

Markup Measurement

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The views expressed herein are those of the speaker and do not necessarily represent the views of the Federal Trade Commission or any individual Commissioner

How should we measure markups?

- Production Approach

- Demand Approach



How should we measure markups?

- **Production Approach**
  - Hall (JPE, 1988)
  - De Loecker and Warzynski (AER, 2012)

- Demand Approach

Production Approach Assumes Cost Minimization

Given:

1. Flexible Input X_{it}
2. Price Taking In Input Market

Markup Wedge

$$P_{it}\frac{\partial F_{it}}{\partial X_{it}} = \frac{P_{it}}{\lambda_{it}}P_{it}^{X}$$

MB of Inc Input **MC of Inc Input**

Production Approach Assumes Cost Minimization

$$\mu_{it} = \frac{\beta_{it}^{X}}{s_{it}^{X}}$$

- s_{it}^{X} = Input Share of Revenue: Measure in Data

- β_{it}^{X} = Output Elasticity for Input X: Estimate PF

Problems with Production Approach

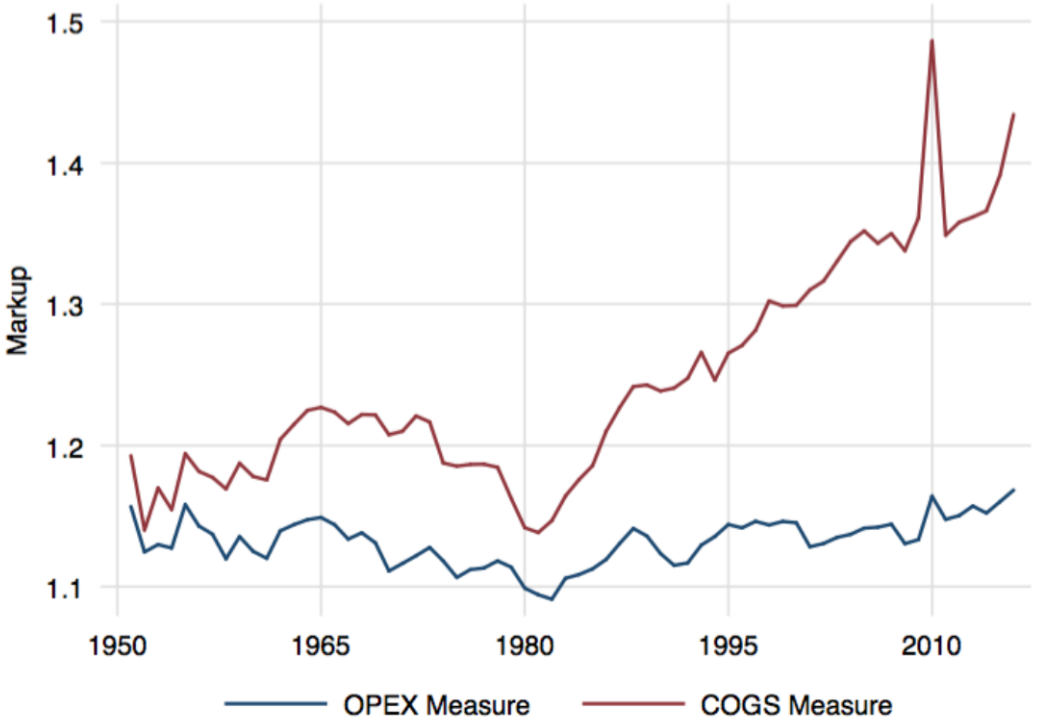
1. Specification of Technology

2. Measure Revenue and Not Output

3. Aggregation

Fixed vs. Variable Input: Traina (2018)

Figure 2: COGS vs. OPEX Markups



Is SG&A (OPEX - COGS) fixed or variable?

Neutrality of Technology Affects Markup Estimates

Most Empirical Work: Productivity is Neutral

$$Y = AF(K, L, M)$$

Neutrality of Technology Affects Markup Estimates

Alternative: Productivity is Non-Neutral

$$Y = AF(K, BL, M)$$

Evidence for Labor Augmenting B:

- US: Raval (RAND, 2019)
- Spain: Doraszelski and Jaumandreu (JPE, 2018)
- China: Zhang (JDE, 2019)

Non-Neutrality Changes Input-Based Markup Estimates

If elasticity of substitution $\sigma < 1$:

Then increase in B:

- $\frac{wL}{PF}$ decreases and so "labor markup" rises
- $\frac{p_m M}{PF}$ increases and so "materials markup" falls

