Advanced Macroeconomics

Market Power and Misallocation in Macro

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INSPER

References

- De Loecker, Eeckhout, and Mongey (2022, WP): Quantifying Market Power and Business Dynamism in the Macroeconomy.
- Edmond, Midrigan and Xu (2023, JPE): How Costly are Markups?
- Chad Syverson (2019, JEP): Macroeconomics and Market Power: Context, Implications, and Open Questions.
- For the data, see the papers in the motivating slides.

Introduction

- Market power is usually defined as the ability of the firm to influence the price at which it sells its products or buys its inputs.
- Large firms tend to have substantial product and labor marker power.
  - Some evidence that is increasing in the past few years.
- Does that matter for the aggregate output?
- Should we do anything about? and what?

Measuring Market Power

- There are many direct or indirect ways to measure (product) market power.
- The most direct way is to compute markups, the gap between price and marginal cost.
  - Very hard to compute in general.
  - Another option is to measure the residual demand curve, as it is related to markups in many models.
- Other indirect ways usually focus on measures of concentration:
  - The Herfindahl–Hirschman index (HHI): $\sum_{i=1}^{n} \text{Mkt Share}_i^2$.
  - The combined market share of the largest n firms: C_n.
  - But differently than markups, You can compute these directly from the data.
- So, how can we measure markups?

The Production Approach to Measure Markups

- Suppose a production function:

$$Y_{it} = \exp(z_{it}) F(K_{it}, L_{it}, M_{it})$$

where K = capital, L = labor, M = intermediate materials.

- Using the cost min. problem, the FOC w.r.t some variable input (say M_{it}) implies:

$$P_{it}^{M} = \lambda_{it} \frac{\partial Y_{it}}{\partial M_{it}} \qquad \Leftrightarrow \qquad P_{it}^{M} \frac{M_{it}}{Y_{it}} = \lambda_{it} \frac{\partial Y_{it}}{\partial M_{it}} \frac{M_{it}}{Y_{it}}$$

where λ_{it} is the Lagrange multiplier associated with the production function constraint, which is also equal to the **firm's marginal cost**.

From Production to Markups

- Recall the Markup definition (price over mg. cost): $\mu_{it} = P_{it}/\lambda_{it}$.

- Using the previous equation and substituting for λ_{it}:

$$\mu_{it} = \frac{\frac{\partial Y_{it}}{\partial M_{it}} \frac{M_{it}}{Y_{it}}}{\frac{P_{it}^M M_{it}}{P_{it} Y_{it}}} \equiv \frac{\theta_{it}^M}{s_{it}^M}$$

  where:
  - θ_{it}^M = output elasticity wrt input M.
  - $s_{it}^M = \frac{P_{it}^M M_{it}}{P_{it} Y_{it}}$ = input's revenue share.

- The revenue share is directly observable from firm-level balance sheet surveys, but the output elasticity must be estimated.

Estimating the Production Function

- The usual method to retrieve output elasticities and firm-level TFP requires production function estimation. Suppose:

$$Y_{jst} = \exp(z_{jst}) K_{jst}^{\alpha_s} L_{jst}^{\beta_s} M_{jst}^{\theta_s}$$

  where j is firm, s is sector and t time. Y_{jst} can be either sales or physical output.
  - Take the logs, add an error term ε and you have an equation to estimate the parameters.
  - The IO people worked really hard on the identification of this equation using what is known **control function approach**: Olley and Pakes (1996), Levinsohn and Petrin (2003), Ackerberg et al. (2015), De Loecker and Syverson (2021).
  - Requires firm-level panel data and some assumption regarding which inputs are predetermined and subject to market power.
    - ⋆ With even stronger assumptions you are able to identify the production function using a cross-section data: **cost share approach**.

Estimating Markups: the Core Idea

- The core idea of the production function approach to estimate markups dates Hall (1988), but it is mostly recently applied in De Loecker and Warzynski (2012, AER) and De Loecker and Eeckhout (2020, QJE).
- The approach has its own methodological problems that have been discussed in many papers. For practical usage, see De Ridder, Grassi and Morzenti (2025, ECTA Forth.), Fernald, Gandhi, Ruzic, and Traina (2025, WP) and Miller (2025, IJIO).
- You can easily extend and compute **wage markdowns** to compute labor market power. See Yeh et al (2022, AER) and Brooks et al (2021, JDE).
- Even with its problem, it is a powerful tool to study market power and its implication for the macroeconomy.

