The Great Gatsby Goes to College:

Tuition, Inequality and Intergenerational Mobility

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Princeton University

Introduction

Motivation

How does higher education contribute to income inequality and intergenerational mobility?

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How does higher education contribute to income inequality and intergenerational mobility?

Partial Equilibrium view

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General Equilibrium view (this paper)

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  - Parental income

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- Role of tuition fees (and governments policies)

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General Equilibrium view (this paper)

- Sorting of students across colleges based on ...
  - Ability
  - Parental income Mean Par. Inc. by Coll.
- Sorting of financial resources across colleges
- Role of tuition fees (and governments policies)
- Sorting into colleges in turn shapes
  - Inequality at the next generation Mean Kid Inc. by Coll.
  - Intergenerational mobility

Approach

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- Build a tractable GE framework with
  - Dynasties of households transmit human capital and choose college
  - Colleges choose students and educational expenditures
  - A government

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- Build a tractable GE framework with
  - Dynasties of households transmit human capital and choose college
  - Colleges choose students and educational expenditures
  - A government
- Use the model to run counterfactuals
  - Develop intuitions using analytical solutions about linkages between
    - Sorting of heterogeneous stud. across heterogeneous coll.
    - Income inequality
    - Intergenerational mobility
  - Quantification based on micro-data in the U.S.

Preview of Findings

Findings 1: Higher ed. increases income inequality and intergenerational persistence, partially mitigated by gov. interventions.

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Findings 1: Higher ed. increases income inequality and intergenerational persistence, partially mitigated by gov. interventions.

Findings 2: Increase in returns to education

- rationalizes increase in tuition and dispersion of expend./students across colleges Data
- worsens misallocation of students

Literature

Theoretical and structural literature

- Transmission of human capital, social mobility and inequality

  Loury (1981), Becker and Tomes (1986), Fernandez and Rogerson (1996), Benabou (2002), Caucutt and Lochner (2020)
- Pricing behavior of colleges and sorting

  Rothschild and White (1995), Epple et al.(2006, 2017), Cai and Heathcote (2019) More.
- Higher education in structural GE

  Restuccia and Urrutia (2004), Abbott et al. (2013), Krueger and Ludwig (2016), Lee and Seshadri (2019),

Empirical/micro literature

- Empirical studies on mobility, returns to higher education

  Dale and Krueger (2002, 2011), Long (2008, 2010), Zimmerman (2014,2019), Chetty et al. (2019)
- Effects of financial aid

  Hoxby et al. (2012), Dynarski et al. (2013), Autor et al. (2019)

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The Model (closed-form)

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Outline

Environment

- Time is discrete, t=1,2,3...

  A period is a generation (30 years)

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  A government (extension)

Timeline and Blocks of the Model

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h: human capital

Timeline and Blocks of the Model

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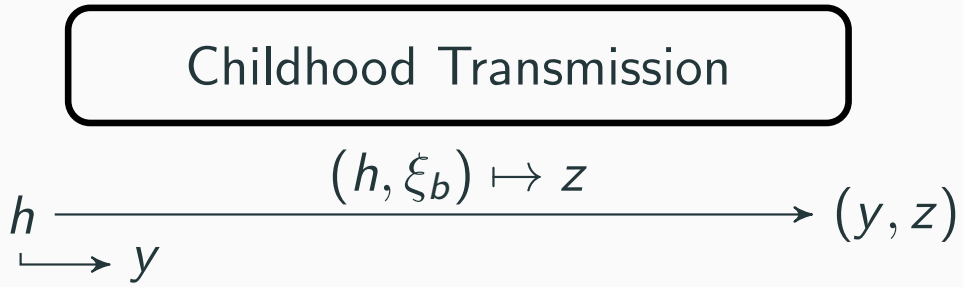

