Designing Efficient Education and Tax Policies

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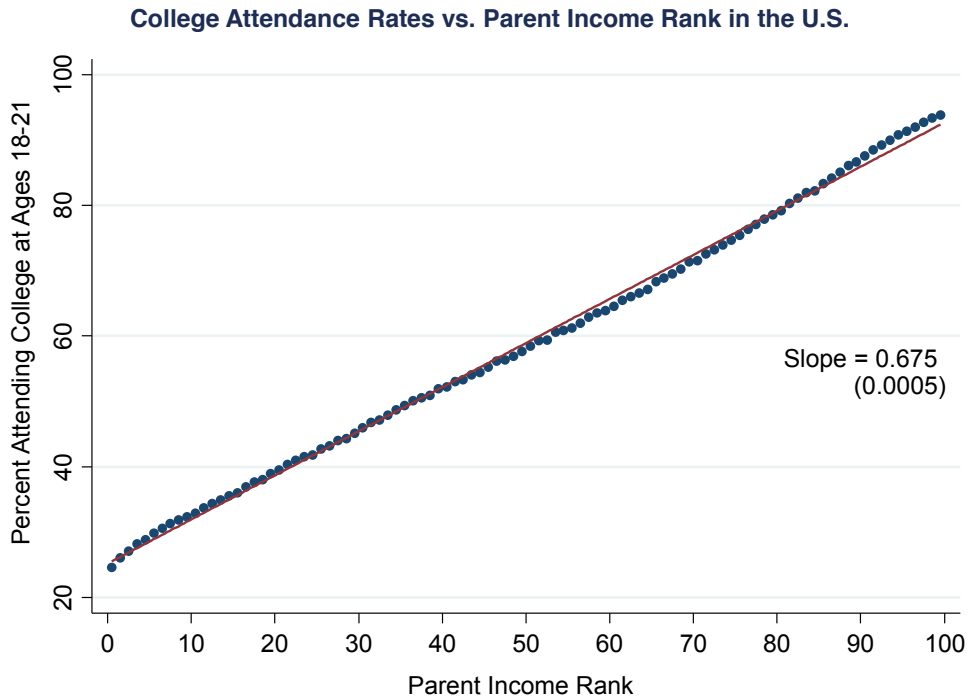
Motivation Social Mobility in the US



Source: Chetty, Hendren, Kline and Saez (2014)

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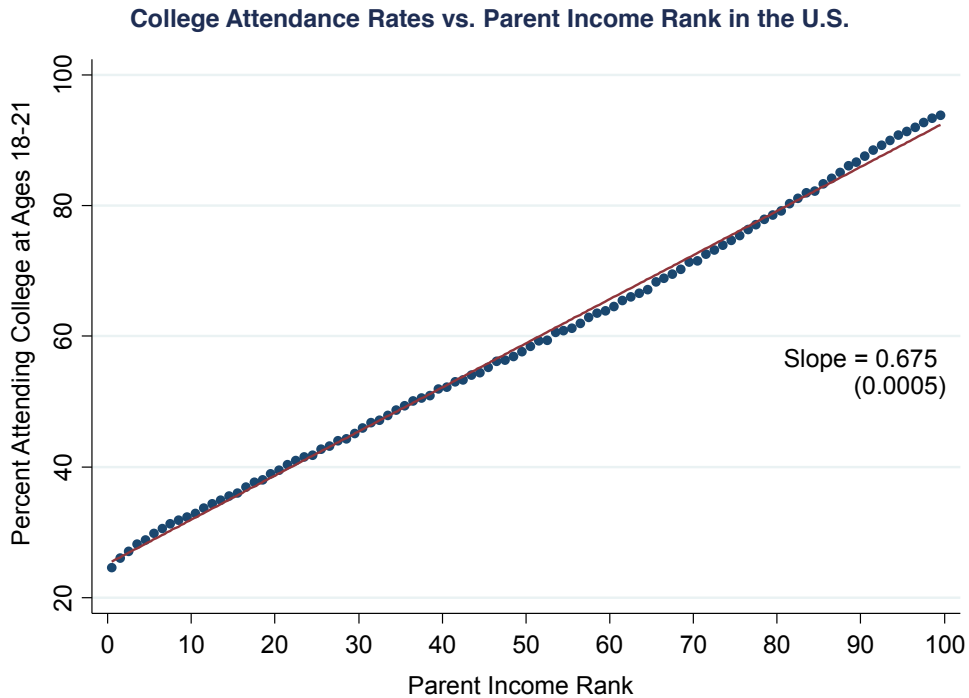

Need-based financial college aid promotes social mobility.

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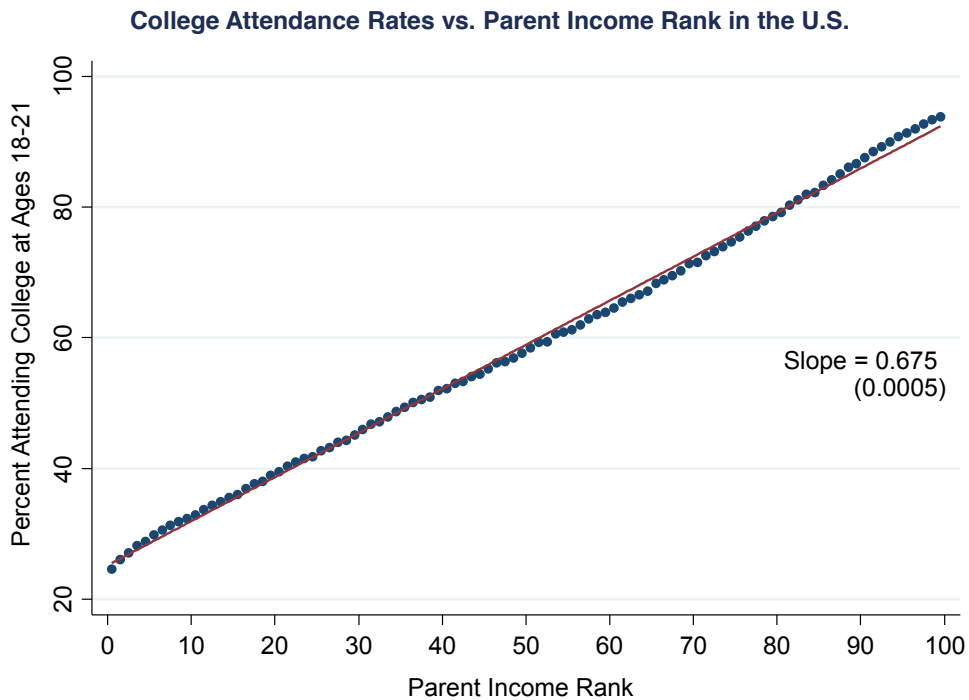