Markups are Increasing in the U.S.

Figure: Avg. Markups (weighted by revenue)

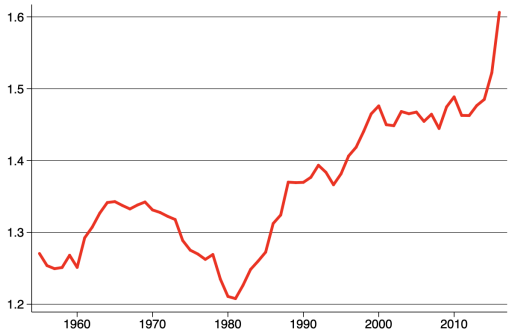
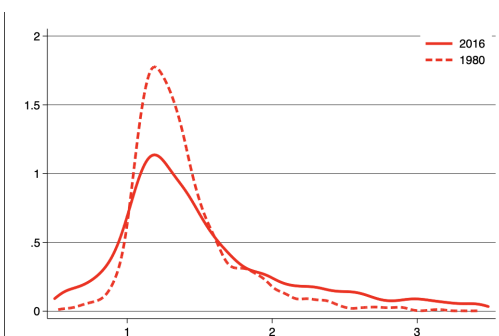


FIGURE I

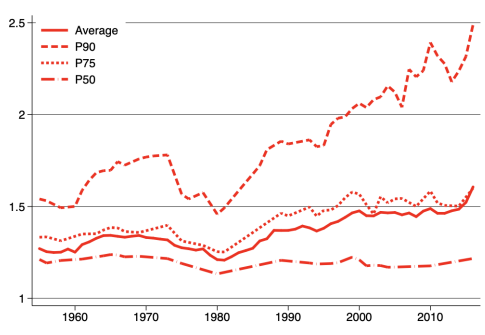
Average Markups

Source: De Loecker, Eeckhout, and U (2020, QJE)

The Change is Driven by the Top Firms



(A) Kernel density (unweighted)



(B) Percentiles markup distribution (revenue weight)

Source: De Loecker, Eeckhout, and U (2020, QJE)

Reallocation of Sales Towards Large Firms are Important

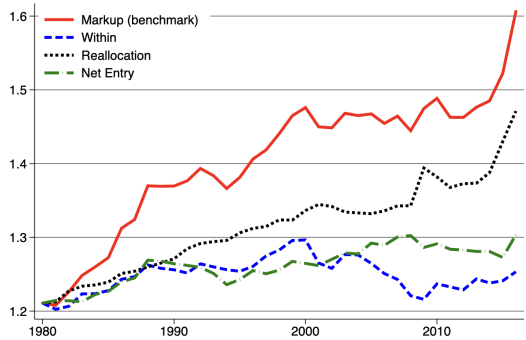


FIGURE IV

Decomposition of Markup Growth at the Firm Level

Source: De Loecker, Eeckhout, and U (2020, QJE)

Is it a Worldwide Phenomena?

Figure: Avg. Markup (revenue wgt.) across regions

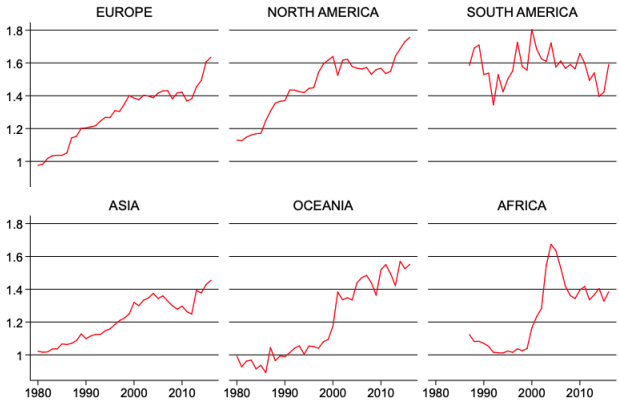


Figure 3: GLOBAL REGIONS

Source: Global Market Power. De Loecker and Eeckhout (2021, WP)

Concentration is rising in the U.S...

