

# Misallocation

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Misallocation and Manufacturing TFP in  
China and India (with Pete Klenow)

The Price of Political Opposition (with Ted  
Miguel, Daniel Ortega, Francisco Rodriguez)

Imperfect Tax Enforcement, Social  
Programs, and Productivity in Mexico (with  
Pete Klenow)

Low aggregate productivity in poor countries driven by resource misallocation

Education

Agricultural land and inputs

Capital and labor in manufacturing

## What we do:

Measure “wedges” across plants in China, India, and US

Measure “triangles” (Loss in aggregate TFP)

## Sources of misallocation

Venezuela: political ties

Mexico: tax evasion, social spending for informal workers

# Measuring Firm-Level Productivity

$$Y = AK^\alpha L^{1-\alpha}$$

$$\Rightarrow A = \frac{Y}{K^\alpha L^{1-\alpha}}$$

But there is a deeper problem

$$Y = AL$$

$$MPL = A$$

# Need a source of diminishing returns

Firm faces downward sloping demand curve

$$\text{Equate } PMPL = PA = PY/L$$

“Span of Control”

$$Y = AL^\gamma \quad \Rightarrow \quad MC \text{ rises with size of firm}$$

$$\text{Equate } MC = \gamma AL^{\gamma-1} = \gamma Y / L$$

# What an efficient equilibrium looks like

$PY/L$  is the same across firms

Differences in  $A$  show up as differences in *size*

Differences in  $PY/L$  are not differences in  $A$ !

So what are differences in  $PY/L$ ?

$$\pi = PY - (1 + \tau_L)WL$$

$$\frac{PY}{L} = W(1 + \tau_L)$$

More general setup:

$$Y_i = A_i K_i^\alpha L_i^{1-\alpha}$$

$$\pi_i = P_i Y_i - (1 + \tau_{L_i}) W L_i - (1 + \tau_{K_i}) R K_i$$

$$\text{Value of MPL} \propto \frac{P_i Y_i}{L_i} \propto 1 + \tau_{L_i}$$

$$\text{Value of MPK} \propto \frac{P_i Y_i}{K_i} \propto 1 + \tau_{K_i}$$

Average MP of K and L

$$\propto \left( \frac{PY_i}{K_i} \right)^\alpha \left( \frac{PY_i}{L_i} \right)^{1-\alpha} = \frac{PY_i}{K_i^\alpha L_i^{1-\alpha}}$$
$$\propto (1 + \tau_{Ki})^\alpha (1 + \tau_{Li})^{1-\alpha}$$

We call this **TFPR**

This is NOT A (firm TFP)

## **Indian Annual Survey of Industries (1985-1995)**

**~ 40,000 plants**

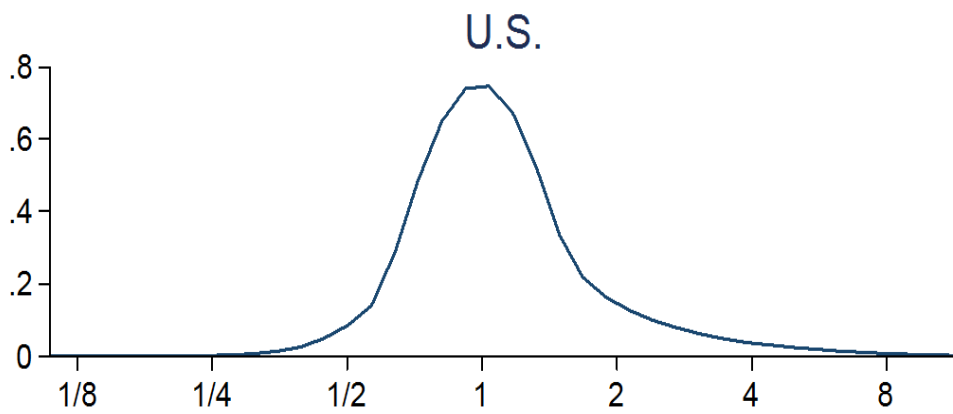
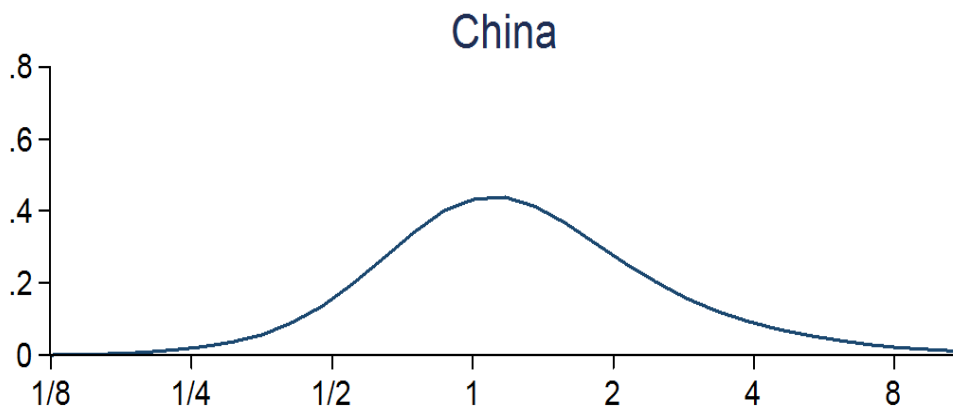
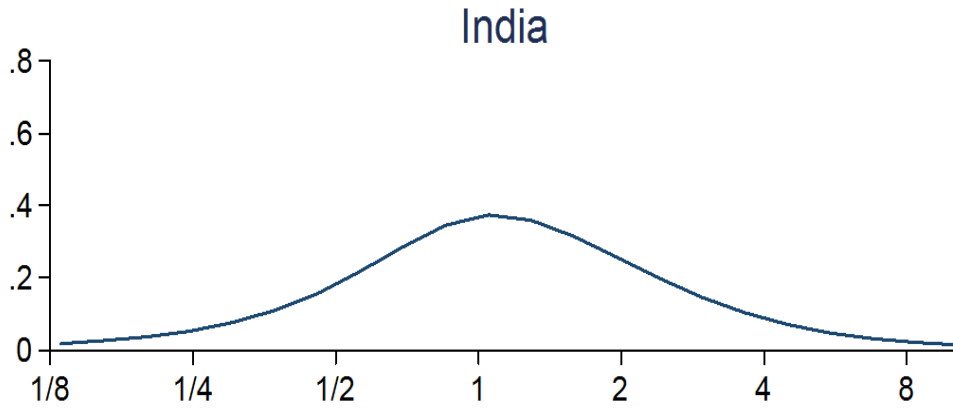
## **Chinese Survey of Industrial Production (1998-2005)**

