A Theory of Falling Growth and Rising Rents

Aghion, Bergeaud, Boppart, Klenow, Li

discussion by

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[†] The views expressed here are those of the authors and do not necessarily reflect those of the Board of Governors or the Federal Reserve System.

Motivation

- Very intriguing paper!
- Clean, straightforward theoretical framework to explore concentration, labor share and growth dynamics
  - Particular attention to labor share dynamics
- Still at early stage, I will have some general comments ...
- ...and then explore how the analysis could be enriched.

Overview of the Analysis

Framework

- Schumpeterian growth framework in discrete time with $J \in \mathbb{N}$ firms
  - Each firm is a continuum of product lines.
- Two firms in each product line compete à la Bertrand
  - Produce y using labor ($y = \varphi l$) with associated quality q
  - Profits and markup
- Firms differ in **labor productivity** and **product quality**
  - ϕJ firms have high productivity φ^H, $(1-\phi)J$ have low φ^L (fixed)
  - Endogenous product quality via external innovation

Framework

- **Innovation:** Linear technology $\Rightarrow$ To obtain x_t lines, invests

$$R(x_t) = \chi_c x_t Y_t$$

$\Rightarrow$ Innovation improves quality by factor γ.

- **Firm boundary:** Firms pay an overhead cost

$$O(n_t) = \frac{1}{2}\psi_o n_t(j)^2 Y_t$$

- Comparison with standard Klette and Kortum (2004) framework
  - Firms as continuum of product lines
  - Linear innovation & firm boundary
  - Two representative firms
  - No entry / exit

Framework

- Let $\Delta \equiv \varphi^H / \varphi^L > 1$ and assume $\gamma > \Delta$.
  - $\Rightarrow$ Innovator always wins the ownership.
- Price-cost markup for leader j in line i:

$$\mu\left(i, j(i), j'(i)\right) = \underbrace{\frac{q(i, j(i))}{q(i, j'(i))}}_{\textit{Quality}} \times \underbrace{\frac{\varphi(j)}{\varphi(j')}}_{\textit{Efficiency}}$$

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- At the product-line level, 3 (fixed) levels of markups and

$$\textit{Profits} \;=\left(1 - \mu(i)^{-1}\right) Y \quad \text{and} \quad \textit{Labor share} \;= \mu(i)^{-1}$$

Framework

- Let $h(j)$ be the share of lines with H-type second-best firms.
  - $\Rightarrow$ For any firm, $h(j)$ fraction of H-type competitors
- Across firms, 2 values for markups (μ)/profits (π)/labor share (α), e.g.:

$$Labor\ share(j) \ = \begin{cases} h(j)\frac{1}{\gamma} + (1-h(j))\frac{1}{\Delta\gamma} & if \quad j = H\text{-}type \\ h(j)\frac{\Delta}{\gamma} + (1-h(j))\frac{1}{\gamma} & if \quad j = L\text{-}type \end{cases}$$

$\Rightarrow$ Notice that $\mu^H = \Delta\mu^L$ and $\alpha^H = \alpha^L/\Delta$

$\Rightarrow$ **Result:** Identical replicas of two representative firms

Framework: BGP

- Let $\{n_L^*, n_H^*\}$ denote firm sizes in BGP. Also, $h(j) = S^*$.
- Any aggregate variable X depends on $\{x_L^*, x_H^*\}$ and firms' market shares:

$$X = \phi J \times n_H^* \times x_H^* + (1-\phi) J \times n_L^* \times x_L^*$$

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  - ⇒ Concentration (S^*) rises ⇒ α_L^* rises.
  - ⇒ Positive within and negative between effects.

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$\Rightarrow$ Concentration (S^*) rises $\Rightarrow \alpha_L^*$ rises.

$\Rightarrow$ Positive within and negative between effects.