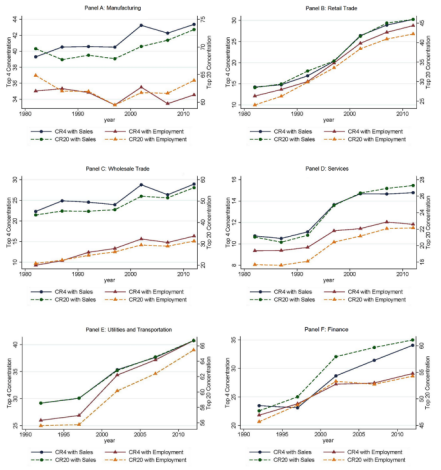
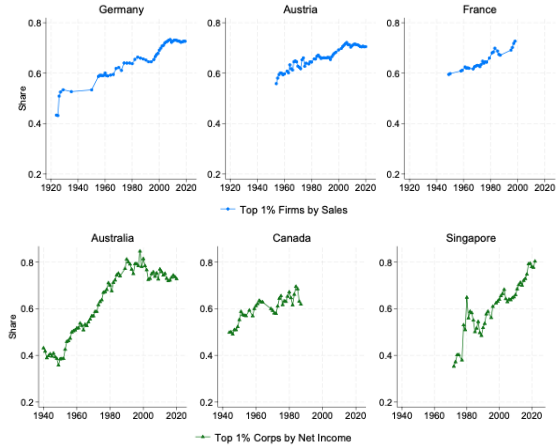


FIGURE IV

Average Concentration across Four-Digit Industries by Major Sector

Source: Fall of the Labor Share and the Rise of Superstar Firms. Autor et al (2020, QJE)

...and around the world!



Source: Business Concentration around the World: 1900–2020. Ma et al (2025, WP)

Local vs National Concentration?

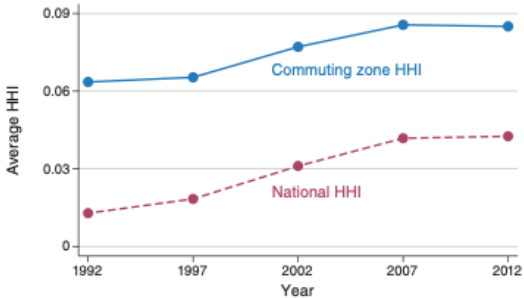


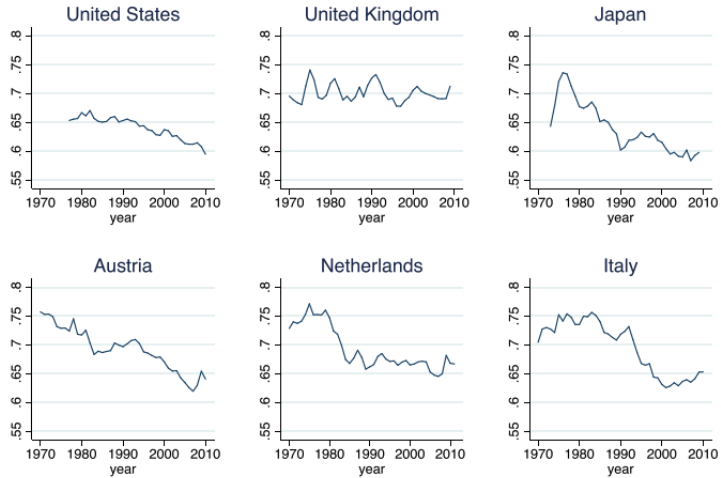
FIGURE 1. NATIONAL AND LOCAL CONCENTRATION

Source: The evolution of U.S. retail concentration. Ocampo-Smith (2025, AEJ-Macro)

Local vs National Concentration? Role of multi-plant firms

Source: Diverging Trends in National and Local Concentration. Rossi-Hansberg et al (2021, NBER-Annual)

Consequences of Mkt Power: Labor Share



Source: Fall of the Labor Share and the Rise of Superstar Firms. Autor et al (2020, QJE)

