Population Ageing, Managers, and Economic Development

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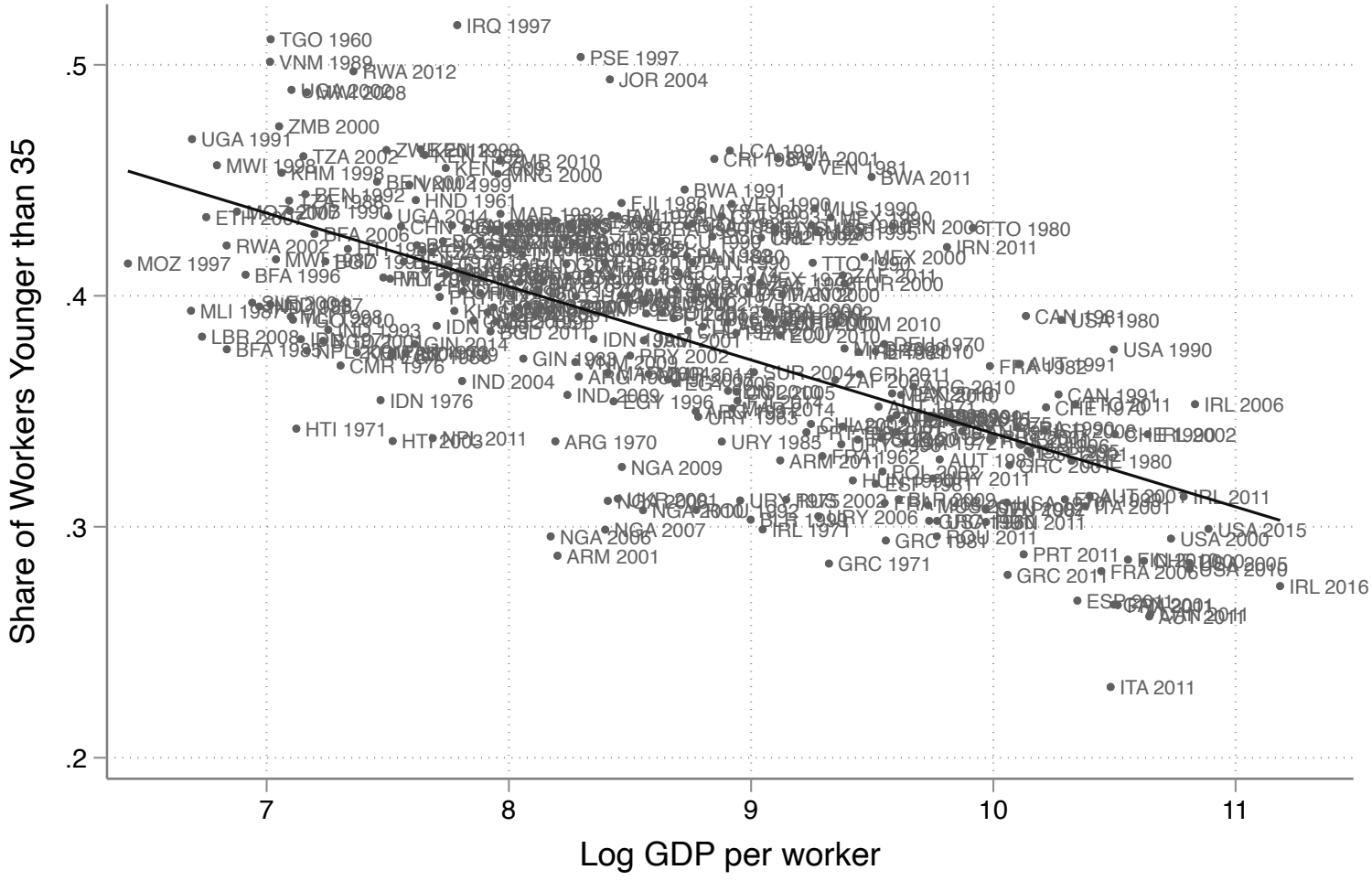
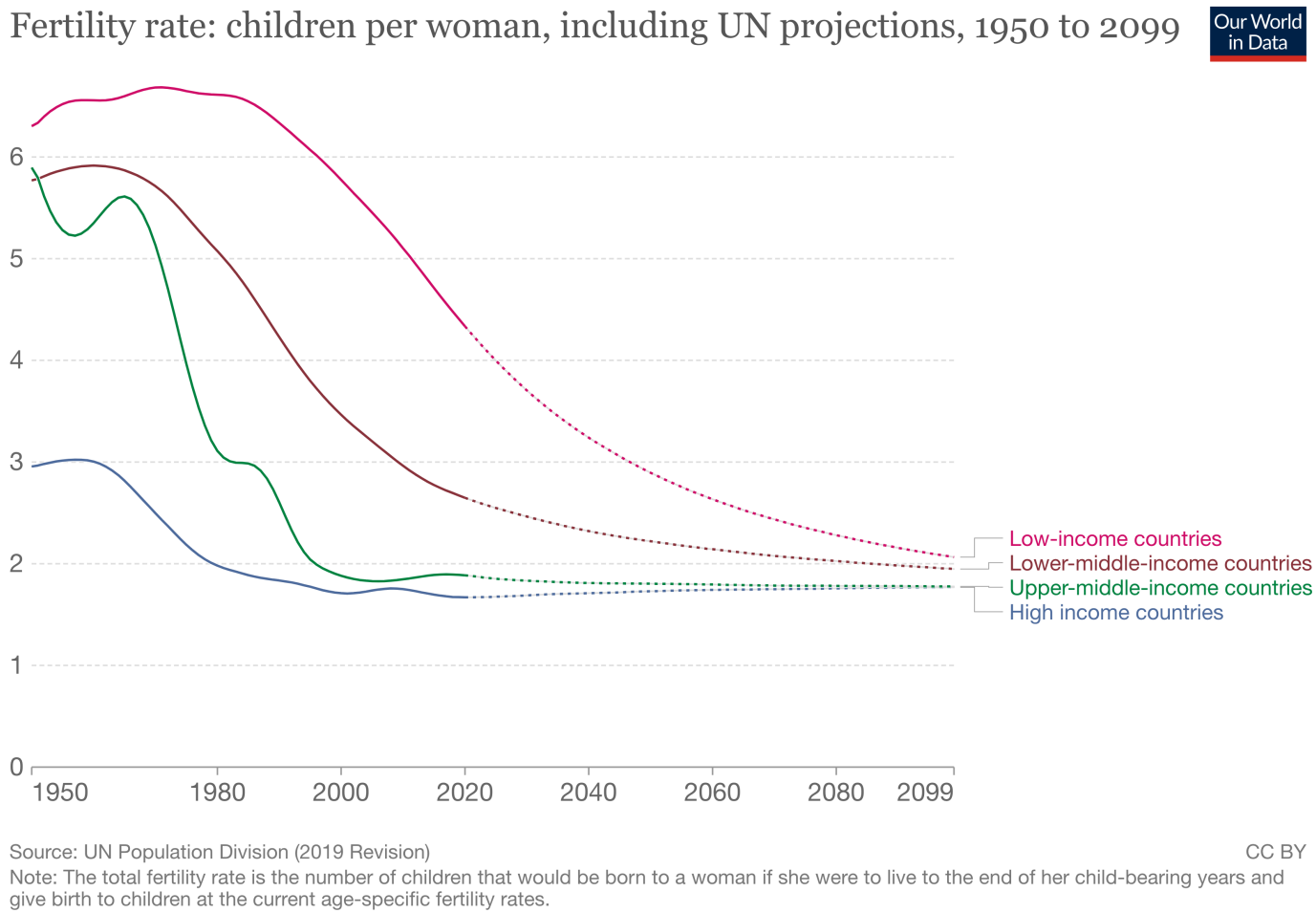
Age Distribution across Countries



Aging Revolution in Low Income Countries



A Human Capital Perspective

- Macro implications of age structure?
  - Savings and secular stagnation (Bernanke, 2005; Auclert et al, 2022)
  - Demographic divided & dependency ratio (Cutler, 1990)
  - Demand for services and structural change (Cravino et al, 2022)
- Heterogeneity in the skills of younger and older *workers*