**~ 200,000 plants**

## **U.S. Census of Manufactures (1977 - 1997)**

**~ 350,000 plant**

Figure 2: Distribution of TFPR



# Distribution of Plant TFPR

	$75^{\text{th}} / 25^{\text{th}}$	$90^{\text{th}} / 10^{\text{th}}$
India	2.5	6.7
China	2.3	4.9
U.S.	1.3	2.4

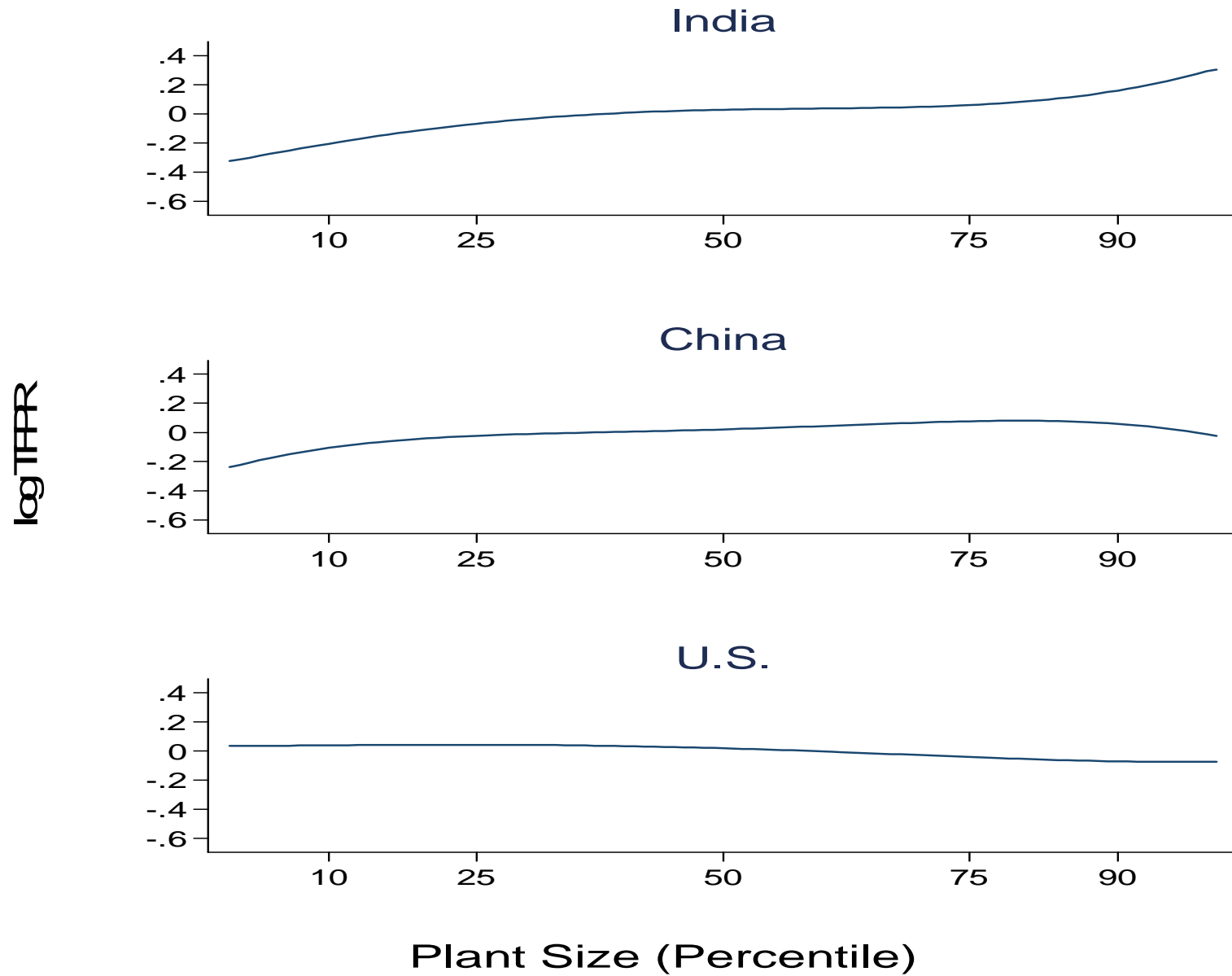
# Varying Markups?

