

Heterogeneous Decline in Sectoral Business Dynamism

Agnieszka Markiewicz and Riccardo Silvestrini

Erasmus University Rotterdam

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Motivation

- The U.S. economy has witnessed a slowdown in business dynamism:
 - Firms' entry and exit rates have declined
 - Price markups, market concentration and profit margins have increased
- The magnitude of these trends differs across sectors.
- Growth of markups and market concentration more pronounced in sectors with higher exposure to the ICT
e.g. Bessen (2017), Calligaris, Criscuolo, and Marcolin (2018) and Diez, Fan, and Villegas-Sanchez (2019)

What this paper does

- The heterogeneity in the slowdown of business dynamism across the U.S. sectors can be explained by a specific technological shift that occurred in ICT-intensive sectors.
- This technological shift has **increased** the likelihood of changing the relative position of firms in the cross-sectional productivity distribution.
- We call this likelihood: *firms' mobility*

Mechanism

- An increase in firms' mobility within cross-sectional productivity distribution →
- Reallocation of market shares towards more productive and larger firms that charge higher markups →
- Sectoral markups, market concentration, and profit margins ↑

Outline

- Definition and interpretation of *firms' mobility*.
- Firms' mobility, ICT exposure and evolution of markups in the data (Compustat).
- A model of a sector that incorporates empirically important heterogeneities across firms.
- We simulate the model and study the transition dynamics: Sector with increase in firms' mobility versus no increase.
- Test model's predictions.

Firms' mobility and ICT

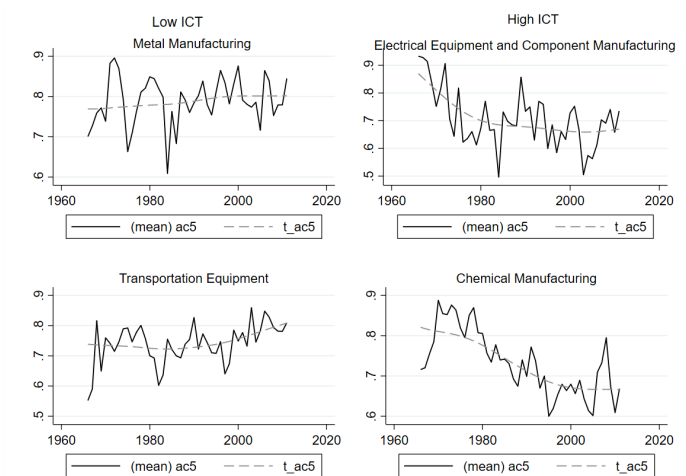
- In a sector exposed to ICT, the firm that implements new technology becomes relatively more productive
- An incumbent that fails to implement them loses in terms of relative productivity
- Its market shares are reallocated towards more productive firm(s)
- Arrival of ICT increases the chances of changes in the productivity rank of the firms within the sector
- In sectors without the ICT shock, the chances of changing the productivity rank remain unaltered

Firms' mobility in the data

- We construct a variable that measures firms' mobility, (Comin and Philippon 2005).
- For each firm: 5-year autocorrelation in labor productivity rank between 1965 and 2016
- Average across firms within each NAICS 3-digit sector in Compustat data.

Firms' mobility in the data

Figure 1: Average autocorrelation in firms' productivity rank in high-ICT and low-ICT sectors



Firms' mobility in the data

- Regress the change in the autocorrelation of productivity ranks on the change in several sectoral characteristics
- NAICS 3-digit sectors that have experienced the steepest increase in firms' mobility (i.e. a decline in autocorrelation) are the most to the most exposed to ICT.