→ This project: implications of age composition from a human capital perspective

Outline

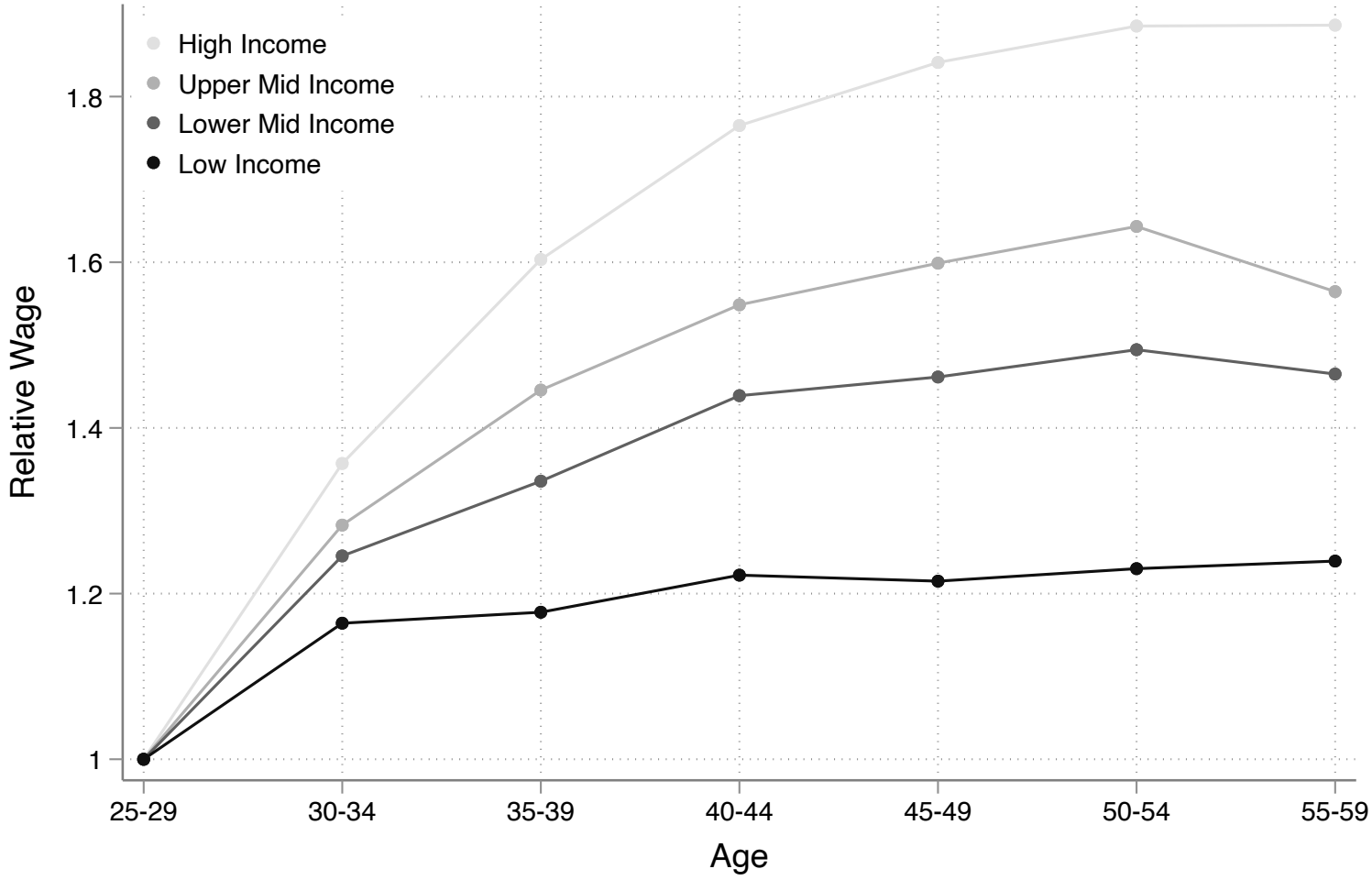
1. Age Composition and Income Accounting
   - Compositional effect of age distribution and wages
2. Evidence on Age and Comparative Advantage
   - Older workers more likely to be managers
   - Firms managed by older workers $\rightarrow$ larger and more productive
3. Model: Lucas (1978) + Cross-Age Heterogeneity
   - Structural interpretation of (2)
   - Revisit (1) in light of (2)

Age Composition and Income Accounting

Data

- Individual-level data from IPUMS International + other sources
- 77 countries, $\sim$ 500 cross-sections (1960-2017)
- 13 countries with income data (more soon)
- Present results by World Bank income group

Wage Profiles



Age Accounting

- Income in country c

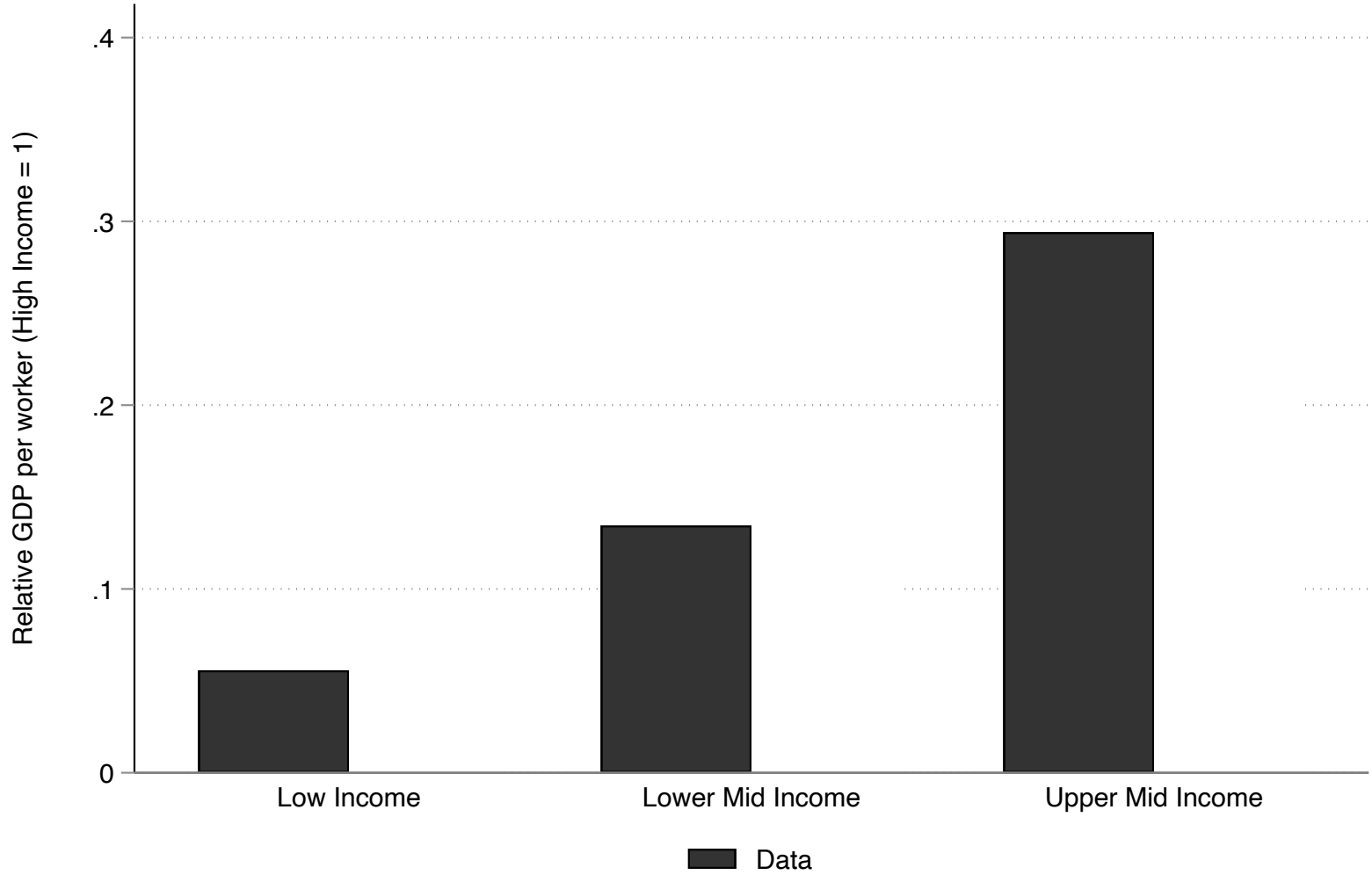
$$Y_c = \sum_a \sigma_{a,c} w_{a,c}$$

where $\sigma_{a,c} \rightarrow$ employment share of age a

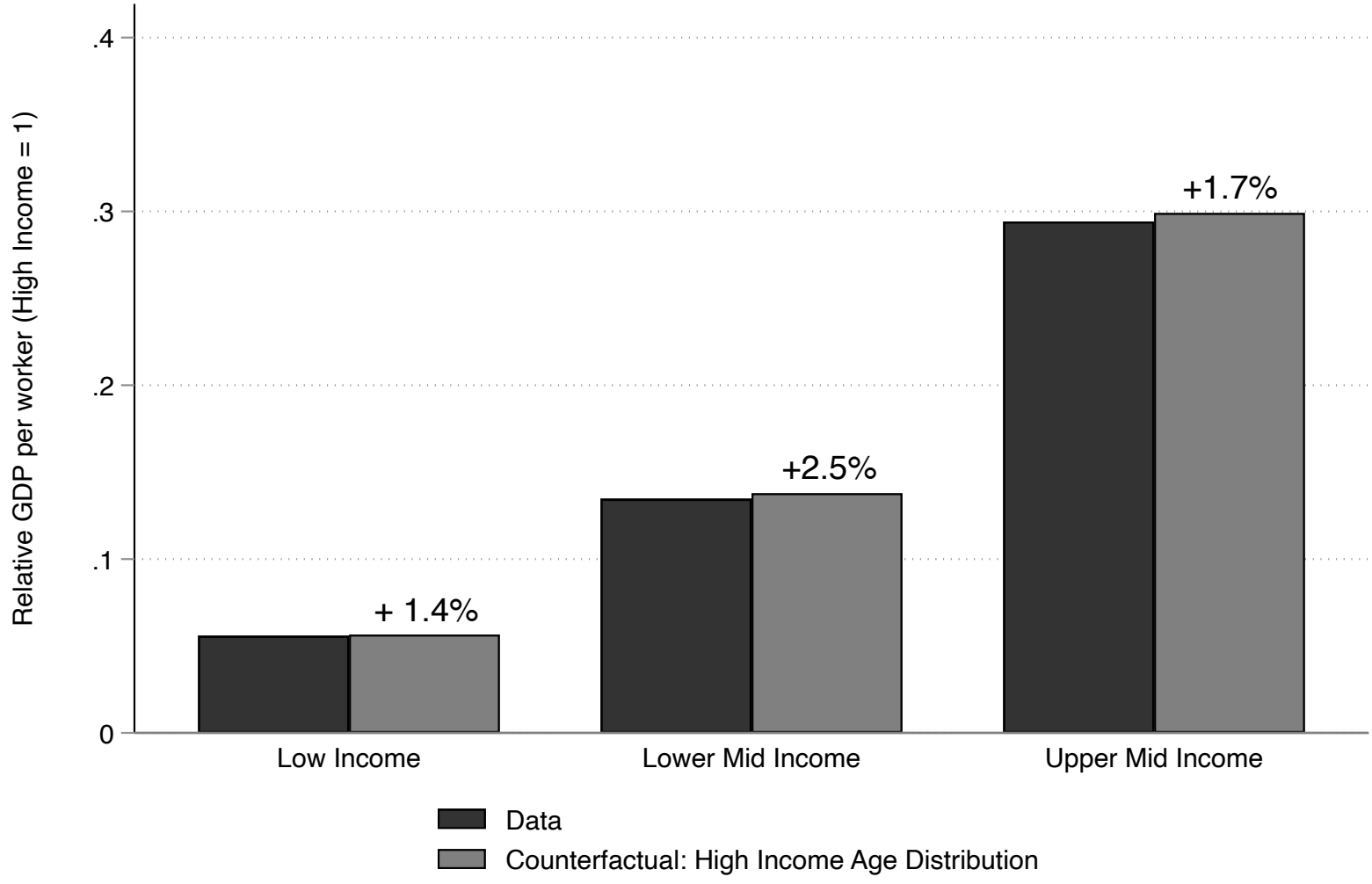
- Age Accounting: assign high-income countries' (R) age distribution, keeping wages fixed

