

# From Micro to Macro: Entry Barriers, Resource Misallocation, and Aggregate Productivity

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World Bank

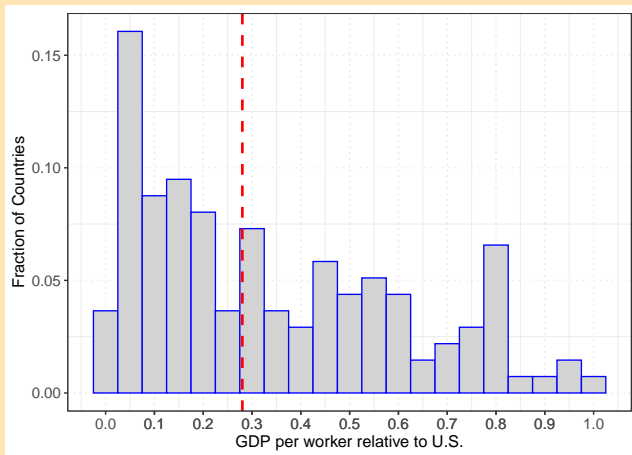
Development Research Group, Macroeconomics and Growth (DECMG)

Policy Research Talk  
February 23, 2021

Disclaimer: the views expressed in this presentation are my own and do not necessarily represent those of the World Bank or its member countries

# Cross-Country Differences in Income per Worker

## Income per worker relative to United States



Source: Penn World Tables v9.0 year 2014

- Kenya 7%, India 13%, Argentina 42%, France 83%

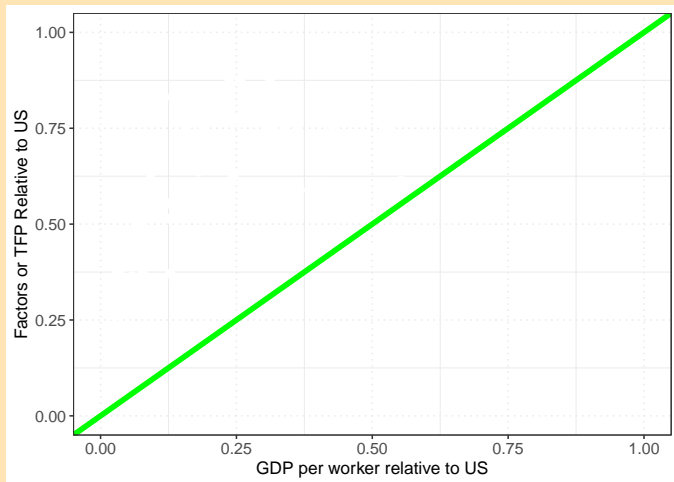
# What Explains Differences in Income? Development Accounting

$$\text{GDP per worker} = TFP * \underbrace{F(K, H)}_{\text{Factors}}$$

- *TFP*: total factor productivity
  - *K* : physical capital
  - *H*: human capital
- 
- Relative role of TFP and factors of production?

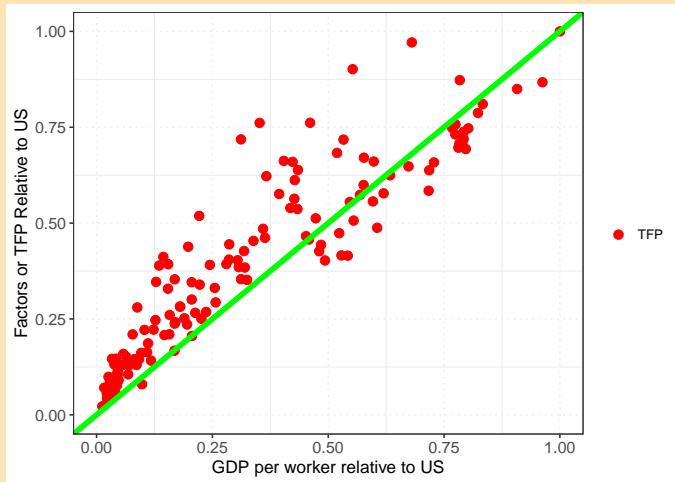
# Development Accounting

## TFP gaps and Factor gaps vs GDP gaps



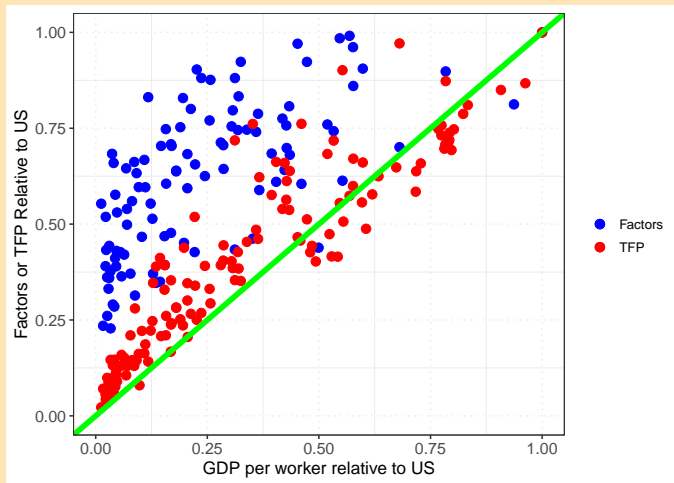
# Development Accounting: The Role of TFP

Contribution of TFP gaps to Income gaps ?



