Sources of Productivity Growth

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What is Aggregate TFP?

Weighted Average of Firm Productivity

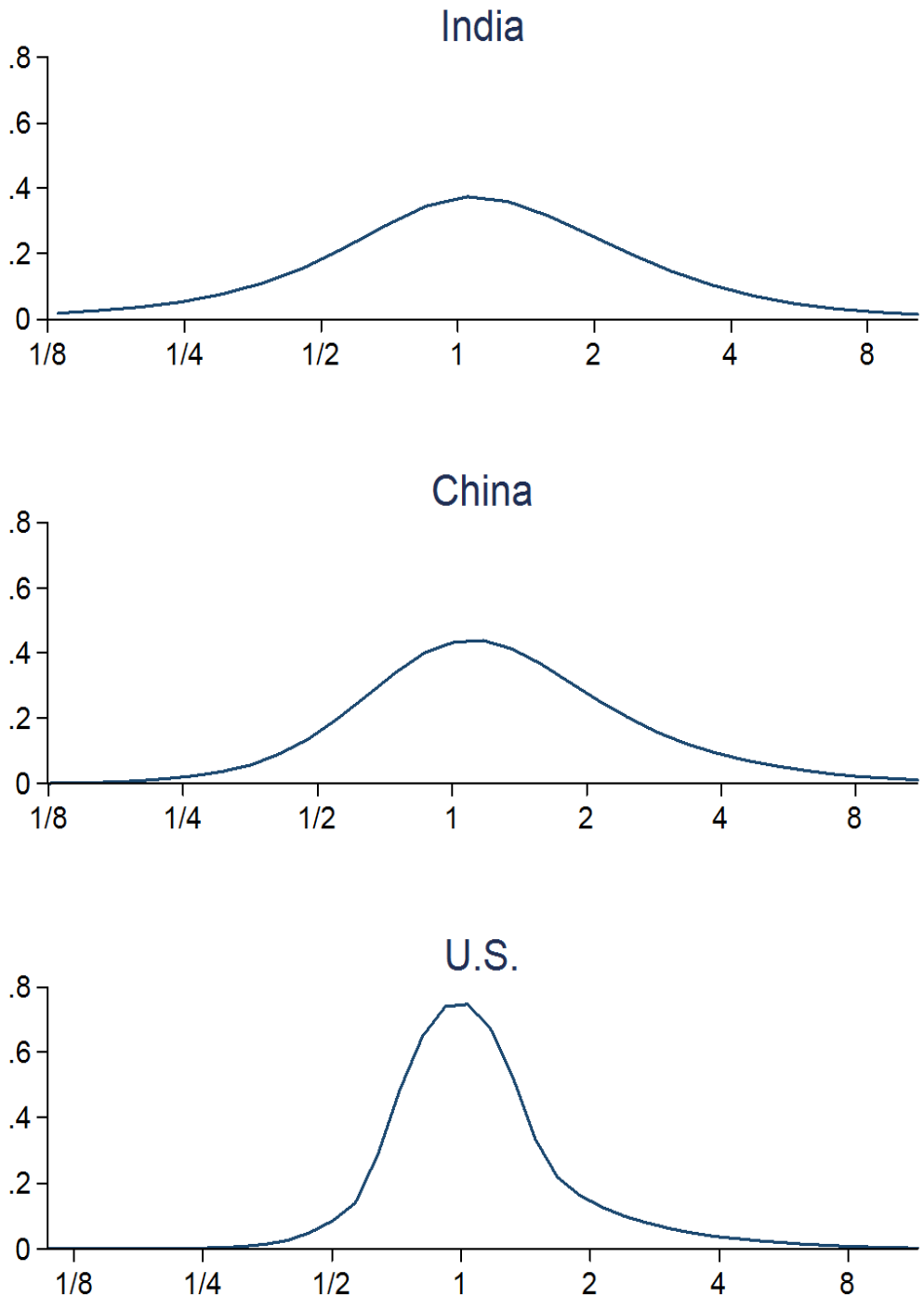
Extent of Resource Misallocation

Measuring Resource Misallocation

$$MPL \propto \frac{PY}{L} \quad and \quad MPK \propto \frac{PY}{K}$$