$$\widetilde{Y}_c = \sum_a \sigma_{a,R} w_{a,c}$$

Age Accounting



Age Accounting



Age & Wage Profile Accounting

- Income in country c

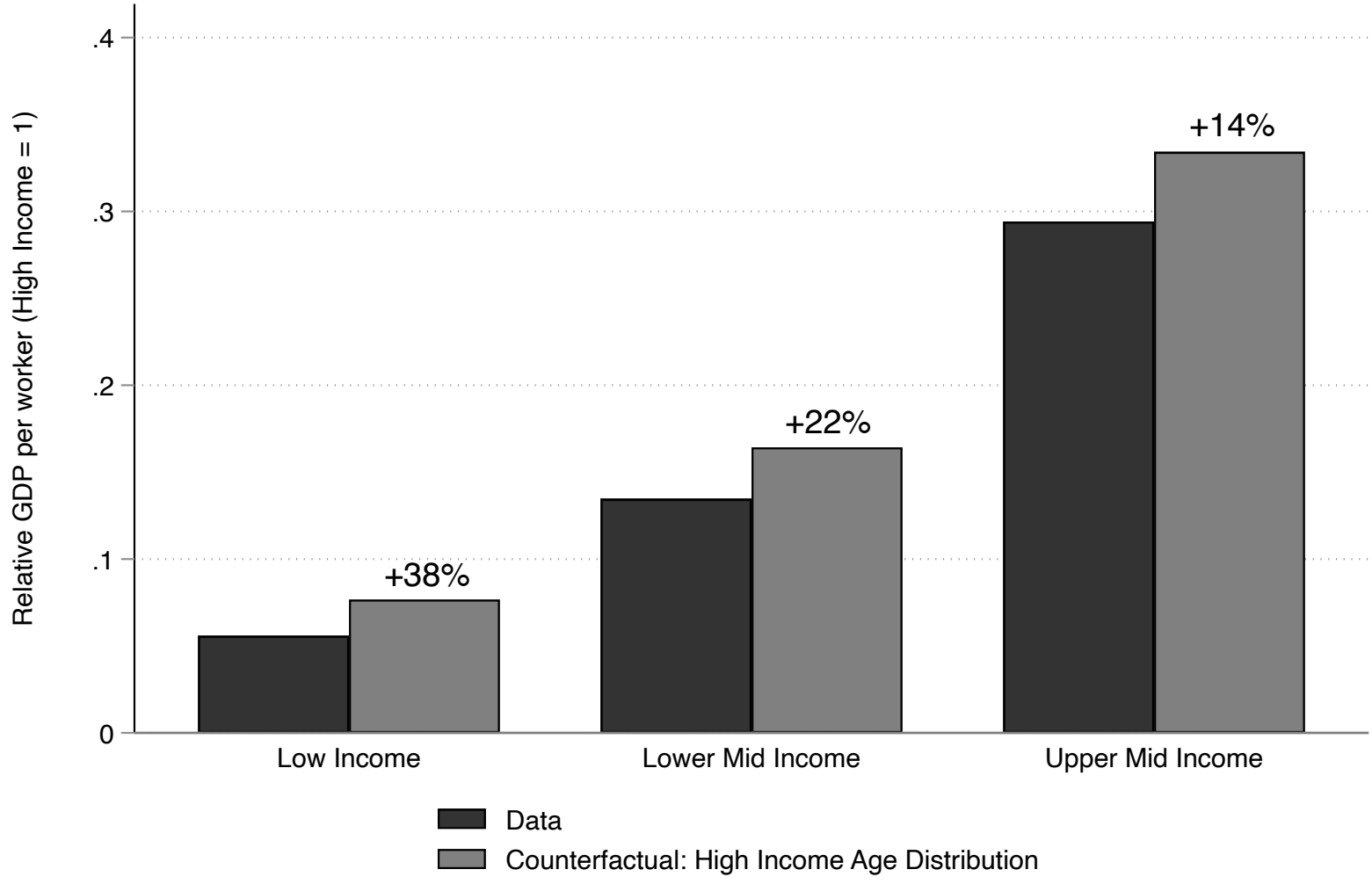
$$Y_c = w_{1,c} \sum_a \sigma_{a,c} \frac{w_{a,c}}{w_{1,c}}$$

where $a = 1 \rightarrow$ youngest group

- Age & Wage Profile Accounting: assign high-income countries' (R) age distribution and wage-age profile