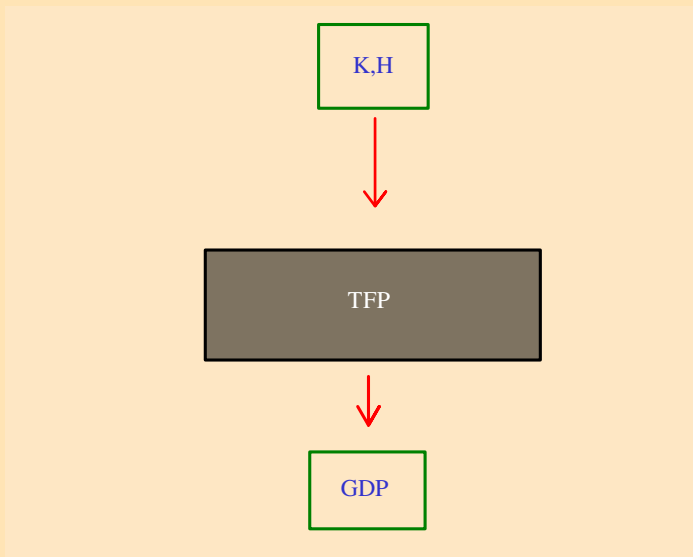
# Development Accounting: The Role of Factors

Contribution of Factors gaps to Income gaps ?



## What Drives Productivity Differences Across Countries?

# Where we are: Macro to Macro





# Where we are Going: Micro to Macro

K,H

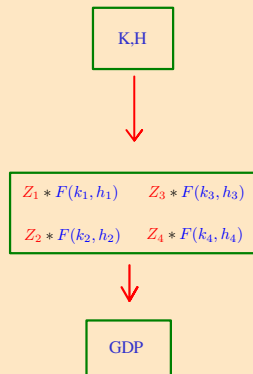


$$\begin{array}{cc} Z_1 * F(k_1, h_1) & Z_3 * F(k_3, h_3) \\ Z_2 * F(k_2, h_2) & Z_4 * F(k_4, h_4) \end{array}$$



GDP

# From Micro To Macro



- Allocation of K,H to maximize output?
- Barriers to this allocation?
- Useful to understand TFP

# From Micro To Macro: Efficiency

K,H

. Prices mechanism  
. Free Entry

$$Z_1 * F(k_1, h_1) \quad Z_3 * F(k_3, h_3)$$

$$Z_2 * F(k_2, h_2) \quad Z_4 * F(k_4, h_4)$$

GDP

# From Micro To Macro: Efficiency

K,H

↓ . Prices mechanism  
↓ . Free Entry

$$\begin{array}{ll} Z_1 * F(k_1, h_1) & Z_3 * F(k_3, h_3) \\ Z_2 * F(k_2, h_2) & Z_4 * F(k_4, h_4) \end{array}$$



GDP

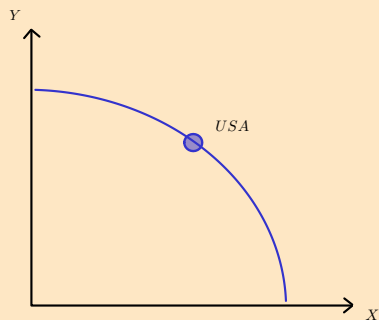
Efficient allocation equalizes  
Marginal Revenue Products across firms