How costly are such policies? How large is the equity-efficiency trade-off?

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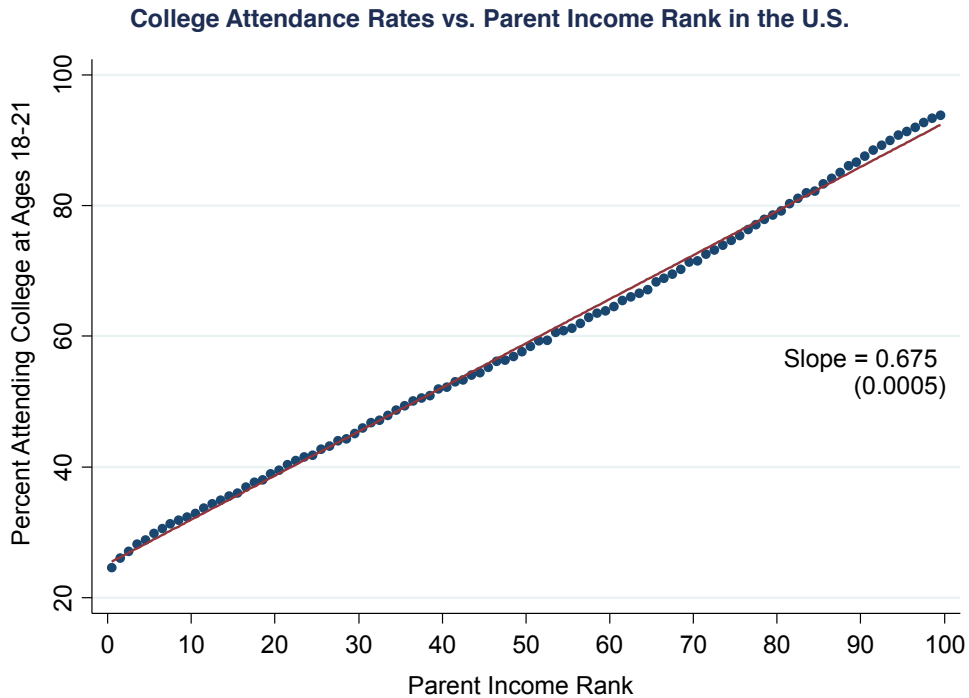

This Paper: There is no equity-efficiency trade-off

Motivation Why Subsidize Education?

- **Public Economics:** Yes, because of a *fiscal externality*
  - Bovenberg & Jacobs (2005): Subsidies counteract tax distortions on human capital margin

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  What does this quantitatively imply?

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- **Flipside** of this argument: taxes might create undesirable distortions on education margin because returns are partly taxed away

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  $\Rightarrow$ But there is empirical evidence on the responsiveness of college enrollment with respect to grants & subsidies
- Our Contribution: Asses excess burden of taxes on college enrollment within an empirically plausible model

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These results rest on one simple formula!

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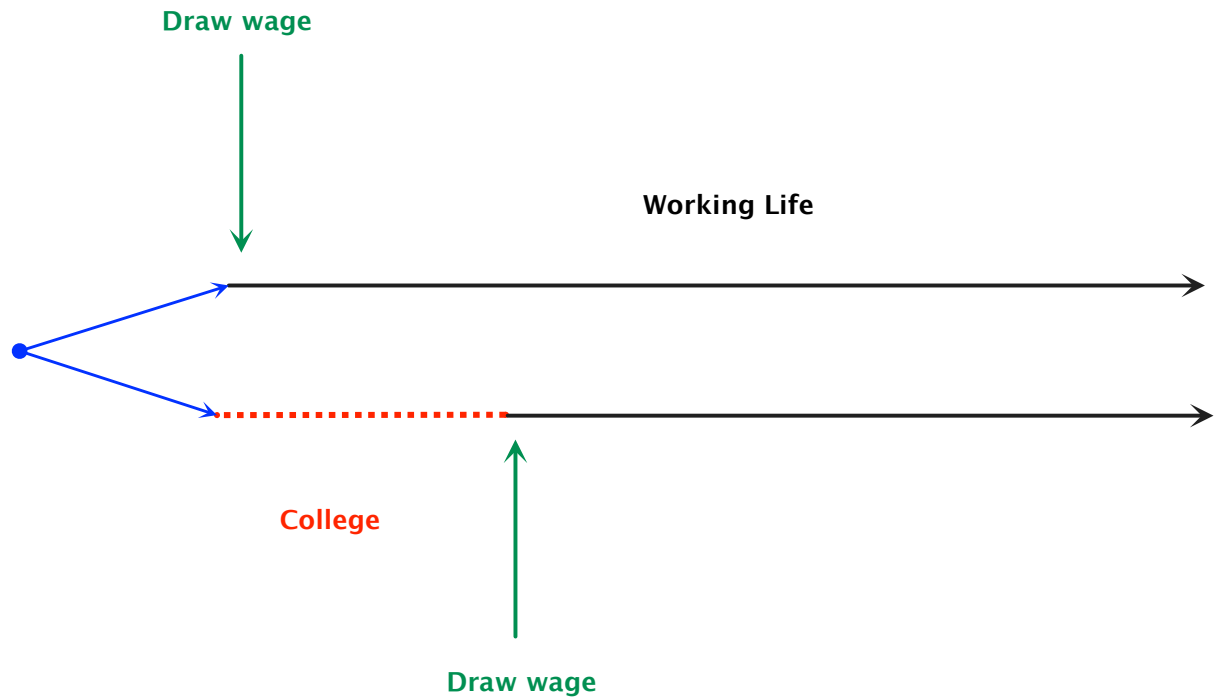
    $\Rightarrow$ Need-based policies *efficient*, large potential for Pareto improvements
- Income taxes: small importance of college graduation for tax design
  - ❏ Diamond-Saez result for optimal income taxes barely affected by endogeneity of college graduation.

