A Simple Method to Measure Misallocation Using Natural Experiments

Paper by

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A New Answer to an Old and Tricky Question

What impact did some observed reform, e.g., financial liberalization, have on macroeconomic efficiency and output?

A Suspicious Answer: Just add up some micro reduced-form estimates!
The Problem: Relative variation may ignore GE or other confounders.

A Painful Answer: Structurally estimate a model of the reform.
The Problem: Gives you gray hair, requires a precise reform model.

This Paper's Answer: Use a sufficient statistics approach.
The Approach: Get reduced-form estimates of shifts in MP dispersion and map these directly to macro efficiency changes.

A Really Cool Paper

Nicely draws out a theoretical insight, natural in a big class of models, which deflects the GE issues, avoids painful model estimation, and yields an operationalized empirical strategy.

A Simple Discussant-y Structure

Output

$$Y = \int y_i d_i, \quad y_i = Z l_i^{\alpha}, \quad 0 < \alpha < 1$$

Distorted Optimization from Mean-Zero Wedges τ_i

$$\max_{l_i} \quad y_i - \frac{W}{(1-\tau_i)^{1-\alpha}} l_i \quad \rightarrow \quad l_i = \left(\frac{\alpha Z}{W}\right)^{\frac{1}{1-\alpha}} (1-\tau_i)$$

Dispersion in τ_i Maps to Dispersion in MP

$$\alpha \frac{y_i}{l_i} = \frac{W}{(1-\tau_i)^{1-\alpha}}$$

Dispersion in τ_i Causes TFP Loss

$$TFP = \frac{Y}{L^{\alpha}} = \frac{\int Z \left[\left(\frac{\alpha Z}{W}\right)^{\frac{1}{1-\alpha}} (1-\tau_i)\right]^{\alpha} di}{\left[\int \left(\frac{\alpha Z}{W}\right)^{\frac{1}{1-\alpha}} (1-\tau_i) d_i\right]^{\alpha}} = Z \int (1-\tau_i)^{\alpha} di$$

David^2's Insights on the TFP Loss

The standard Jensen's inequality logic implies that a static misallocation loss is present due to dispersion in the wedges τ_i:

$$TFP = Z \int (1 - \tau_i)^{\alpha} di < Z.$$

Insight #1
Common GE price terms drop out of the TFP loss, both in this toy model and in a wide class of related "Cobb-Douglas-y" models, because *relative, cross-sectional variation is the variation of interest*.

Insight #2
GE still drops out with dynamics, TFP shocks, time-to-build in capital, homogeneity in adjustment and financial frictions, etc. Most applied firm dynamics models analyzing financial frictions, etc, fit into this structure.

Insight #3
With a lognormality assumption, and some additional cross-industry notation, you get closed form expressions for macro TFP changes in terms of reduced-form observed shifts in MPK dispersion and related moments in affected industries which can be drawn from diff-in-diff exercises.

Why Is 2 $\times$ David's Approach So Cool?

The Intuition is Clear
Anyone who's written down output functions in this model class with the multiplicative GE terms can see why they drop out in log variances.

The Model Class is Broad
It turns out that we've all been scaling our adjustment cost and financial frictions functions for the right reasons!

The Method is Practical
The paper uses an off-the-shelf identification strategy from Bertrand, et al. (2007) for French banking deregulation to compute TFP gains.

I Like It!
I'll put this paper on my second-year PhD reading list next year, and I learned a lot from this well done paper.

What Will Be Missing from $\exp(2\ln(David))$'s Results?

The misallocation measured by this method comes from

- firm-level effective decreasing returns, and
- firms having the wrong inputs at a given moment in time.

Although the distortions may have an explicitly dynamic source at the micro level, e.g., financial frictions, from the aggregate production function perspective they result in **static losses**.

An Inherited Limitation

Just as with any calculation following the Hsieh-Klenow logic, this method ignores certain types of **dynamic losses** which *endogenously stem from but are not reflected in MPK dispersion*.

A Discussant-y Growth Model

Endogenous TFP Growth through R&D x_i

$$z_i' - z_i = x_i^{\gamma} z_i^{1-\gamma}, \quad 0 < \gamma < 1$$

Maintain the Previous Static Profit Structure & Wedges τ_i

$$y_i = z_i l_i^{\alpha}, \quad \Pi_i = \max_{l_i} y_i - \frac{W}{(1-\tau_i)^{1-\alpha}} l_i = \Pi_i(\tau_i, ...)$$

Wedges Affect R&D Dynamically

Value Max: $$\max_{x_i, x_i', ...} (\Pi_i - P x_i) + \frac{1}{R}(\Pi_i' - P x_i') + ...$$

R&D Optimality: $$P = \frac{1}{R} \frac{\partial \Pi_i'(\tau_i, ...)}{\partial x_i} \to x_i = x_i(\tau_i, ...)$$

Dynamic Misallocation Loss: Average TFP Growth is Typically Lower

$$\mathbb{E} g_i' = \int \frac{z_i' - z_i}{z_i} d_i = \int \left(\frac{x_i(\tau_i, ...)}{z_i} \right)^{\gamma} di$$

is subject to the same Jensen's inequality logic from before, but this dynamic loss isn't measured in the misallocation formulas in this paper.

Is This Just Some Weird Growth Model Thing to Ignore?

Not really. The logic above could in principle apply to a range of widely used models of endogenous dynamic forces:

- TFP growth/innovation,
- task automation,
- human capital investments,
- FDI,
- ...

A General "Lower Bound" Takeaway
With dynamic forces endogenously *responding to, but not reflected in* MPK dispersion, the aggregate gains from reform will generally be higher than the static TFP misallocation shifts computed here.

A Specific Takeaway
Maybe French banking deregulation added even more than 5.3% to TFP.

A Really Cool Paper

There are multiple attractive aspects to unpack here.

- The paper goes after a big, important question.
- The paper provides an elegant theoretical insight.
- The paper offers a practical, operational method.

Go read the paper.
It's worth your time.