$$MRP_i = MRP_j$$

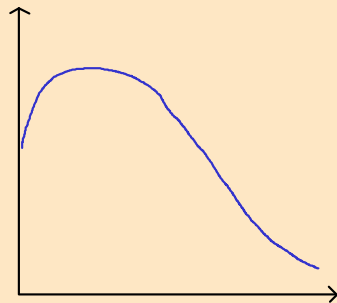
Optimal competition & innovation

# From Micro To Macro: Efficiency

$$MRP_i = MRP_j$$

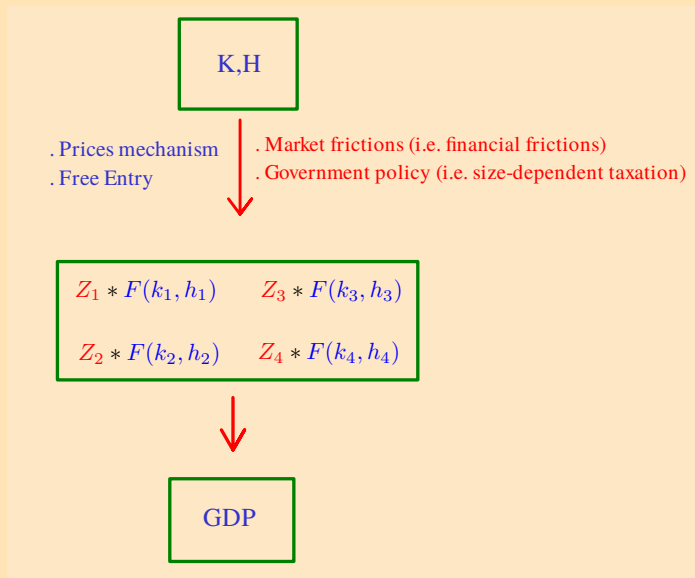


Production Possibilities Frontier



Size Distribution

# From Micro To Macro: Allocative Distortions



# From Micro To Macro: Allocative Distortions

K,H

. Prices mechanism  
. Free Entry

. Market Frictions  
. Government Policy



$Z_1 * F(k_1, h_1)$	$Z_3 * F(k_3, h_3)$
$Z_2 * F(k_2, h_2)$	$Z_4 * F(k_4, h_4)$



GDP

Suppose:

$$Z_1 > Z_2 > \dots > Z_4$$

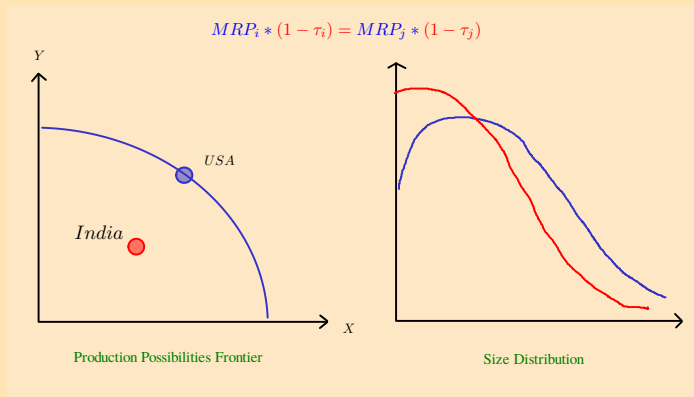
Size dependent distortion:

$$\tau_1 > \dots > \tau_4$$

$$MRP_1 * (1 - \tau_1) = MRP_2 * (1 - \tau_2)$$

Misallocate Resources from high to low productivity firms

# From Micro To Macro: Allocative Distortions





# From Micro To Macro: Entry Barriers

K,H

- . Prices mechanism
- . Free Entry

- . Market Frictions
- . Government Policy
- . Entry Barriers

Entry Barrier:  $EC_i = EC_{USA} * (1 + \tau_e)$

$$\begin{matrix} Z_1 * F(k_1, h_1) & Z_3 * F(k_3, h_3) \\ Z_2 * F(k_2, h_2) & Z_4 * F(k_4, h_4) \end{matrix}$$

$$\begin{matrix} \tilde{Z}_1 * F(k_1, h_1) \\ \tilde{Z}_2 * F(k_2, h_2) \end{matrix}$$

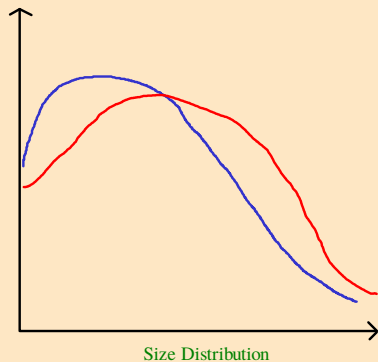
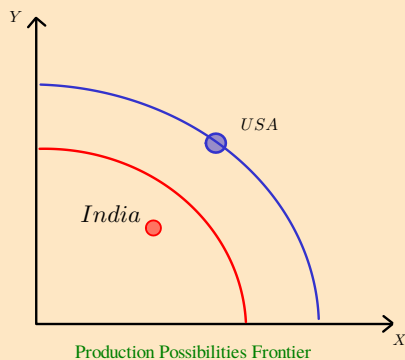