Negative correlation between labor and materials markup

Testable Implication: Negative Correlation

If elasticity of substitution $\sigma < 1$:

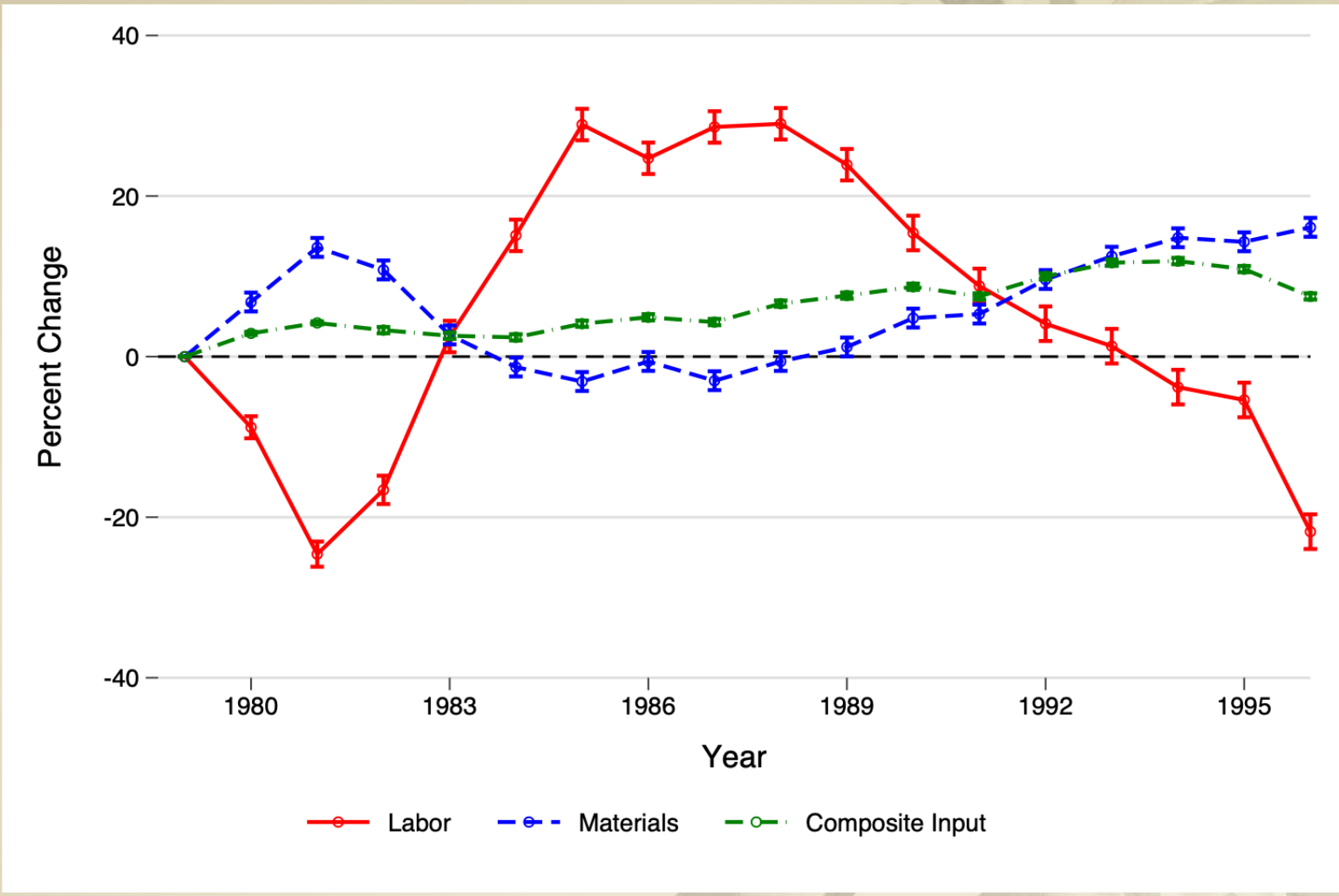
