Tapping into Talent: Coupling Education and Innovation Policies for Economic Growth

Akcigit, Pearce, & Prato (2020)

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February 2020

How does policy affect talent allocation & aggregate productivity?

- **standard models:**

$$\frac{\partial g}{\partial \text{R\&D subsidy rate}} \approx g, \qquad \frac{\partial g}{\partial \text{Edu subsidy rate}} = 0$$

- **Goolsbee (1998):** supply of R&D workers inelastic $\implies$ R&D subsidies mostly just raise their wages, **muted impact on growth relative to standard models**
- **this model:**

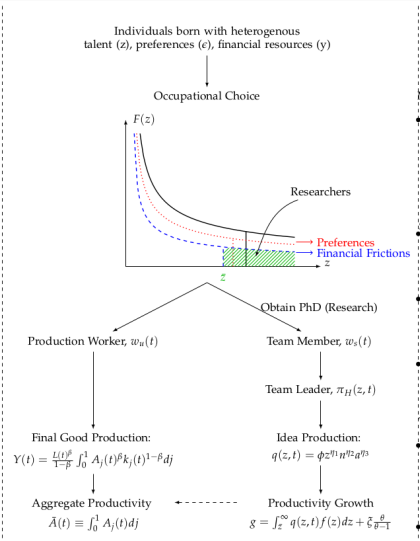
$$\frac{\partial g}{\partial \text{R\&D subsidy rate}} = f(\mathbf{X}), \qquad \frac{\partial g}{\partial \text{Edu subsidy rate}} = h(\mathbf{X})$$

  where $\mathbf{X} = [\text{talent}, \text{preferences}, \text{parental income}, \text{time-to-build}, \text{limited slots}]$
- **policy implications:** different policies tap into different parts of the talent pool
- **today:** quick review of facts & model, then comments

Ten facts (Denmark 2001–13)

1. individuals with **higher IQ** are **more likely** to obtain a PhD
2. individuals with **higher parental income** are **more likely** to obtain a PhD
3. individuals' **IQ** is **correlated** with parental income (not perfectly)
4. only a **fraction** of people with high IQ, high parental income obtain a PhD
5. PhDs are **20-times more likely** to become **inventors** (relative to avg. person)
6. conditional on education, higher IQ people are **more likely** to innovate
7. inventors work in **teams** and team size is **heterogeneous**
8. probability of innovating as team leader over the **lifecycle** is **inverted-U shape**
9. increase in **PhD slots** is associated with **decline** in average IQ of PhDs
10. economy is **open** in goods market; **closed** in skills market

Model in a picture: Heterogeneity + Career choice

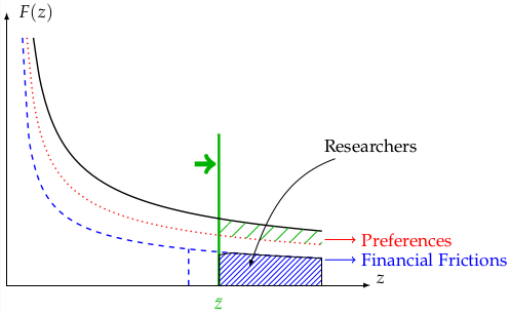


How does talent allocation respond to policies?

- **R&D subsidy**
- **Education subsidy**
- **More PhD slots**

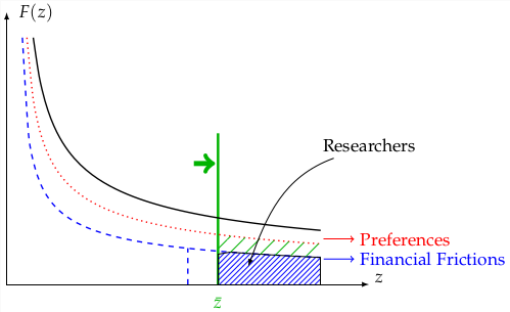
How does talent allocation respond to policies?

- **R&D subsidy**
  1. increase price of idea
  2. profits from idea production rise
  3. buy more equipment, more individuals choose research
- Education subsidy
- More PhD slots



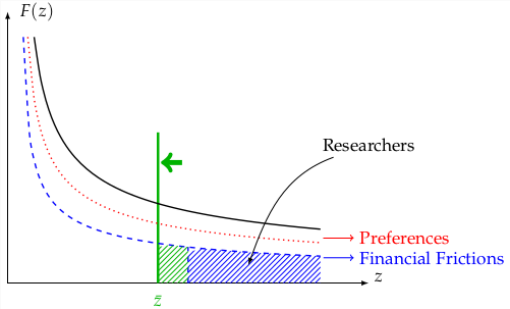
How does talent allocation respond to policies?

- R&D subsidy
- **Education subsidy**
  1. decrease cost of education
  2. increase $\tilde{\mu}$ (prob. that education is affordable)
  3. individuals who like research but couldn't afford it now choose research
- More PhD slots

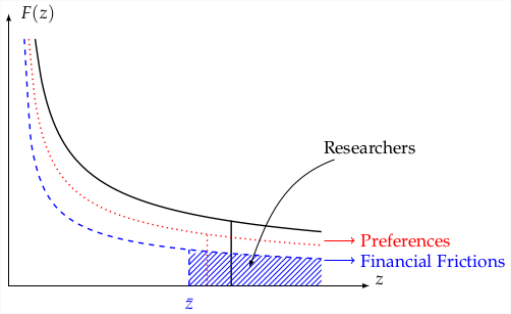


How does talent allocation respond to policies?

- R&D subsidy
- Education subsidy
- **More PhD slots**
  1. quality of marginal researcher drops to clear labor market
  2. partly offset by drop in profits from ideas
  3. still, more individuals choose research



How did we get such nice figures?



$$\underbrace{N}_{\text{mass PhDs}} = \underbrace{\Pr\{z \geq \bar{z}\}}_{\text{enough talent}} \times \underbrace{\tilde{\mu}}_{\text{Pr(afford)}} \times \underbrace{\alpha}_{\text{Pr(preference)}}$$

We made $\tilde{\mu}$ and α independent of z!

$$\tilde{\mu} \equiv \mu + (1-\mu) \times \left(\frac{\tilde{\theta} - 1}{\tilde{\theta}} \right)^{\tilde{\theta}}$$

with μ: frac. w/ [parent income] $\propto z$

$1 - \mu$: frac. w/ [parent income] $\perp z$

$$\alpha \equiv \Pr\left\{ V^{\text{PhD}} > V^{\text{worker}} + \ln(\epsilon) \right\}$$

with $\epsilon^{\chi} \sim U[0, Ez]$