Consequences of Mkt Power: Labor Share

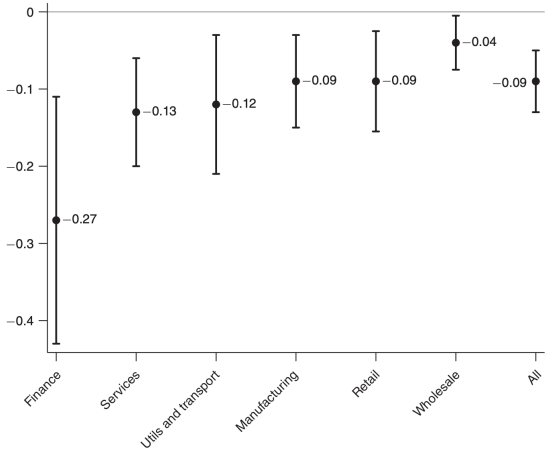


FIGURE 5. CORRELATION BETWEEN SECTOR-LEVEL CHANGES IN CONCENTRATION AND LABOR SHARE

Source: Fall of the Labor Share and the Rise of Superstar Firms. Autor et al (2020, QJE)

Consequences of Mkt Power: Increasing in Profits

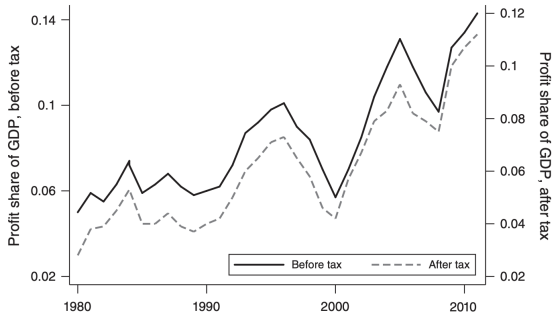


FIGURE 3. PROFITS AS A FRACTION OF GDP OVER TIME

Source: Market Power and Innovation in the Intangible Economy. De Ridder (2024, AER)

Consequences of Mkt Power: Manager Pay

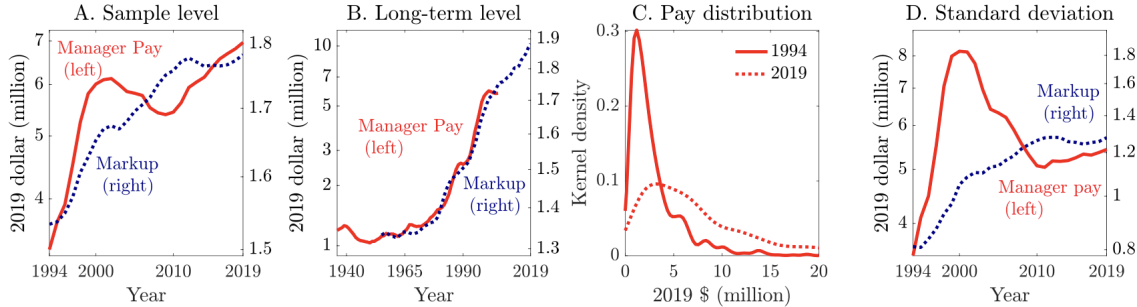


Figure 1: The evolution of manager pay and markups

Source: Manager Pay Inequality and Market Power. Bao, De Loecker, Eeckhout (2023, WP)

Consequences of Mkt Power: TFP Slowdown

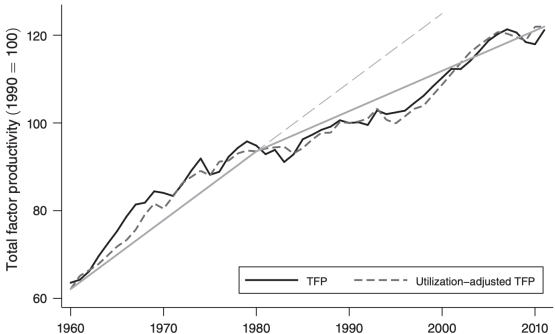


FIGURE 11. AVERAGE TFP GROWTH HAS SLOWED DOWN

Source: Market Power and Innovation in the Intangible Economy. De Ridder (2024, AER)

Model

Markup and Misallocation: Simple Intuition

- Recall that efficiency in het. firms model with monopolistic competition means mg. rev. product equalization.
- Suppose $y_i = z_i n_i$. Optimal pricing with CES aggregation implies constant markups: $p_i = \mu w / z_i$. Then:

$$\text{MgRPN} = p_i z_i = \mu w \qquad \Rightarrow \qquad \text{Constant across firms.}$$

- But if markups are different across firms, the MgRPNs are not equal anymore! Dispersion in markups $\Rightarrow$ misallocation.
- Large firms [more productive] will be smaller in equilibrium, while smaller firms will be relatively too large.