# TFPR of Exporters vs. Non-Exporters

U.S.: 0.19

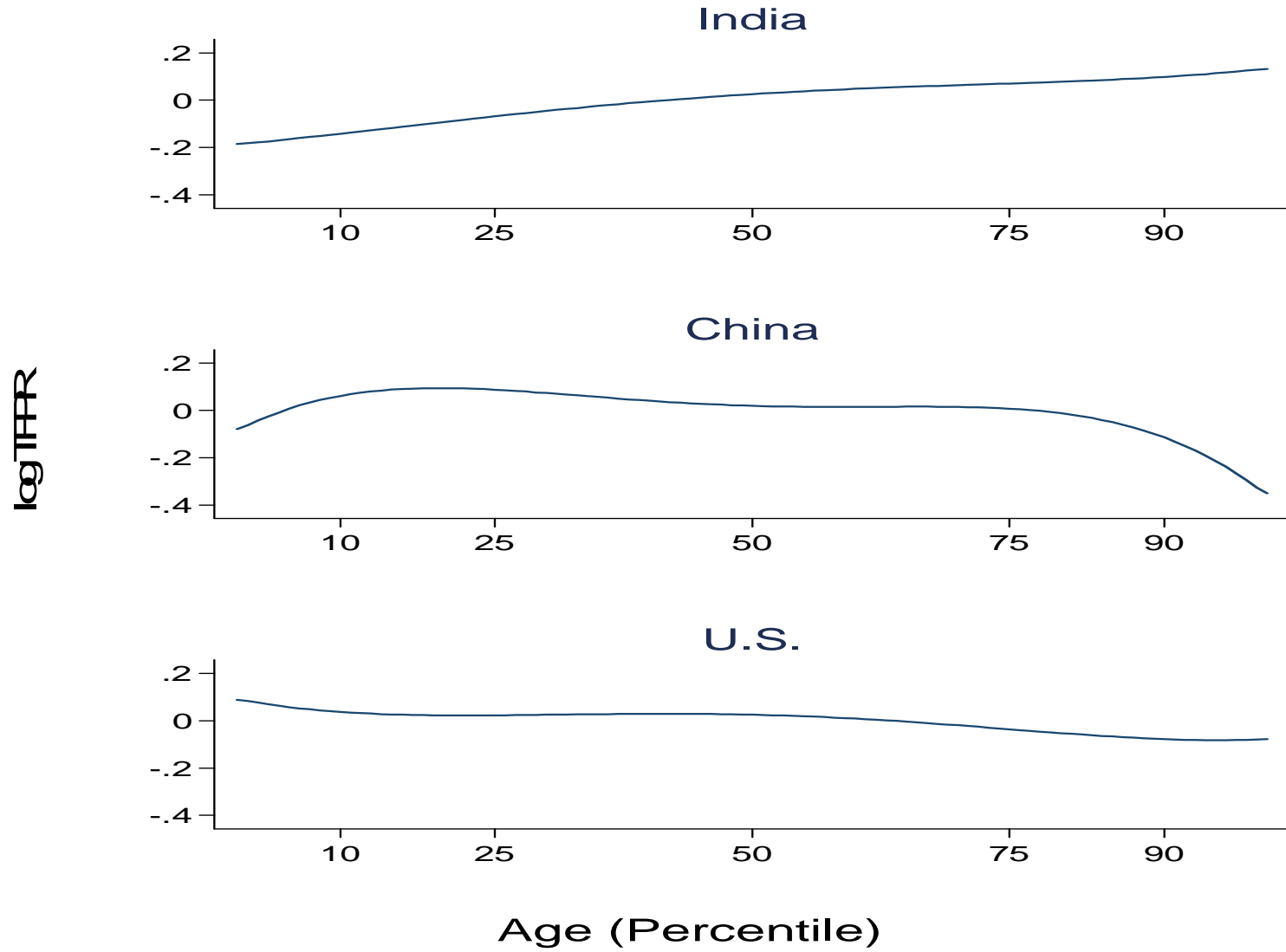
China: -0.14

Figure 6: TFPR and Size



# Adjustment Costs?

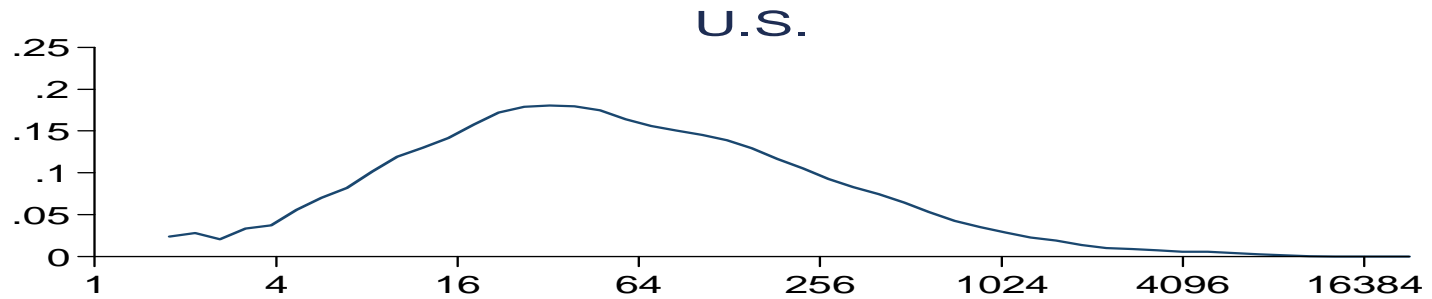
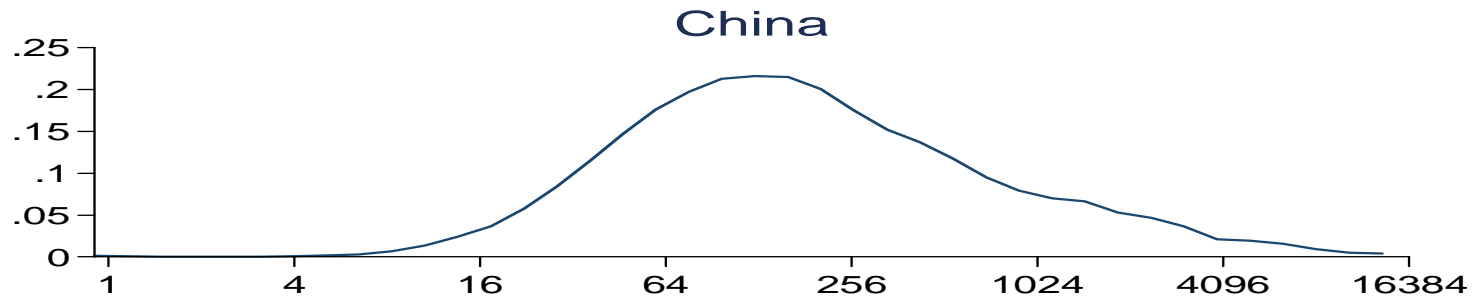
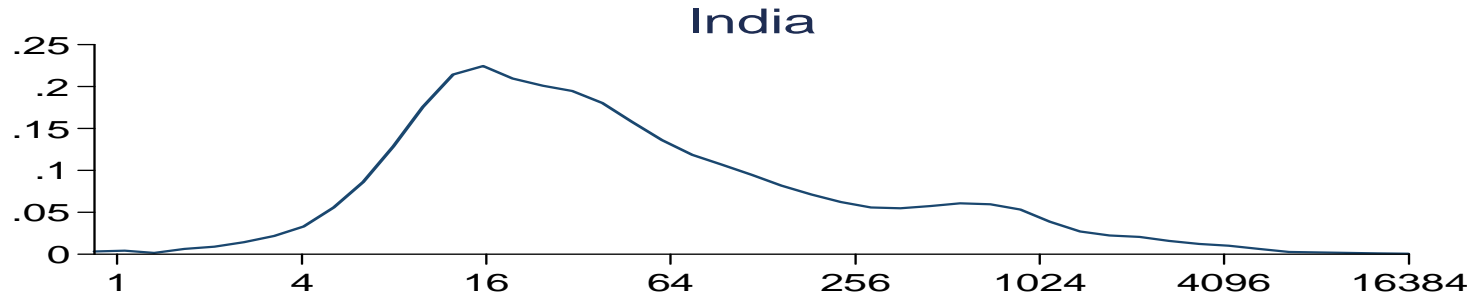
Figure 7: TFPR and Age