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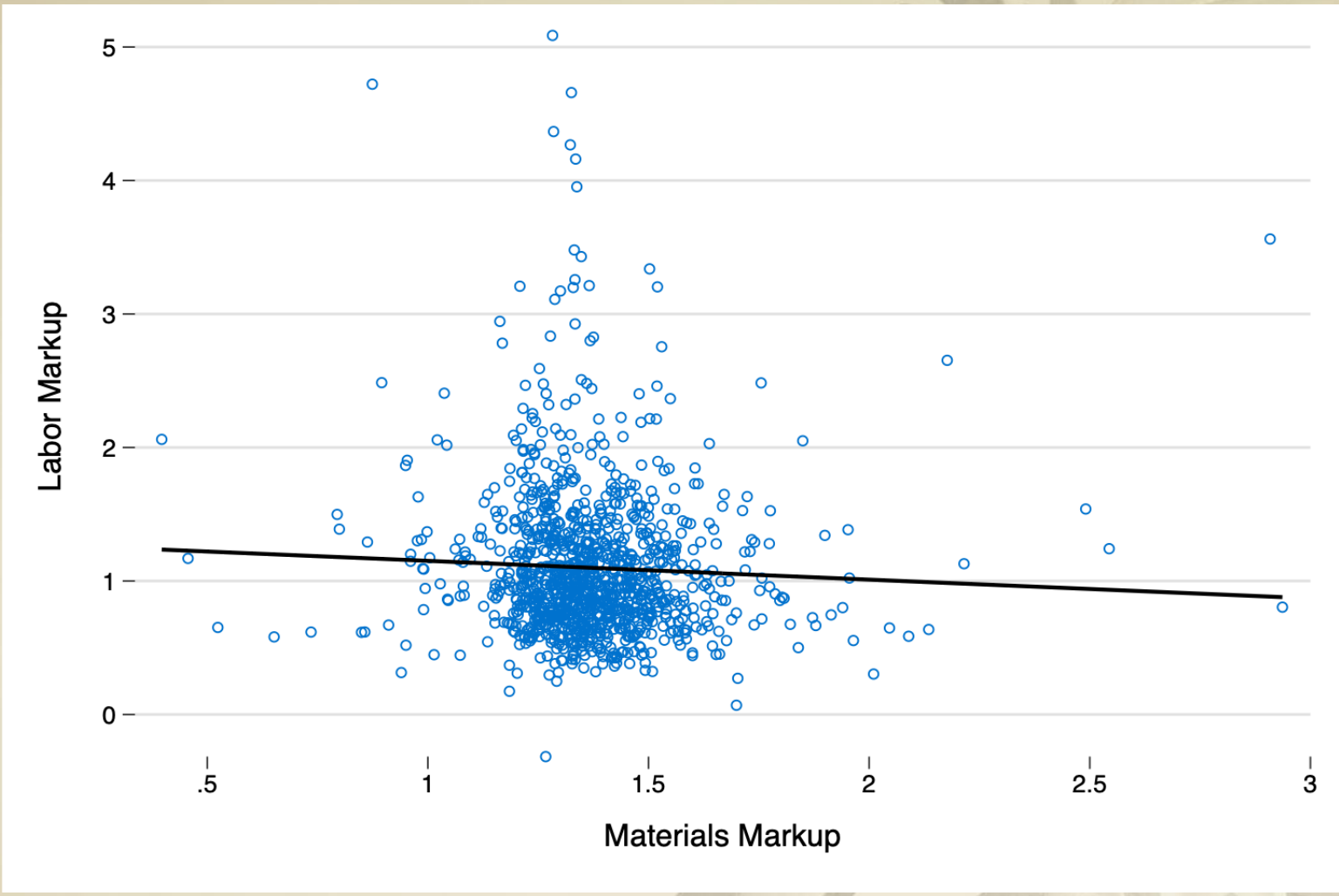
$\frac{p_m M}{PF}$ increases and so "materials markup" falls