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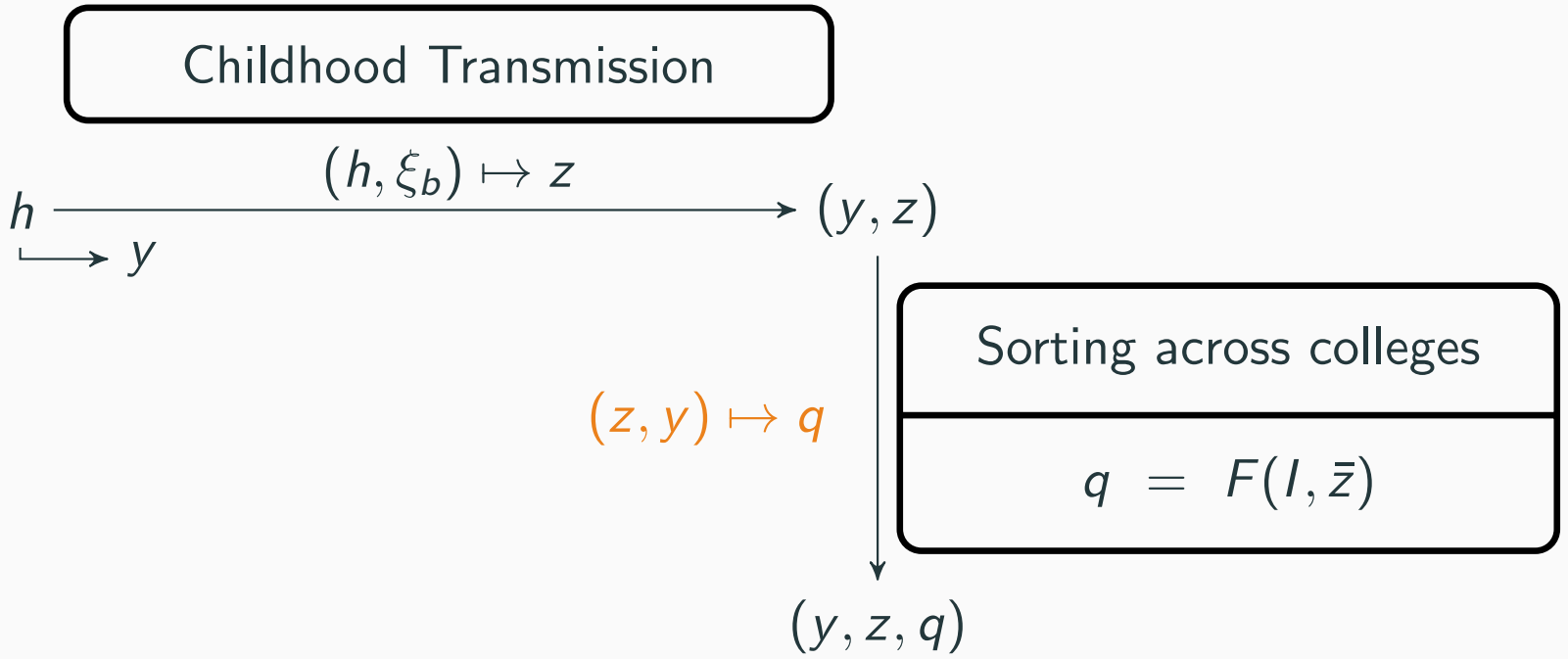