## Distribution of Plant Age (Percentiles)

	<b>25<sup>th</sup></b>	<b>50<sup>th</sup></b>	<b>75<sup>th</sup></b>
<b>China</b>	2	5	22
<b>India</b>	6	12	22
<b>U.S.</b>	5	10	25

Figure 9: Distribution of Number of Workers



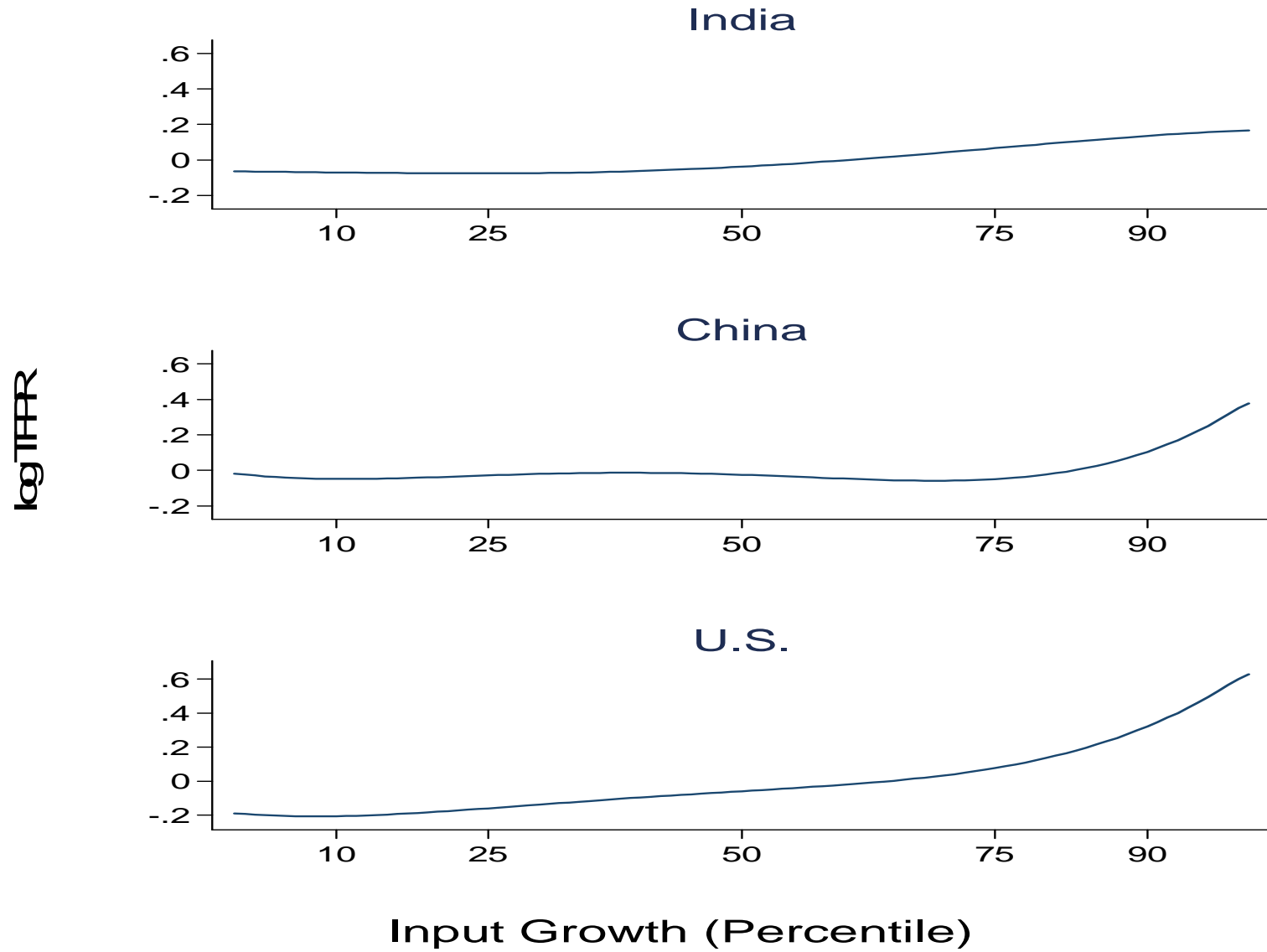
# Dispersion of Input Growth (75-25 Gap)