$$MPL^{1-\alpha} MPK^{\alpha} \propto \frac{PY}{L^{1-\alpha} K^{\alpha}}$$

Figure 2: Distribution of TFPR



Dispersion in Marginal Product of K and L

90-10 Gap

US (1987)	China (1998)	India (1989)
1.97	6.49	8.17

Resource allocation has improved in China

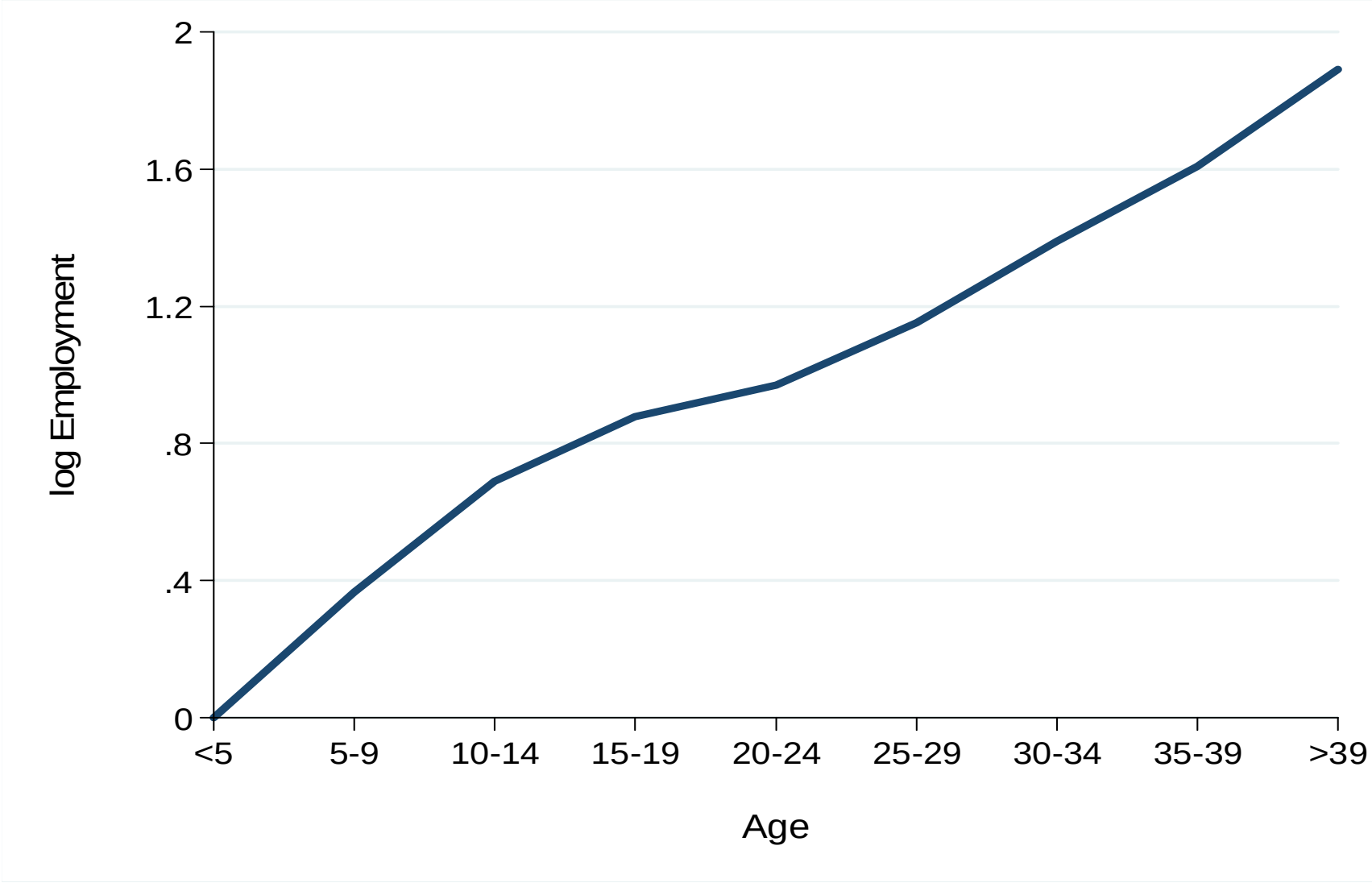
But not in India (at least in the manufacturing factor)