Endogenous Markups in General Equilibrium

- What is the cost of varying markups (and markdowns) in general equilibrium?
- Use a model with endogenous market structure: **Atkeson-Burstein (2008, AER)** framework.
- But there are other ways to model endogenous markups.
  - Kimball demand structure, innovation models, search models (in labor and goods), discrete choice, etc...
- We will study in the context of De Loecker-Eeckhout-Mongey (2022, WP) and Edmond-Midrigan-Xu (2023, JPE).

Atkeson and Burstein Framework: Production

- **Production: nested CES**. The final good is produced using inputs from a continuum of markets $s \in [0,1]$, with each market containing a discrete, exogenous number of firms, M_s.

$$Y = \left(\int_0^1 y_s^{\frac{\theta-1}{\theta}} ds \right)^{\frac{\theta}{\theta-1}}, \qquad \text{and} \qquad y_s = \left(M_s^{-1} \sum_{i=1}^{M_s} y_{is}^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}}.$$

- $\gamma > \theta > 1$: goods are more substitutable within markets (e.g., different brands of coffee) than across markets (e.g., coffee and cars).

- Strategic interactions between firms **within** markets, but price takers **across** markets.
  - Within markets firms compete with each other a la *Cournot*.

Atkeson and Burstein Framework: Production

- Solution implies the following demand $p_{is} = y_{is}^{-\frac{1}{\gamma}} y_s^{\frac{1}{\gamma}-\frac{1}{\theta}} Y^{\frac{1}{\theta}} P$, where the optimal price index are:

$$P = \left(\int_0^1 p_s^{1-\theta} ds \right)^{\frac{1}{1-\theta}} \qquad \text{and} \qquad p_s = \left(M_s^{-1} \sum_{i=1}^{M_s} p_{is}^{1-\gamma} \right)^{\frac{1}{1-\gamma}}.$$

- Firms are heterogeneous in their productivity, $z \sim G(z)$, and use labor as their sole input: $y_{is} = z_{is} n_{is}$. Profit maximization problem is:

$$\begin{aligned} \pi_{is} = \max_{y_{is}, p_{is}} \quad & p_{is}(y_{is}, \mathbf{y_{-is}}, Y, P) y_{is} - \frac{y_{is}}{z_{is}} W \\ \text{s.t.} \quad & p_{is} = y_{is}^{-\frac{1}{\gamma}} y_s^{\frac{1}{\gamma}-\frac{1}{\theta}} Y^{\frac{1}{\theta}} P, \end{aligned} \tag{1}$$

- Note that firm is take as given the output, $\mathbf{y_{-is}}$, of its $M_s - 1$ competitors.

Optimal Price

- Solution of the firm problem implies the optimal price:

$$p_{is}^F = \underbrace{\frac{\varepsilon_{is}}{\varepsilon_{is}-1}}_{\equiv \mu_{is}} \frac{W}{z_{is}},$$

where $\varepsilon_{is} > 1$ is the demand elasticity and μ_{is} the markup of a firm i in market s.

- The demand is elasticity is given

$$\varepsilon_{is} = \left[\frac{1}{\gamma}(1-\omega_{is}) + \frac{1}{\theta}\omega_{is} \right]^{-1},$$

where $\omega_{is} = p_{is}y_{is} / \sum_{i=1}^{M_s} p_{is}y_{is}$ is firm's i market share.