China: 0.34

India: 0.24

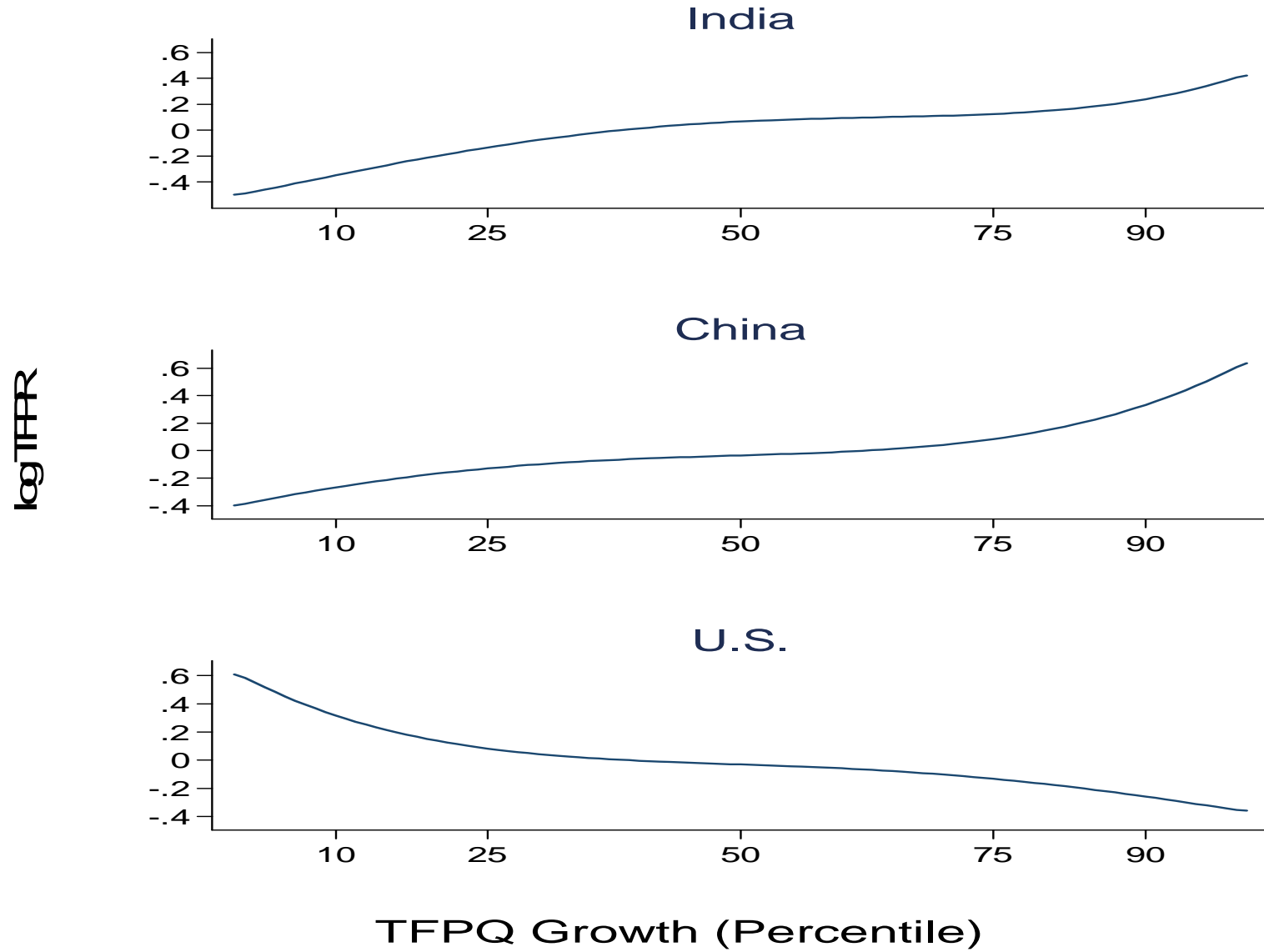
U.S.: 0.43

Figure 8: TFPR and Input Growth



# Unobserved Investments?

Figure 10: TFPR and TFPQ Growth



# Measurement Error?

# TFPR is Correlated with Ownership in China

State: -42%

Collective: 11%

Foreign: -13%

# Regression of Exit on TFPR

China: -0.011

India: -0.019

U.S.: -0.011

TFPR = Revenue/Inputs

Regression of Revenue on Inputs

China: 0.82

India: 0.90

U.S.: 0.82

# Measuring Triangles

Add downward sloping demand curve

$$Y = \left( \sum_{i=1}^M Y_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

# Allocation of Resources

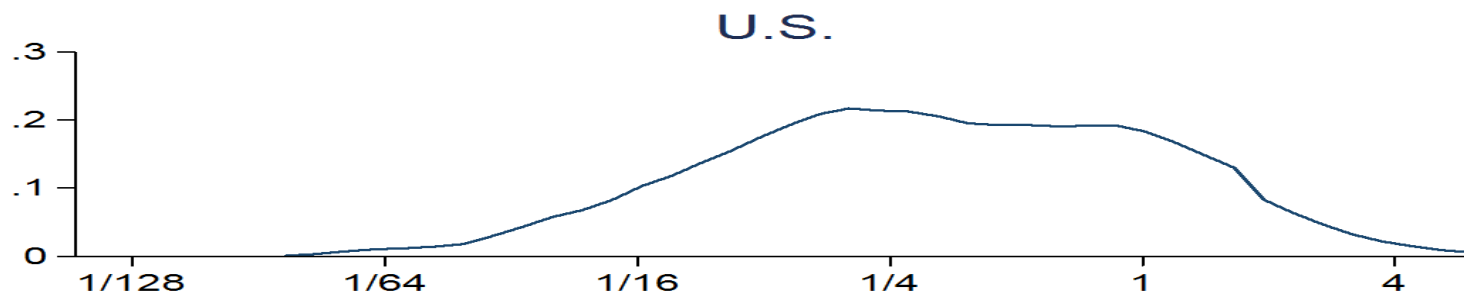
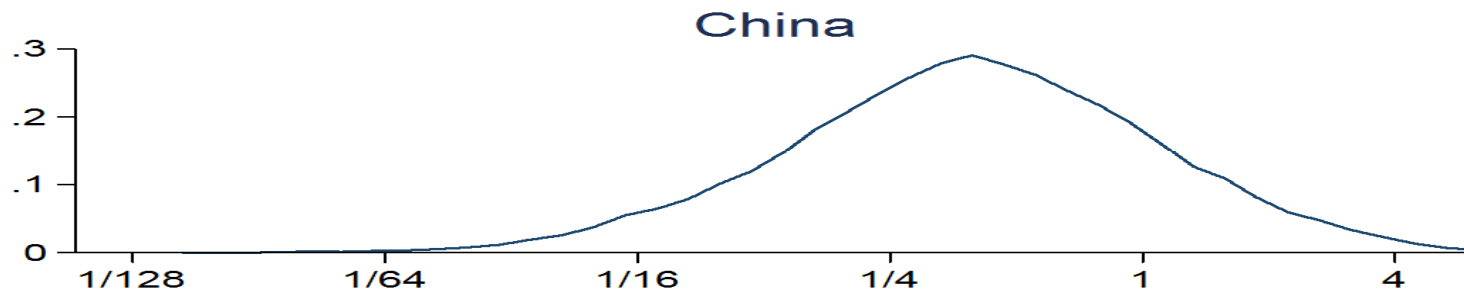
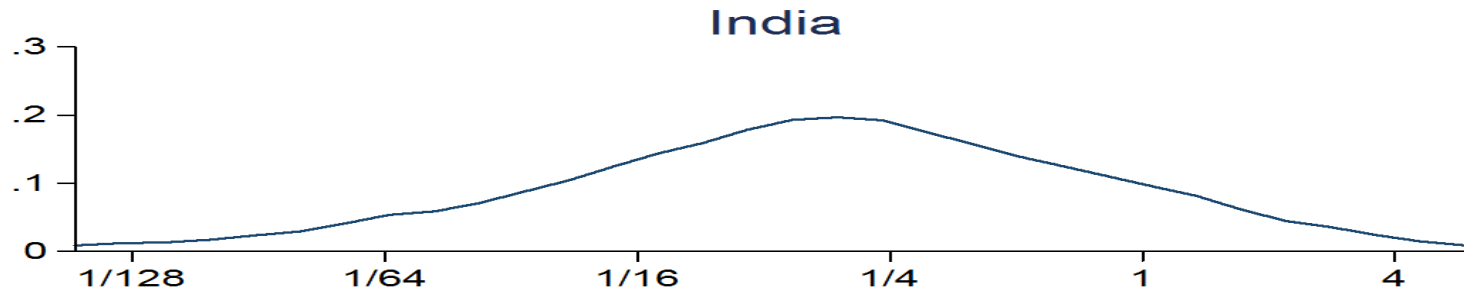
$$P_i Y_i \propto \frac{A_i^{\sigma-1}}{TFPR_i^{\sigma-1}}$$