The Model Graphical Illustration

Decisions:

- College Entry



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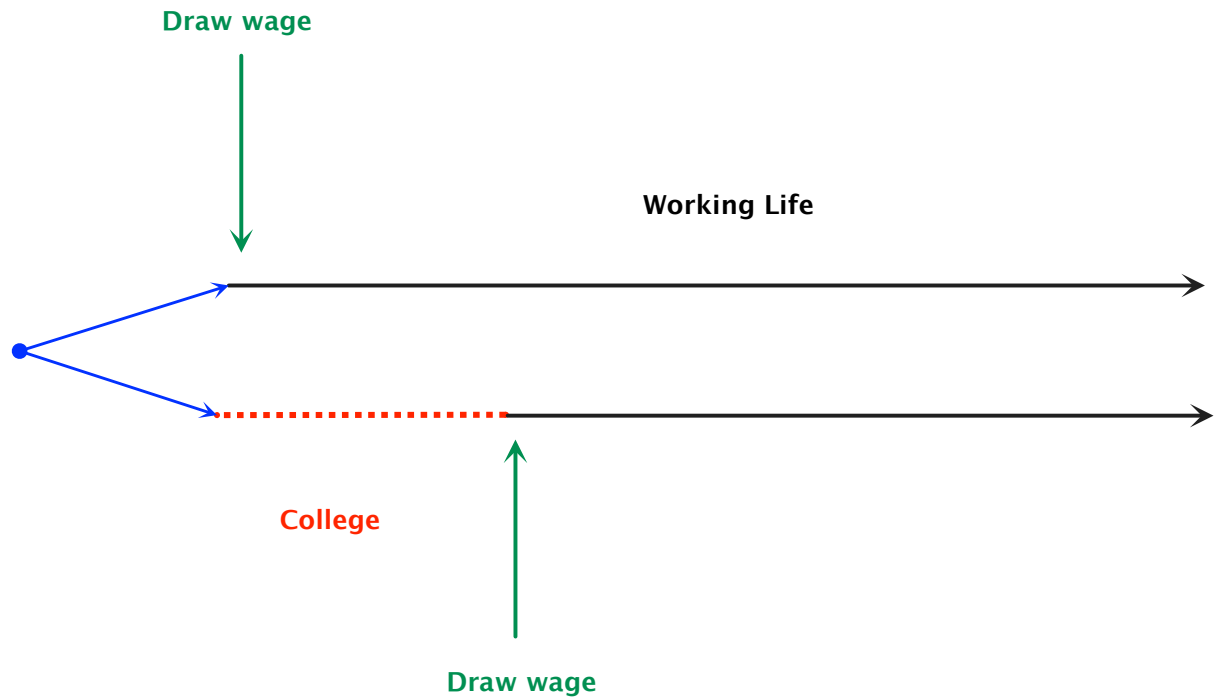

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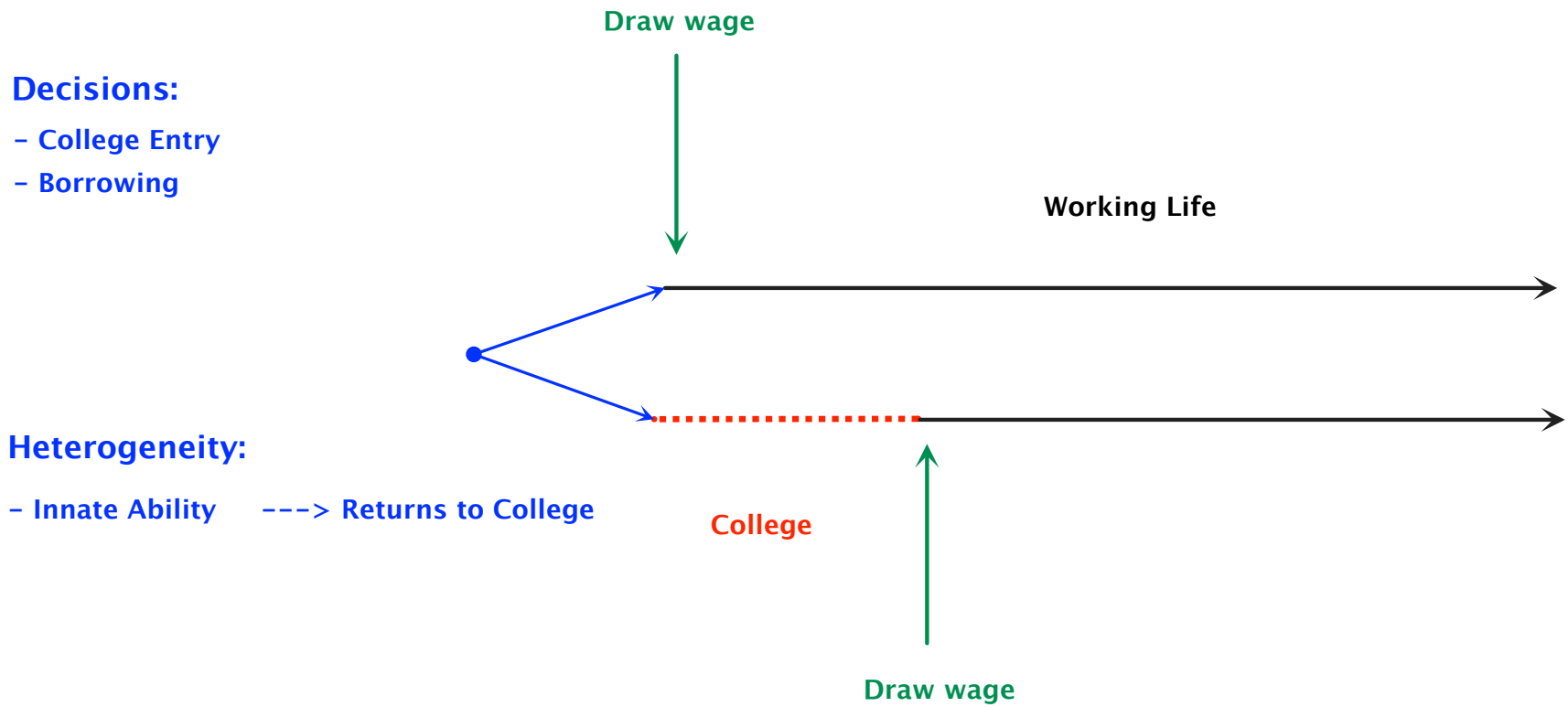

