Misallocation Measures: The Distortion that Ate the Residual

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Stylized environment in Hsieh and Klenow (2009)

CES preferences

$$Y = \left[\sum_i (Q_i Y_i)^{1-1/\sigma} \right]^{\frac{\sigma}{\sigma-1}}$$

Cobb-Douglas production with CRS

$$Y_i = A_i L_i$$

Monopolistic competition with a mysterious distortion

$$\pi_i = \frac{P_i Y_i}{\tau_i} - w L_i \Longrightarrow P_i = \frac{\sigma}{\sigma - 1} \cdot \tau_i \cdot \frac{w}{A_i}$$

Y increases if τ_i is eliminated

Haltiwanger, Kulick and Syverson (2018)

non-CES preferences

- Elasticity of demand depends on a product's relative quantity
- Let's call this endogenous elasticity σ_i for short

non-CRS production

$$Y_i = A_i L_i^{\gamma}$$

monopolistic competition (still)

$$P_i = \frac{\sigma_i}{\sigma_i - 1} \cdot \tau_i \cdot \frac{w}{\gamma A_i L_i^{\gamma - 1}}$$

TFPR and TFPQ

Hsieh and Klenow (2009)

$$\text{TFPR}^*_i \equiv \frac{P_i Y_i}{L_i} \propto \tau_i$$

$$\text{TFPQ}^*_i \equiv \frac{(P_i Y_i)^{\frac{\sigma}{\sigma-1}}}{L_i} \propto A_i \cdot Q_i$$

Haltiwanger, Kulick and Syverson (2018)

$$\text{TFPR}_i \equiv \frac{P_i Y_i}{L_i^{\gamma}} \propto \frac{\sigma_i}{\sigma_i - 1} \cdot \frac{\tau_i}{L_i^{\gamma-1}}$$

$$\text{TFPQ}_i \equiv \frac{Y_i}{L_i^{\gamma}} \propto A_i$$

Why do we care?

- non-CRS
  - TFPR* $\propto$ VMP even when $\gamma \neq 1$
  - Must deviate from isoelastic production (e.g. via overhead labor) to drive a wedge between TFPR* and VMP
  - But matters for aggregate productivity gains/losses!
- non-CES
  - Can matter for aggregate productivity losses/gains!
  - Implications for policy and innovation (e.g. Peters, 2017)
- Quality vs. process efficiency
  - Matters for modeling (Hottman, Redding & Weinstein, 2016)

HKS data and key findings

11 detailed Census of Manufacturing NAICS

Crucially, data on quantities $\Rightarrow$ can infer average unit prices

Key findings:

- $\widehat{\gamma} = 1.00$ (not even overhead costs?)
- $\widehat{\sigma}_i \downarrow$ with quantity $\Rightarrow$ markups $\uparrow$ with TFPQ*
- dispersion in $\widehat{\sigma}_i$ accounts for 21% of TFPR dispersion
- the bulk of TFPQ* dispersion comes from Q_i (not A_i)

Markup dispersion and misallocation

No theorem says markup dispersion always leads to misallocation.

But it *does* lead to misallocation in these environments:

- Baqaee and Farhi (2017)
  - isomorphic to τ_i under CES
  - estimate 50% productivity loss
- Peters (2017)
  - Bertrand competition with innovation
- Haltiwanger, Kulick and Syverson (2018)

Magnitude of misallocation in HKS

My version: variable elasticity of demand *a la* Kimball (1995).