# Aggregate TFP

$$TFP = \left( \sum_{i=1}^M \left[ A_i \left( \frac{\overline{TFPR}}{TFPR_i} \right) \right]^{\sigma-1} \right)^{\frac{1}{\sigma-1}}$$

$$\log TFP = \log \left( \sum_{i=1}^M A_i^{\sigma-1} \right)^{\frac{1}{\sigma-1}} - \frac{\sigma}{2} \text{var} \log TFPR$$

Figure 1: Distribution of TFPQ



# TFP Gain from Equalizing TFPR

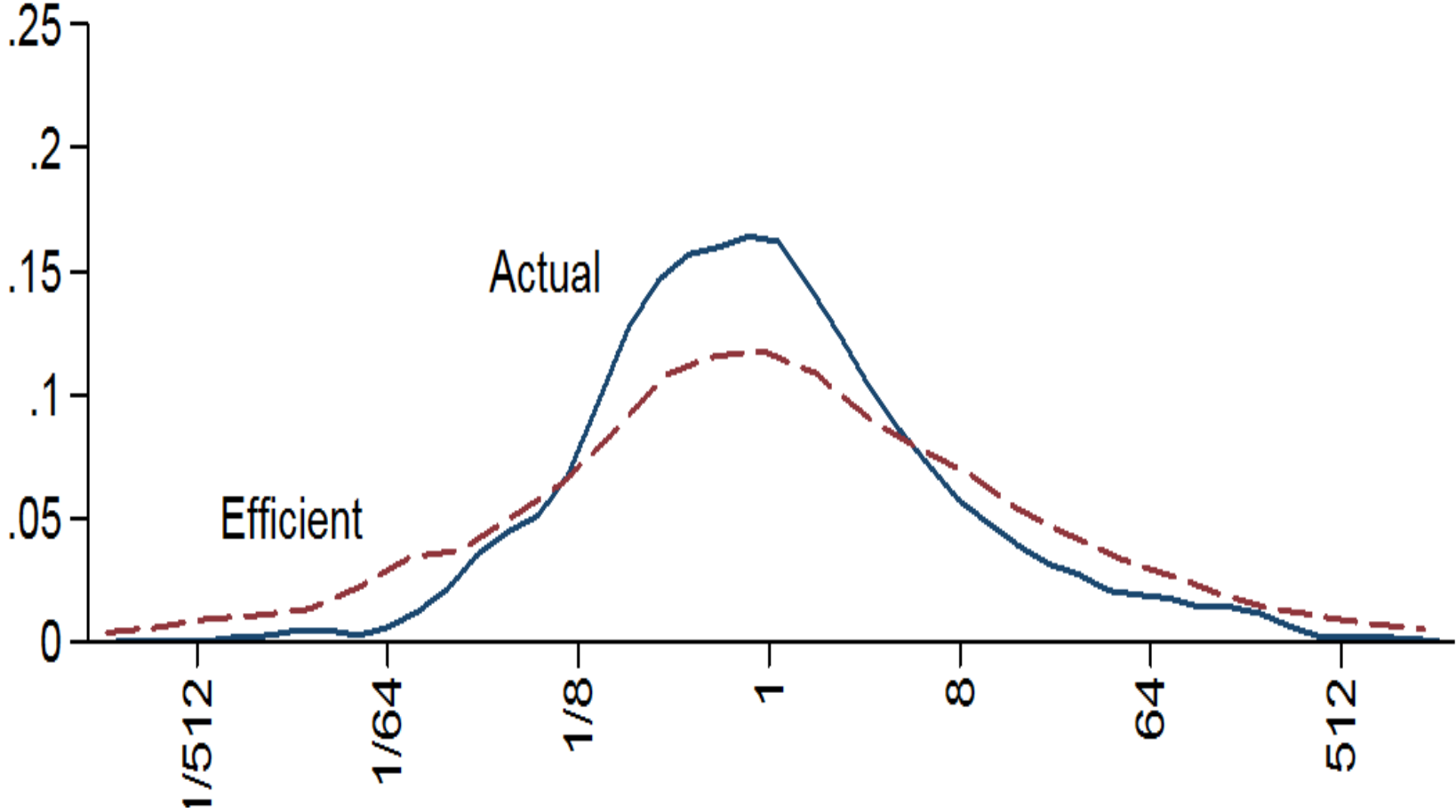
India            132%

China           87%

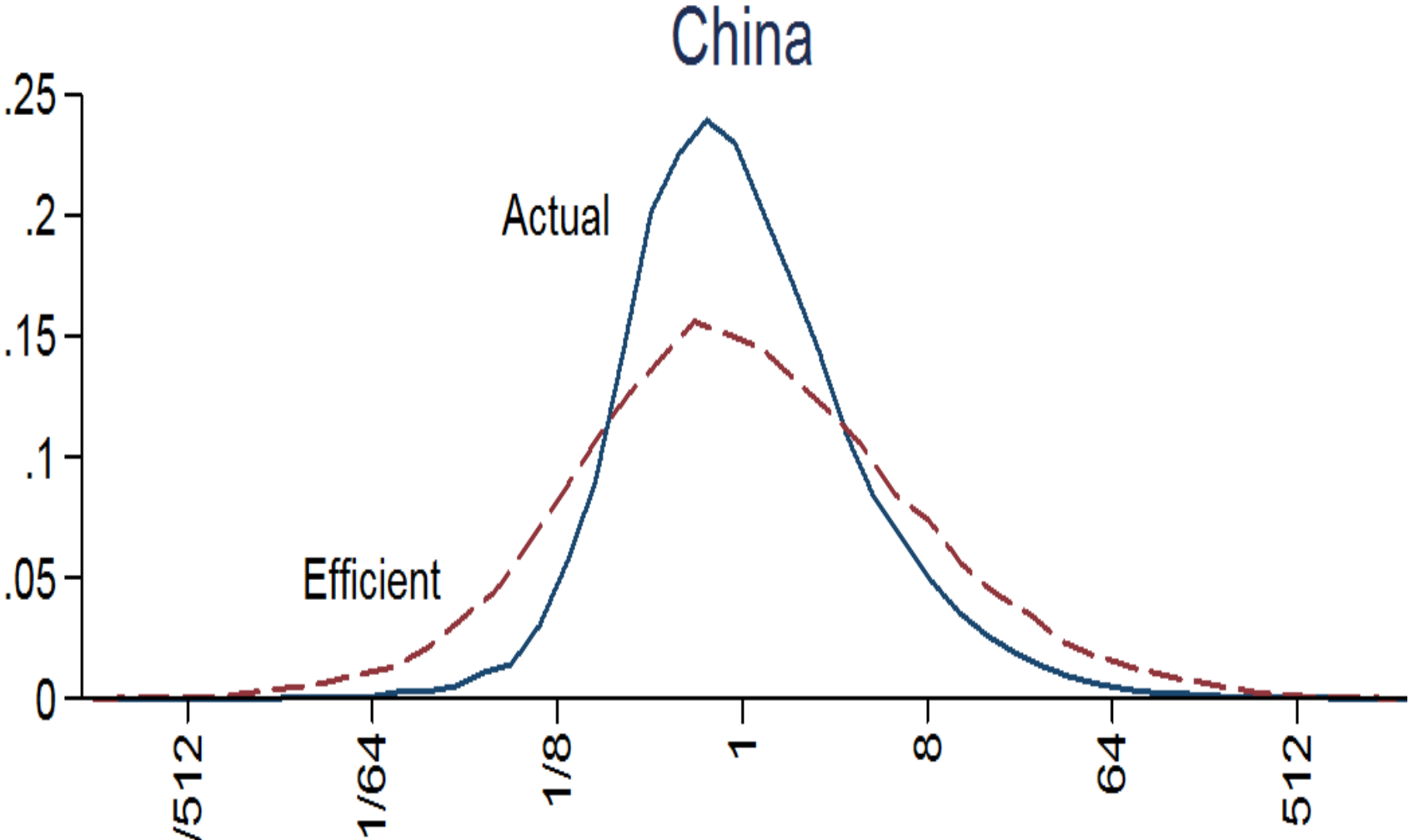
U.S.             47%

# Distribution of Plant Size

India

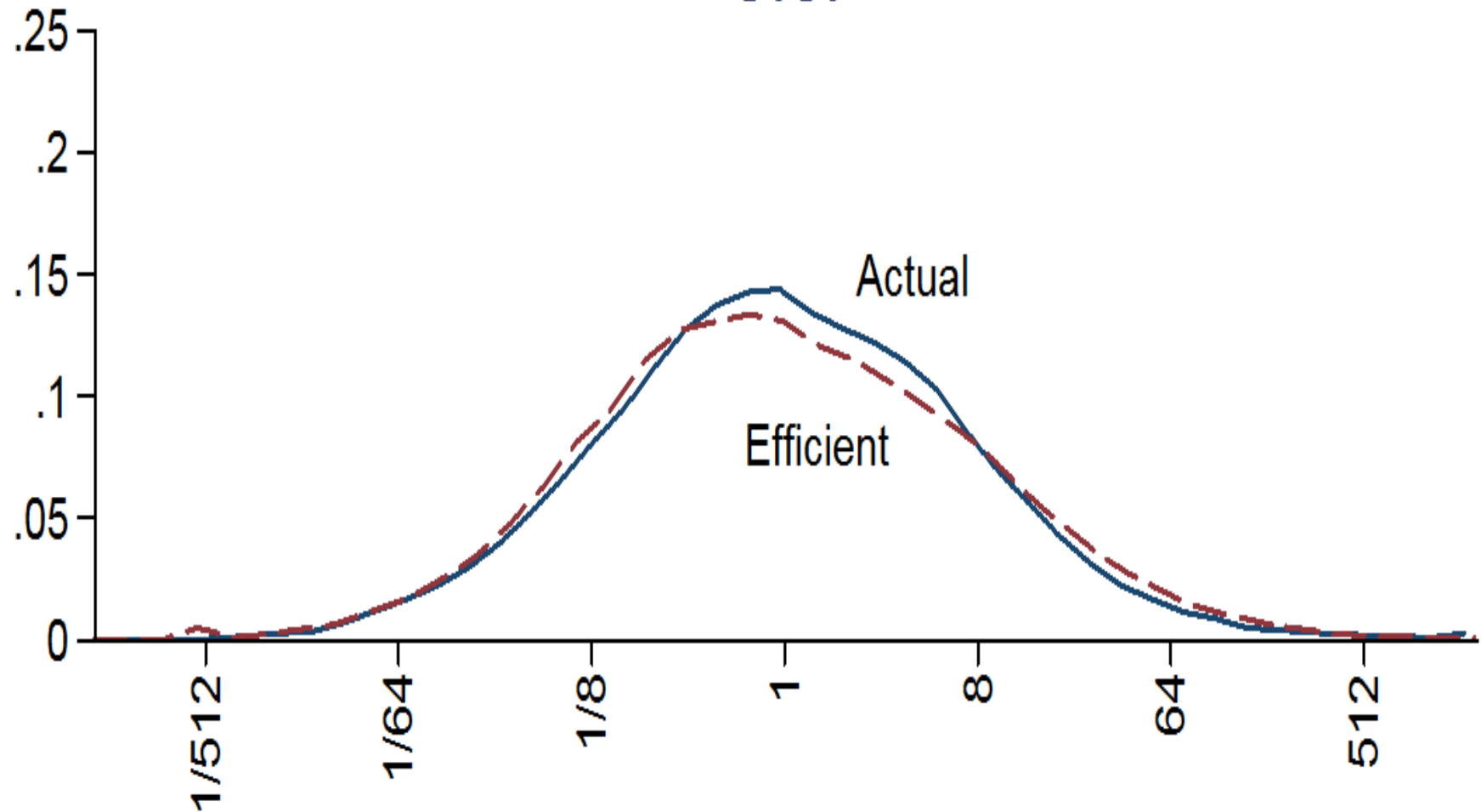


# Distribution of Plant Size



# Distribution of Plant Size

U.S.



# TFP Gain from Moving to US TFPR Dispersion

	Earliest year	Latest year
India	53%	58%
China	40%	27%

# Dispersion of Marginal Products

Has narrowed in China:

75-25 TFPR Gap: 2.6 to 2.3 from 1998 to 2005

But not in India:

75-25 TFPR Gap: 2.4 in 1987 and 2.5 in 1994

## Ownership of Chinese Plants

	<b>1998</b>	<b>2001</b>	<b>2005</b>
<b>Private Domestic</b>	15.9	37.4	62.5
<b>Private Foreign</b>	20.0	21.7	21.9
<b>State</b>	29.0	18.5	8.1
<b>Collective</b>	35.1	22.4	7.5

# Tax Evasion in Mexico

Social Security Payroll Tax (IMSS)

30% of Wage Bill

Public health care, pensions

## Most firms do not pay

Workers' valuation of benefits < 30% of wage bill  
(and perhaps falling over time)

Imperfect Tax Enforcement (“We hunt for animals in the zoo.”)

Expansion of parallel health care and pension programs since 2004

# Maisanta

All registered voters ( >12 million)