$\Rightarrow$ Between dominates if $S^* > 1/2$

Main Exercise

- Endogenous BGP responses of variables to a decline in ψ_o
  - Calibrate to initial BGP
  - Match decline in between-component of L-share varying ψ_o
  - Across BGP variations: aggregate L-share and within component

	1982–2012			
	MFG	RET	WHO	SRV
$\Delta\frac{\text{Payroll}}{\text{Sales}}$	-7.01	-0.79	0.19	-0.19
Within	-1.19	3.74	4.01	2.43
Between	-4.97	-4.03	-4.38	-0.44

A) L-Share decomposition (Autor et al., 2017)

Untargeted	Data	Model
1. 2006–17 productivity growth rate (ppt)	1.06	0.86
2. change in aggregate labor share (%)	-5.7	-3.6
3. within change in labor share (%)	5.9	8.0
4. change in intangible share (ppt)	1.5	1.1
5. change in concentration (ppt)	5.3	35.1

B) Exercise results (untargeted)

$\Rightarrow$ Captures changes in L-share and within component

$\Rightarrow$ Growth declines as more H-vs-H competition squeezes profit margins

General Comments

General Comments: Empirical support for mechanism

- (Suggestive) evidence for the main mechanism: decline in overhead costs
  - Larger firms' activities shifting to high fixed overhead costs? (Berry, Gaynor, and Morton, 2019)
  - New technologies with higher fixed costs lowering marginal (Hsieh and Rossi-Hansberg 2019)
- ICT could have worked in other ways
  - Lower external innovation costs, non-homothetic demand
  - Lower knowledge diffusion

$\Rightarrow$ *Some direct evidence on the preferred mechanism from micro data*

General Comments: Mechanism I

- One central point: decline in aggregate labor share and its sources
- Most of labor share decline appears to have occurred in manufacturing
- Better to match dynamics in manufacturing?
  - Within component negative in manufacturing ...
  - ...as opposed to other sectors and the model

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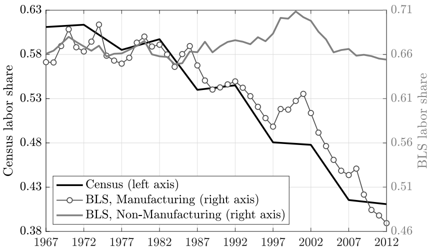
A) L-Share decomposition (Autor et al., 2017)



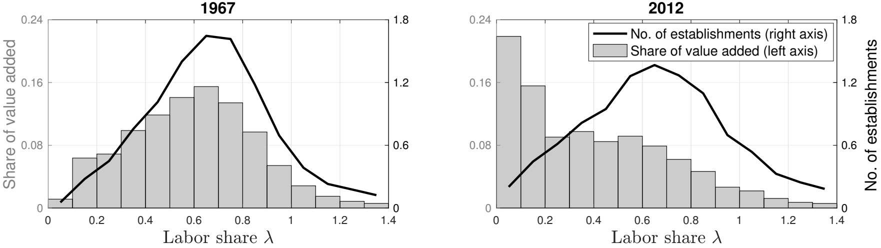
B) Sectoral L-shares (Vincent and Kehrig, 2018)

- Moreover, diving deep into L-share dynamics in manufacturing ...

General Comments: Mechanism I

- Vincent and Kehrig (2018) highlight using ASM
  - i) Little change, if any, in number of establishments across L-shares
  - ii) But value added shifts to low L-share establishments
- Thus, ii) occurs not just at firm but also establishment level
- How to think about the implied increase in S^* in this context?

Figure 1: The changing distributions of labor shares and value added



$\Rightarrow$ *Paper should realign the mechanism with targeted dynamics.*

General Comments: Mechanism II

- Competition-innovation nexus
- Here, competition among more H-type firms is growth reducing.
- Seminal work by co-authors established pro-innovative effect of close competition.