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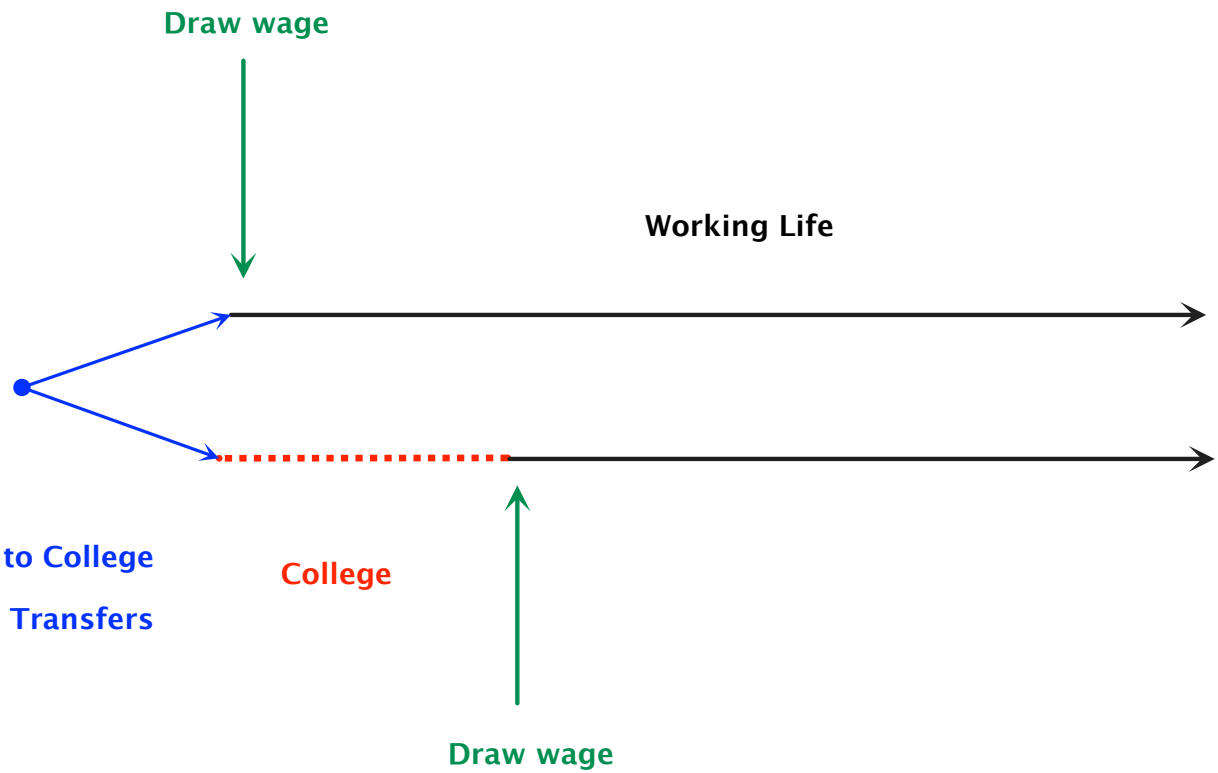
Heterogeneity:

- Innate Ability ---> Returns to College
- Parental Income ---> Parental Transfers