Instead appears to have worsened since late 1980s

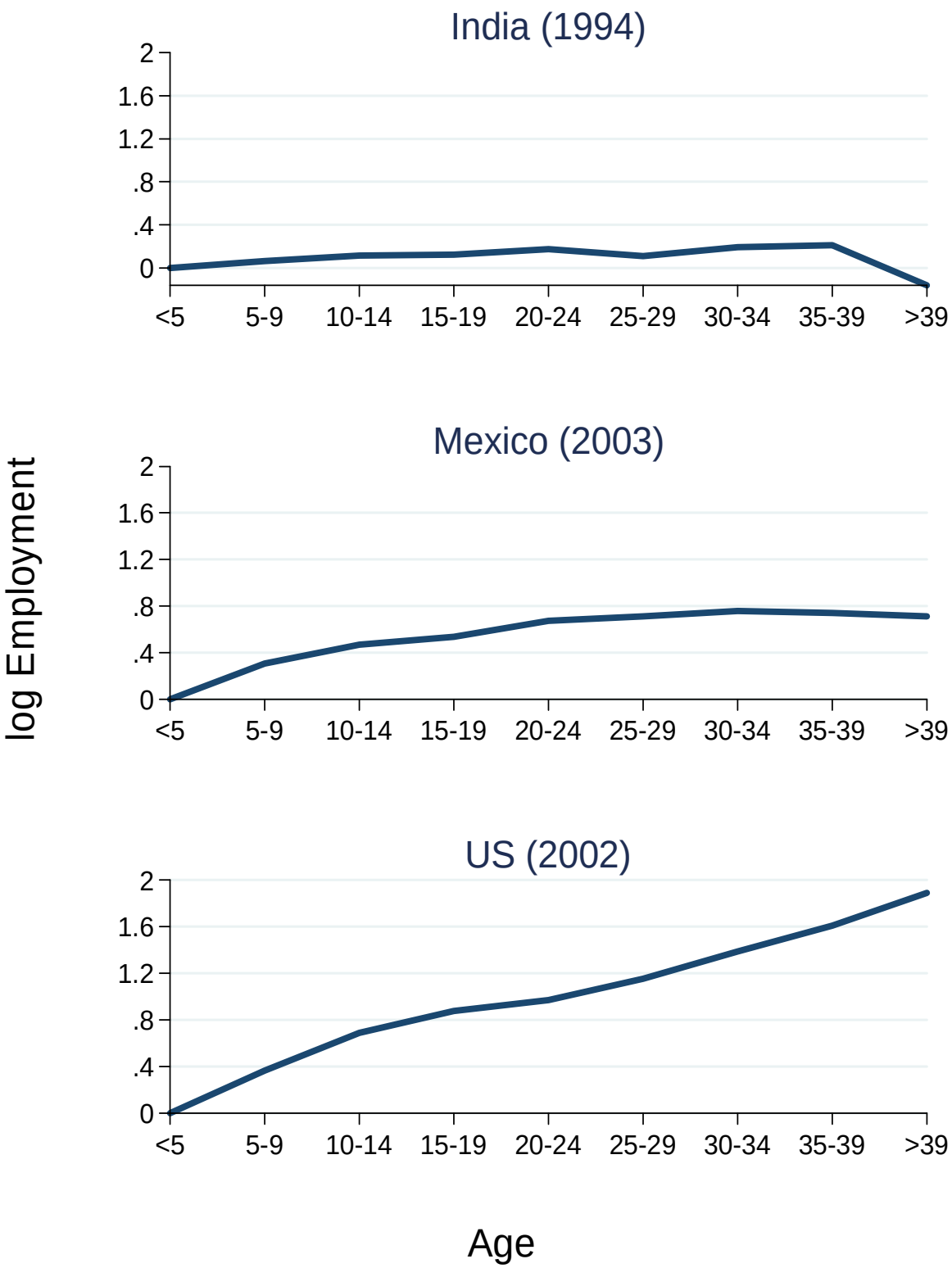
Why is Average Firm Productivity Low?