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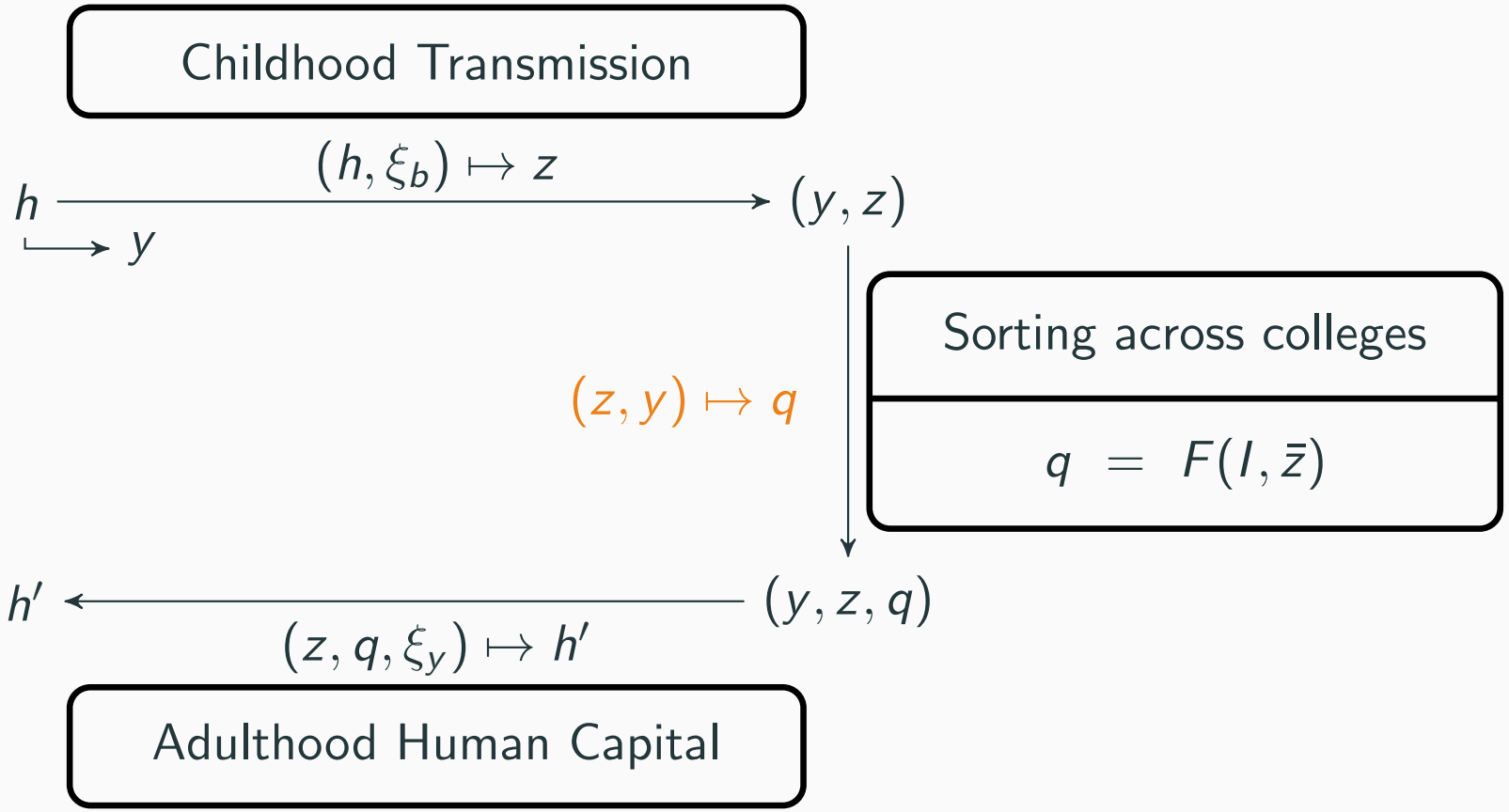

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The Model (closed-form)

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A dynasty solves:

$$\mathcal{U}(h,z) = \max_{c,\ell,q} \left\{ \ln c - \ell^{\eta} + \beta E\left[\mathcal{U}(h',z')\right] \right\}$$

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- Intergenerational Borrowing Constraint

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$$\xi_b, \xi_y \sim \text{Log-normal} \qquad \text{Birth and Labor Market Shocks}$$

Model with Government | Borrowing Constraint

The Model (closed-form)

Colleges

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Technology: A college delivers a quality to its students

$$q = I^{\omega_1} \left(\bar{z}\right)^{\omega_2} \qquad \text{Production Func. of Quality}$$

with two inputs

$$p_I I = E_{\phi(.)}[e(q, z, y)] \qquad \text{Educational Services/Budget Constraint}$$

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Objective: Taking tuition schedule $e(q, z, y)$ and p_I as given, college chooses

- density $\phi(z, y)$ = composition of student body
- educational services I

to solve $\max_{I, \bar{z}, \phi(.)} q$

More Positioning

The Model (closed-form)

Equilibrium: Tuition Schedule, Sorting Rule and Law of Motion

Tuition Schedule and Sorting Rule

Competitive Eq. exists and unique in class of log-normal eq. Details

Tuition Schedule and Sorting Rule

Proposition

In equilibrium, the tuition schedule is given by

$$e(q, z) = p_{I,t} q^{\frac{1}{\omega_1}} z^{-\frac{\omega_2}{\omega_1}}$$

and the sorting rule by

$$q = K_t y^{\omega_1} z^{\omega_2}$$

with C, K aggregate variables. Epple HH K

Sorting Rule: Illustration

Proposition

The sorting rule is given by $q = \tilde{K}_t h^{\omega_1 \lambda} z^{\omega_2}$ $\tilde{K}$