$$\widetilde{Y}_c = w_{1,c} \sum_a \sigma_{a,R} \frac{w_{a,R}}{w_{1,R}}$$

Age & Wage Profile Accounting

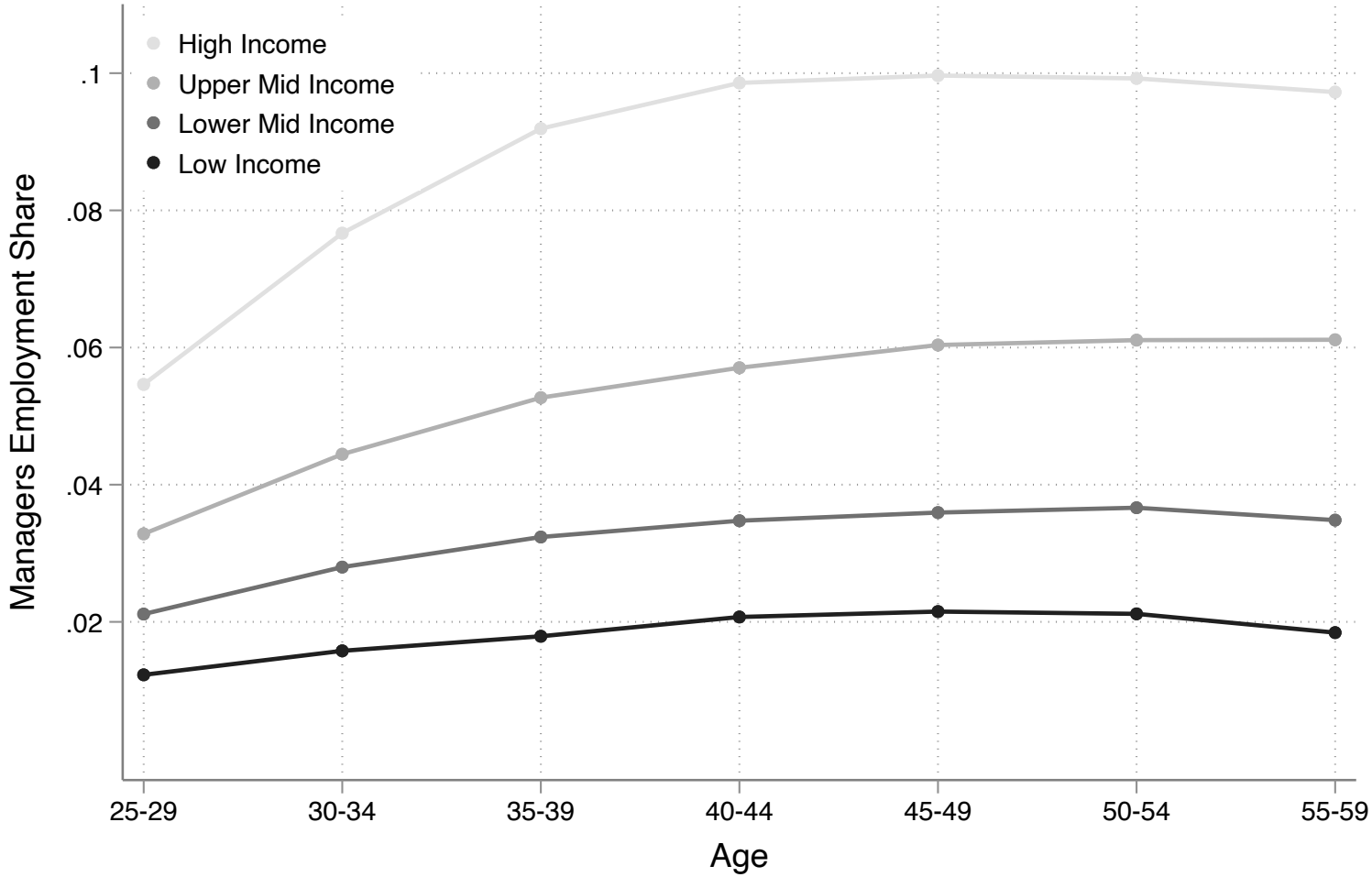


Evidence on Age and Comparative Advantage

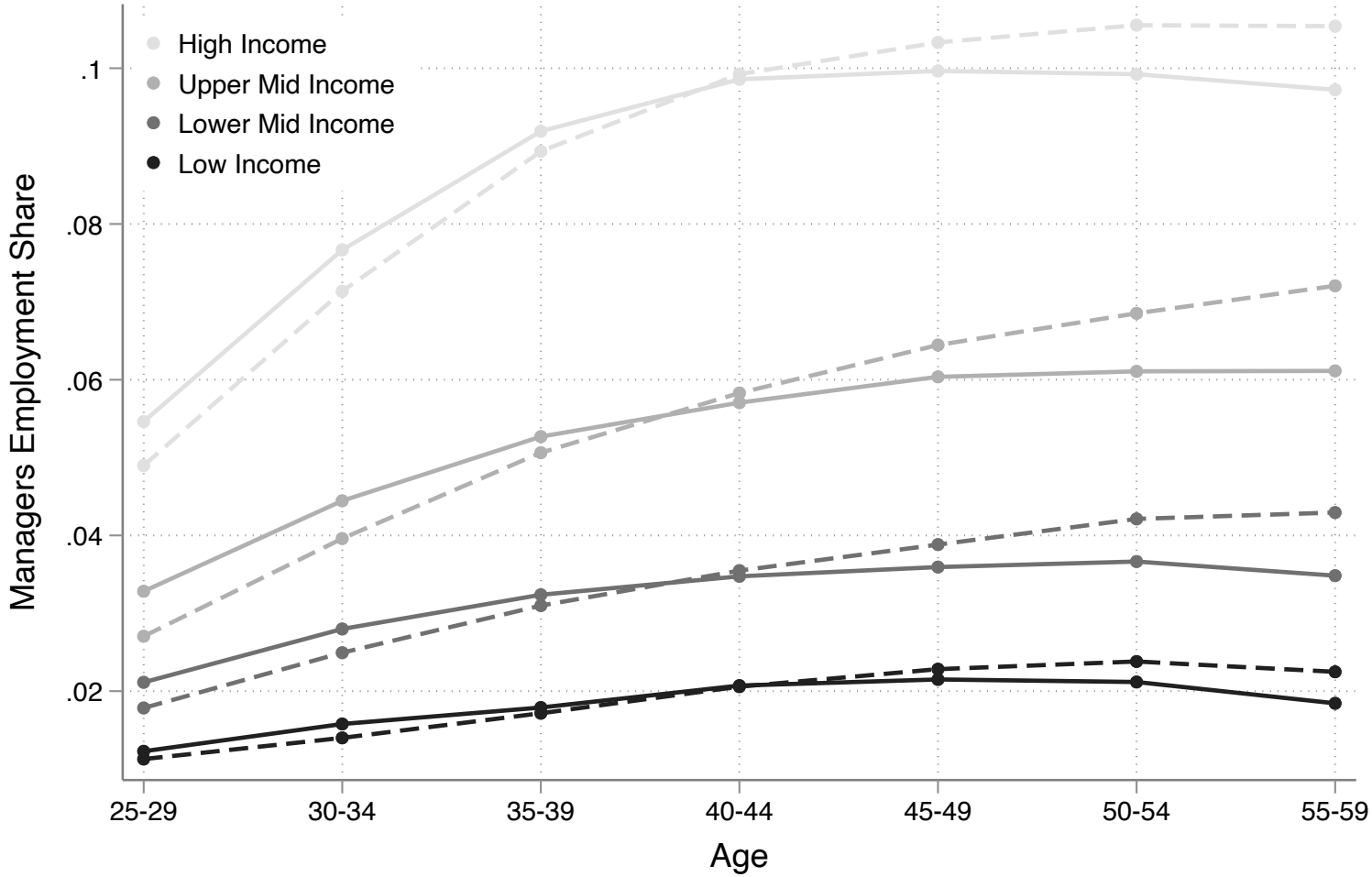
Key Results

1. Older workers more likely to be in managerial occupations
    - Managers = Reporting *Managers*, *Legislators*, *Senior Officials* as occupation
    - Likely to lead teams / supervise workers
    - Exclude own-account workers

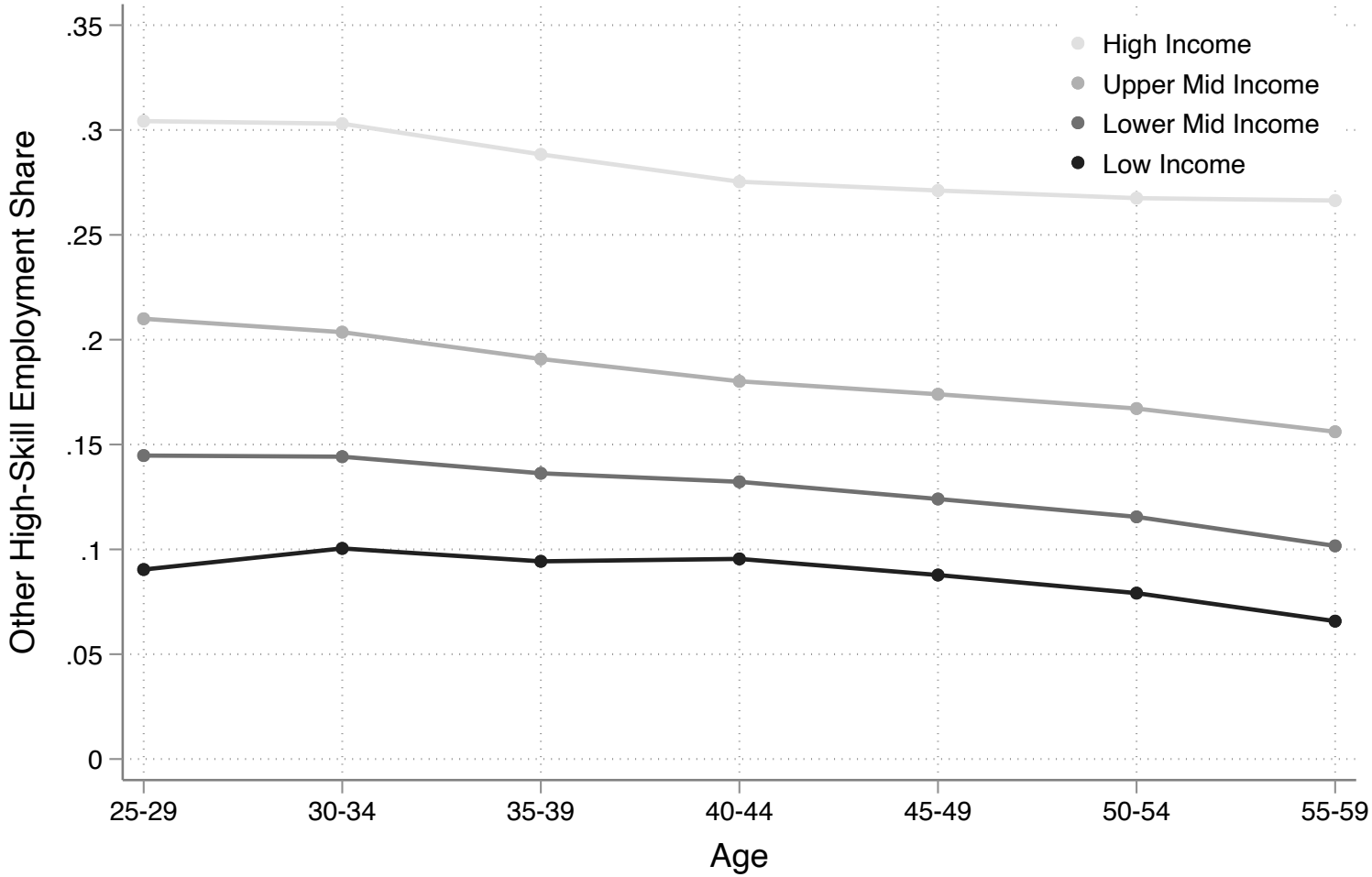
Mangerial Employment - Age Profile



Controlling for Schooling (Dashed Line)



Other High-Skill Occupations - Age Profile



Key Results

2. Older managers work in larger and more productive firms

- *Mexican National Occupation and Employment Survey*
  - → size of work establishment Show
- *PIAAC & STEP* (34 countries)
  - → firm size Show
- *World Bank Enterprise Survey* (32 countries)
  - → firm size Show
  - → sales per worker Show
  - → (self-reported) technology level Show

Model

Lucas (1978) + Cross-Age Heterogeneity

- Mass σ_a of individuals of age a
- Occupational choice: workers and managers
- Workers of age a supply h_a efficiency units ($h_1 = 1$)
- Pareto distribution of managerial talent x, with age-specific mean m_a ($m_1 = 1$)
- Manager with talent x hires $l(x)$ to produce according to

$$y(x) = Axl(x)^{\gamma}$$

Occupational choice

- Workers get labor income $w_a = wh_a$
- Manager with talent x gets profits $\pi(x) = Axl(x)^\gamma - wl(x)$

$\rightarrow$ Age-specific thresholds $\bar{x}^a$ such that individuals with $x \geqslant \bar{x}^a$ become managers

$\rightarrow$ Difference in thresholds due to different opportunity costs from the labor market

Equilibrium

Key Predictions

1. Wage Age Profile

$$\frac{w_a}{w_1} = h_a$$

→ h_a increases with age, more so in rich countries Show

2. Managerial Share Age Profile

$$\frac{\text{Managerial Share}_a}{\text{Managerial Share}_1} = \left(\frac{m_a}{h_a^{1-\gamma}}\right)^{\alpha}$$

→ m_a increases with age, more so in rich countries Show

3. Firm Size and Profits by Manager's Age

$$\frac{\text{Size}_a}{\text{Size}_1} = \frac{\text{Profits}_a}{\text{Profits}_1} = h_a$$