Look at the “Life-Cycle” of a Firm

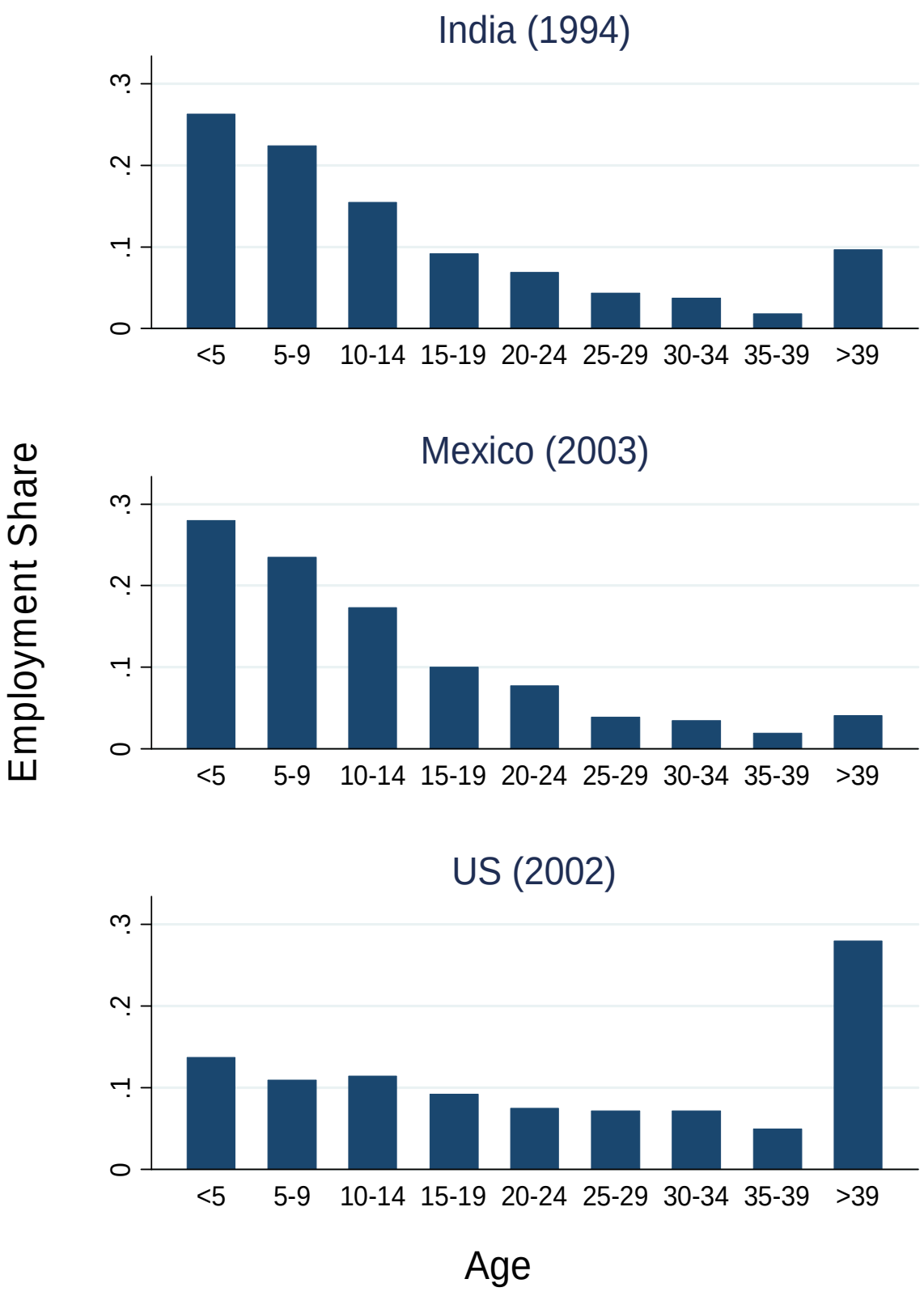
Plant Size by Age in the US Cross-Section (2002)