Raval (ReStud, 2023): Tests negative correlation

Negative Time Series Correlation: Chile



Cross Sectional Correlation: Chilean Food Products (1996)



Negative Cross-Sectional Correlation

$$\log\left(\widehat{\mu_{i,t}^{\mathrm{L}}}\right) = \alpha + \beta \log\left(\widehat{\mu_{i,t}^{\mathrm{M}}}\right) + \gamma_t + \delta_n + \epsilon_{i,t}$$

Dataset	Cobb-Douglas	Translog
Chile	-0.66 (0.017)	-0.16 (0.014)
Colombia	-0.99 (0.015)	-0.28 (0.021)
India	-1.73 (0.012)	-0.53 (0.009)
Indonesia	-0.97 (0.018)	-0.48 (0.021)
US (Compustat)	-0.20 (0.032)	-0.50 (0.029)
S Europe (ORBIS)	-0.80 (0.005)	-0.32 (0.008)
Retailer	-7.51 (0.143)	-10.08 (0.102)

Why Revenue Production Functions Can Fail

Bond, Hashemi, Kaplan, Zoch (JME, 2021)

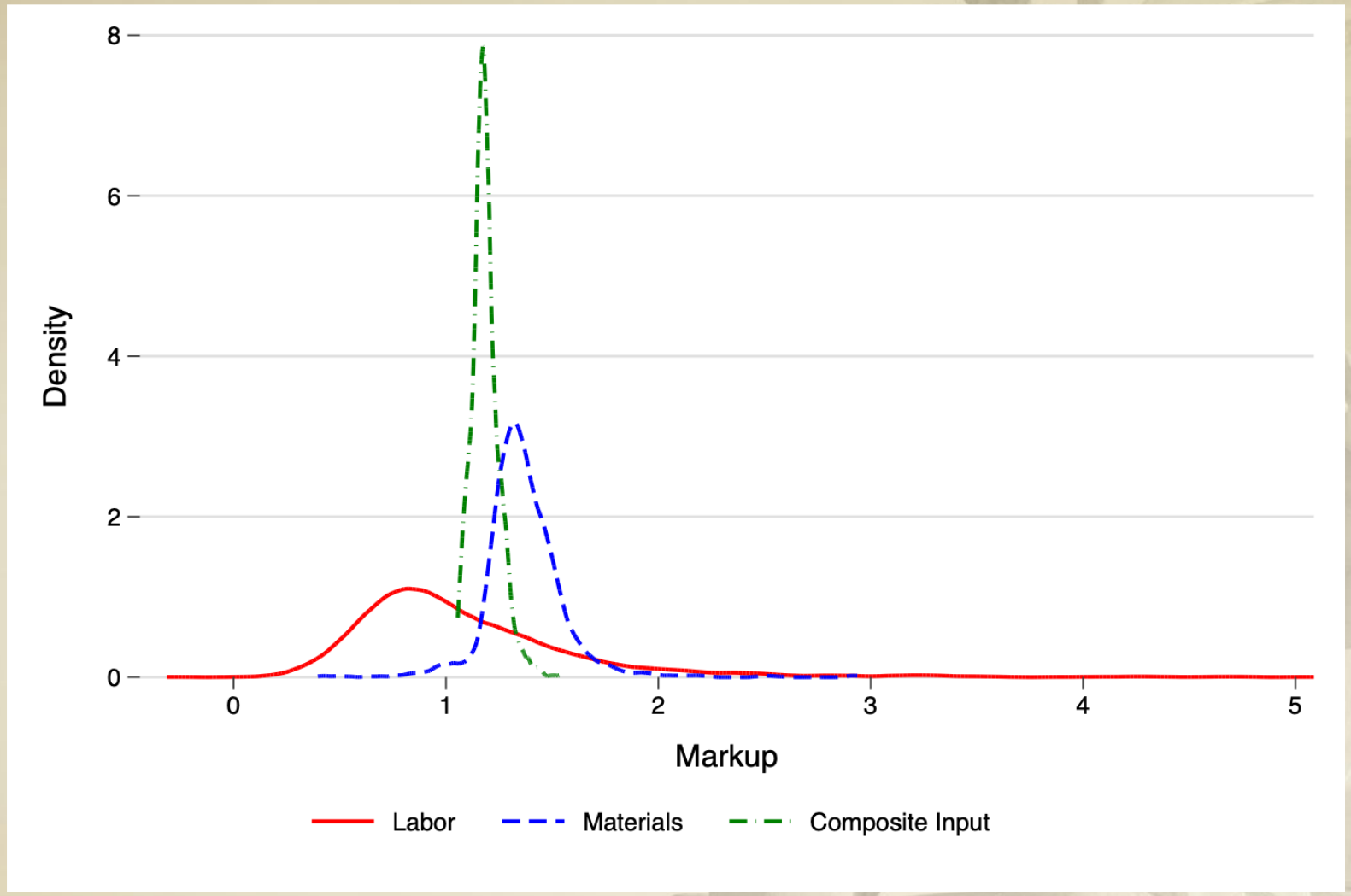
Given optimal pricing:

$$\beta^{X,Rev} = \frac{\beta^{X,Qty}}{\mu}$$

$$\hat{\mu} = \frac{\beta^{X,Rev}}{s^X} = \frac{\beta^{X,Qty}/\mu}{\beta^{X,Qty}/\mu} = 1$$

All markup estimates are 1!!

But: lots of dispersion empirically (Chilean Food Products, 1996)



What if we only observe revenue?

Klette and Griliches (JAE, 1996)

Omitted Price Bias: Output Prices Correlated with Inputs

$$r_{it} = q_{it} + p_{it} = \beta^{V} v_{it} + p_{it} + \omega_{it}$$

$$\hat{\beta}^{V} = \beta^{V} + \frac{E(p_{it} v_{it-1})}{E(v_{it} v_{it-1})}$$

What if we only observe revenue?