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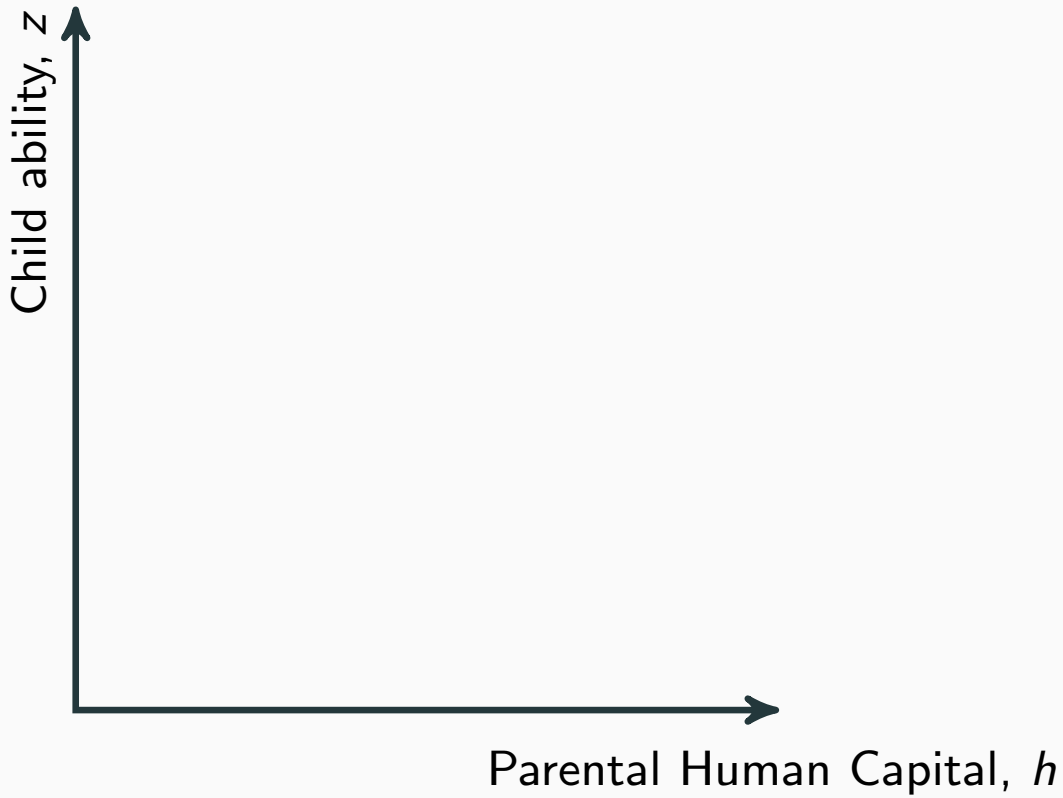
Perfect Assortative Matching (Frictionless)
Eq. w/ Borrowing Constraint: Imperfect Assortative Matching



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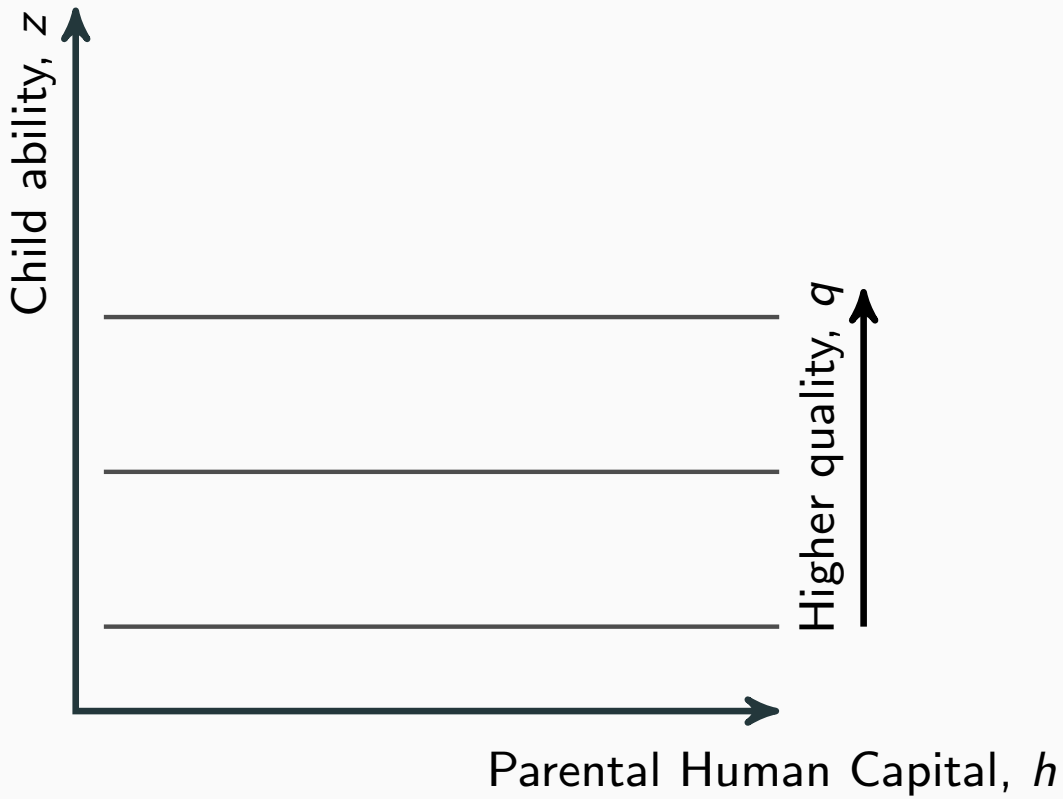