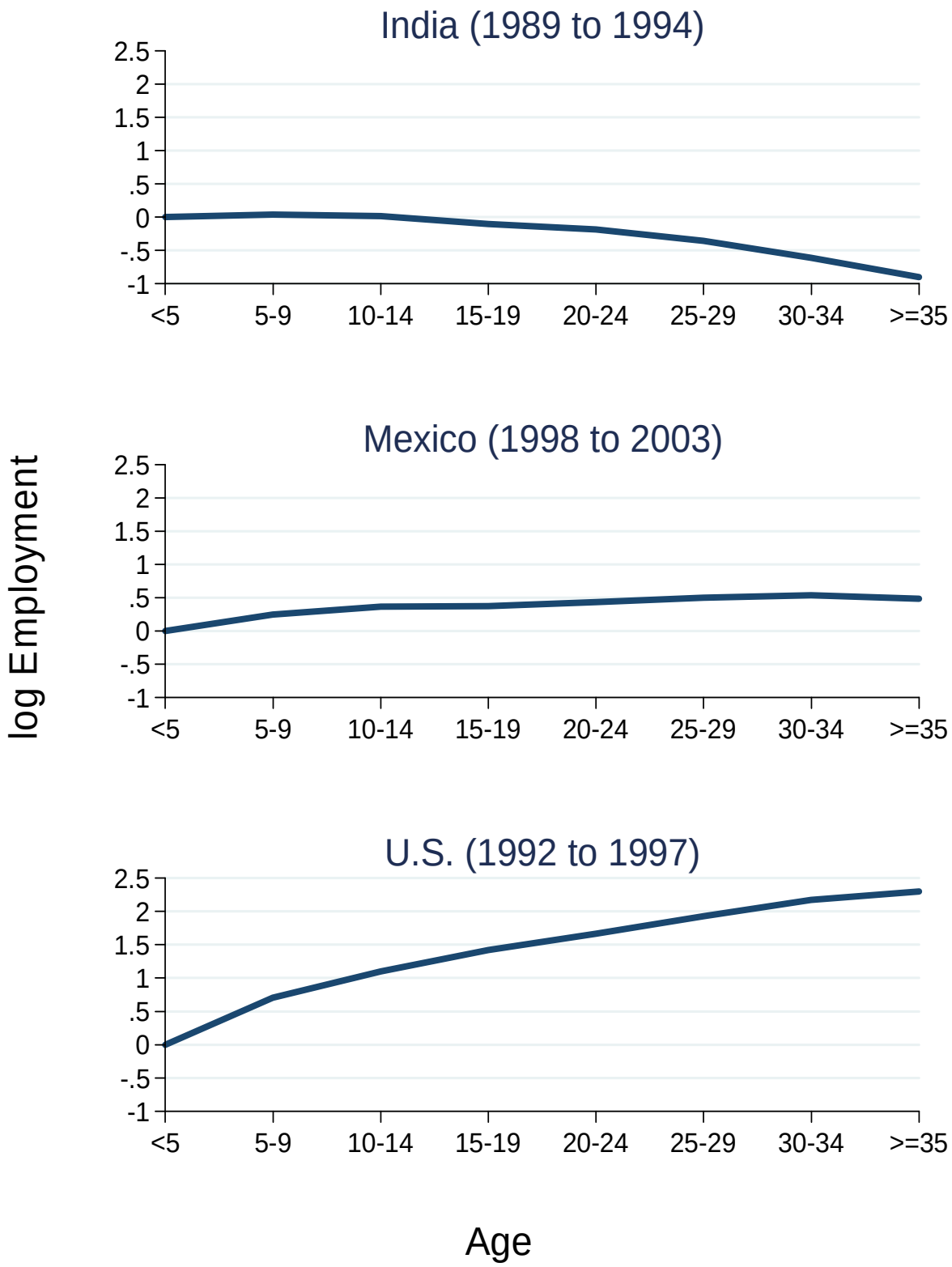
Plant Size by Age in the Cross-Section



Employment Shares by Age



Plant Employment over the Life-Cycle



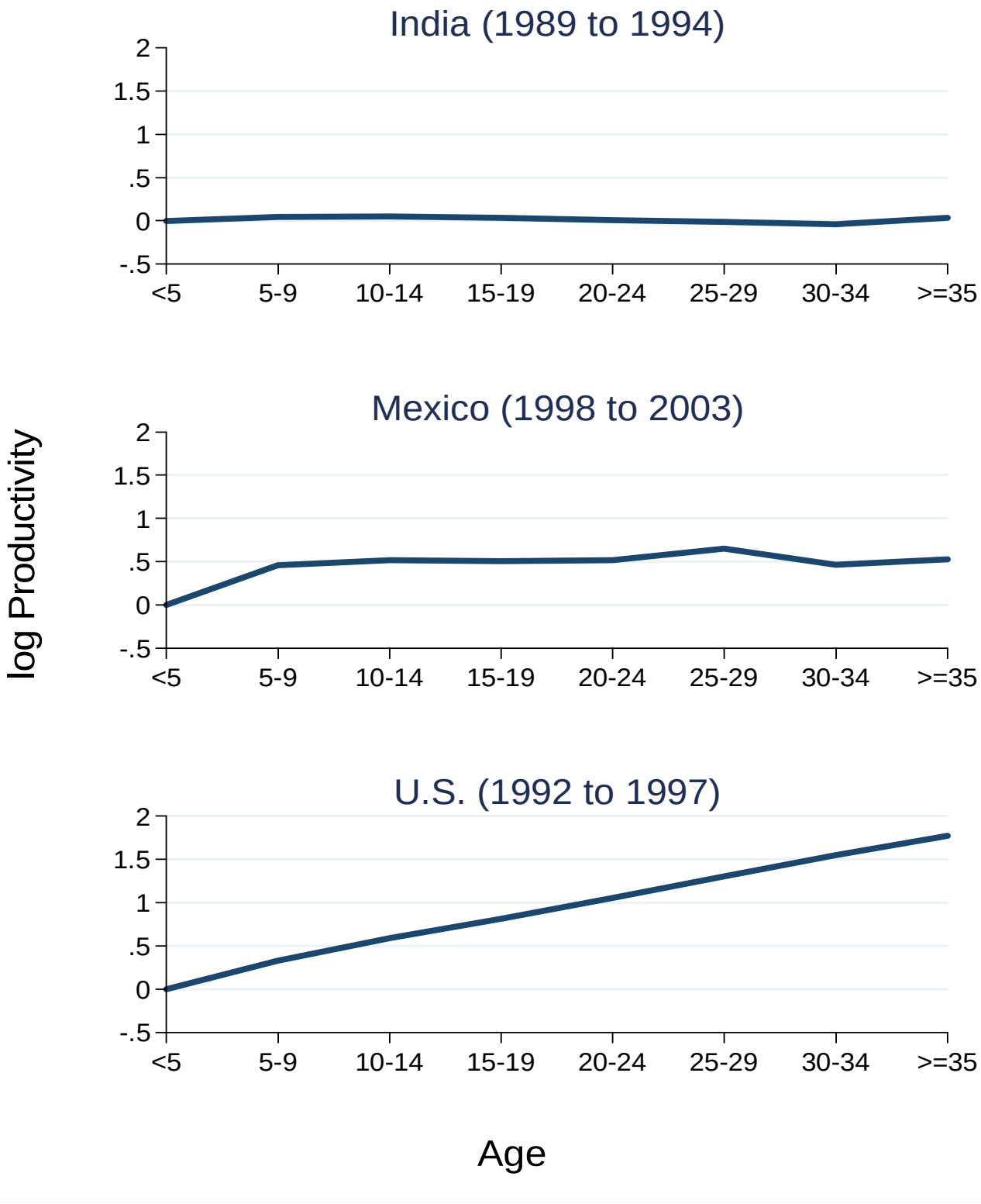
Imposing More Structure

$$Y = \left[\sum_{a} \sum_{i=1}^{N_a} Y_{a,i}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