Theoretical Framework

We need a model to study sectoral and firm-level dynamics:

- A model economy of a sector in the spirit of Edmond, Midrigan and Xu (2015)
- Finite number of heterogeneous firms
 - Firms are identified by productivity type $x(i)$
 - Firms with highest $x(i)$ are called superstars
 - There can be several firms of each type i
- Oligopolistic competition á la Cournot
- Idiosyncratic exit, entry and productivity shocks

Theoretical Framework - Competition

- Firms compete under Cournot oligopolistic competition

From the F.O.C. of the firms, the real price $\rho_t(i)$ is:

$$\rho_t(i) = \mu_t(i) \frac{w_t}{x(i)}$$

The market share is defined as:

$$\omega_t(i) = \rho_t(i)^{1-\theta}$$

The idiosyncratic markup $\mu_t(i)$ is:

$$\mu_t(i) = \left(\frac{\theta}{\theta - 1} \right) \left(\frac{1}{1 - \omega_t(i)} \right)$$

There is one-to-one relation between productivity and size.

Benchmark Simulation

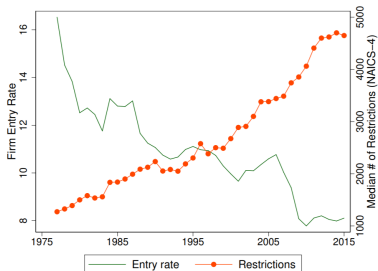
- Simulation of the benchmark model economy with 3 types of firms
 - type 1 with $x(1)$: least productive
 - type 3 with $x(3)$: superstars
- Transition of a high-ICT and a low-ICT sector between 2 steady states.
- The initial steady state is calibrated to reproduce key features of the U.S. industries in pre-80s with low entry costs and low firms' mobility.

Simulations: high-ICT sector

In the first period, we introduce two permanent shocks:

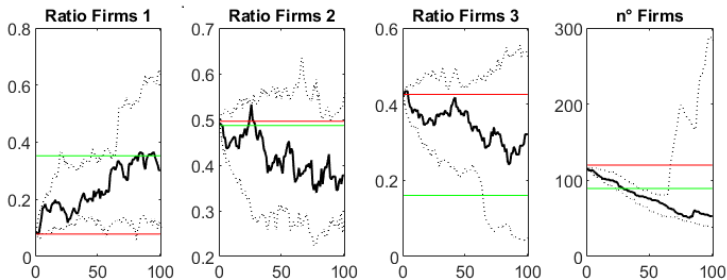
- 1 Increase in firms' mobility
- 2 Increase in entry costs

Figure 2: Average entry rates and median number of restrictions

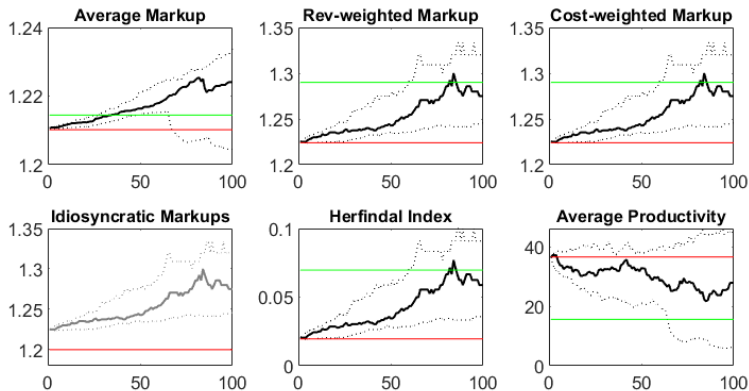


- In every period, firms are hit by a chain of idiosyncratic entry, exit and productivity shocks.

