State subsidies and the spatial allocation of production: Evidence from the US manufacturing industry

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Overview

Overview

Place-based subsidies are ubiquitous and controversial

The New York Times

Amazon HQ2: How New York and Virginia Won the Beauty Contest

Eager candidates offered name changes, helipads and even cactuses to entice the company into setting up shop.

WSJ | OPINION

Ending the Corporate-Welfare Circus

State gifts to the likes of Boeing, Ford, Google and Apple are unnecessary and unfair.

Bloomberg Opinion

Wisconsin's Deal With Foxconn Was as Bad as They Come

The state offered billions to win a big factory.

The Washington Post
Democracy Dies in Darkness

Opportunity Zones: Can a tax break for rich people really help poor people?

Bloomberg
Apple's 22-Year Tax Break Part of Billions in California Bounty

Where are subsidies important?

Ratio of total manufacturing subsidies to total manufacturing output

Legend

Total subsidy/production

Low

High
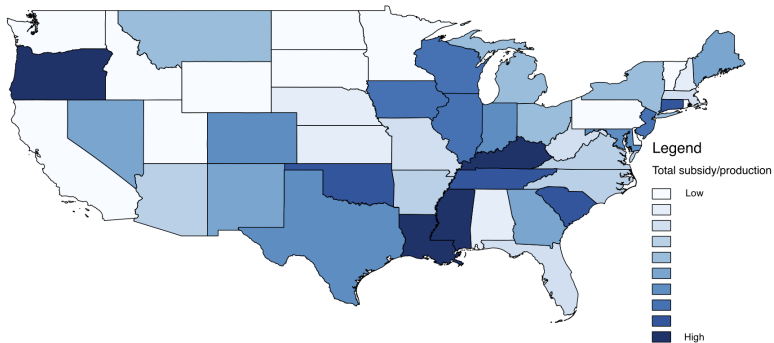
Source: Good Jobs First Subsidy Tracker database; Commodity Flow Survey

Relevant literature

- Local and state governments spend $30-40 billion per year on place-based subsidies (Moretti 2011)

- Firm location decisions are sensitive to government policy:

  - State and local subsidies attract increased business activity (Simone et al. 2019, Harger and Ross 2014);

  - Subsidiary location decisions for multinational corporations are sensitive to bilateral tax rates (Barrios et al. 2012);

  - US firm location choice varies based on state corporate and income tax (Fajgelbaum et al. 2019);

- Subsidies increase local labor demand (Busso, Gregory, Kline 2013; Criscuolo et al. 2019)

$\Rightarrow$ What are the general equilibrium impacts of state and local production subsidies?

Preview of results

- Build a general equilibrium model to assess trade-offs between increased local labor demand and aggregate distortions induced by state production subsidies;
  - Build on model of firm location choice in Arkolakis et al. 2017
  - Validate key model predictions in the data
- Calibrate with microdata on firm productivity and subsidy payments in the US manufacturing industry;
  - Low productivity states tend to offer higher subsidies;
- Elimininating subsidies increases total welfare by 1.1% – but creates both winners and losers
  - States with high subsidies mostly experience welfare losses

Overview

Model setup

- **Geography:** The country is partitioned into discrete regions (states);

- **Consumers:**
  - Representative consumer in each region has CES preferences over a continuum of goods;
  - Fixed labor endownment inelastically supplied in each region.

- **Production:**
  - Firms produce differentiated product using labor as only input;
  - National firms receive correlated productivity draw in each region;
  - To sell in each destination market, firms can either:
    1. Produce in same location as headquarters;
    2. Open subsidiary to produce in destination market;
    3. Open subsidiary in third location, and ship to destination.
  - For each destination market, firms choose production location that maximizes profit.

Supply chain

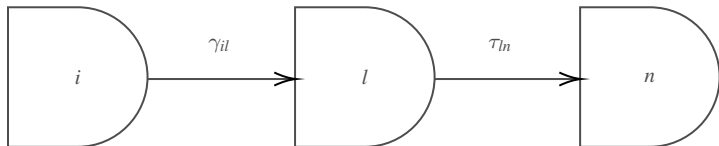**Headquarters**

Draw
$(z_1, \ldots, z_N) \in G_i$

Subsidiary

Produce at cost
$s_l * (\gamma_{il} w_l)/z_l$

Destination

Sell at price
$\overline{\sigma} * s_l * (\gamma_{il} w_l \tau_{ln})/z_l$

Structure of production subsidies

States exogenously offer iceberg subsidies s_l according to the following rule:

$$s_l = A_l / z_l^{\beta}$$

- A_l represents a state-specific shifter;
- β captures preference for subsidizing more productive firms.