$\Rightarrow$ *How to reconcile with pro-innovative effects of competition?*

$\Rightarrow$ *Maybe some empirical evidence on the implied mechanism?*

General Comments: Quantitative framework

- Some simplifications for analytical tractability
  - No problem if the focus was empirical
    (cf. Aghion, Bergeaud, Lequien, and Melitz, 2019; Liu, Mian, and Sufi, 2019)
- But deeper quantitative analysis needs more flexible framework ...
  - ...in line with the advances in the quantitative use of these models.
- E.g. multiples of two representative firms
  - Further insights from richer dynamics / distributions
- In Ates and Saffie (2018), we use a similar model
  - Klette-Kortum, discrete time, two types of innovative productivity
  - Accounts for full transition in business cycle

$\Rightarrow$ *Quantitative analysis reflecting full endogenous dynamics of firms*

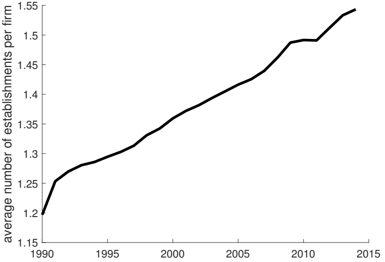
Extending the Quantitative Analysis

Enriching the quantitative analysis

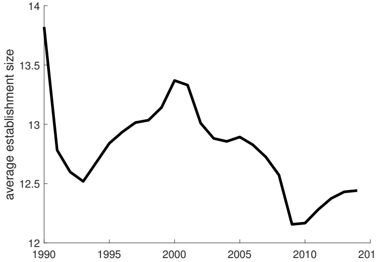
- As mentioned, important to focus on transitional dynamics
- Also, important to account for other closely related facts and channels
- Firm growth, establishment, and size (employment) dynamics
  - Vincent and Kehrig (2018) as mentioned earlier
  - Cao et al. (2019), Hsieh and Rossi-Hansberg (2019)

Quantitative Analysis: Additional facts

- Complementary work by Cao et al. (2019)
  - Key empirical observations:
    1. Number of establishments per firm is rising.
    2. Average establishment size is shrinking.
  - Similar framework extending KK04 with firm types
    - Both internal & external innovations, endogenous entry
  - Carefully match Pareto firm employment size distribution and its shift
  - Find a decrease in external innovation cost (also rising entry barriers)



A) Average number of establishments



B) Average establishment size (by workers)

Quantitative Analysis: Additional facts & channels

- An empirical regularity inherently relevant & a mechanism to consider
  - Your model could easily (with few modifications) speak to these
- What would your mechanism imply in terms of these findings?
- Horse-race between mechanisms using extended set of facts
  - External innovations, overhead costs, policy, others?

Miscellaneous Comments

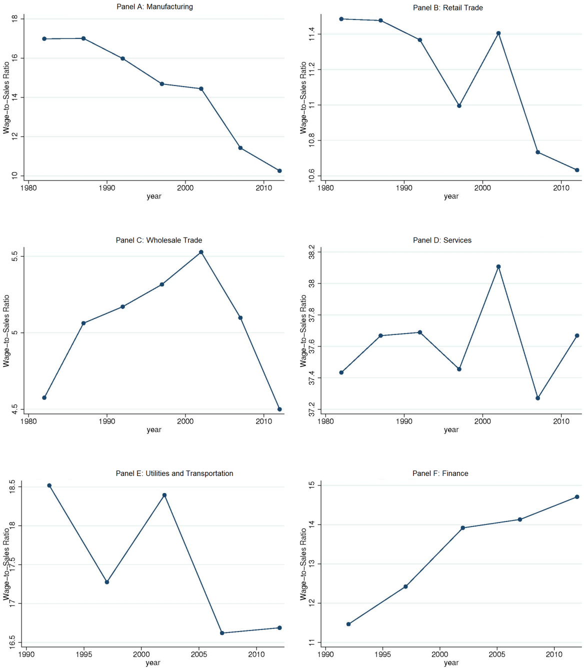
1. Deviation from Klette and Kortum framework
2. Consistency of periods for moment generation
3. Exclude Great Recession period and its aftermath
4. Robustness section
5. Labor content of overhead costs
6. Difference between dynamics induced by ψ_o and χ_c decline
   - Sharp predictions from $\chi_c \downarrow\uparrow$ due to linear R&D technology

Conclusion

- Enlightening and thought provoking!
- Alignment of the mechanism with empirical regularities
- For quantitative investigation
  - More flexible framework
  - More comprehensive and comparative analysis (facts, mechanisms)
- Looking forward to extended analysis!

Appendix

Figure 3: Average Payroll-to-Sales Ratio



Cao et al. (2019) details