→ firm's outcomes reflect opportunity costs from labor market

Revisiting Age Accounting

- Age Accounting: assign high-income countries' (R) age distribution, keeping wages fixed

$$\tilde{Y}_c = \sum_a \sigma_{a,R} \bar{w}_{a,c}$$

- Compare with model-based counterfactual $\tilde{Y}_c^{Model}$

Proposition

$\tilde{Y}_c \geqslant \tilde{Y}_c^{Model}$ *(accounting overstates the output gain)*

$\rightarrow$ Accounting misses crowding out of managerial income for the old ($\uparrow$ supply of potential managers $\rightarrow \downarrow$ profits)

Revisiting Age & Wage Profile Accounting

- Age & Wage Profile Accounting: assign high-income countries' (R) age distribution and wage-age profile

$$\tilde{Y}_c = \bar{w}_{1,c} \sum_a \sigma_{a,R} \frac{\bar{w}_{a,R}}{\bar{w}_{1,R}}$$

- Compare with model-based counterfactual $\tilde{Y}_c^{Model}$ (equalizing age shares and relative productivities)

Proposition

$\tilde{Y}_c < \tilde{Y}_c^{Model}$ *(accounting understates the output gain)*

$\rightarrow$ Accounting misses level effect on $\bar{w}_{1,c}$ ($\uparrow$ managerial quality $\rightarrow \uparrow$ wages)

Extensions

- Model suggests possible novel sources of cross-country gaps in age profiles

1. Differences in span of control Show
   - Lower $\gamma \rightarrow$ less leverage of old's comparative advantage
   - Proxy for barriers to firm growth?

1. Size-based distortions in poor countries (Guner et al, 2007)
   - Higher costs of operating large firms $\rightarrow$ less leverage of old's comparative advantage

Wrapping Up

- Large differences in the relative quantity and productivity of older workers
- Older workers have comparative advantage in managerial occupations, particularly so in rich countries
- This reinforces accounting results $\rightarrow$ small output impact of differences in quantities, large impact of differences in relative productivities
- Next: richer model + more data for quantitative analysis

Thank you!

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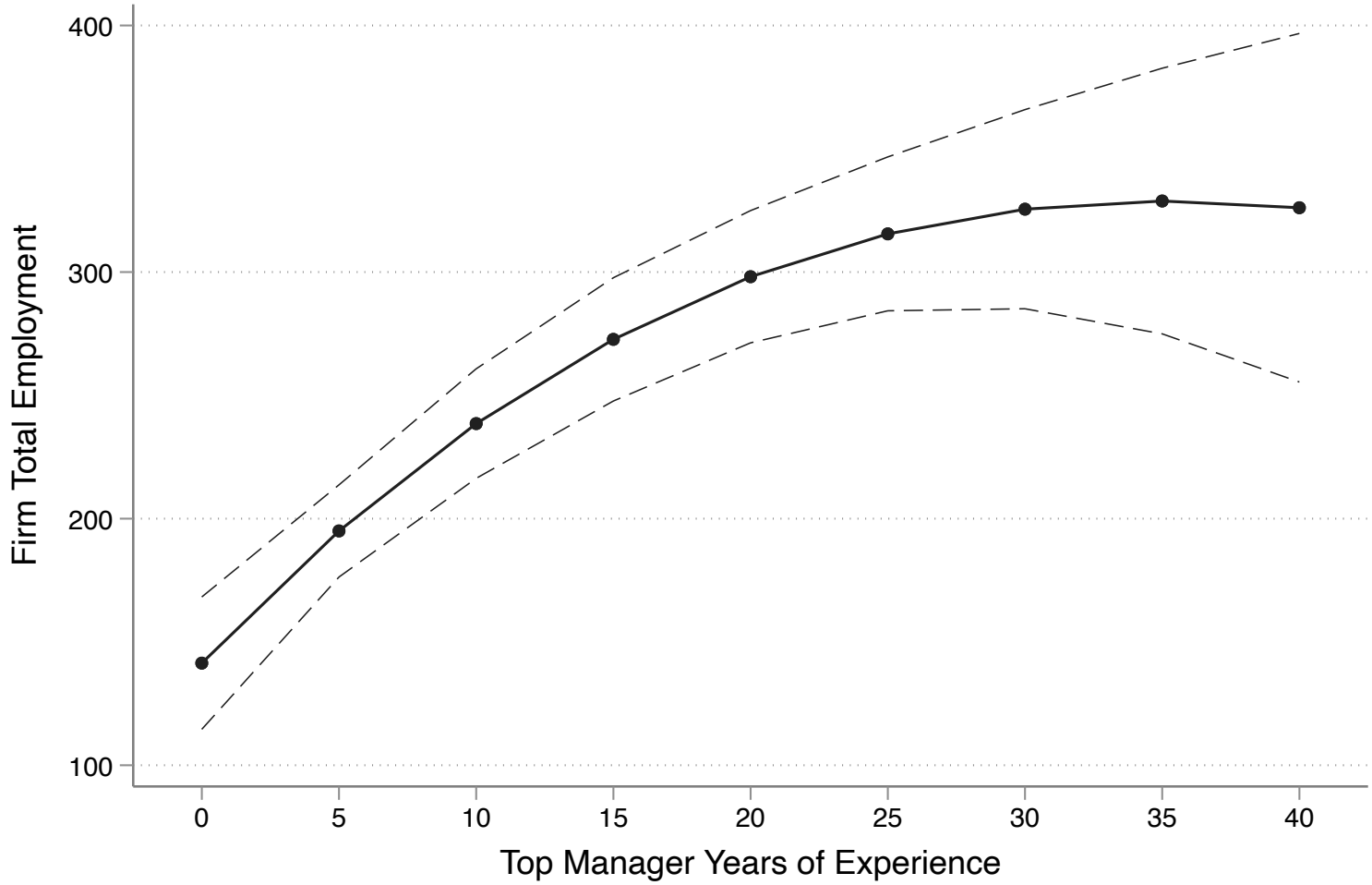
WBES


400
300
200
100
Firm Total Employment
0
5
10
15
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25
30
35
40
Top Manager Years of Experience

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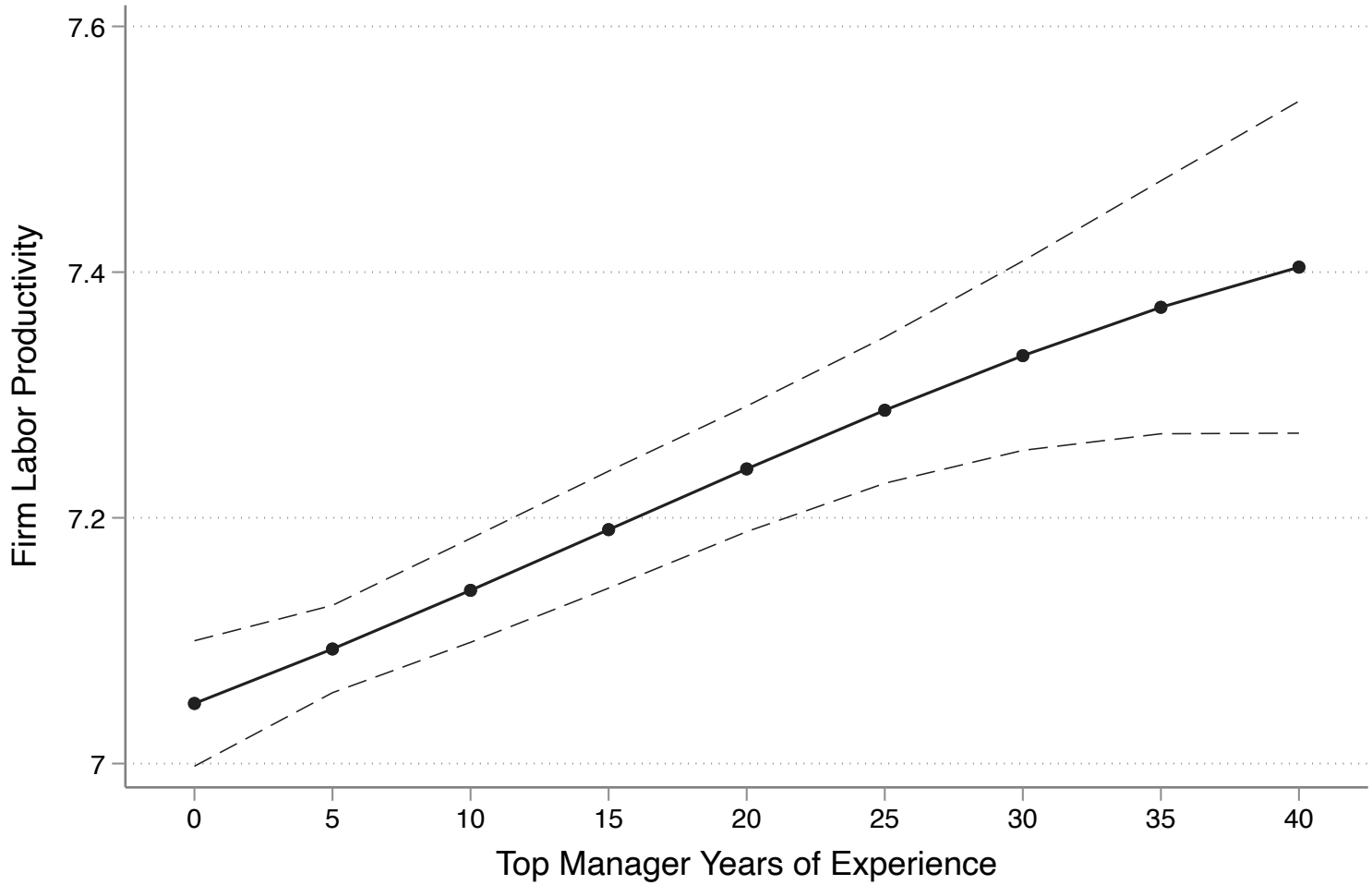
WBES