GDP

Lower competition ==> fewer and larger firms ==> lower TFP

# From Micro To Macro: Entry Barriers

$$EC_i = EC_{USA} * (1 + \tau_e)$$

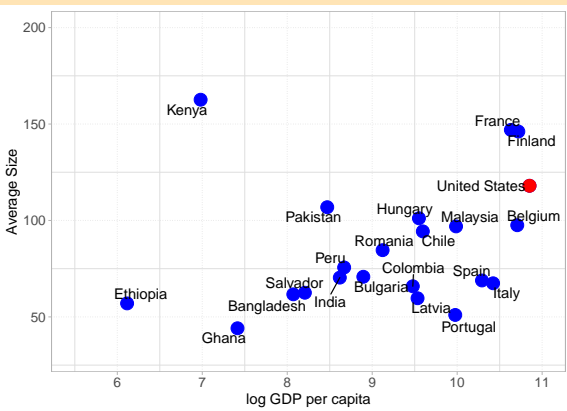


- Interaction between firms, frictions, policies → theory of *TFP*
- Frictions and policies manifest on firm size distribution

**Are there differences in size distribution across countries?**

- Representative firm-level data, manufacturing formal firms
- Manufacturing Censuses of 10+ worker firms
  - ▷ Chile, Colombia, El Salvador, Peru
  - ▷ Ghana, Ethiopia, Kenya
  - ▷ Bangladesh, India, Malaysia, Pakistan
- Amadeus: countries with representative size distribution
  - ▷ Belgium, Bulgaria, Finland, France, Hungary, Italy, Latvia, Portugal, Romania, Spain

# Cross-Country Differences in Average Size?



- Smaller firms in poorer countries
- Promising starting point for distortions as theory of TFP

▶ control

How large is each type of distortion?

How much of TFP difference they account for?

# Inferring Distortions: A Theory Based Approach

Firm size distribution contains information about distortions

1. Propose model of size distribution calibrated to USA
2. Introduce entry barriers  $\tau^e$  and allocative distortions  $\tau(z)$  into model
3. Distortions  $\rightarrow$  Model  $\rightarrow$  Model based size distribution

Identify distortion pair that matches size distribution in data

# Theoretical Underpinnings

- Key Mechanisms connecting distortions with size distribution
  - ▷ heterogeneous productivity
  - ▷ endogenous innovation
  - ▷ entry and exit
- Assumptions:
  - ▷ competitive factor markets

# Identification Strategy of Idiosyncratic Distortions

- Deviation from output-maximizing rule:

$$MRP(z) [1 - \tau(z)] = [1 - \bar{\tau}] \overline{MRP}$$

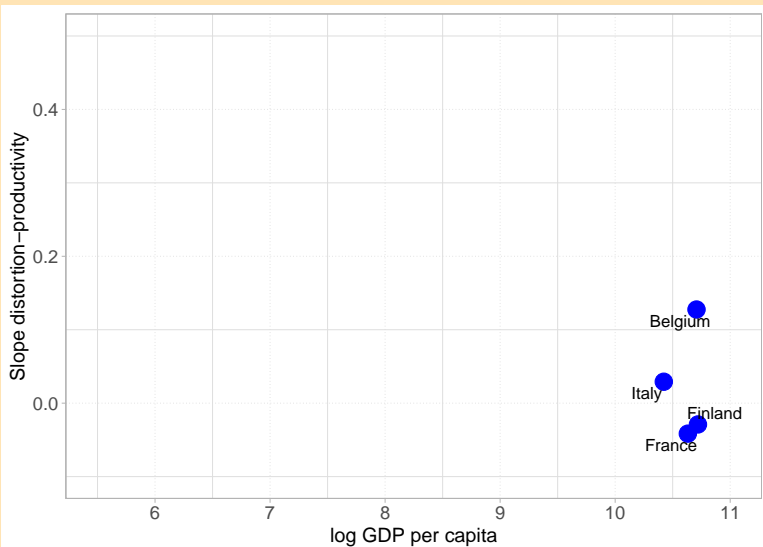
- How can I identify  $\tau(z)$ ?
- $MRP(z)$  is proportional to  $\frac{Revenue(z)}{Inputs(z)}$
- Hsieh and Klenow (2009): revenues and input observable
- Summary statistic: elasticity between  $(1 - \tau_z)$  and  $z$
- correlated distortions