Simulations: high-ICT sector



Simulations: high-ICT sector



Intuition: high-ICT sector

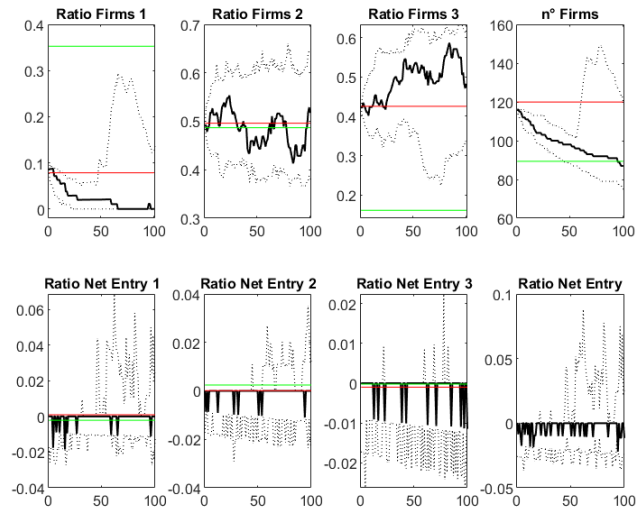
- Firms' mobility over productivity distribution \uparrow
- Chances of becoming more productive \uparrow but chances of losing its leadership position \uparrow as well
- Detrimental shocks dominate favorable shocks
 - Superstars can only experience a detrimental shock
 - They are large

Detrimental productivity shocks \rightarrow **reallocation** of market shares toward superstar firms with highest productivity and lowest prices
 \rightarrow

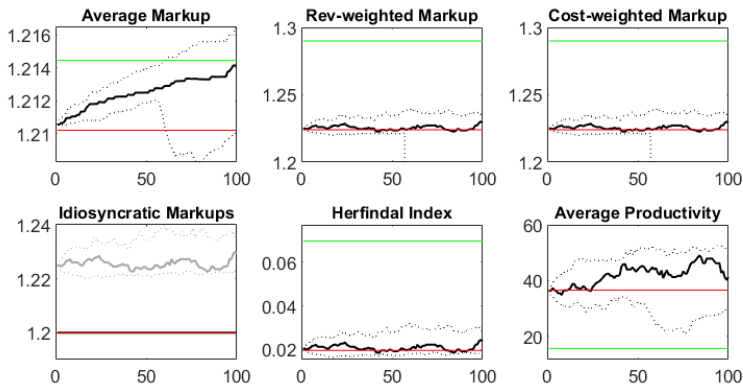
- The revenue-weighted markup increases
- Markups of Superstar firms rise because of fewer competitors

Simulations: low-ICT sector

① Permanent increase in entry costs in period 1



Simulations: low-ICT sector



Intuition: low-ICT sector

- Increase in entry costs \rightarrow
- Entry is nil and productivity shocks are rare \rightarrow
- Sectoral dynamics driven by idiosyncratic exit shocks mainly of type 1 firms \rightarrow
- Change in **composition** of the sector in favor of larger firms \rightarrow
- Average markup \uparrow but weighted markups remain stable

Model's Predictions

- Growth in firms' mobility → reallocation of market shares
- Higher reallocation of market shares towards high-markup firms → higher revenue-weighted sectoral markup
- Growth in firms' mobility → increase in the number of low productivity firms → reduction of average productivity
- Sectors with most of reallocation are the most exposed to the ICT.

Testing Model's Predictions

- Compustat data between 1965 and 2016.
- Cross-sectional regressions with NAICS-3 sector being unit of observation.
- We compute the average and cumulative contribution of the reallocation to the markup growth.
- ICT intensity:
 - Share of intangible capital
 - ICT dummy

Testing Model's Predictions

Table 1: Reallocation and sectoral characteristics: $ra_i = \alpha + \beta X_i + \sigma_i$

Δ Mobility	Δ Markup	Δ Productivity	ICT	Δ IC- <i>unw</i>	Δ IC- <i>w</i>
0 -0.135*** (0.015)					
-0.129*** (0.016)	0.028*** (0.002)				
-0.118*** (0.017)	0.028*** (0.003)	-0.099*** (0.008)			
-0.023 (0.016)	0.037*** (0.005)	-0.150*** (0.008)	0.049** (0.017)		
-0.124*** (0.015)			0.097*** (0.019)		
-0.056** (0.021)	0.028*** (0.003)	-0.123** (0.008)		0.105*** (0.008)	
-0.050* (0.026)	0.133*** (0.038)	-0.127** (0.011)			0.134*** (0.007)

Conclusions

The proposed framework predicts the deterioration of business dynamism in high-ICT sector:

- Increase in market concentration
- Increase in average price markups In low-ICT sector these dynamics are not present