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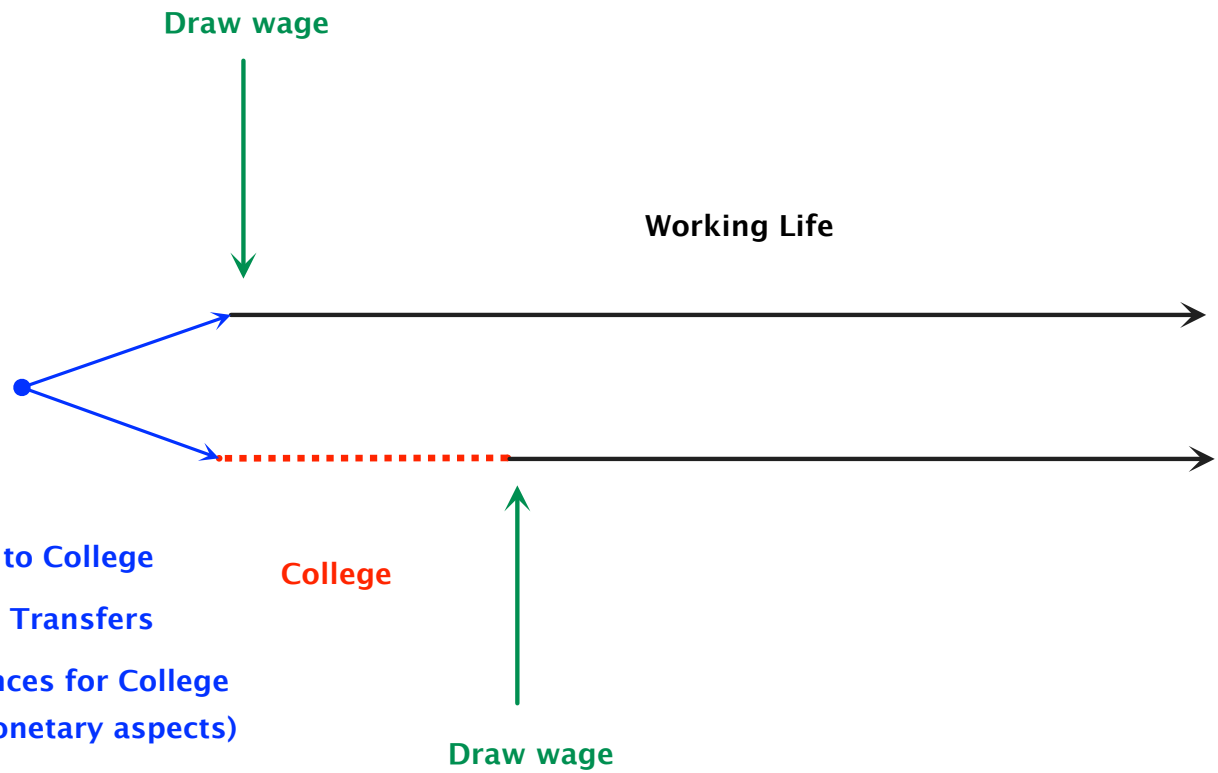

Heterogeneity:

- Innate Ability ---> Returns to College
- Parental Income ---> Parental Transfers
- Psychic Costs ---> Preferences for College (non-monetary aspects)

The Model Heterogeneity

- Ex-ante, individuals differ in
  1. Innate ability $\theta \in [\underline{\theta}, \overline{\theta}] \sim F(\theta)$.
  2. Parental Income $\mathcal{I} \in R_+ \sim K_\theta(\mathcal{I})$
  3. Psychic Costs of going to college $\kappa \in [\underline{\kappa}, \overline{\kappa}] \sim H_{\theta,\mathcal{I}}(\kappa)$
4. When individuals enter the labor market, they draw a wage $\omega \in [\underline{\omega}, \overline{\omega}]$ from
   - $G_\theta^{hs}(\omega)$ when they are high school graduates
   - $G_\theta^{co}(\omega)$ when they are college graduates

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$$V_{co}(\theta, \mathcal{I}) - \kappa \geq V_{hs}(\theta, \mathcal{I}).$$

- For each type $(\theta, \mathcal{I})$, we can define a threshold

$$\tilde{\kappa}(\theta, \mathcal{I}) = V_{co}(\theta, \mathcal{I}) - V_{hs}(\theta, \mathcal{I})$$

  such that individuals of type $(\theta, \mathcal{I}, \kappa)$ (don't) go to college whenever $\kappa < (>) \tilde{\kappa}(\theta, \mathcal{I})$.

Assumptions Parameters & Current Policies

- Utility function

$$U = \frac{1}{1-\gamma}\left(C - \frac{\left(\frac{y}{w}\right)^{1+\varepsilon}}{1+\varepsilon}\right)^{1-\gamma}$$

  with $\gamma = 2$ and $\varepsilon = 3$

- Years of College 4 and overall life 48 years
- $R = 1.04$ and $\beta = \frac{1}{R}$
- Parametric income tax approximation from Guner et al. (2013, RED)
- Take weighted averages for year 2002 for 4 regions (northeast, northcentral, south, west)
- Borrowing maximum is \$23,000 (Stafford Loan Maximum in year 2002)

Procedure

- **Data:** NLSY $\Rightarrow$ Ability measures (AFQT) and parental transfers
- **Step 1:** Estimate $G_\theta^{hs}(\omega)$ and $G_\theta^{co}(\omega)$
- **Step 2:** Estimate $tr_{hs}(\mathcal{I})$ and $tr_{co}(\mathcal{I})$
- **Step 3:** Estimate $\mathcal{G}(\theta, \mathcal{I}, X)$
- **Step 4:** Calculate $V_{co}(\theta, \mathcal{I})$ and $V_{hs}(\theta, \mathcal{I})$
- **Step 5:** Estimate the distributions $H_{\theta,\mathcal{I}}(\kappa)$ with Maximum Likelihood