## Evidence of Correlated Distortions Across Countries?

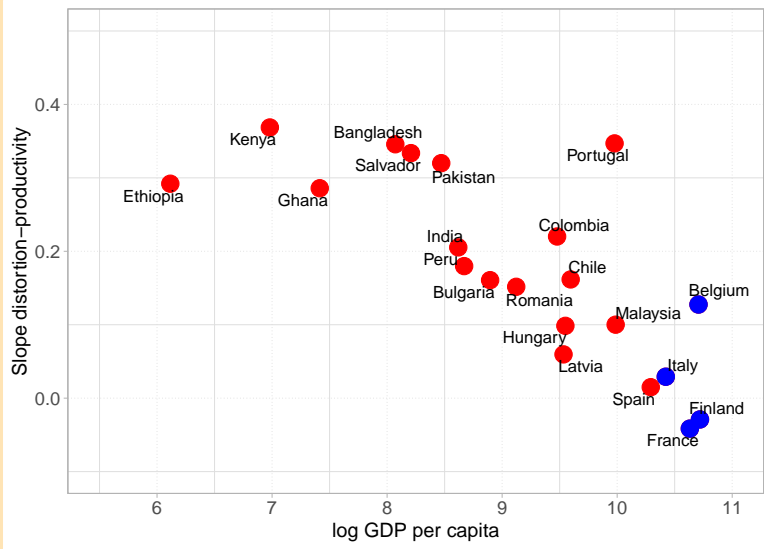
# Evidence on Correlated Distortions

Estimate elasticity of  $\tau(z)$  and  $z$  across firms



# Evidence on Correlated Distortions

Estimate elasticity of  $\tau(z)$  and  $z$  across firms

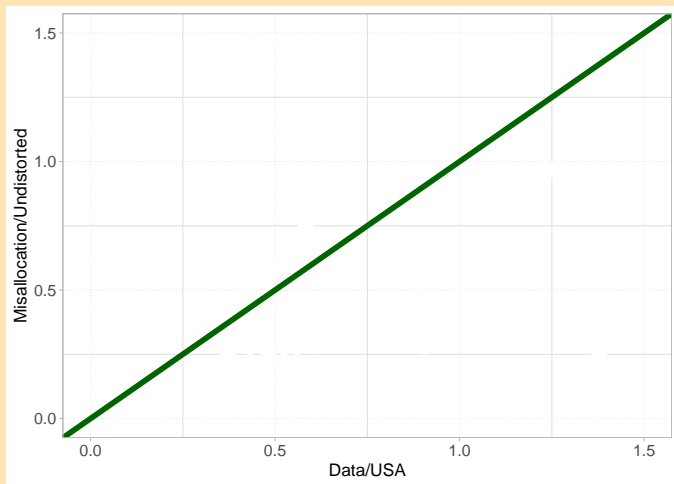


- Correlated distortions reduce average size (theory)
- Lower average size in less developed countries (data)
- More correlated distortions in less developed countries (data)

**Can idiosyncratic distortions account for average size data?  
Any role for entry barriers?**

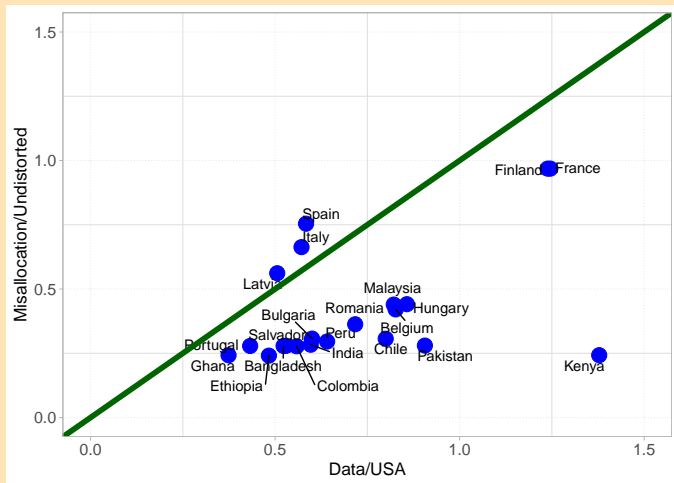
# Can Idiosyncratic Distortions Account for Average Size Distribution?

- Feed elasticity  $\tau_z$  vs  $z$  in model. Equilibrium vs data?



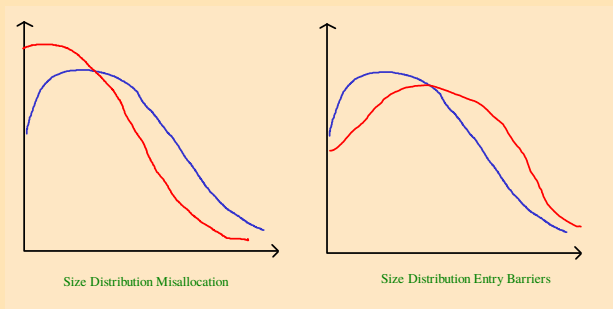
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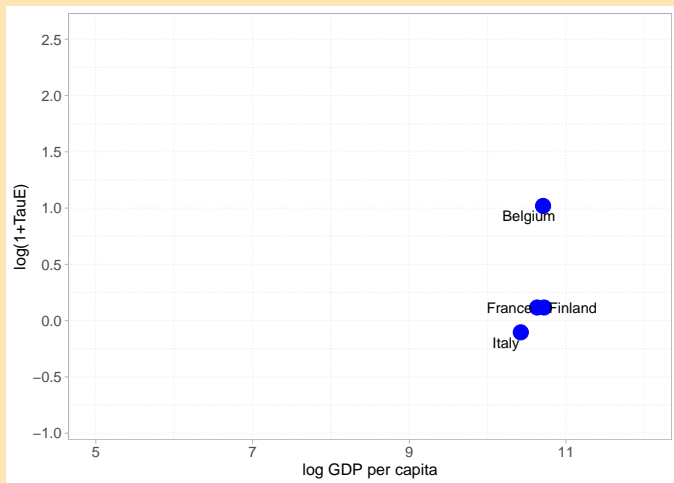
# Identification Strategy of Entry Barriers