Prediction: The total subsidy paid to any individual firm is increasing in: (1) total wages paid to employees; and (2) total productivity

$\Rightarrow$ Supported in sample of firm-specific subsidy records from Good Jobs First matched to Orbis BvD balance-sheet data

Distribution of productivity levels

Assume that productivity vector drawn from G_i, where:

$$G_i(\mathbf{z}) = \Pr(Z_1 \le z_1, \ldots, Z_N \le z_N) = 1 - \left(\sum_{k=1}^{N} \left(T_l(z_k)^{-\theta} \right)^{\frac{1}{1-\rho}} \right)^{1-\rho}$$

- Pareto Type I marginal CDFs with regional shifter T_k and shape parameter θ;
- Correlation across states governed by ρ

Prediction: Raising subsidy payments increases the likelihood that firms locate in a given state

$\Rightarrow$ Supported using conditional fixed effects logit regression on Orbis BvD panel of subsidiary location choices for multi-establishment US firms

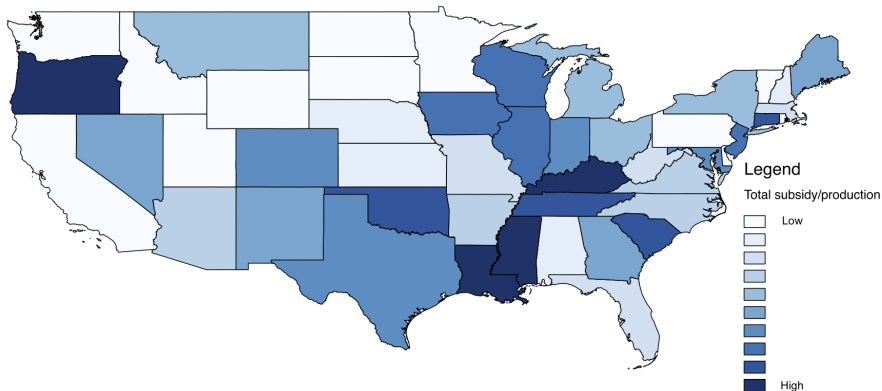# Overview

Calibration procedure

- *Productivity parameters*: Two-step procedure (using Orbis BvD microdata):
  - Estimate shifters T_i and shape parameter θ using quantiles estimator, with adjustments to make data representative of population of US firms;
  - Estimate correlation parameter ρ using maximum likelihood.
- *Subsidy parameters*: Match model-generated ratio of total subsidy to total production in each state to the data, and discipline using microdata estimates in matched subsidy - balance sheet sample;
- *Trade costs, MP costs, marketing costs*: Standard gravity techniques;
- *Elasticity of substitution*: Average markups.

Model fit
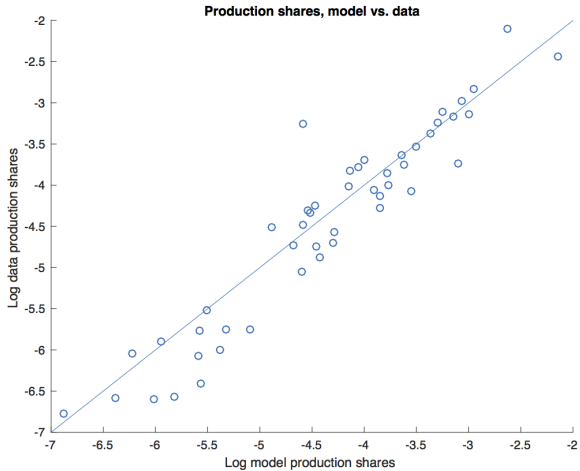
Production shares, model vs. data

Where are subsidies important?