Markups

$$\varepsilon_{is} = \left[\frac{1}{\gamma}(1-\omega_{is}) + \frac{1}{\theta}\omega_{is}\right]^{-1},$$

Intuition:

- If M_s is large and the market is very competitive, $\omega_{is} \to 0$, and the firm's elasticity of demand is given by the within-market elasticity.
- When the firm is a monopolist, $\omega_{is} = 1$ and the only relevant elasticity is the across-market elasticity.
- Note markups, μ_{is}, are increasing and convex in market share ω_{is}, with
  - upper bound: $\theta/(\theta-1)$ (monopoly);
  - lower bound: $\gamma/(\gamma-1)$ (monopolistic competition);

Aggregation: within markets

- We can aggregate within market and then across sectors.
  - Price index of market s: $p_s = \mu_s \dfrac{W}{Z_s}$, where $Z_s \equiv \left[M_s^{-1} \sum_{i=1}^{M_s} z_{is}^{\gamma-1}\right]^{\frac{1}{\gamma-1}}$
  - Sector-level markups: $\mu_s = \left[M_s^{-1} \sum_{i=1}^{M_s} \left(\dfrac{z_{is}}{Z_s} \dfrac{1}{\mu_{is}}\right)^{\gamma-1}\right]^{\frac{1}{1-\gamma}}$.
  - Output and sector-level wedge:

    $Y_s = \Omega_s Z_s N_s$ where $\Omega_s = \left[M_s^{-1} \sum_{i=1}^{M_s} \left(\dfrac{z_{is}}{Z_s}\right)^{\gamma-1} \left(\dfrac{\mu_{is}}{\mu_s}\right)^{-\gamma}\right]^{-1}$.

- **Intuition:**
  - Markup dispersion reduces aggregate TFP ($\Omega < 1$).
  - If all markups are the same: $\mu_{is} = \mu_s$, no misallocation ($\Omega = 1$), TFP is at first best - but there could be effects through other channels since aggregate markup is still there.

Aggregation: across markets

- Economy-wise aggregation:
  - Economy-wise price index: $P = \mu \frac{W}{Z}$, where $Z \equiv \left[\int_0^1 Z_s^{\theta-1} ds\right]^{\frac{1}{\theta-1}}$
  - Economy markups: $\mu = \left[\int_0^1 \left(\frac{Z_s}{Z}\frac{1}{\mu_s}\right)^{\theta-1} ds\right]^{\frac{1}{1-\theta}}$.
  - Output and sector-level wedge: $Y = \Omega Z N$ where $\Omega = \left[\int_0^1 \Omega_s \left(\frac{Z_s}{Z}\right)^{\theta-1} \left(\frac{\mu_s}{\mu}\right)^{-\theta} ds\right]^{-1}$.
- Sectoral markup dispersion + dispersion in sectoral wedges reduces aggregate TFP ($\Omega < 1$).
- Dispersion in μ_s, also affects the level of markup μ.

Heterogeneity Across Markets

- Why there is heterogeneity across markets?
- Suppose the number of firms is the same in every market $M_s = M$. Then, markets are **ex ante** the same.
- But because of finite number of draws of z_{is}, markets will be **ex post** heterogeneous.
  - E.g. A market with $M = 2$ and all the firms with the same z has no markup dispersion.
  - If the market has one high z and the other with low z there will be dispersion in mkt shares and markups.
- Markets can also be heterogeneous in the number of firms, M_s (and in other dimensions).
  - Some papers use ex-ante stochastic M_s;
  - Others have endogenous M_s with an entry decision.

Intuition

- Suppose one producer in each sector (monopoly): maximum markup-level $\theta/(\theta-1)$, but no dispersion and thus no misallocation.
- Increase to two producers (duopoly): aggregate markup falls, but markup dispersion increases and generates misallocation!
- Keep increasing the number of firms and agg. markups will keep falling and misallocation will increase, until the number of firms is too high and we are too close to the monopolistic markup.
- Higher dispersion of z means more dispersion of markups (condition on M_s).
- Higher dispersion of M_s usually means more dispersion of markups.

Applications

- **Edmond, Midrigan and Xu (2023, JPE): *How Costly are Markups?***
  - Use the model to measure the GDP cost of markups through multiple channels.

- **De Loecker, Eeckhout, and Mongey (2022, WP): *Quantifying Market Power and Business Dynamism in the Macroeconomy***
  - A model that can account for both the increase of market power and the decline in business dynamism.

- **Edmond, Midrigan and Xu (2015, AER): *Competition, Markups, and the Gains from International Trade***
  - Open to trade reduces misallocation through pro competitive effects.

How Costly are Markups?