- Countervailing force on size distribution missing



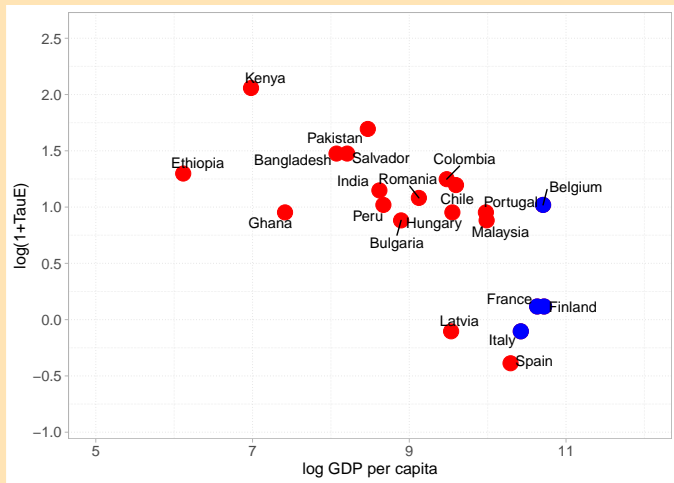
- Exactly what entry barriers accomplish
- Identification strategy of entry Barrier?
- Solve for  $\tau^e$  that attains average size in data (45<sup>0</sup>line)

# Model-Based Entry Barriers across Countries





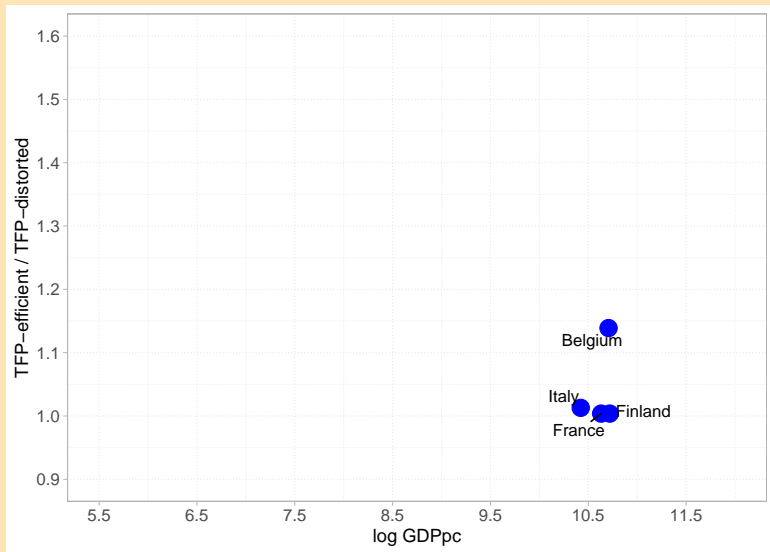
# Model-Based Entry Barriers across Countries



## From Micro to Macro

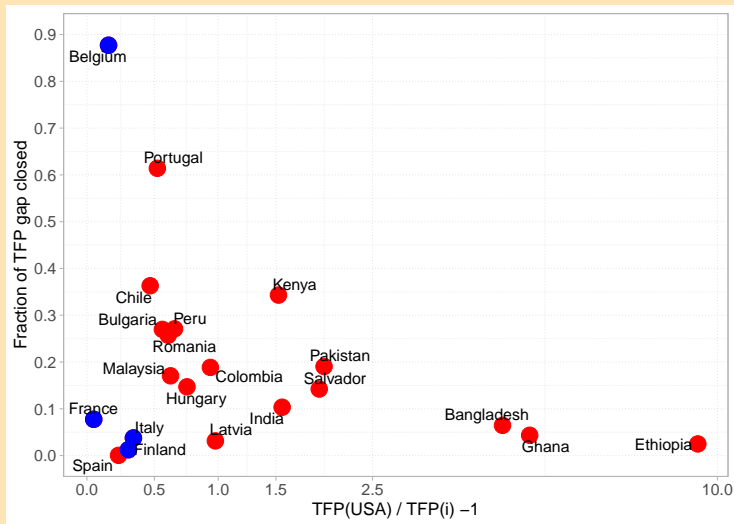
### Aggregate Effects of Entry Barriers and Misallocation