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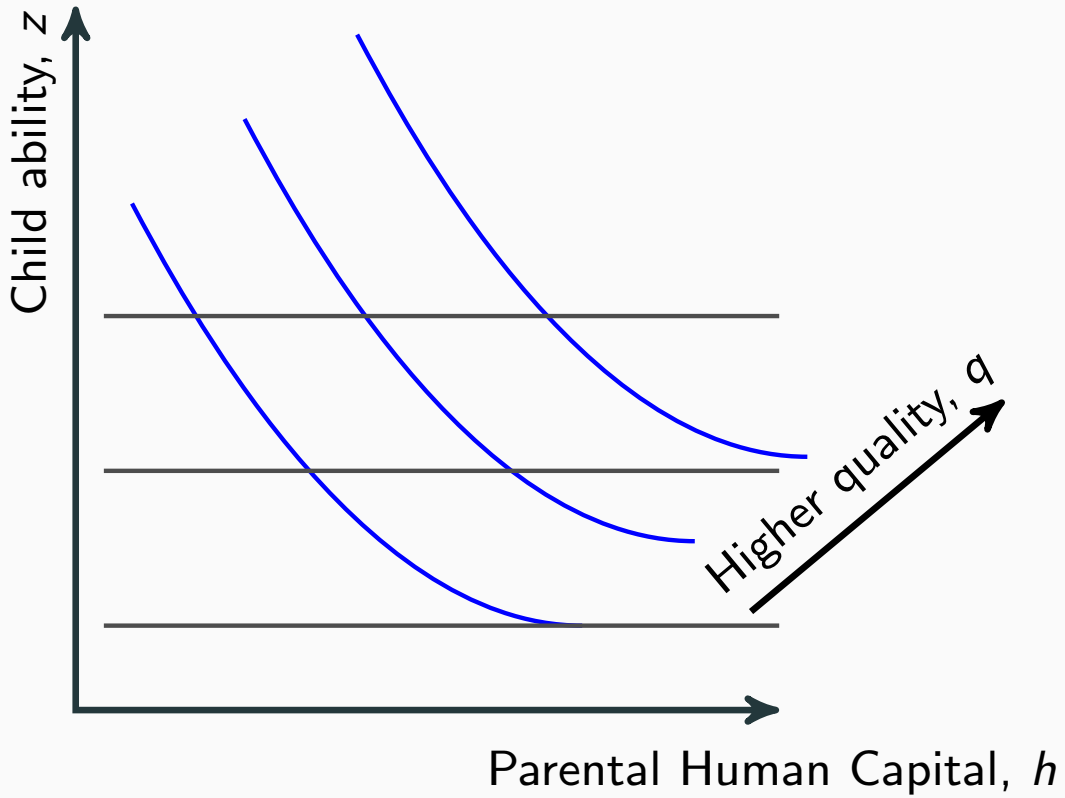