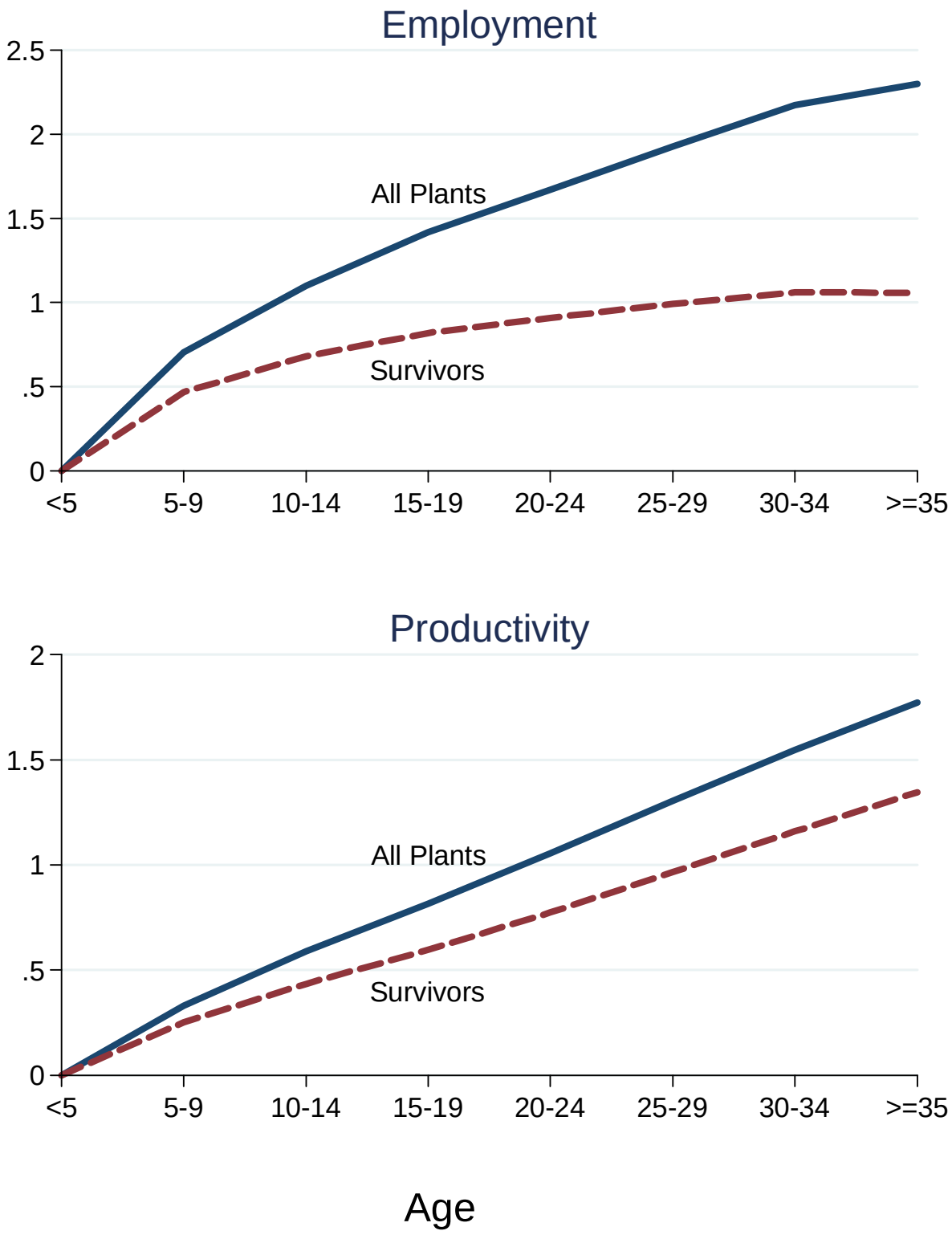
$$Y_{a,i} = A_{a,i} Inputs_{a,i}$$

$$Y_{a,i} \propto \left(\frac{A_{a,i}}{MP_{a,i}} \right)^{\sigma}$$

Plant Productivity over the Life-Cycle



U.S. Employment and Productivity over the Life-Cycle



Direct Effect of Life-Cycle Growth on TFP (Holding Entry Fixed)