7.6
7.4
7.2
7
Firm Labor Productivity
0
5
10
15
20
25
30
35
40
Top Manager Years of Experience

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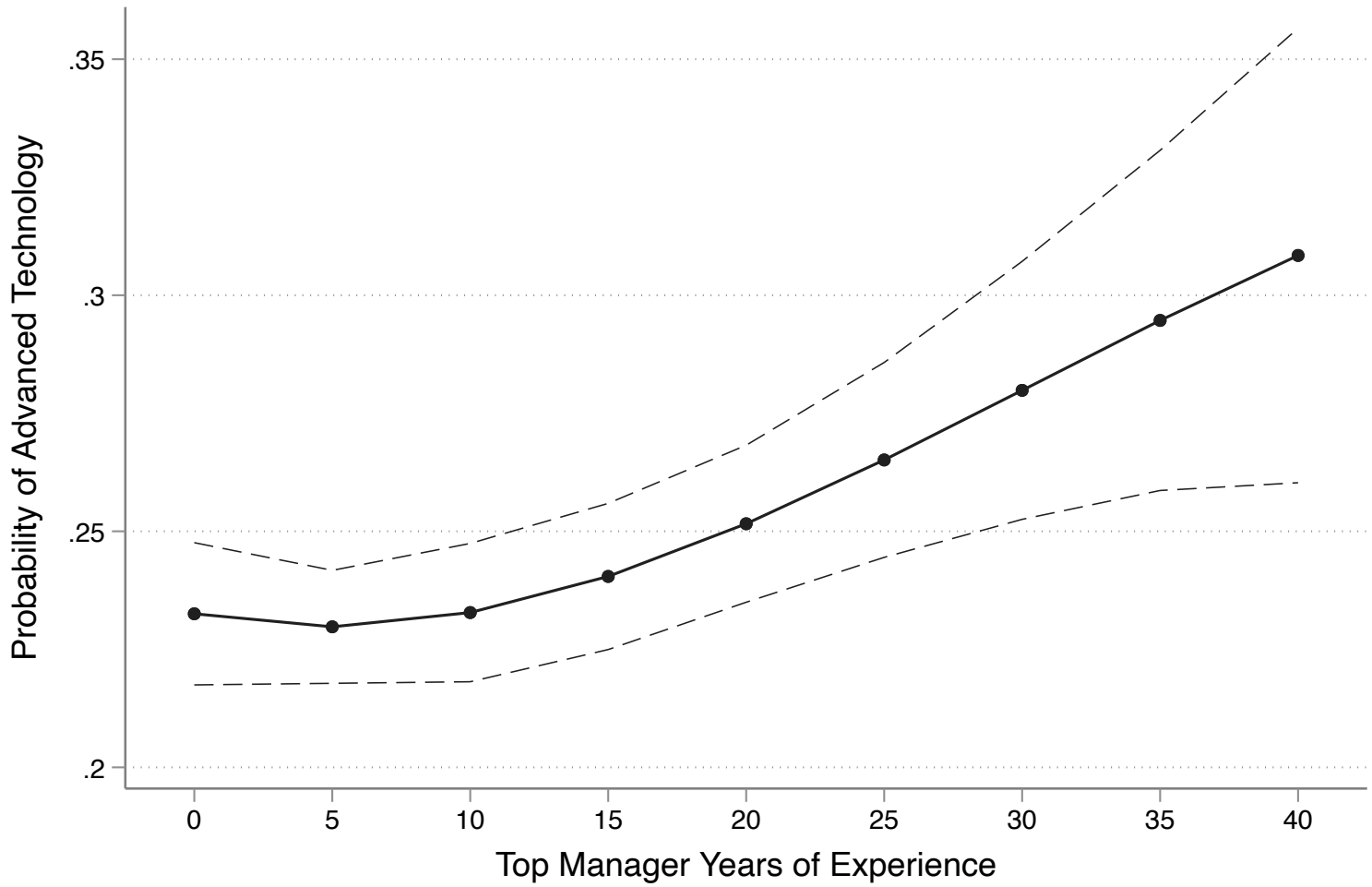
WBES


Probability of Advanced Technology
.35
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35
40
Top Manager Years of Experience

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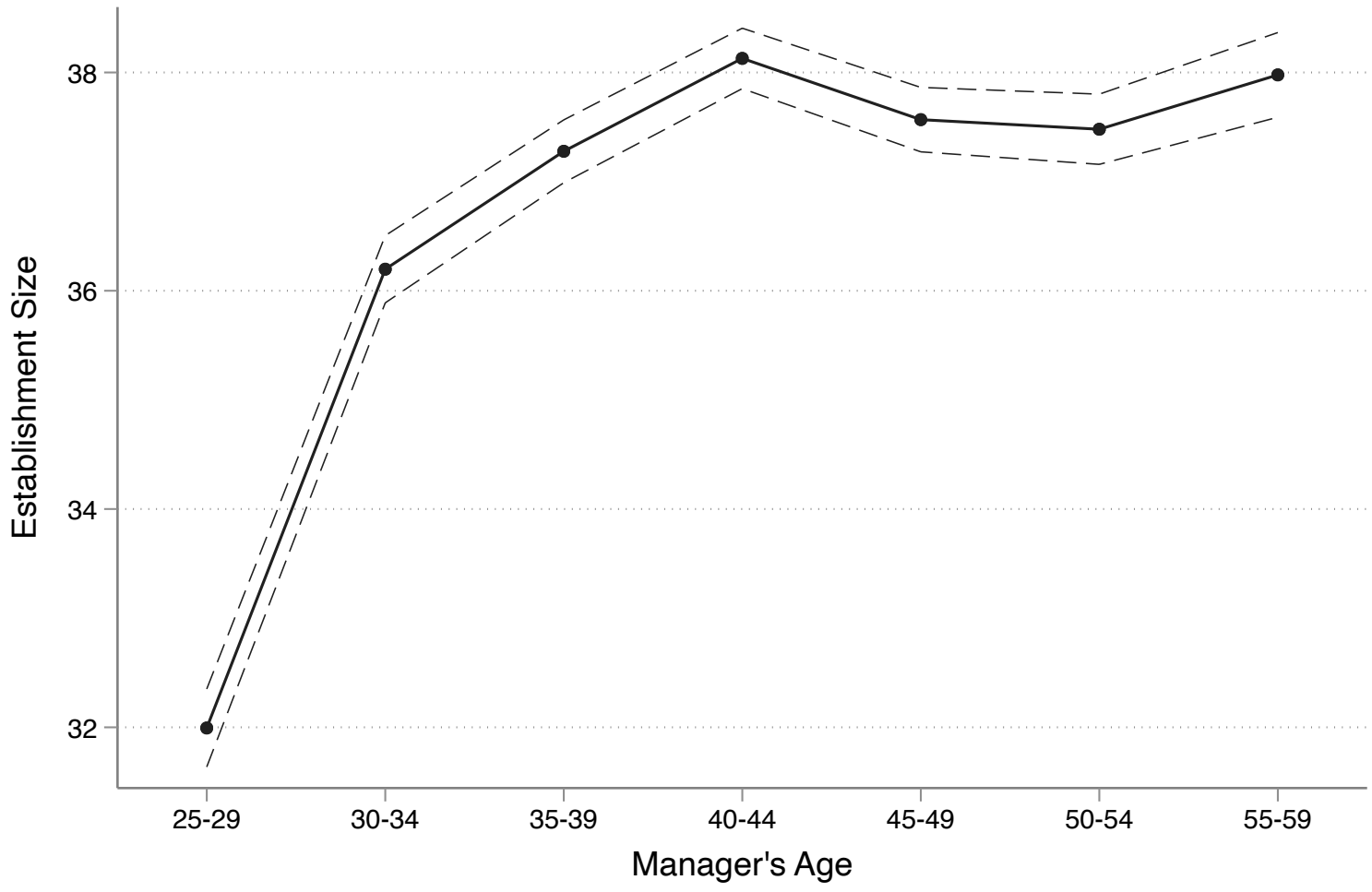
Mexican Data



