms w/ Ownership are the observations that, in addition, have available data in the Ownership Files. Age is in years, Output is in million 2015 USD at constant exchange rates, and $\Delta \log(k)$ is capital's one-year growth rate measured in log changes.

Firm Dynamics After Trade: ARPL vs ARPK

- Using Orbis firm-level data from several high-income European countries we run

$$\log x_{it} = \beta_0 + \sum_{h \in \mathcal{T}} \beta_h D_{it}^h + \gamma \mathbf{c}_{it} + \epsilon_{it},$$

where $\mathcal{T} = \{-1, 1, \ldots, 5\}$ and D_{it}^h equals 1 for each h around the trading episode

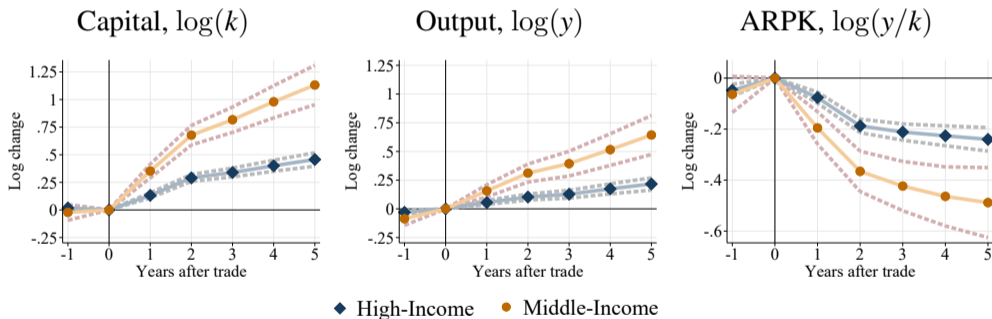ARPL, $\log(y/wl)$ ARPK, $\log(y/k)$
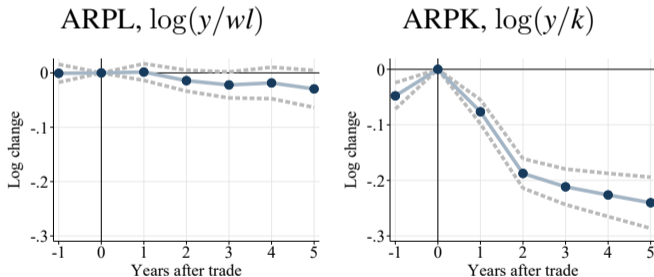
Source: Orbis. *Notes*: Estimated coefficients $\hat{\beta}_h$. The dashed lines correspond to 99% confidence intervals considering firm-level clustered standard errors. Controls $\mathbf{c}_{it}$ include: country, NACE 4-digit sector, year fixed effects, and firms' age when traded.

Firm Dynamics After Trade: High- vs. Middle-Income

- Post-trade firm dynamics for high- and middle-income European countries in Kochen 2023

  - Dynamics are $\times 2$ larger in middle-income and less financially developed countries

$$\log x_{it} = \beta_0 + \sum_{h \in \mathcal{T}} \beta_h D_{it}^h + \gamma \mathbf{c}_{it} + \epsilon_{it},$$

Capital, $\log(k)$ Output, $\log(y)$ ARPK, $\log(y/k)$

◆ High-Income   ● Middle-Income

Source: Orbis. *Notes*: Estimated coefficients $\hat{\beta}_h$. The dashed lines correspond to 99% confidence intervals considering firm-level clustered standard errors. Controls $\mathbf{c}_{it}$ include: country, NACE 4-digit sector, year fixed effects, and firms' age when traded. High-income countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Norway, Spain, Sweden, and UK. Middle-income countries: Bulgaria, Croatia, Czechia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

Firm Dynamics After Trade: Profits

- Using Orbis firm-level data from several high-income European countries we run

$$\log x_{it} = \beta_0 + \sum_{h \in \mathcal{T}} \beta_h D_{it}^h + \gamma \mathbf{c}_{it} + \epsilon_{it},$$

where $\mathcal{T} = \{-1, 1, \ldots, 5\}$ and D_{it}^h equals 1 for each h around the trading episode

Profits, $\log(\pi)$ Negative Profits, $\mathbb{1}\{\pi < 0\}$ Profitability, π/k
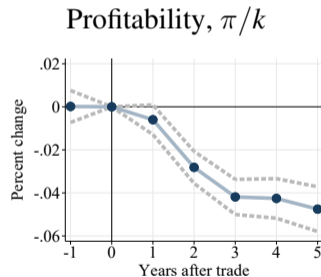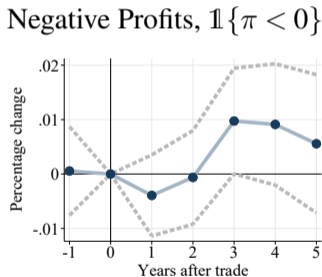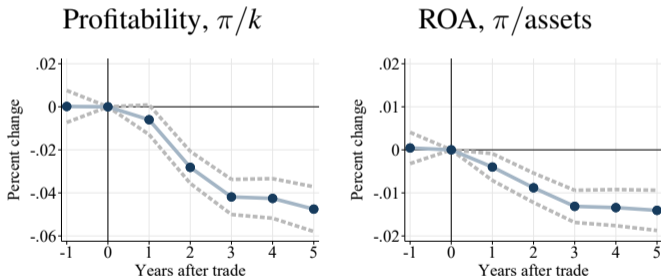
Source: Orbis. *Notes*: Estimated coefficients $\hat{\beta}_h$. The dashed lines correspond to 99% confidence intervals considering firm-level clustered standard errors. Controls $\mathbf{c}_{it}$ include: country, NACE 4-digit sector, year fixed effects, and firms' age when traded.

Firm Dynamics After Trade: Profitability and ROA

- Using Orbis firm-level data from several high-income European countries we run

$$\log x_{it} = \beta_0 + \sum_{h \in \mathcal{T}} \beta_h D_{it}^h + \gamma \mathbf{c}_{it} + \epsilon_{it},$$

where $\mathcal{T} = \{-1, 1, \ldots, 5\}$ and D_{it}^h equals 1 for each h around the trading episode

Profitability, π/k ROA, π/assets

Source: Orbis. *Notes*: Estimated coefficients $\hat{\beta}_h$. The dashed lines correspond to 99% confidence intervals considering firm-level clustered standard errors. Controls $\mathbf{c}_{it}$ include: country, NACE 4-digit sector, year fixed effects, and firms' age when traded.