Indian TFP with U.S. Productivity Growth: +28%

Life Cycle Growth and Plant Size

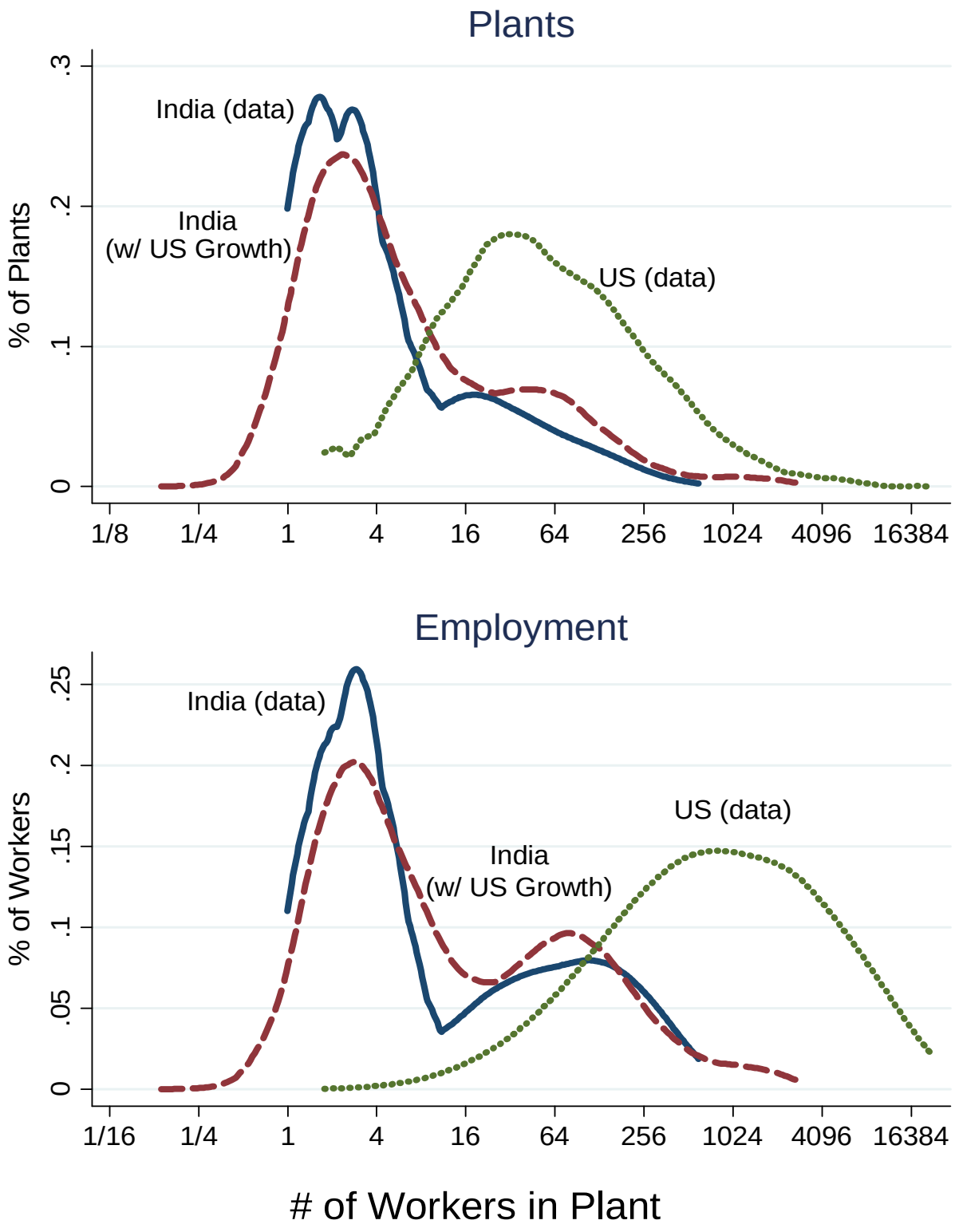
$$L_{a,i} = \left(\frac{A_{a,i}}{TFP} \right)^{\sigma-1} L$$

$$= \frac{L}{N} \left(\frac{A_{a,i}}{A} \right)^{\sigma-1}$$

Holding Entry and Exit Rates (N) fixed:

Size of representative firm will not change

U.S. vs. Indian Density of Plant and Employment by Size



Life-Cycle Growth and Entry

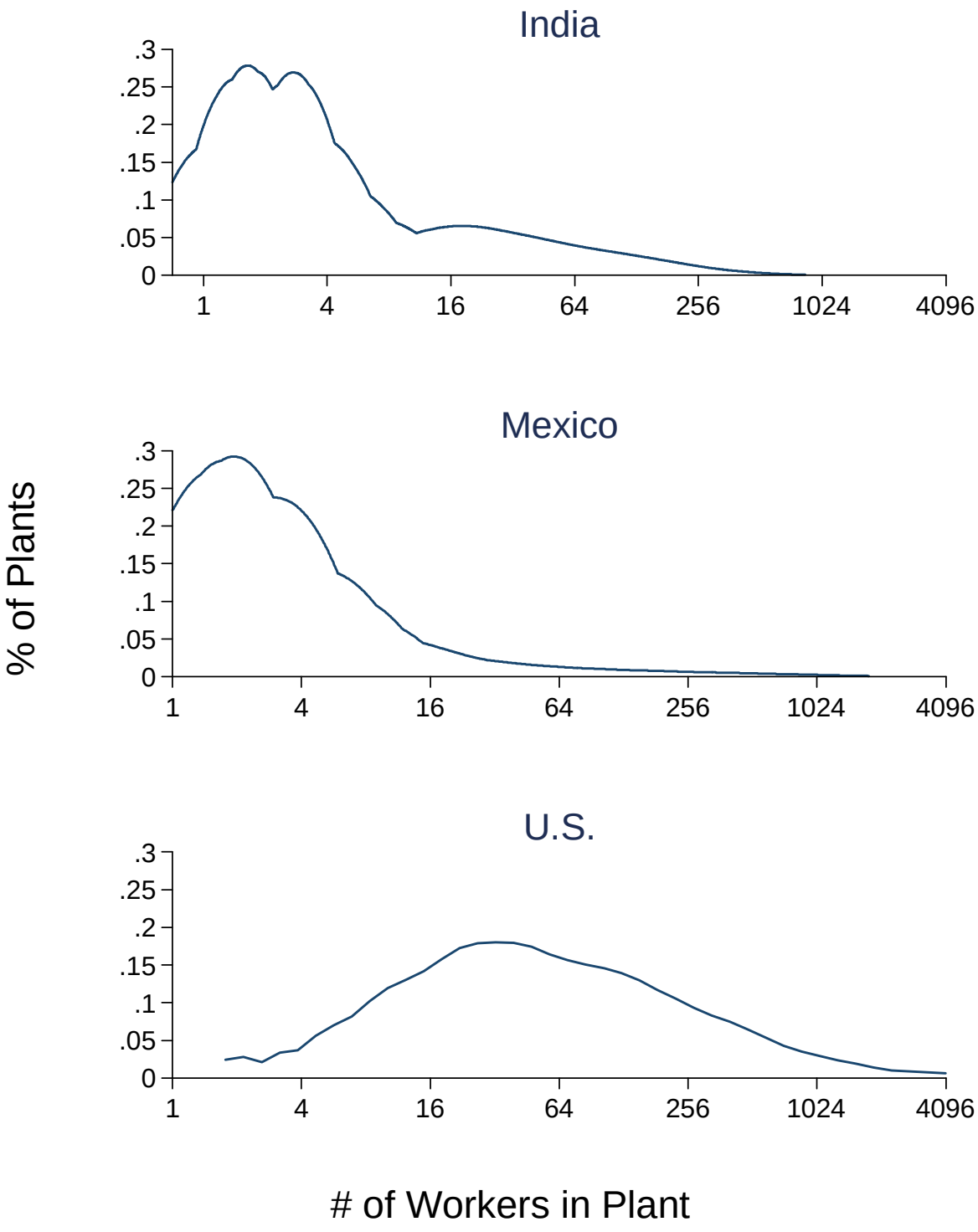
Entry Cost $\propto W$

Lower Life-Cycle Growth Lowers Wage

Lower Life-Cycle Growth Lowers Profits from Entry, but by less (because future profits are discounted)

Lower Life-Cycle Growth Induces More Firm Entry

Density of Plants by Size



Entry and Entrant Quality

More dispersion in entrant productivity in India than U.S.

S.D. of (log) Entrant Productivity

India: 1.2 U.S.: 0.3

Lower wages could induce lower quality firms to enter

Potential effects of lower life-cycle growth

1) Direct effect on aggregate TFP ($\downarrow TFP/A_0$)

   No effect on firm size

2) More entry ($\uparrow$ Welfare)

   $\downarrow$ Firm size

3) ***Possibly*** lower quality entrants ($\downarrow A_0$)

   More dispersion of Entrant Productivit