# Aggregate Productivity Gains from Removing Distortions





# Aggregate Productivity Gains from Removing Distortions



## POLICY DISCUSSION

# What is behind the Model-Based Entry Barriers and the Idiosyncratic Distortions?

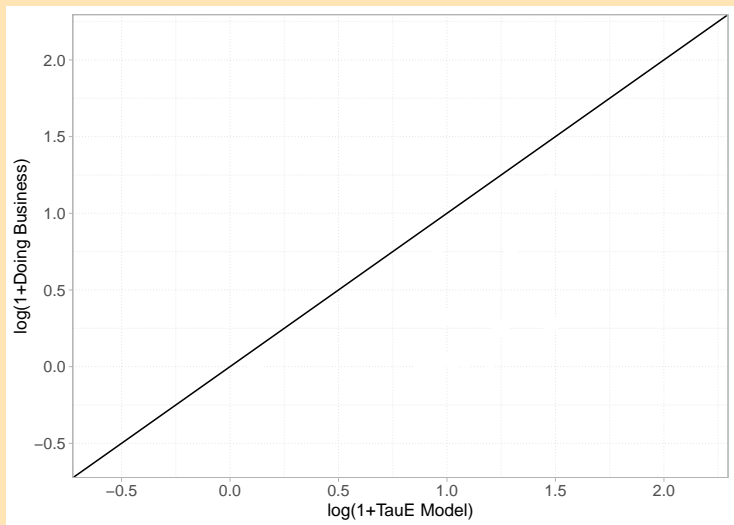
- Natural reactions: “all very nice, but....”
  1. What’s behind all these distortions?
  2. How to fix them?
- A discussion coming, but pause to appreciate the progress
  - ▷ Development accounting only recently feasible, still improving
  - ▷ Opening “black-box” of TFP not trivial:
    - ▶ integrate industry dynamics in general equilibrium
    - ▶ firm-level data
    - ▶ numerical methods

# Model-Based Entry Barriers and Idiosyncratic Distortions: Connection with actual policies and frictions?



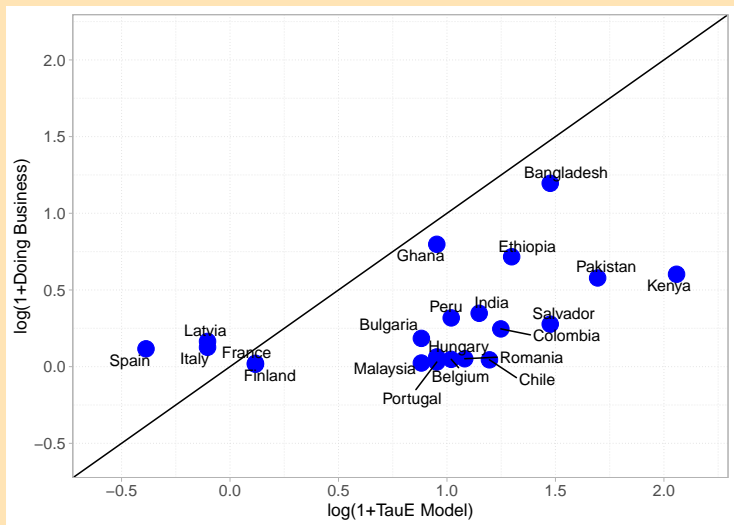
# Model-Based Barriers and Entry Regulation

- Model's entry barriers vs WB's Doing Business' entry cost



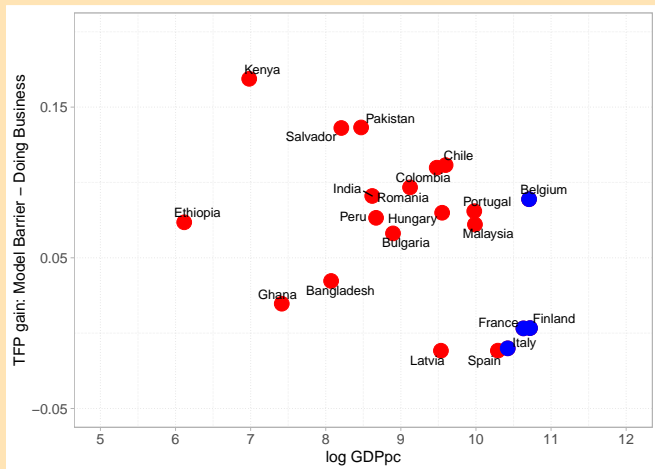
# Model-Based Barriers and Entry Regulation

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# TFP Gains from Removing Model-Based Barriers vs Entry Regulation

- Differential TFP gains model-based barriers vs regulation?