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  Rather standard. Regress income on innate ability and college.
  Based on that calibrate wages as in Saez (2001).
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  Regress transfers on parental income, education and controls.
  Result: college students on average receive 40% more of parental transfers.
- **Step 3:** Estimate $\mathcal{G}(\theta, \mathcal{I}, X)$
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  Grants increase in ability, decrease in parental income and are higher for blacks
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  Directly follows from parameter assumptions, 1., 2. and 3.
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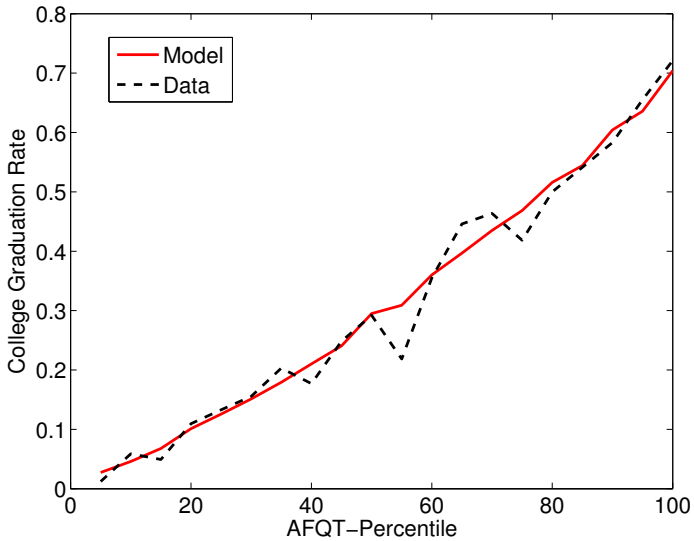
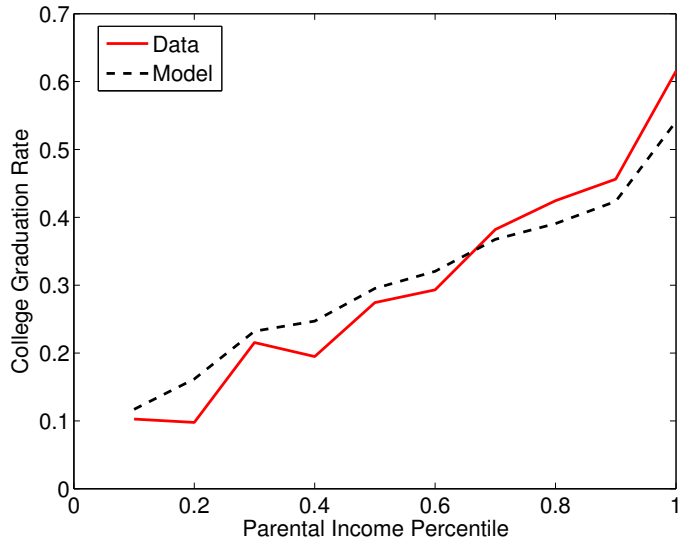
  Use Probit model. Take parental education and AFQT as determinant of psychic costs

Model Performance



(a) AFQT



(b) Parental Income

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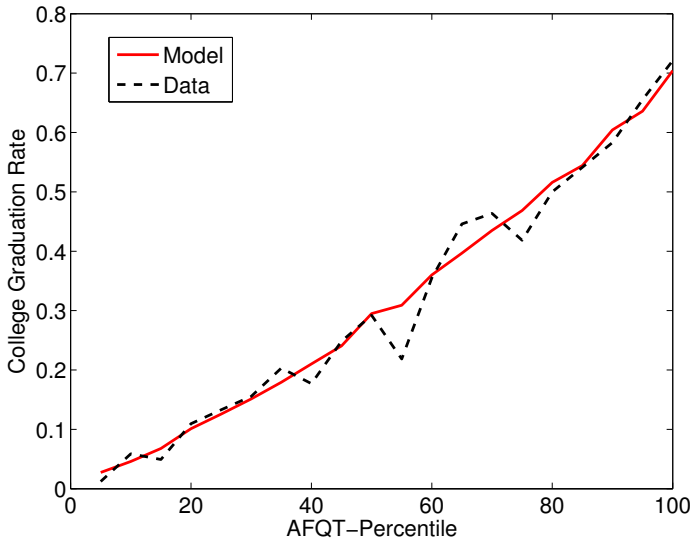

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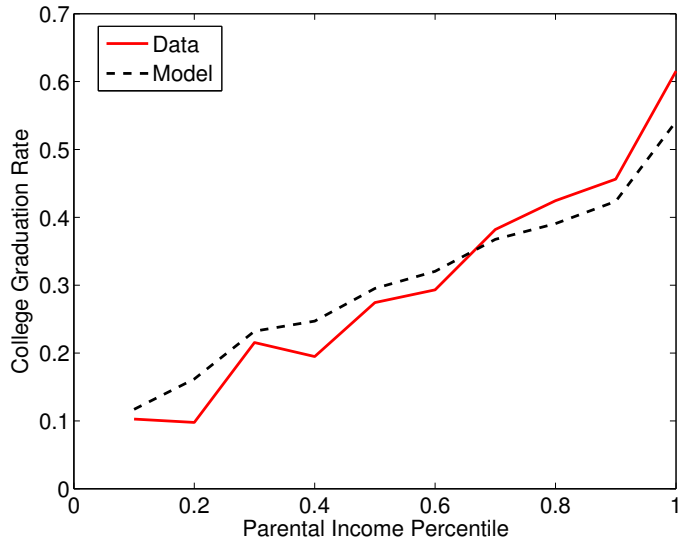

(b) Parental Income

- Replication of Natural Experiment: \$1,000 increase in grants
  - Literature: 1.2-2.4 percentage points increase in BA-completion
  - Our model: 1.9%

Result 1 Subsidies to a Large Extent Self-Financing

- Impact of a \$1 increase in universal tuition subsidy on *government budget*

$$\gamma_R^{\mathcal{G}} = \frac{\Delta \bar{e} \Delta \bar{\mathcal{T}}}{G^{co}} - 1.$$

