Quantifying Market Power and Business Dynamism in the Macroeconomy

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Summary

The paper presents a general equilibrium economy with oligopolistic competition and endogenous firms dynamics to explain three key facts:

1. Aggregate/Average Price Markup $\uparrow$
2. Employment Reallocation $\downarrow$
3. Weight of Overhead Costs $\uparrow$

Main takeaway: the observed trends result from changes in **both** technology and competition/market structure.

Key Features and Main Contributions

- Unified explanation for some key dynamics that characterized the US economy in the last four decades.
- Extensive validation: the calibrated model predicts untargeted facts both at the macro and micro level, uncovering new evidence.
- The model allows for counterfactual exercises where each channel can be shut down, showing the importance of changes in both market structure and technology.
- Intuitive framework to remind us two often *forgotten* facts:
  1. While they move(d) together in the data, there is no clear mapping between markups and business dynamism.
  2. The source for the increase in markups matters for welfare.

From the Model ...

In the theoretical model, there is a clear and *standard* notion of dynamism (and time).

Given a set of potential competitors M_j, the realization of the AR(1) productivity processes connects adjacent periods, determining incumbents, entrants and exiting firms.

1. The adjustments on the extensive margin(s) are driven by ex-post idiosyncratic shocks $\rightarrow$ σ represents the volatility of productivity shocks.
2. The model could also account for ex-ante heterogeneity, important for firms dynamics, see Sterk et al. (2021).

... to the Quantitative Exercise

However, in the quantitative exercise we have a collection of steady states, to which a latent dynamic process is superimposed.

$$\bar{M} = \begin{bmatrix} z_{1,1980} \\ z_{2,1980} \\ \vdots \\ z_{\bar{M},1980} \end{bmatrix} \rightarrow \sigma_{1981} \rightarrow ?^{1} \rightarrow \begin{bmatrix} z_{1,1981} \\ z_{2,1981} \\ \vdots \\ z_{\bar{M},1981} \end{bmatrix} \rightarrow \sigma_{1982} \rightarrow \dots$$

where $\bar{M} = \max M_t$ and the initial distribution of z is given by the stationary distribution of the technological process given ρ and σ_{1980}.

[1] Is $z^*_{i,j,t}$ given by the stochastic realization of $z^*_{i,j,t-1}$ to the AR(1) process with innovation σ_t or is obtained by re-drawing from the stationary distribution with ρ and σ_t, as for 1980?

Open Questions

The dual nature of the exercise, i.e. static collection of equilibria from different economies but with a latent dynamic productivity evolution, might create some inconsistencies:

- To talk about firms dynamics and reallocation we should track firms, or at least their status. If we do that, the competitive pressure is given by the *exiters* as they never truly leave and/or by potential entrants who stay *potential* for decades.

- **Firms' status**. Two reasons for exit: *exogenous* if removed randomly from pool of M_t, *endogenous* if active in period t and below implicit threshold in period $t+1$. Also potential competitors vs. potential entrants?

- The computation of **welfare** abstracts from transitional effects, is it a good proxy?

Sectoral Productivity and Markup

- How are sectoral and aggregate productivity defined? Aggregating from $y_{ijt}/z_{ijt} = n_{ijt}$, we get that if:

$$z_{jt} = \left(\sum \frac{y_{ijt}}{y_{jt}} \frac{1}{z_{ijt}}\right)^{-1}$$

then $y_{jt} = z_{jt} n_{jt}$ (or with $1/M_j$ in the sum for a variety adjusted measure).

- Is there a reason for the definition you provide? Are they equivalent? They are under monopolistic competition, I am not sure under oligopoly. Same for sectoral and aggregate markups.

Derivation

Revenue vs. Cost-Weighted Average Markup

- In a model similar to yours, Edmond et al. (2021) show that:

$$\bar{\mu}_t = \mu_t + \frac{1}{\mu_t}\mathsf{Var}[\mu_{it}]$$

  where the bar refers to the revenue-weighted average markup. The cost-weighted markup appears to be a cleaner measure of market power, in particular for welfare analyses.

- Note that the above holds if the variable cost elasticity is constant within a sector:

$$\frac{\partial c_{ijt}}{\partial y_{ijt}} \frac{y_{ijt}}{c_{ijt}} = \frac{mc_{ijt}}{ac_{ijt}} = \psi_{jt} \quad \text{for all} \quad i \in j$$

  This holds in your benchmark model, as $\frac{W}{z_{ijt}} / \frac{W}{z_{ijt}} = 1$.

Other Suggestions

- Is it possible to study the reason for the observed paths of the primitives? Parameters could be linked to the literature, e.g. σ to the change in the quality ladder in Olmstead-Rumsey (2020), ϕ to the higher intangible ratio in De Ridder (2019) or costly ideas in Bloom et al. (2017)
- Can M_{jt} change in response to a change in ϕ? Are the channels independent? Can we test for that?
- No variety effect. Are the results regarding welfare even stronger due to the reduction in the number of varieties if we allow for this effect? This would be consistent with the data and the increase in concentration.

Typos

- If markups, page 12, line 10.
- Lagrangian, Appendix A.1.
- all T periods, Appendix B.5.

Derivation Sectoral Productivity and Markup

Starting from $y_{ijt}/z_{ijt} = n_{ijt}$, we multiply and divide the LHS by y_{jt}:

$$y_{jt}\frac{y_{ijt}}{z_{ijt}y_{jt}} = n_{ijt}$$

Sum over i (also multiply both sides by $1/M_j$ if variety adjusted) to write:

$$y_{jt}\sum\frac{y_{ijt}}{z_{ijt}y_{jt}} = \sum n_{ijt} = n_{jt}$$

This gives sectoral production as:

$$y_{jt} = z_{jt}n_{jt}$$

where we define the sectoral productivity z_{jt} as:

$$z_{jt} = \left(\sum\frac{y_{ijt}}{y_{jt}}\frac{1}{z_{ijt}}\right)^{-1}$$

Define $p_{jt} = \mu_{jt} \frac{W_t}{z_{jt}}$. Then:

$$\frac{p_{ijt} y_{ijt}}{p_{jt} y_{jt}} = \frac{\mu_{ijt} W_t}{z_{ijt}} z_{ijt} n_{ijt} \left(\frac{\mu_{jt} W_t}{z_{jt}} z_{jt} n_{jt} \right)^{-1}$$

Solve for n_{ijt} and sum over i:

$$\mu_{jt} n_{jt} \sum \frac{p_{ijt} y_{ijt}}{p_{jt} y_{jt}} \frac{1}{\mu_{ijt}} = \sum n_{ijt} = n_{jt}$$

This gives the sectoral markup μ_{jt} as:

$$\mu_{jt} = \left(\sum \frac{p_{ijt} y_{ijt}}{p_{jt} y_{jt}} \frac{1}{\mu_{ijt}} \right)^{-1}$$

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Sterk, V., Sedláček, P., & Pugsley, B. (2021). The nature of firm growth. *American Economic Review*, *111*(2), 547–79.