Ratio of total manufacturing subsidies to total manufacturing output

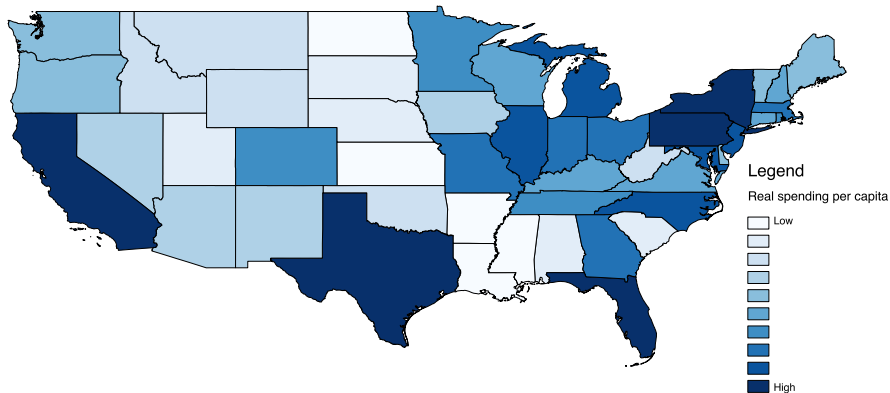Legend

Total subsidy/production

Low

High

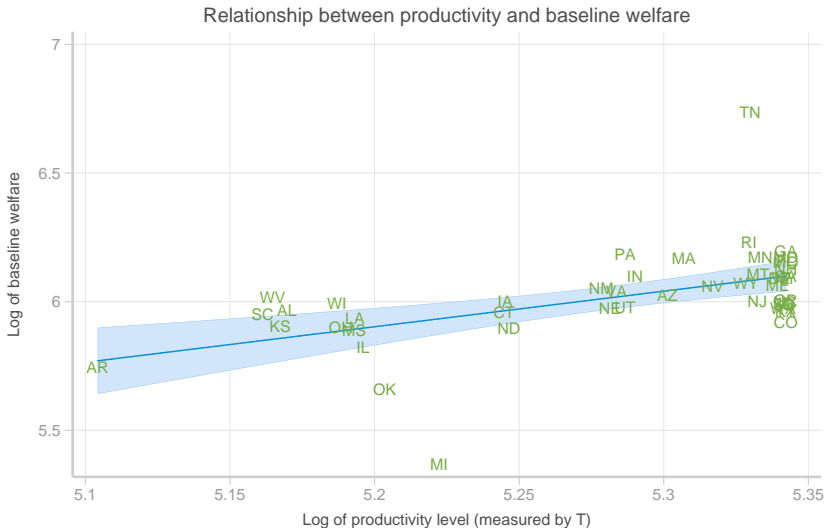Source: Good Jobs First Subsidy Tracker database; Commodity Flow Survey

Baseline welfare levels

Baseline welfare by state

Higher productivity is associated with higher welfare...

Relationship between productivity and baseline welfare

...low productivity states offer higher subsidies
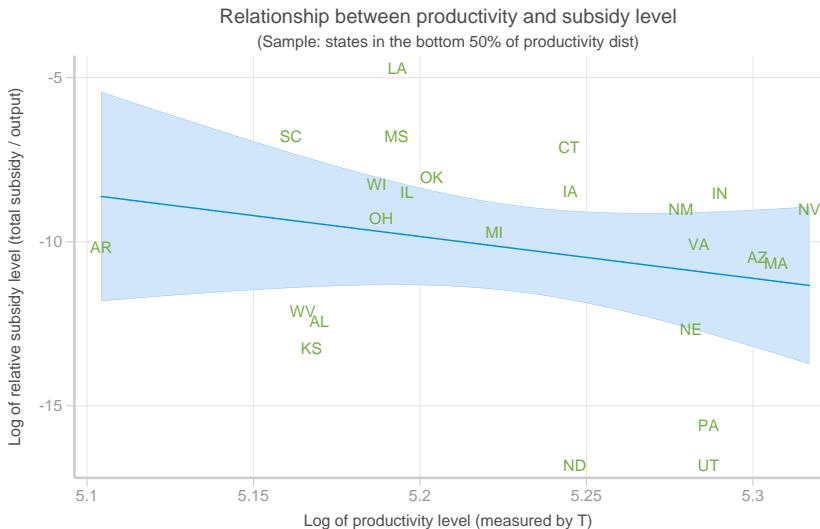
Relationship between productivity and subsidy level
(Sample: states in the bottom 50% of productivity dist)

Overview

Eliminating subsidies creates winners and losers...

Change in welfare from eliminating subsidies

Legend

Change in per capita spending (%)

- -4.22 to -2.02
- -2.02 to -1.12
- -1.12 to -0.61
- -0.61 to -0.32
- -0.32 to 0.15
- 0.15 to 0.53
- 0.53 to 0.78
- 0.78 to 1.29
- 1.29 to 1.52
- 1.52 to 2.13

$\Rightarrow$ **Total impact:** +1.1%

Relationship between change in welfare and subsidy level
(Sample: states with the top 50% of productivity subsidized)
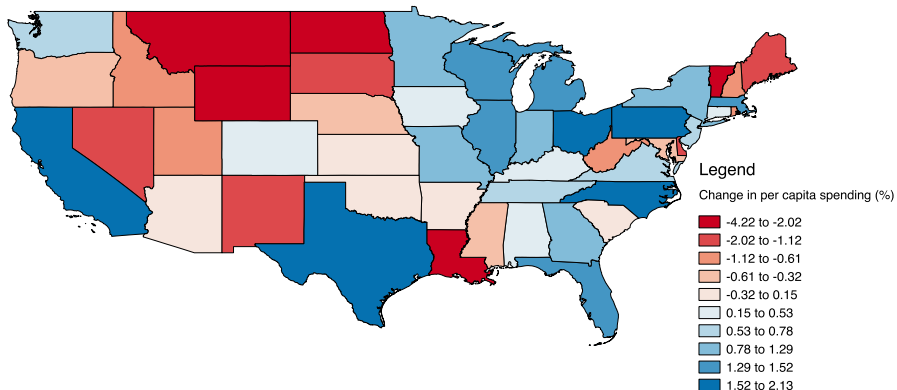
Summary

- Model with heterogeneous, multistate firms and variable per-unit production subsidies;

- Important model predictions fit features of the US manufacutring industry;

- Calibrated model using firm balance sheet and subsidy microdata:
  - States use subsidies to compensate for low productivity endownments

- Counterfactual experiment: What's the impact of elimininating subsidies?
  - Overall increase in welfare of 1%
  - Produces winners and losers – especially in states with high subsidy levels

- Policy implications: policies to mitigate the impact of subsidies may be efficient, but will create real costs in high-subsidy places