De Ridder, Grassi, Morzenti (ECMA, 2026)

If Common Proportional Bias in Output Elasticity:

$$\widehat{\mu_{it}} = c\mu_{it}$$

1. Markup Levels Differ

2. Same Trends and Dispersion

Revenue-Based Markups Understate Levels

French Data: Compare Revenue to Quantity Markup

$$\underbrace{0.13}_{\text{Avg Log Rev Markup}} < \underbrace{0.37}_{\text{Avg Log Qty Markup}}$$

But Markups Move Together

French Data: Compare Revenue to Quantity Markup

$$\log \mu_{it}^{Q} = \alpha_s + \beta \log \mu_{it}^{R} + \varepsilon_{it}$$

$$\beta = 0.89$$

$$\Delta \log \mu_{it}^{Q} = \gamma_s + \beta_\Delta \Delta \log \mu_{it}^{R} + u_{it}$$

$$\beta_\Delta = 0.92$$

Aggregate from Product to Firm

Cairncross, Morrow, Orr, Rachapalli (2025)

Identifying Product Markups from Firm Data Depends On:

1. Within Firm Productivity Differences
2. Joint Production (Economies of Scope)

- Koh and Raval (2025): Evidence of (1) and (2)
- Khmelnitskaya, Marshall, Orr (RAND, 2026): Evidence of (1)
- Orr (JPE, 2022): Evidence of (2)

Aggregate from Product to Firm

Cairncross, Morrow, Orr, Rachapalli (2025)

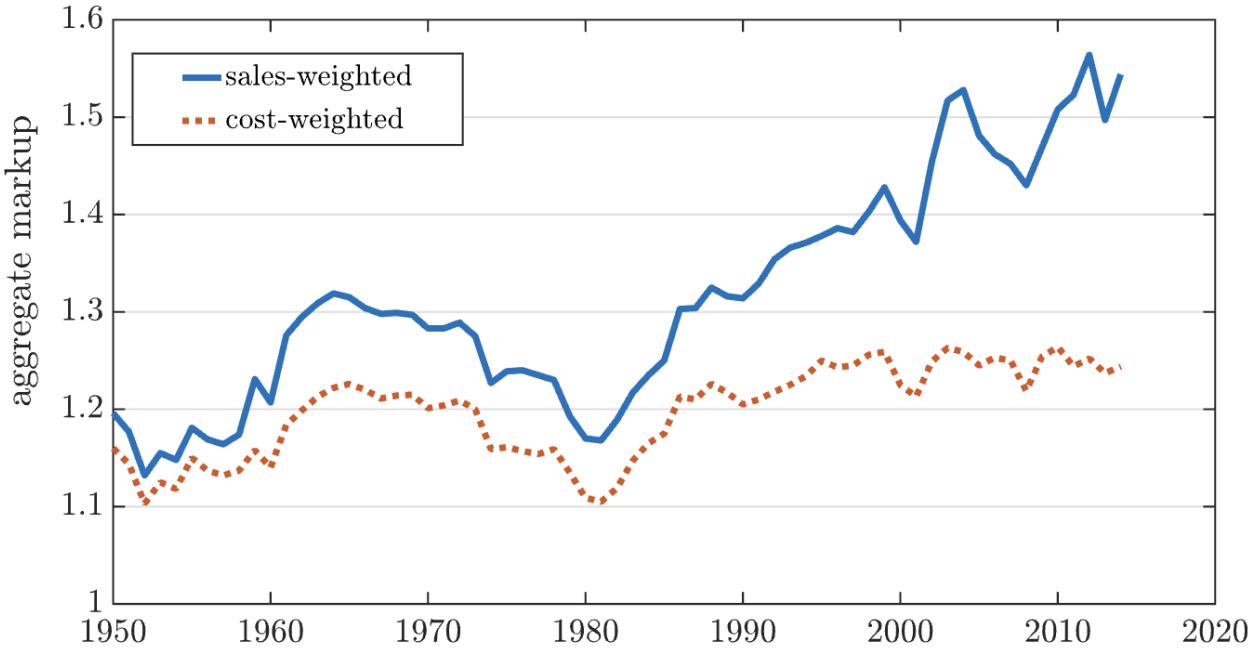
Identifying Product Markups from Firm Data Depends On:

1. Within Firm Productivity Differences
2. Joint Production (Economies of Scope)

- Product Level Markups: Not Identified
- Firm Markup: Identified

Aggregate from Firm To Economy

Figure 8: Cost-weighted vs. sales-weighted average markups, Compustat data



Edmond, Midrigan, Xu (JPE, 2023): Weight by Cost

How should we measure markups?