Identifies “Opositor”

Based on Signatures from Three Recall  
Petitions in 2002-2003

Widely available and used

We match Maisanta to:

Owners of manufacturing firms

Individuals in Household Survey

# Recall Petitions

**Consultivo** (November 2002)

1.4 million signatures for non-binding referendum

**Firmazo** (February 2003; submitted in August)

2.9 million signatures for recall referendum.

**Reafirmazo** (December 2003)

3.4 million signed petition for a recall referendum.

# List of Referendum Signers Posted on Web

January 2003: Pro-Chavez legislator Luis Tascon claims many signatures for first petition were forged

Tascon List was updated with later two petitions

# RETIRA TU FIRMA

El 40 % de las firmas presentadas por la Coordinadora Antichavista fueron trampeadas o clonadas; dicho de otra manera, son **Firmas Chimbas**.

Utilizaron las cédulas de tus difuntos, la de los abstencionistas crónicos, de los ancianos y a lo mejor la tuya también, pretendiendo sacar al presidente fraudulentamente. Los golpistas enloquecidos y obsesionados quieren robarte la paz, quitarte las misiones y matarte de hambre.

Si tu cédula, la de un amigo o la de un familiar fue utilizada: **DEBES RETIRARLA**  
Si firmaste presionado o estás arrepentido: **RETIRA TU FIRMA.**

**Búscate en los listados de los centros de votación o la página web [www.cne.gov.ve](http://www.cne.gov.ve).  
Si no puedes por estos medios, comunícate con el PPT a través de los números:  
