Global Firm Dynamics, Productivity, (Mis)Allocations

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Misallocation Concepts

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My definition of misallocation

*Misallocation exists if a social planner could implement budget-neutral targeted taxes and subsidies to induce the reallocation of inputs across activities (e.g., across products, firms or occupations) in a way that would increase the welfare of a representative agent.*

Example: Taxing polluting activities and subsidizing non-polluting activities.

This is just the efficiency of resource allocation — all of economics is about this! Well, at least the half of economics that is not about welfare across heterogeneous agents. One might want to suffer some misallocation if it raises utilitarian welfare.

“could implement” rules out things like repealing gravity to eliminate transportation costs

“could implement” also requires that the government observes its targets
Simple model setup

\[ Y = \left( \sum_{i=1}^{M} Y_i^{1-\frac{1}{\sigma}} \right)^{\frac{1}{1-\frac{1}{\sigma}}}, \quad P = \left( \sum_{i=1}^{M} P_i^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \]

- \[ Y_i = A_i L_i \]

- \[ \max (1 - \tau_i^Y) P_i Y_i - w L_i \]
  - Monopolistic competitor takes \( w, Y, \) and \( P \) as given

- \[ L = \sum_{i=1}^{M} L_i \]

- Exogenously fixed \( L \) and \( M \)
Simple model results

- \( P_i = \left( \frac{\sigma}{\sigma - 1} \right) \times \left( \tau_i \cdot \frac{w}{A_i} \right) \), where \( \tau_i \equiv \frac{1}{1 - \tau_i^Y} \)

- \( \text{TFPR}_i \equiv \frac{P_iY_i}{L_i} \propto \tau_i \neq A_i \equiv \text{TFPQ}_i \)

- \( \text{TFP} \equiv \frac{Y}{L} = \left[ \sum_{i=1}^{M} A_i^{\sigma-1} \left( \frac{\tau_i}{\tau} \right)^{1-\sigma} \right]^{\frac{1}{\sigma-1}} \)

- \((A_i, \tau_i) \sim LN(\mu_A, \mu_\tau, \sigma_A^2, \sigma_\tau^2) \) \implies \log(\text{TFP}) = \mu_A + \frac{\sigma - 1}{2} \cdot \sigma_A^2 - \frac{\sigma}{2} \cdot \sigma_\tau^2 \)
Lessons from the simple model

- “Wedges” show up in TFPR

- $\text{TFPR} \neq \text{TFPQ}$ (so do not use the former to proxy for the latter)

- Aggregate TFP is decreasing in the dispersion of wedges (misallocation)

- Aggregate TFP is unrelated to the mean wedge (in this static model)

- Aggregate TFP is increasing in the dispersion of TFPQ because $\sigma > 1$
Can infer $Y_i \propto \left( \frac{P_i Y_i}{L_i} \right)^{\frac{\sigma}{\sigma - 1}}$

- Captures a firm or plant’s process efficiency, quality, and variety as well as quantity.

Then $\text{TFPQ}_i = \frac{Y_i}{L_i}$

- Composite of process efficiency, quality, and variety.

If data on physical quantities $Q_i$, can infer process efficiency from $\frac{Q_i}{L_i}$

Then get quality and variety from $\frac{\text{TFPQ}_i}{Q_i}$
Easy model generalizations

- Physical capital (Hsieh and Klenow, 2009)
- Intermediates (Bils, Klenow and Ruane, 2020)
- Wedges on all inputs (HK 2009, BKR 2020)
- Overhead costs (Bartelsman, Haltiwanger and Scarpetta, 2013 AER)
- Entry costs (HK 2009, Dhingra and Morrow 2019 JPE)
Harder generalizations

- Financial frictions
  - Buera, Kaboski and Shin (2011 AER), Moll (2014 AER), Midrigan and Xu (2014 AER)

- Adjustment costs
  - Asker, Collard-Wexler and De Loecker (2014 JPE), David and Venky (2019 AER)

- VES instead of CES (Dhingra and Morrow 2019, Edmond Midrigan and Xu 2019)

- Arbitrary Input-Output Network and RTS (Baqaee and Farhi, 2020 QJE)

- Endogenous TFPQ (HK 2014 QJE, Bento and Restuccia AEJ-Macro 2017)
What is *not* misallocation

TFPR dispersion due to ...

- Measurement error in revenue or inputs
- Unavoidable adjustment costs and transportation costs
- Differential riskiness of investments in capital, R&D, etc.
- Compensating differentials for labor (amenities and disamenities)
- Misspecification of the production function
  - E.g., ignoring heterogeneity in production elasticities or overhead costs
What \textit{can} generate misallocation

TFPR dispersion due to ...

- Tax rate differences across firms (e.g., lower tax rates for oil and gas firms)
- Size-dependent regulations (e.g., firing restrictions on bigger firms)
- Price markup differences across products (e.g., Apple vs. Samsung smartphones)
- Wage markdown differences across firms (e.g., Apple and Google collusion)
Other potential sources of misallocation

- Discrimination
  - Labor market, lending, housing, school admissions/funding

- Financial frictions, state-owned banks, cronyism

- Efficiency wages in some firms or industries relative to others

- Licensing, entry, and land use restrictions

- Under- or over-investment in R&D, infrastructure, etc.
The Allocation of Talent in the U.S.

Share of each group in high-skilled occupations: lawyers, doctors, engineers, scientists (excluding social scientists), architects, mathematicians and executives/managers

<table>
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<tr>
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<th>1960</th>
<th>2018</th>
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<tbody>
<tr>
<td>White men</td>
<td>18.8%</td>
<td>26.3%</td>
</tr>
<tr>
<td>White women</td>
<td>5.3%</td>
<td>21.2%</td>
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<tr>
<td>Black men</td>
<td>2.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>Black women</td>
<td>1.3%</td>
<td>15.8%</td>
</tr>
</tbody>
</table>

Source: U.S. Census data; Hsieh, Hurst, Jones and Klenow (2019 Econometrica)
Decomposing TFPR with multiple inputs

- \( \text{TFPR}_i \equiv \frac{P_i Y_i}{(K_i^\alpha L_i^{1-\alpha})^{\gamma} X_i^{1-\gamma}} \)

  - \( PY \) here is gross output, \( K \) is physical capital, and \( X \) are intermediates

- Equivalently, \( \text{TFPR}_i \equiv \left[ \text{VAPK}_i^\alpha \text{VAPL}_i^{1-\alpha} \right]^{\gamma} \text{VAPX}_i^{1-\gamma} \)

  - where \( \text{VAPK} \equiv \frac{PY}{K} \), \( \text{VAPL} \equiv \frac{PY}{L} \), and \( \text{VAPX} \equiv \frac{PY}{K} \)

- VAPK refers to the Value of the Average Product of Capital, and so on

- \( \text{VAPK} \propto \text{VMPK} \propto \text{MRPK} \) if Cobb-Douglas and equal markups