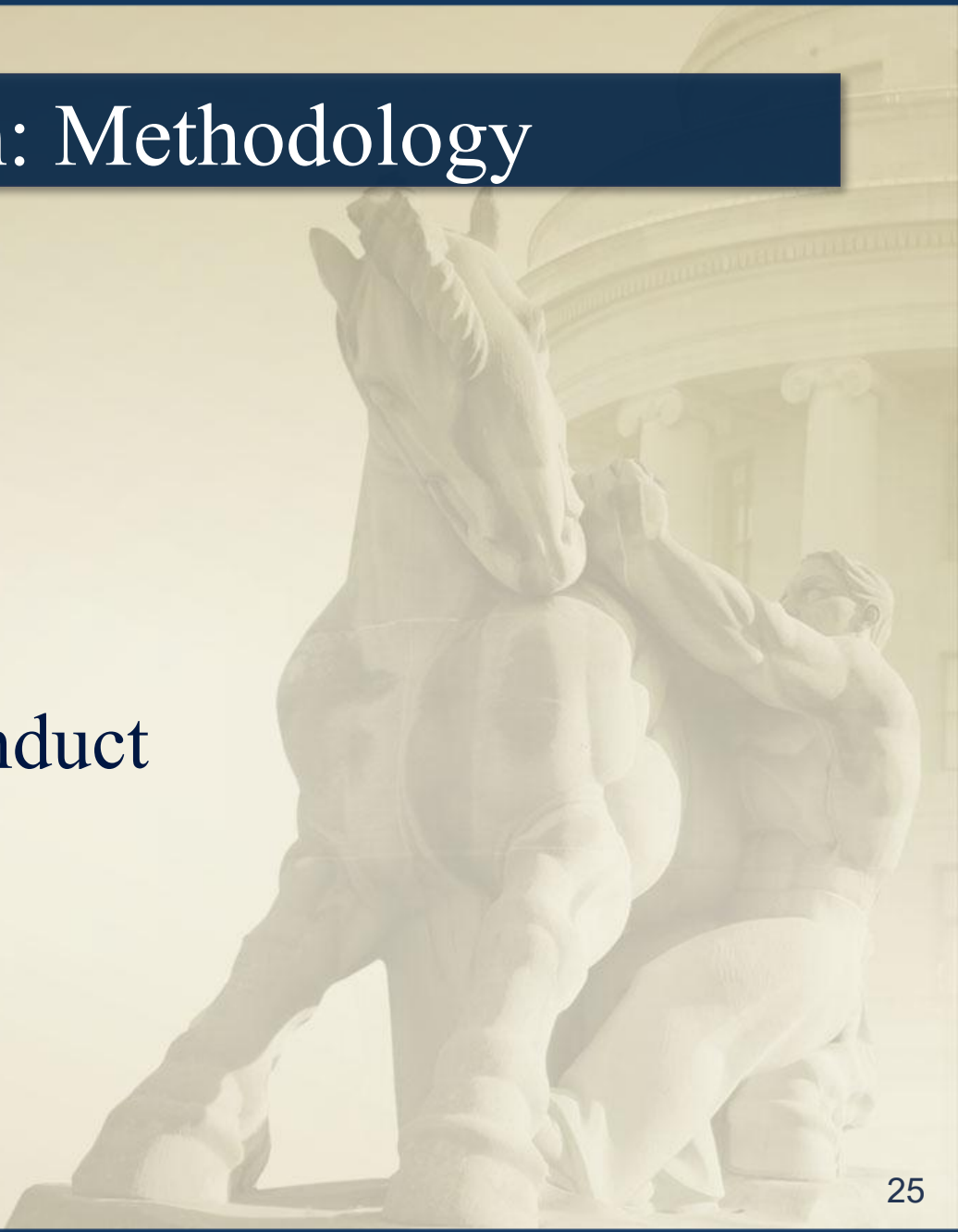
- Production Approach

- **Demand Approach**
  - BLP (ECMA, 1995)

Demand Approach: Methodology

1. Estimate Demand

2. Assume Firm Conduct



Demand Approach: Macro

1. CES Demand

2. Monopolistic Competition

$$\mu = \frac{\hat{\varepsilon}}{\hat{\varepsilon} - 1}$$

Demand Approach: IO

1. Random Coefficients / Nested Logit Demand

2. Nash Bertrand Competition

$$\mathbf{p} - \mathbf{mc} = \left[-\boldsymbol{\Omega} \odot \frac{\partial \mathbf{s}}{\partial \mathbf{p}'} \right]^{-1} \mathbf{s}$$