- **Goal:** Quantify welfare losses from markups.
- **Model:** heterogeneous markups + endogenous entry + exit risk. Three distortion channels:
  - Aggregate markup $\rightarrow$ acts like a uniform tax
  - Markup dispersion $\rightarrow$ misallocation
  - Entry distortion $\rightarrow$ inefficient variety count
- **Results**
  - Welfare costs can reach 25% (depending on assumptions).
  - Aggregate markup and misallocation channels are dominant; entry channel is minor.
  - Entry subsidies have weak effects: more small firms, but compositional reallocation toward high-markup firms offsets gains.
  - Efficient policy: combination of uniform and size-dependent subsidies to correct distortions.

Quantifying Market Power and Business Dynamism

- Market power is increasing in the U.S.
  - How much is due to technology (e.g. productivity dispersion, fixed costs) vs. structural competition (entry, number of firms)?
  - What are What are the welfare effects of those changes?

- **Model:**
  - Atkeson & Burnstein framework
  - Fixed cost + stochastic productivity + endogenous entry;

- **Identification**
  - Use time-series data (1980–2016) on markups, job reallocation, and fixed cost (over total cost).
  - Because changes in technology vs. changes in competition affect these moments differently, one can disentangle the two channels.

Quantifying Market Power and Business Dynamism

- **Quantitative Findings**
  - Fixed costs increased; productivity dispersion rose; competition weakened (fewer effective competitors).
  - Welfare declined by 9%, output loss 10%. Gains from tech are outweighed by losses from markups and overhead.
  - Output decomposition: +5% from technology vs –15% from markup distortions.

- **Macro Implications & Validation:**
  - The model reproduces secular trends: falling labor share, declining dynamism, shift of sales toward large firms, wage stagnation.
  - The decline in dynamism itself is generated by reduced passthrough and higher markups—small firms' reallocation rates decline more than large ones.

Competition, Markups, and the Gains from International Trade

- **Old idea:** Opening to international competition could have *procompetitive* effects.
  - Still, models with varying markups could not really predict procompetitive gains at the time;

- **Model**: Atkeson & Burnstein framework + Melitz trade
  - Two-countries trade model;
  - Firms can export to the other country by paying fixed cost + iceberg cost;
  - Heterogeneous firm's productivity + heterogeneity in sector's productivity + heterogeneity in the number of firms per sector.

- Note that standard effects of trade are also present in the model:
  - Comparative advantage; love for variety; selection; labor reallocation among domestic producers.

Competition, Markups, and the Gains from International Trade

- Calibrate to Taiwanese data
  - Data at the producer (labor, sales, etc) and product level (sales, import/export shares).
  - Able to compute markups, measures of concentration, and trade.
- Gains from trade: about 12% increase in agg. productivity;
- Procompetitive gains: 20% decrease in misallocation;
- Procompetitive gains are larger if
  - The economy is very concentrated;
  - The correlation of productivity of sectors among countries is large (i.e., opening to trade brings strong head-to-head competition).

Where to go now?

- **Innovation:** Peters (ECTA, 2020); De Ridder (2024, AER); Cavenaile et al (JME, 2025; EJ, 2022); Akcigit and Ates (2023).
- **Labor Market Power:** Berger, Herkenhoff, Mongey (AER, 2022; ECTA, 2025); Amodio, Medina, Morlacco (AER, 2025); Azkarate-Askasua, Zerecero (WP, 2023); Jarosch, Nimczik, Isaac Sorkin (ReStud, 2024); Gutierrez (WP, 2023); Felix (WP, 2023); Luduvice, Martinez & Sollaci (WP, 2024), Armangué-Jubert et al (AER:I, 2025).
- **Mergers, Acquisitions and Cartels:** Fons-Rosen et al (WP, 2024); Chan, Qi (RED, 2025); Moreau, Panon (WP, 2023).
- **Inequality & Informality:** Mongey, Waugh (WP, 2025) Bao, De Loecker, Eeckhout, (WP, 2022); Deb (WP, 2023); Martinez and Santos (WP, 2025).
- **Misallocation & Networks:** Baqaee & Farhi (QJE, 2020; ReStud, 2024 w/ Sangani); Liang (RED, 2023).
- **Markup Fluctuations & Granularity:** Burstein, Carvalho, Grassi (QJE, 2025); Grassi & Carvalho (AER, 2019); , di Giovanni and Levchenko (JPE, 2012).