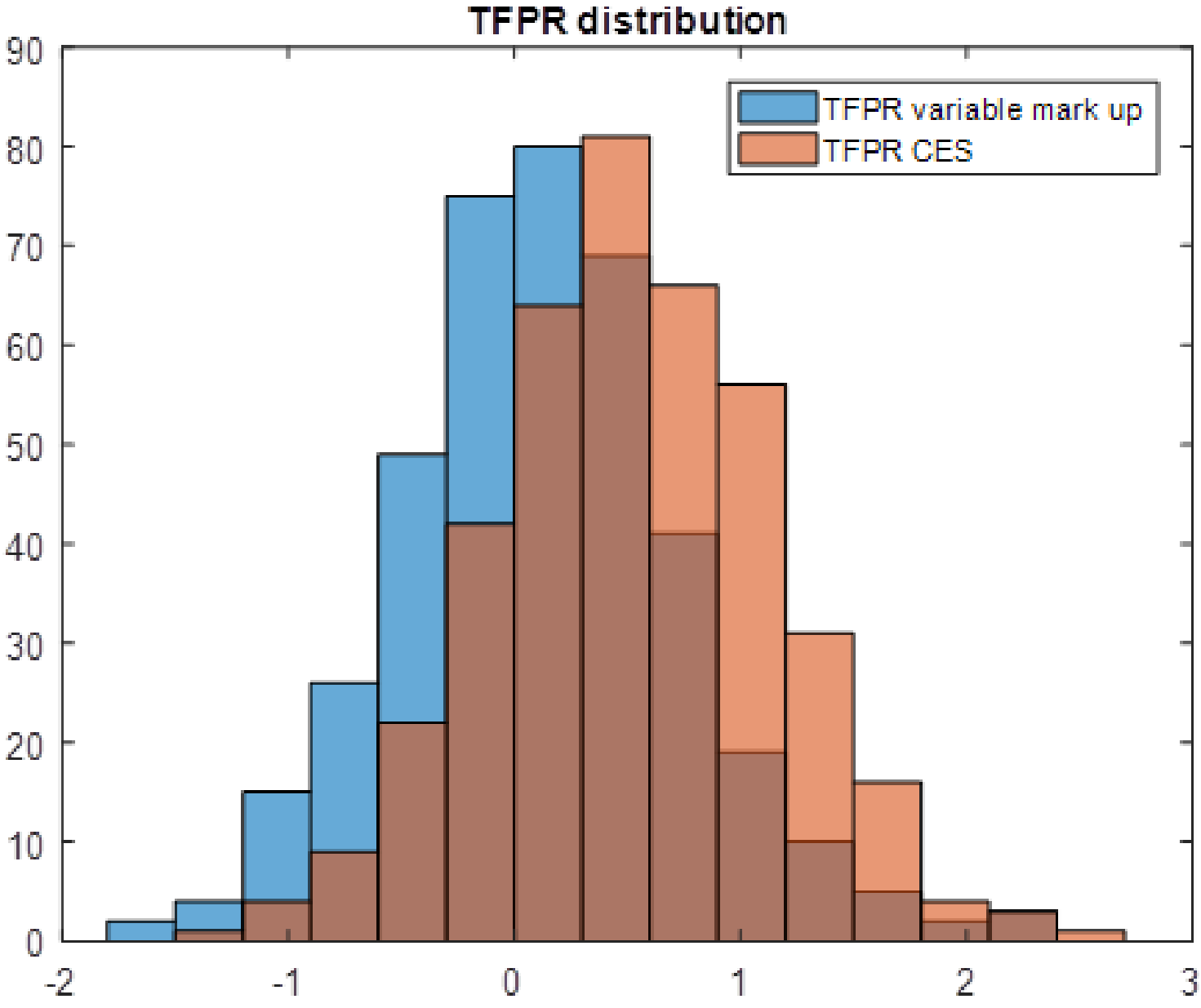
Used in Gopinath and Itskhoki (2011) and Klenow and Willis (2016)

Features a "superelasticity" (the elasticity of the elasticity).

I set this superelasticity to -2/3 to mimic HKS estimates.

Get 25% of TFPR* dispersion from markups (close to their 21%).

RESULT: Only 34% aggregate productivity gain from eliminating TFPR* dispersion in Kimball economy vs. 44% in CES economy


TFPR distribution
TFPR variable mark up
TFPR CES
90
80
70
60
50
40
30
20
10
0
-2
-1
0
1
2
3

Margins of misallocation

- "Static" misallocation
  - Inputs misallocated among existing producers
  - Focus of Hsieh and Klenow (2009)
- Extensive margin misallocation
  - The wrong producers enter and/or exit
  - Atkeson and Burstein (2010), Fattal-Jaef (2010)
- Dynamic misallocation
  - Producers do not make the right productivity investments
  - Cole, Greenwood & Sanchez (2016), Bento & Restuccia (2017)

Remaining dispersion in τ_i

- Misallocation
  - financing frictions (e.g., Midrigan and Xu, 2014)
  - taxes and subsidies (Fajgelbaum et al., 2016)
  - ...
- Misspecification
  - adjustment costs (Asker, Collard-Wexler and De Loecker, 2014)
  - overhead costs that differ by i
  - ...
- Mismeasurement

Distortions may be endogenous to TFPQ

Two more HKS (2018) facts:

- $\widehat{\tau}_i$ is $\uparrow$ in TFPQ*
- Exit is $\uparrow$ in $\widehat{\tau}_i$ conditional on TFPQ*

Not surprising if financing constraints and firing costs.

Why? Expect corr(TFPQ*, growth of TFPQ*) > 0

TFPR and TFPQ in India

Indian formal manufacturing plants, 1983–2013

Contains quantities (and therefore average unit prices)

Find the HKS facts *on steroids*:

- TFPR* is strongly $\uparrow$ in TFPQ*
- corr(TFPQ*, growth of TFPQ*) $\gg 0$
- Exit is strongly $\uparrow$ in TFPR* conditional on TFPQ*
- TFPQ* reflects quality *much* more than process efficiency
- Exit $\downarrow$ with quality, but not process efficiency

Measurement error in India

Misallocation or Mismeasurement?

- 2017 working paper with Mark Bils and Cian Ruane
- Additive measurement error (or overhead costs)
- Manufacturing plants in India, 1985–2011
- After correcting for measurement error:
  - TFPR dispersion is cut by 50%
  - Misallocation is reduced by 40%

Recap on Haltiwanger, Kulick and Syverson

- Provide evidence of markups ↑ in TFPQ*
- Show that TFPQ* reflects quality more than process efficiency
- Estimate RTS close to 1
- These estimates are useful for:
  - Quantifying the role of markup dispersion in misallocation
  - Gauging productivity losses from TFPR* dispersion
  - Modeling firm heterogeneity and growth