- $\Delta \bar{e}$: marginal students, behavioral response

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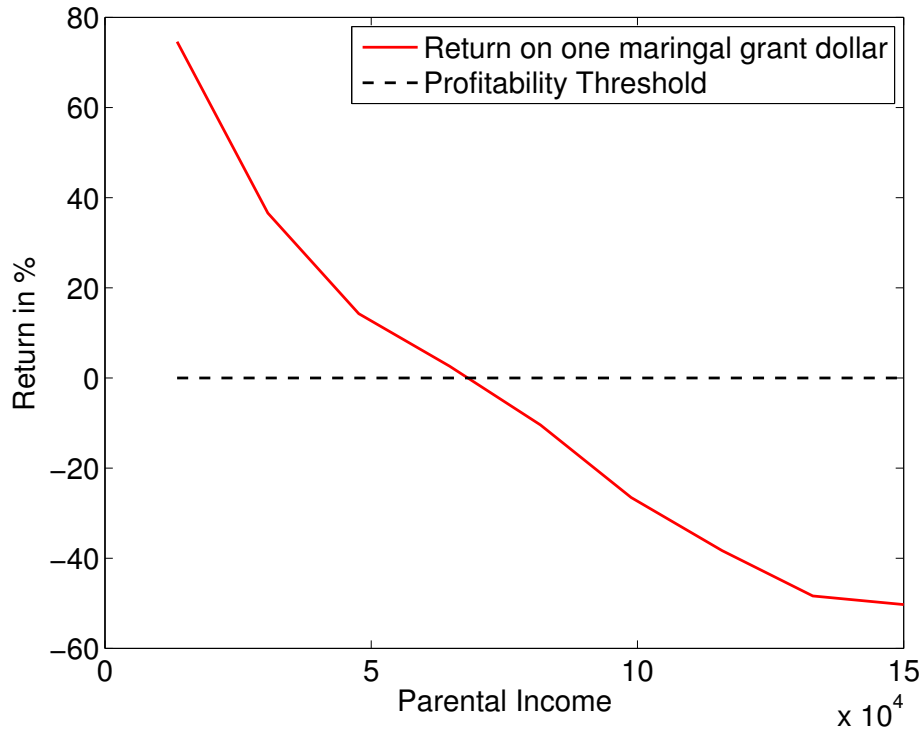
- $\gamma_R^{\mathcal{G}} = -0.02$

Result 2 Need-Based Financial Aid Efficient



- Returns up to 70%
- What drives this result? $\Delta\bar{\mathcal{T}}$? $\Delta\bar{e}$? G^{co}?

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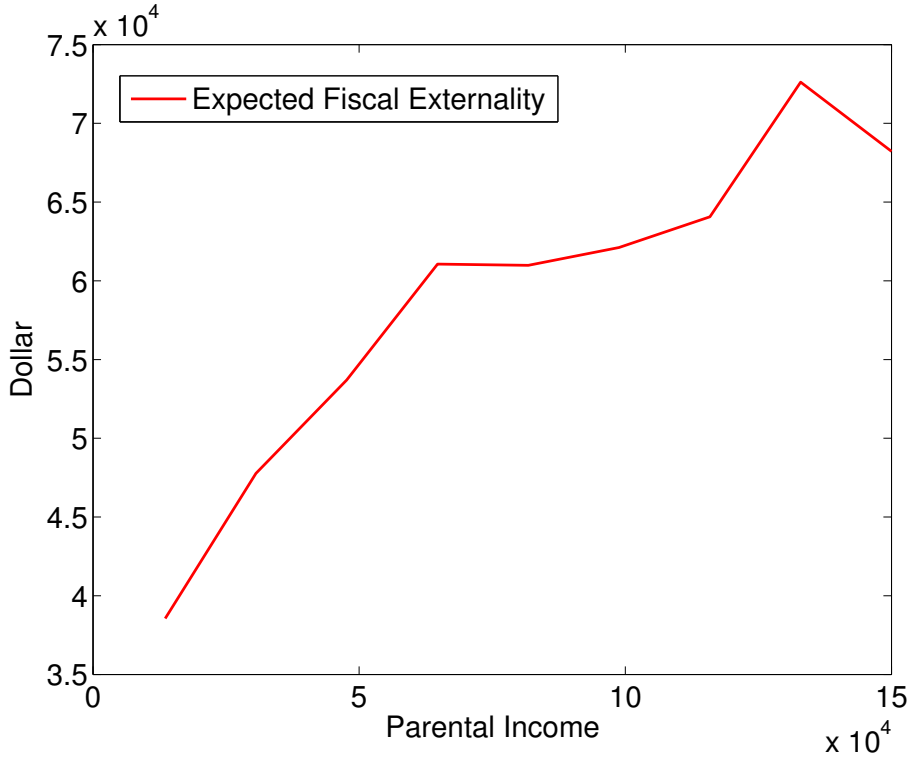

- Returns to education for marginal students are (more or less) increasing in parental income

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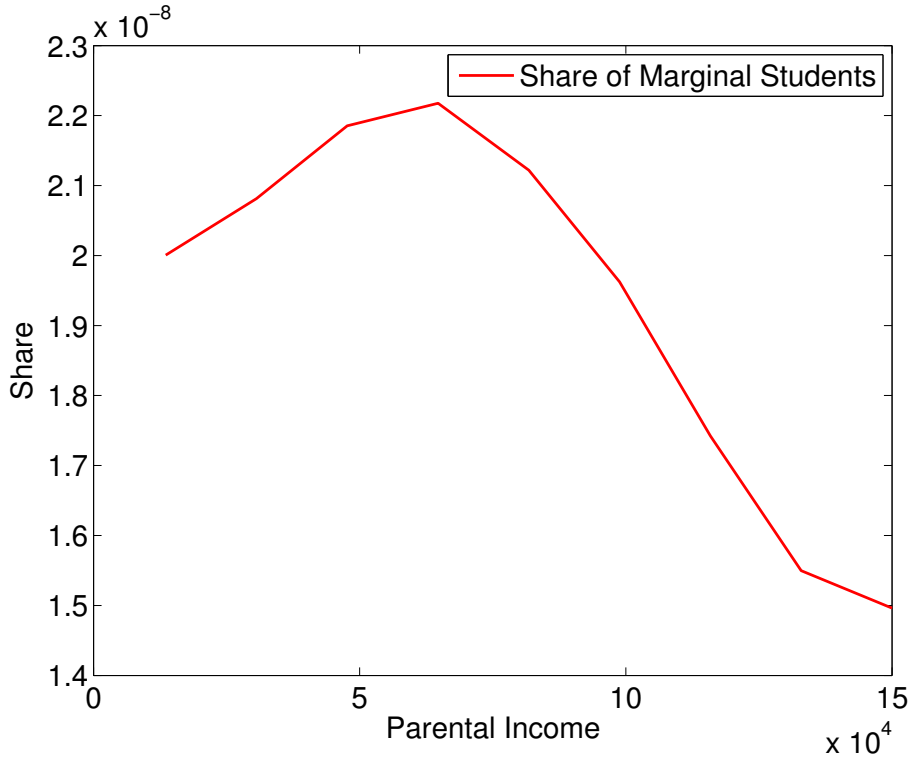