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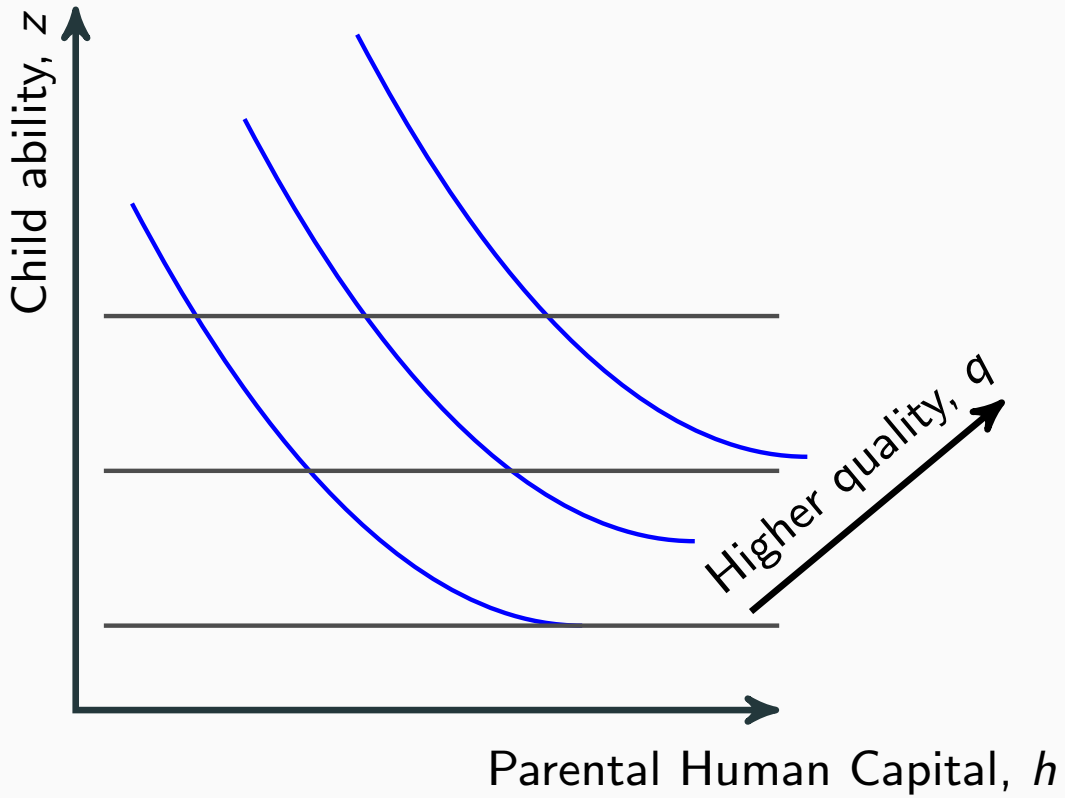

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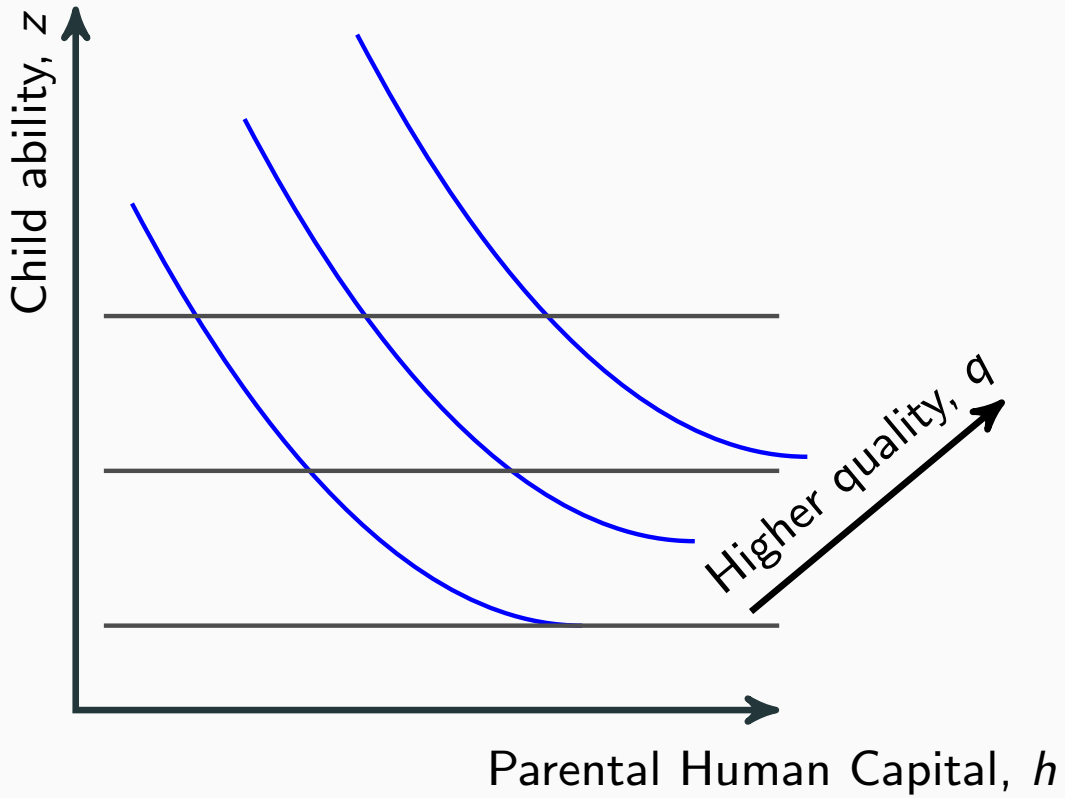