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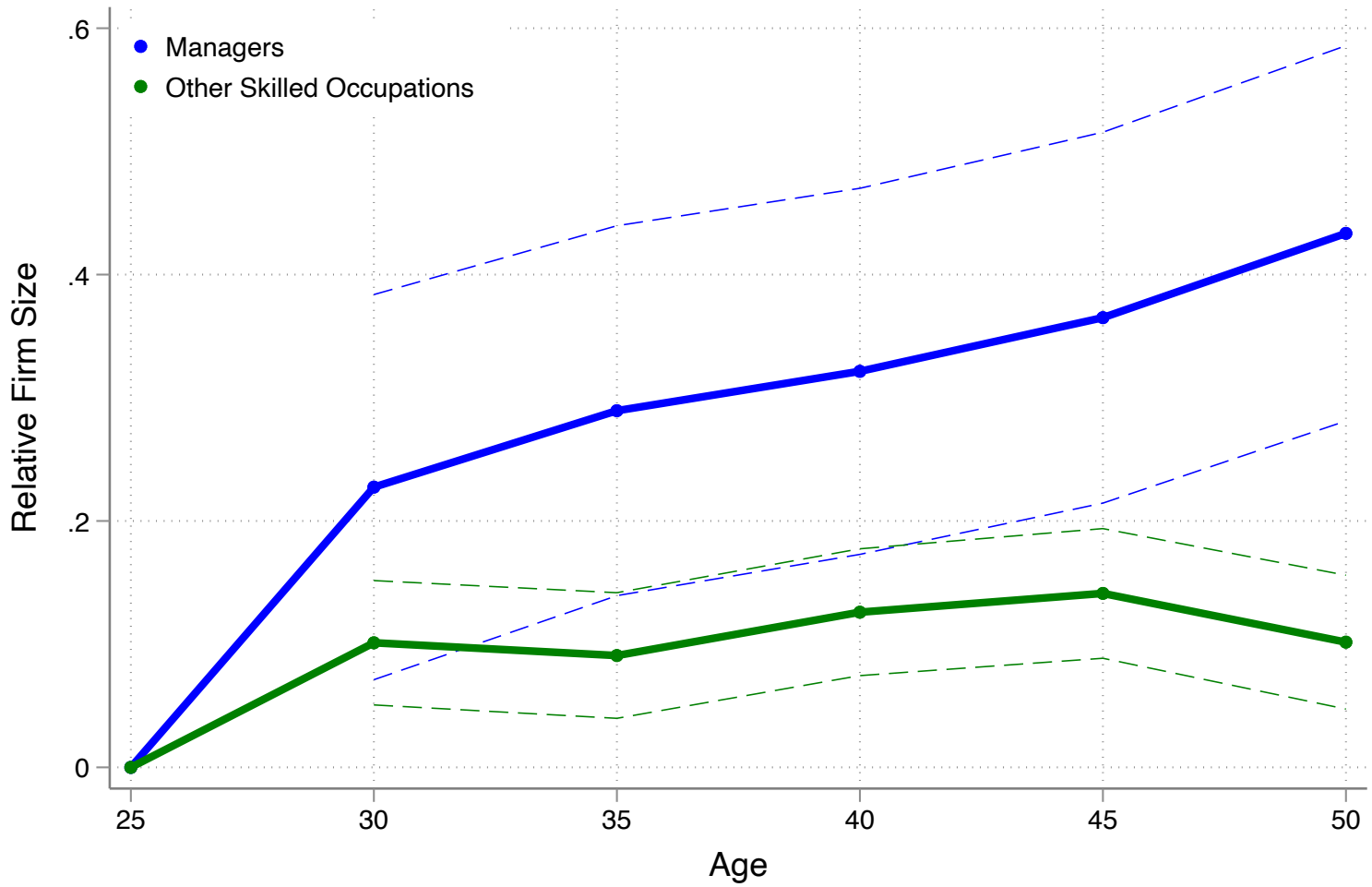
PIAAC


Managers
Other Skilled Occupations
Relative Firm Size
0
.2
.4
.6
25
30
35
40
45
50
Age

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Equilibrium

- Indifference of marginal managers

$$\pi(\bar{x}^a) = wh_a$$

- Profit maximization

$$A\gamma x l(x)^{\gamma-1} = w$$

- Labor market clearing

$$\sum_a \sigma_a \int_{\bar{x}_a}^{\infty} l(x) f^a(x) dx = \sum_a \sigma_a h_a \int_{\frac{\alpha-1}{\alpha} m_a}^{\bar{x}_a} f^a(x) dx$$

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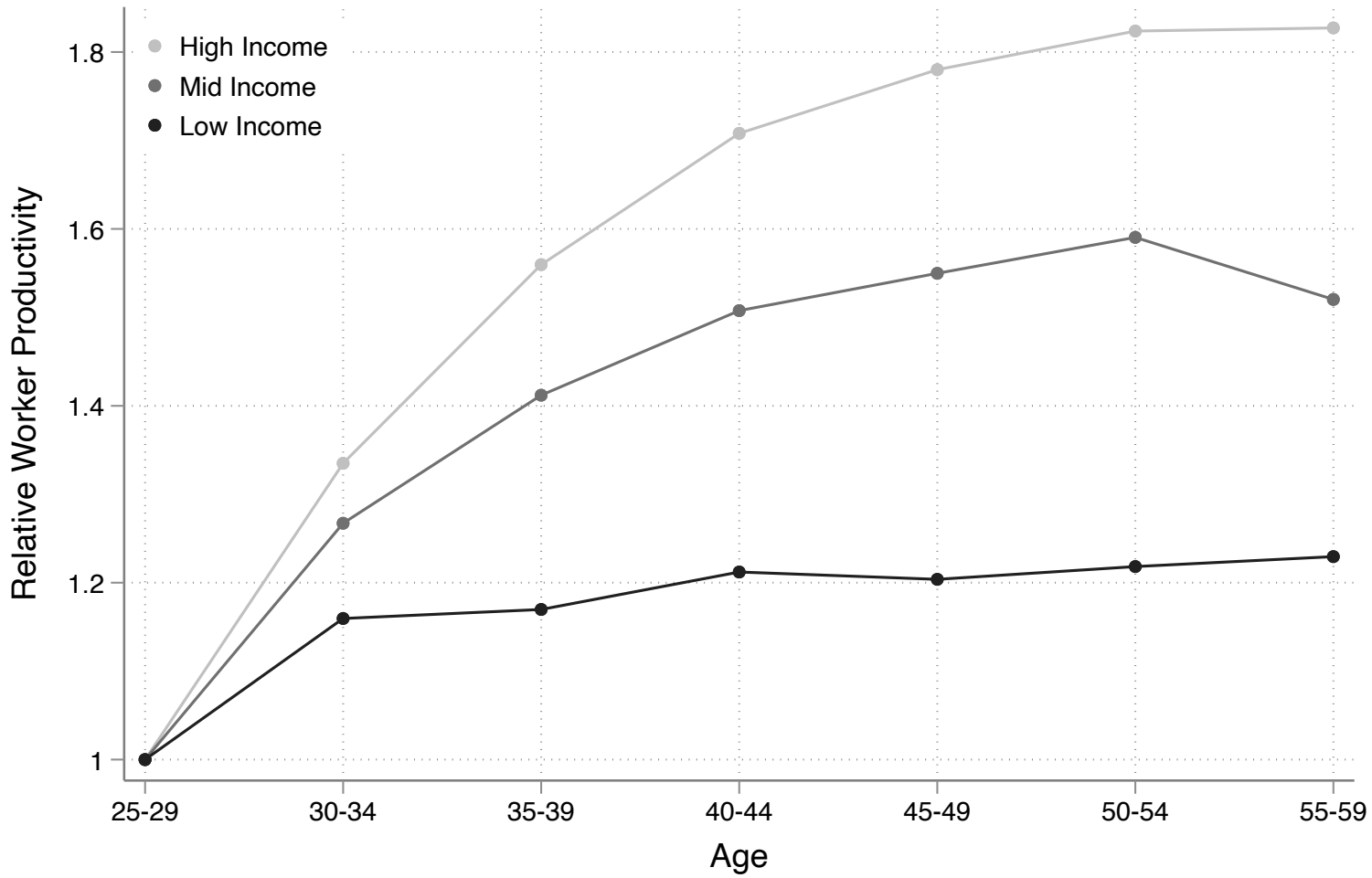
Worker Productivity - Age Profile



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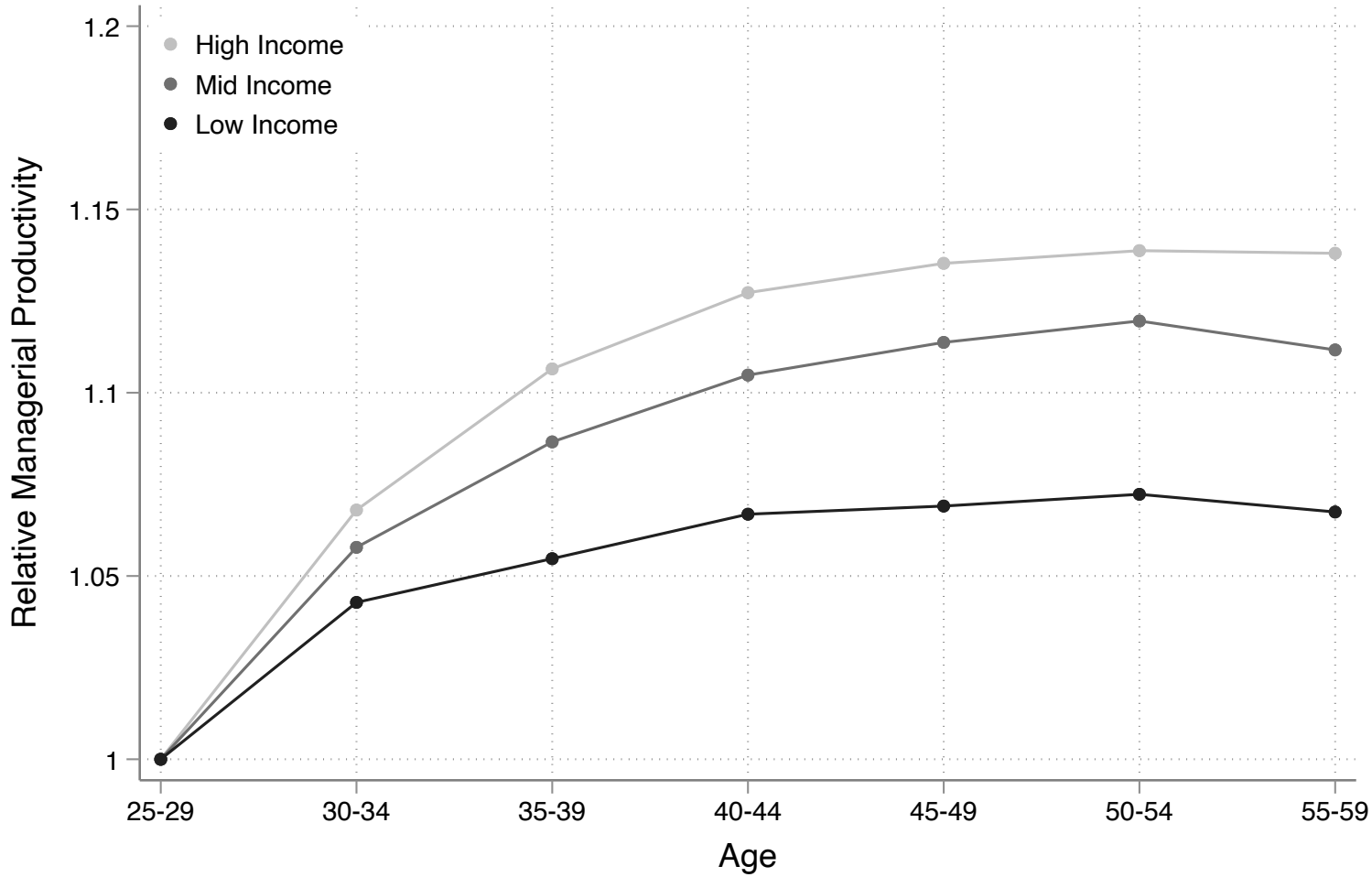
Managerial Productivity - Age Profile