0212-577.45.45, 578.02.12, 578.15.46 y 414.10.95, disponibles las 24 horas del día.**



**RETIRA TU FIRMA  
DEFIENDE LA DEMOCRACIA**

**Militantes de la Unidad**

[www.ppt.org.ve](http://www.ppt.org.ve)

# Maisanta

Maisanta appears in July 2004 (before recall vote)

Contains all 12.3 registered voters

Software distributed to Chavez voter outreach groups (“Unidad de batalla electoral”), government offices.

Leaked and sold on streets of Caracas



Leer

Registros: 12,394,109

Ingrese su Número de Cédula:

\*\*\*TENDENCIA POLITICA\*\*\*

Fecha Nac:

Apellidos y Nombre:

Dirección:

Indique el Número de Cédula y Presione <ENTER>

>> Listar Cédulas de mi Centro de Votación <<

>> Florentino <<

Centro Votación:

Dirección:

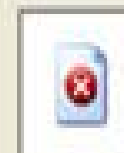
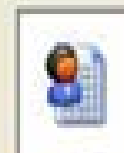
Región:

Fallecido:

Abstencionista:

Misión RIBAS 1

Vuelvan Caras 1





Leeme

Registros: 12,394,109

Ingrese su Número  
de Cédula:

3693693

SI FIRMO CONTRA EL PRESIDENTE (VALIDA)

Fecha Nac:

Apellidos y Nombre:

[REDACTED]

22/01/1956

Dirección:

CLL EL SOCORRO S/N TINAQUILLO

&gt;&gt; Listar Cédulas de mi Centro de Votación &lt;&lt;

&gt;&gt; Florentino &lt;&lt;

Centro Votación:

20370 LICEO JOSE LAURENCIO SILVA

Dirección:

CLL EL SOCORRO S-N TINAQUILLO

Región:

COJEDES MP. FALCON PQ. TINAQUILLO

Fallecido:

NO

Abstencionista:

NO

Misión RIBAS :

NO

Vuelvan Caras :

NO



Tu Voto es  
Secreto  
Tu Firma **NO**



PCP

PARTIDO COMUNISTA DE CHILE



# Employment



# Wage