- Responsiveness to subsidies hump-shaped

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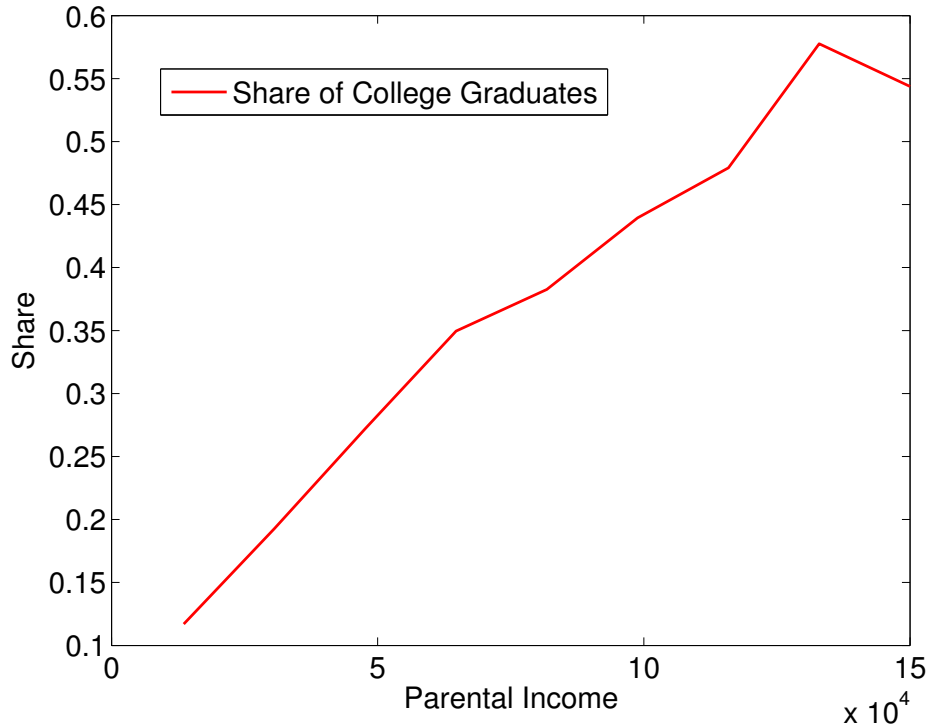
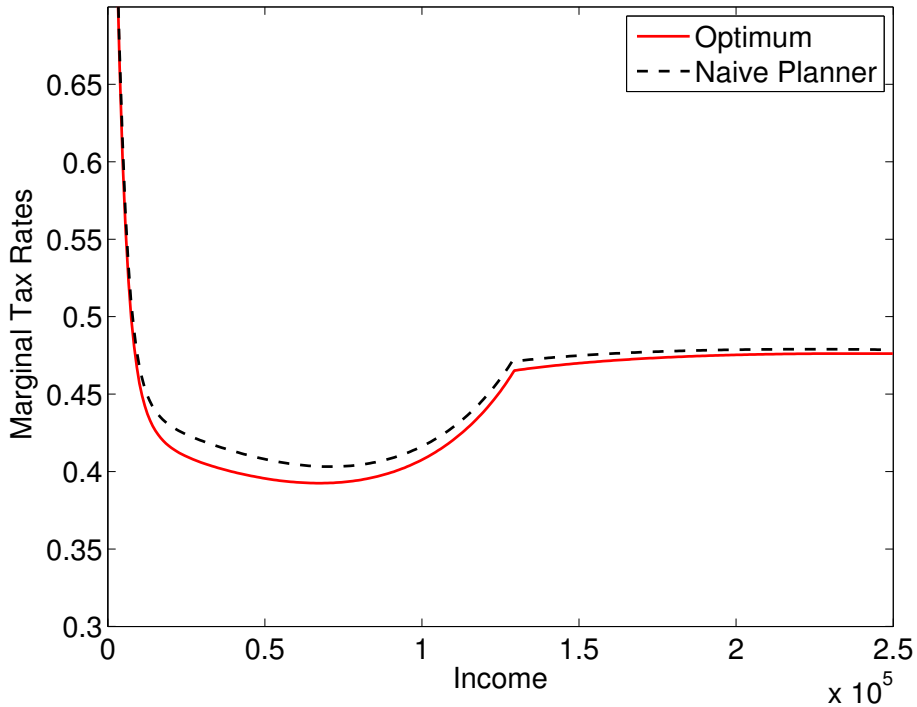


- Share of infra-marginal students heavily increasing (varies by factor of 6)

$$\gamma_R^{\mathcal{G}} = \frac{\Delta \bar{e} \Delta \bar{\mathcal{T}}}{G^{co}} - 1.$$

Result 3 Optimal Income Taxes Slightly Lower



- Optimal taxes only slightly affected by endogenous graduation. At maximum 1.4% points