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Revisiting Age & Wage Profile Accounting

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- Compare with model-based counterfactual $\tilde{Y}_c^{Model}$ (equalizing age shares and relative productivities)

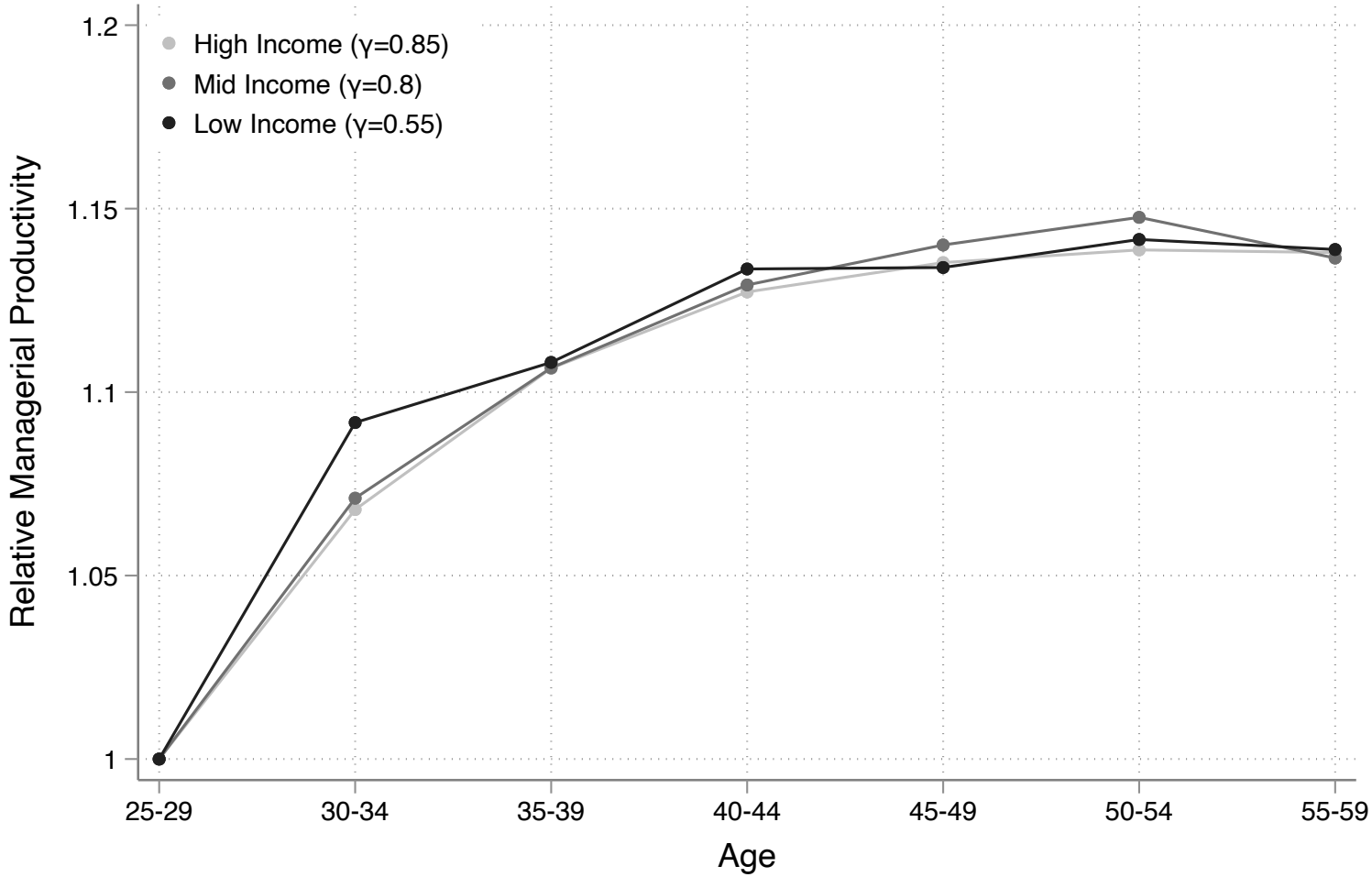
Proposition

If

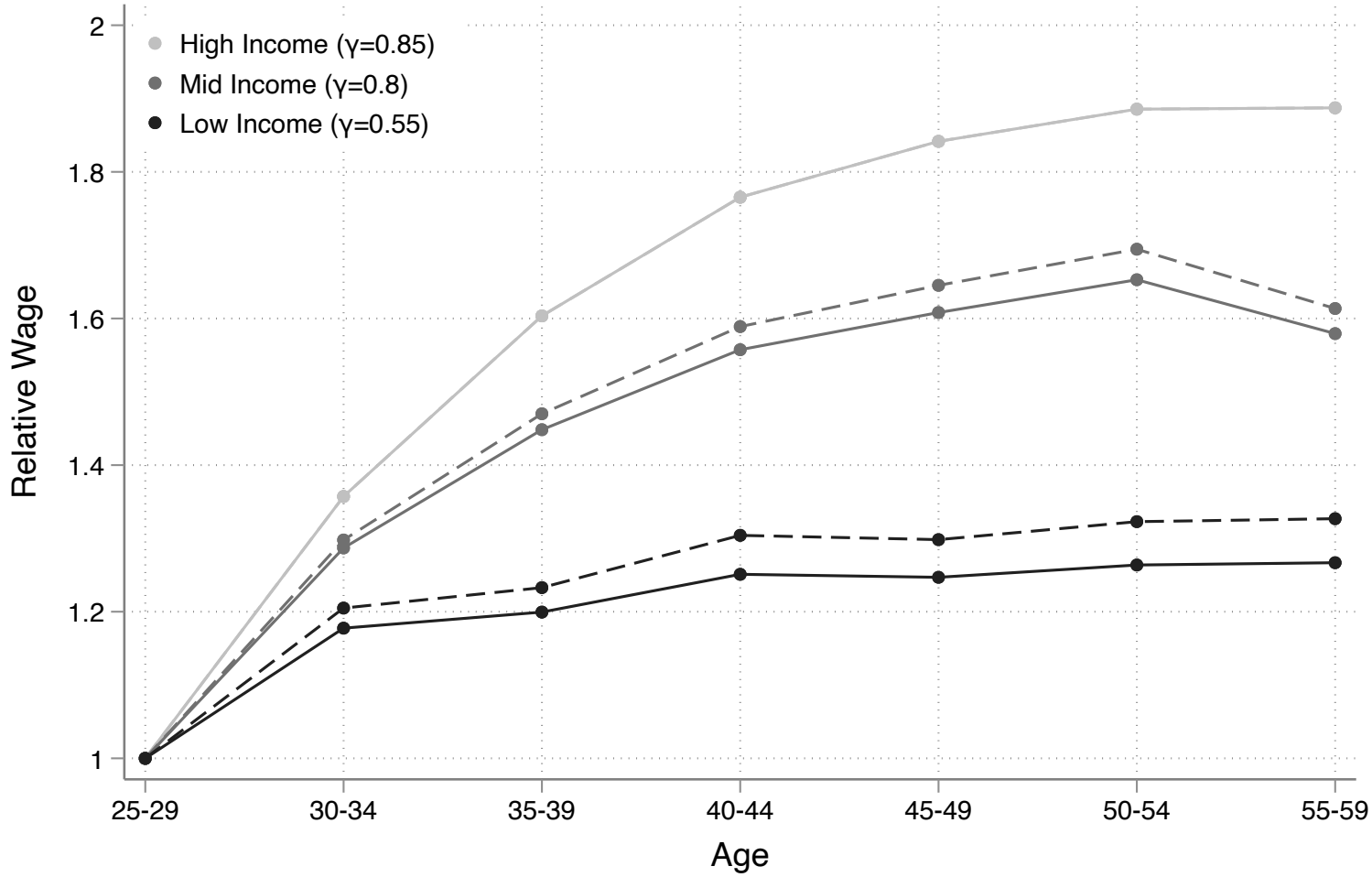
$$\underbrace{\frac{\sum_a \sigma_{a,R} m_{a,R}^{\alpha} h_{a,R}^{1-\alpha(1-\gamma)}}{\sum_a \sigma_{a,c} m_{a,c}^{\alpha} h_{a,c}^{1-\alpha(1-\gamma)}}}_{\text{Managerial Quality Gap}} > \underbrace{\frac{\sum_a \sigma_{a,R} h_R}{\sum_a \sigma_{a,c} h_c}}_{\text{Labor Quality Gap}}$$

then $\tilde{Y}_c < \tilde{Y}_c^{Model}$ *(accounting overstates the output gain).*

Span of Control and Managerial Productivity



Span of Control and Wage Age Profiles



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