# Idiosyncratic Distortions and Specific Policies and Frictions

- Extensive literature on causes of idiosyncratic distortions
- Labor regulations (firing costs, size-dependent labor costs)
  - ▷ Hopenhayn and Rogerson (1993), Garicano, Lelarge and Van Reenen (2013)
  - ▷ Accounts for little misallocation, small aggregate effects
- Size-dependent taxation
  - ▷ Bachas, Fattal-Jaef, Jensen (2019)
  - ▷ Small productivity losses from size-dependent tax enforcement
- Financial Frictions
  - ▷ Buera, Kaboski, and Shin (2011), Midrigan and Xu (2014)
  - ▷ Small effects on misallocation, large effects on TFP when interacted with technology adoption

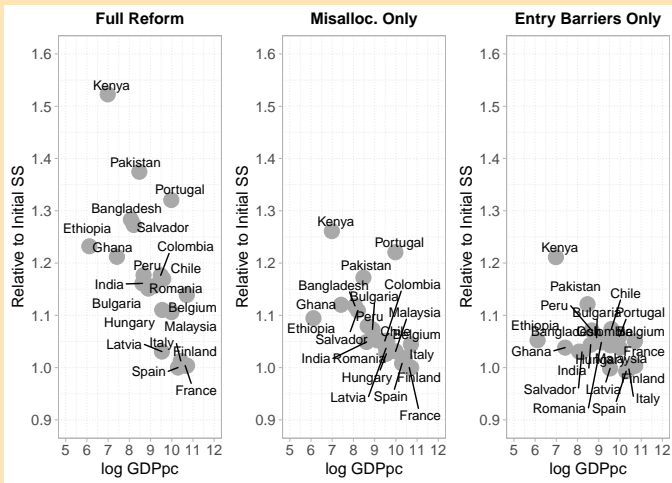
Misallocation combines multiple sources, country specific  
Useful diagnostic to rank reforms and prioritize

## THANK YOU

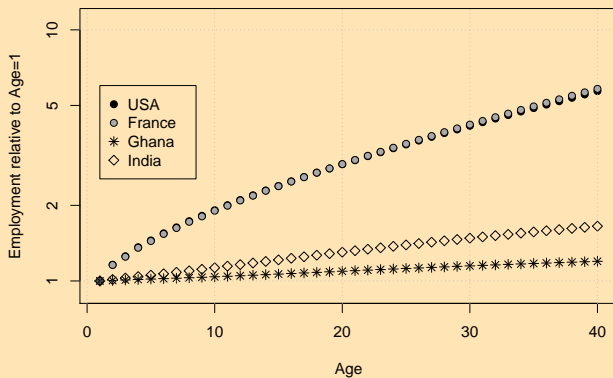
- Repository for Fattal-Jaef (2021) forthcoming AEJ:macro:
  - ▷ [https://github.com/rfattaljaef/Misallocation\\_EntryBarriers](https://github.com/rfattaljaef/Misallocation_EntryBarriers)
- Repository for Figures and Slides of this Talk
  - ▷ <https://github.com/rfattaljaef/PolicyResearchTalk>

## BACK-UP SLIDES

# Decomposition TFP Gains: Misallocation vs Entry Barriers

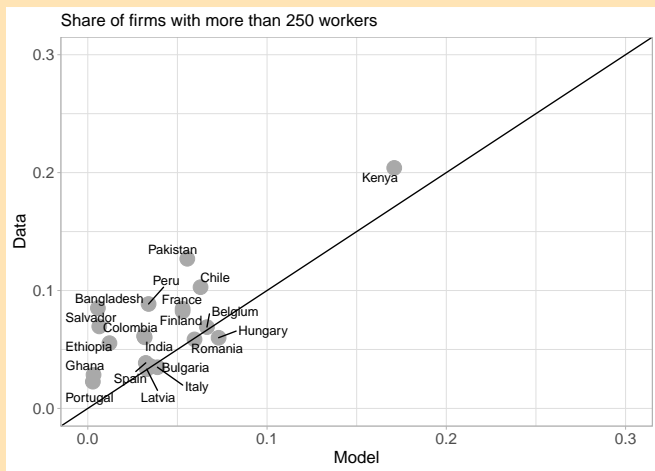


# Validation 1: Implications for Life-Cycle Dynamics





## Validation 2: Implications for Top of Size Distribution



# Measurement of Average Size: Controlling for Production Structure

- Need to control for differences in production structures within manufacturing

$$AvSize = \sum_{s=1}^S AvSize_s * \frac{M_s}{M}$$

- Theory is silent about cross-country differences in  $\frac{M_s}{M}$

Strategy: aggregate according to the U.S.' distribution of firms

$$AvSize^{FD} = \sum_{s=1}^S AvSize_s * \left( \frac{M_s}{M} \right)^{US}$$

▶ avsize