Demand Approach: Markup Trends

- Autos: Grieco, Murry, Yurokoglu (QJE, 2025)
  - 25.6% decrease from 1980 – 2018
- Cement: Miller, Osborne, Sheu, Sileo (2025)
  - 5.3% increase from 1974 - 2019
- CPG: Atalay, Frost, Sorensen, Sullivan, Zhu (JPE, 2025)
  - 37% increase from 2006 - 2018
- CPG: Dopper, MacKay, Miller, Stiebale (JPE, 2025)
  - 37.5% increase from 2006 - 2019

Problems with Demand Approach

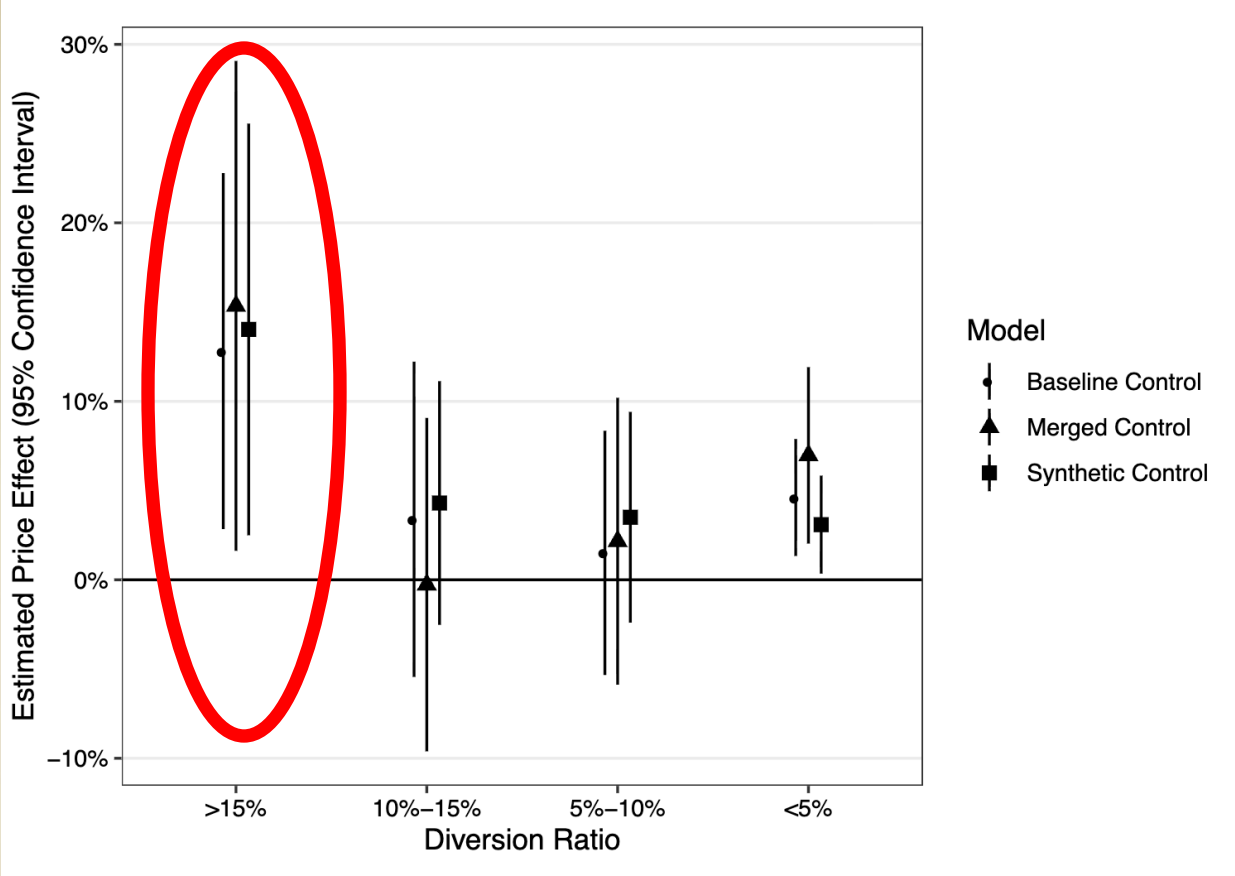
1. Estimate Demand
   - Need Data on Price and Quantity
   - Need to Account for Price Endogeneity
   - May Need Product Characteristics