Intergenerational Transmission of Status

$$h' = \xi_y \underbrace{(\xi_b h)^{\alpha_1}}_{z} \left(\underbrace{\tilde{K}_t h^{\omega_1 \lambda} z^{\omega_2}}_{q} \right)^{\alpha_2}$$

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with α_h the intergenerational elasticity (IGE)

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Income Inequality

Steady-state variance of (log) labor earnings GGC

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$$V[\ln y] = \lambda^2 V[\ln h] = \lambda^2 \frac{\sigma_y^2 + [\alpha_1 (1 + \alpha_2 \omega_2)]^2 \sigma_b^2}{1 - \alpha_h^2}$$

Rationalizing Trends in Higher Education

Comparative Static: Increase in Returns to Human Capital, $\uparrow \lambda$

Proposition

Assume the economy starts from a steady-state at $t = 0$. Consider a weakly increasing sequence $\{\lambda_t\}_0^{+\infty}$.

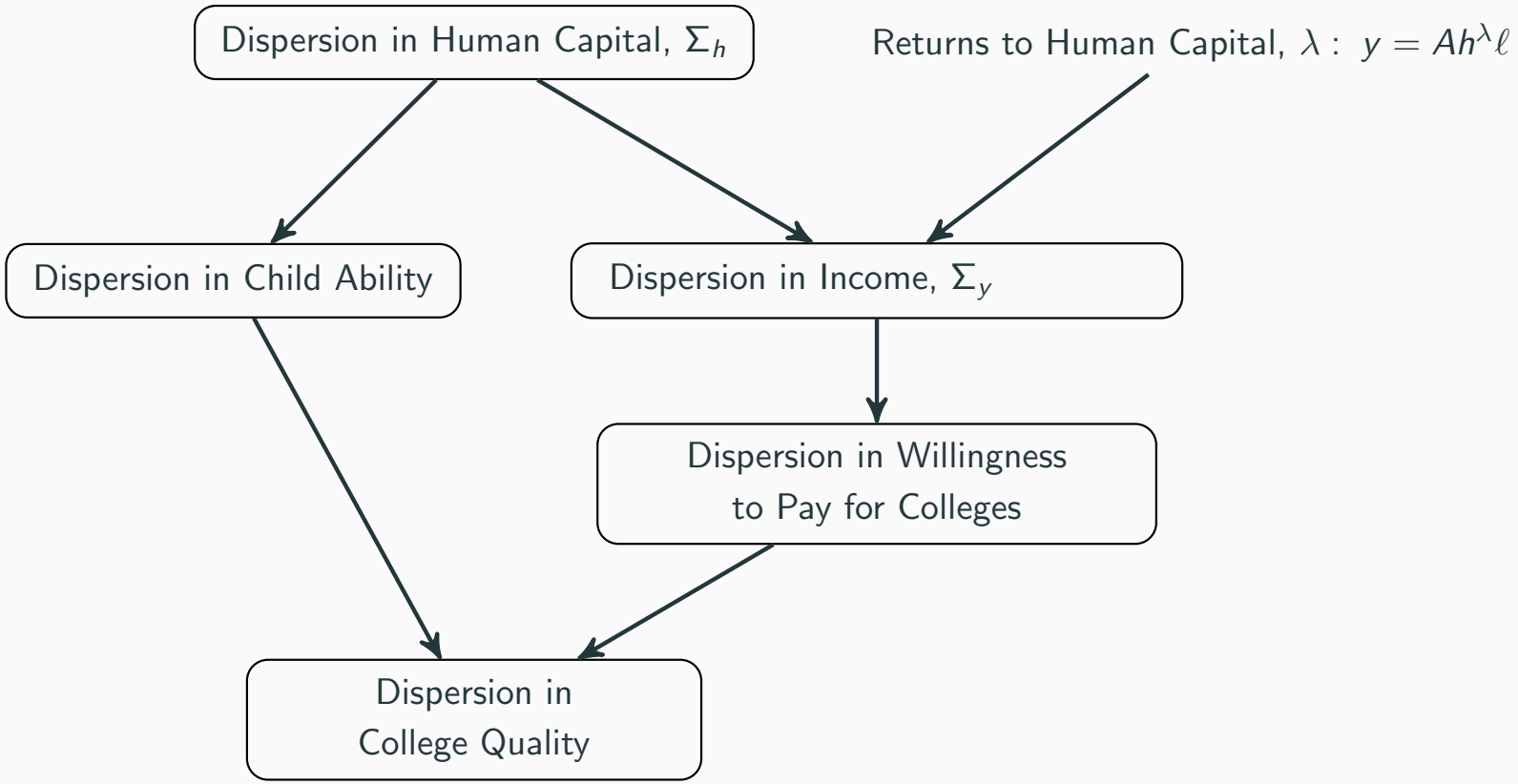
a) *The Gini coefficient of human capital and income increase.*