2. Firm Conduct
   - Need to know Firm Conduct
   - Can Change: Miller and Weinberg (ECMA, 2017)

Measurement of Effects of Antitrust Policy

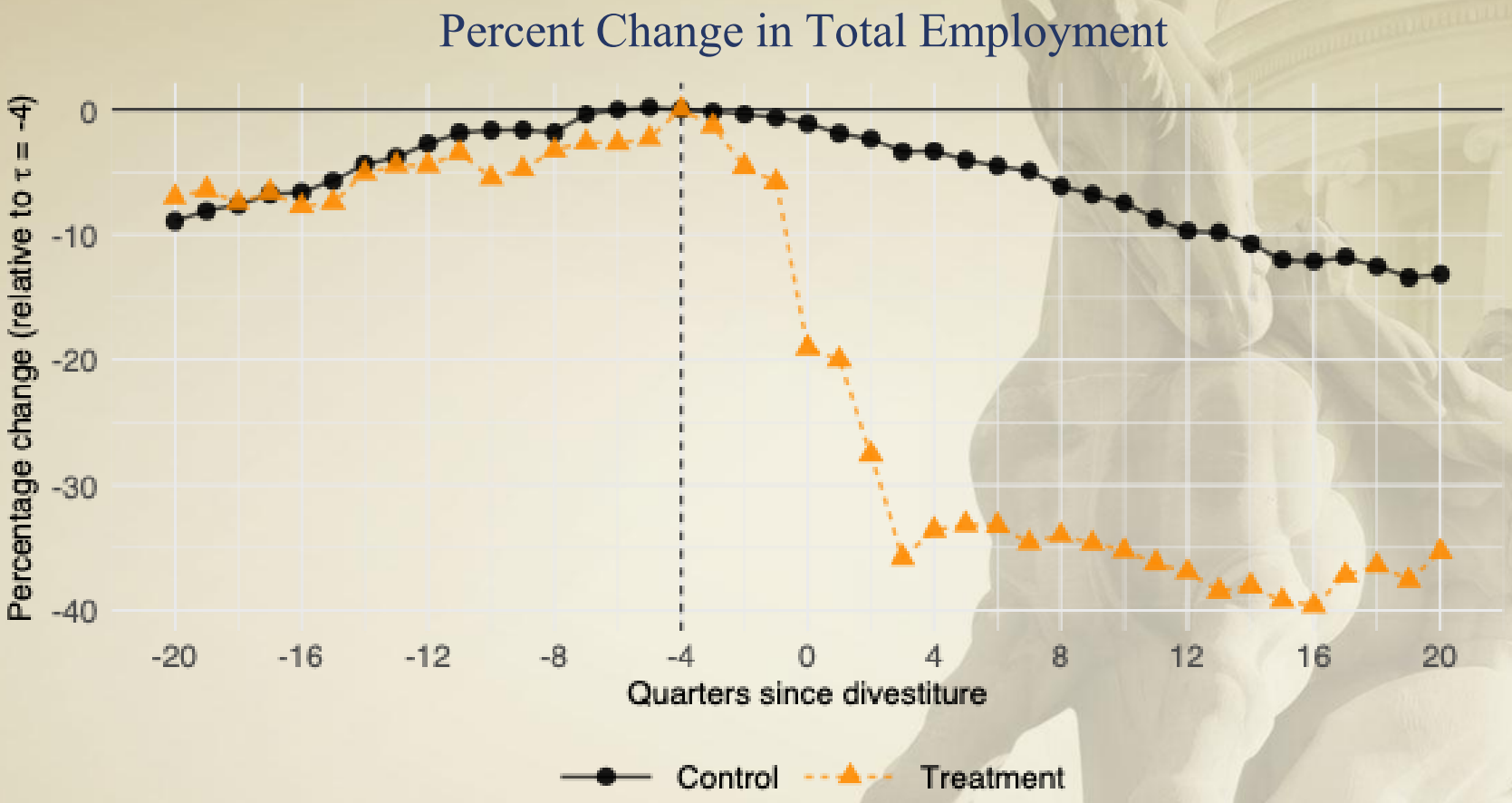
- Concentration Studies
  - Retail: Smith and Ocampo (AEJ:Macro, 2025) 
  - CPG: Benkard, Yurukoglu, Zhang (AEJ:Micro, 2025) 
- Merger Retrospectives
  - What happens to prices or output post-merger?
  - ≈ 20% done by FTC: Lew and Raval (PNAS, 2026)

Hospital Price Changes Post-Merger



Brand, Garmon, Rosenbaum (JLE, 2023)

Employment After Supermarket Divestitures



Dong, Koh, Raval, Smith, Wendling (2026)