b) *The Gini coefficient of colleges' (log) expenditures per student and quality increase.*

c) *The average expenditure for college as a share of income increases.*

d) *The ratio of variance of (log) income within a college over variance of (log) income in economy decreases.*

e) *The intergenerational elasticity increases.*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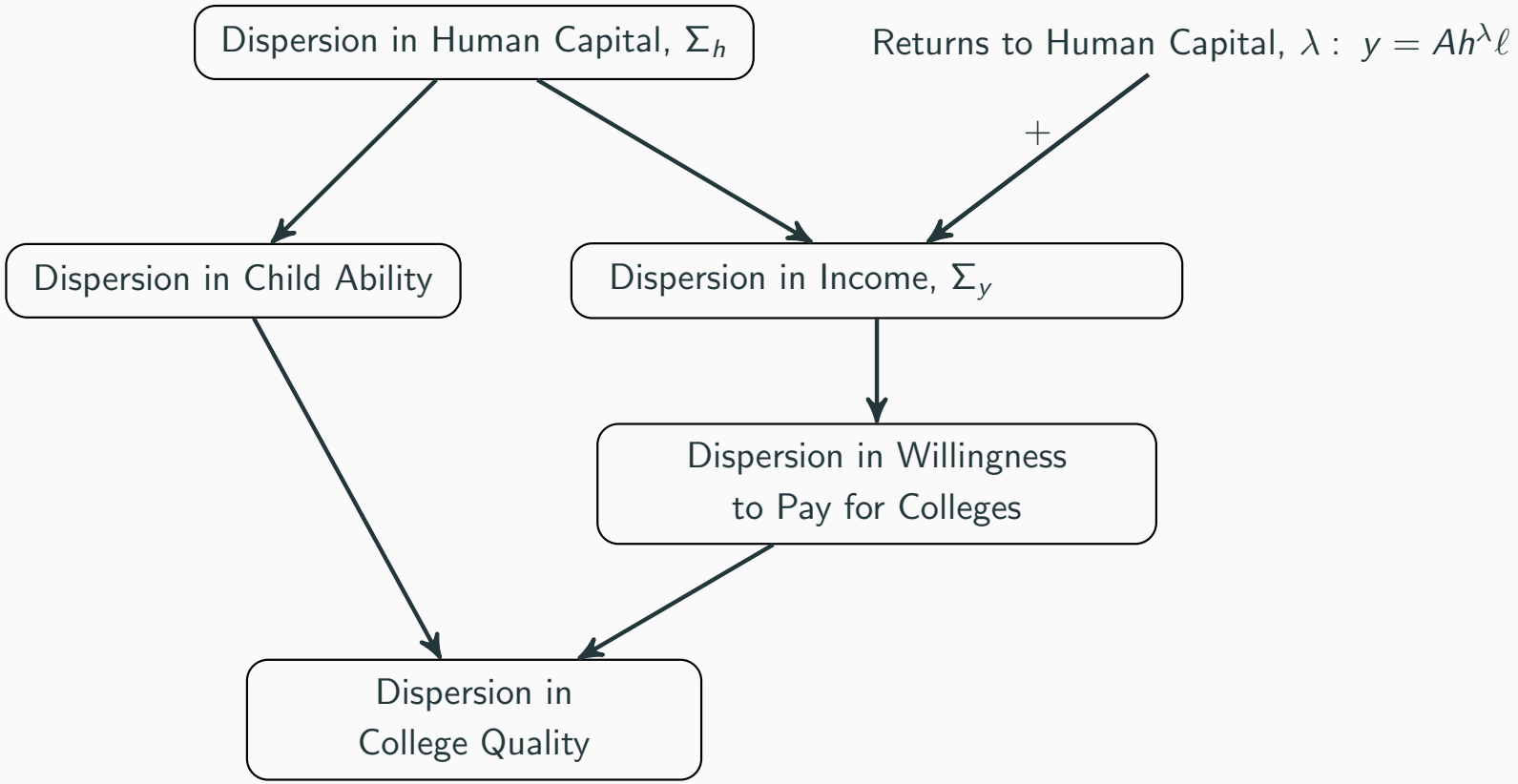
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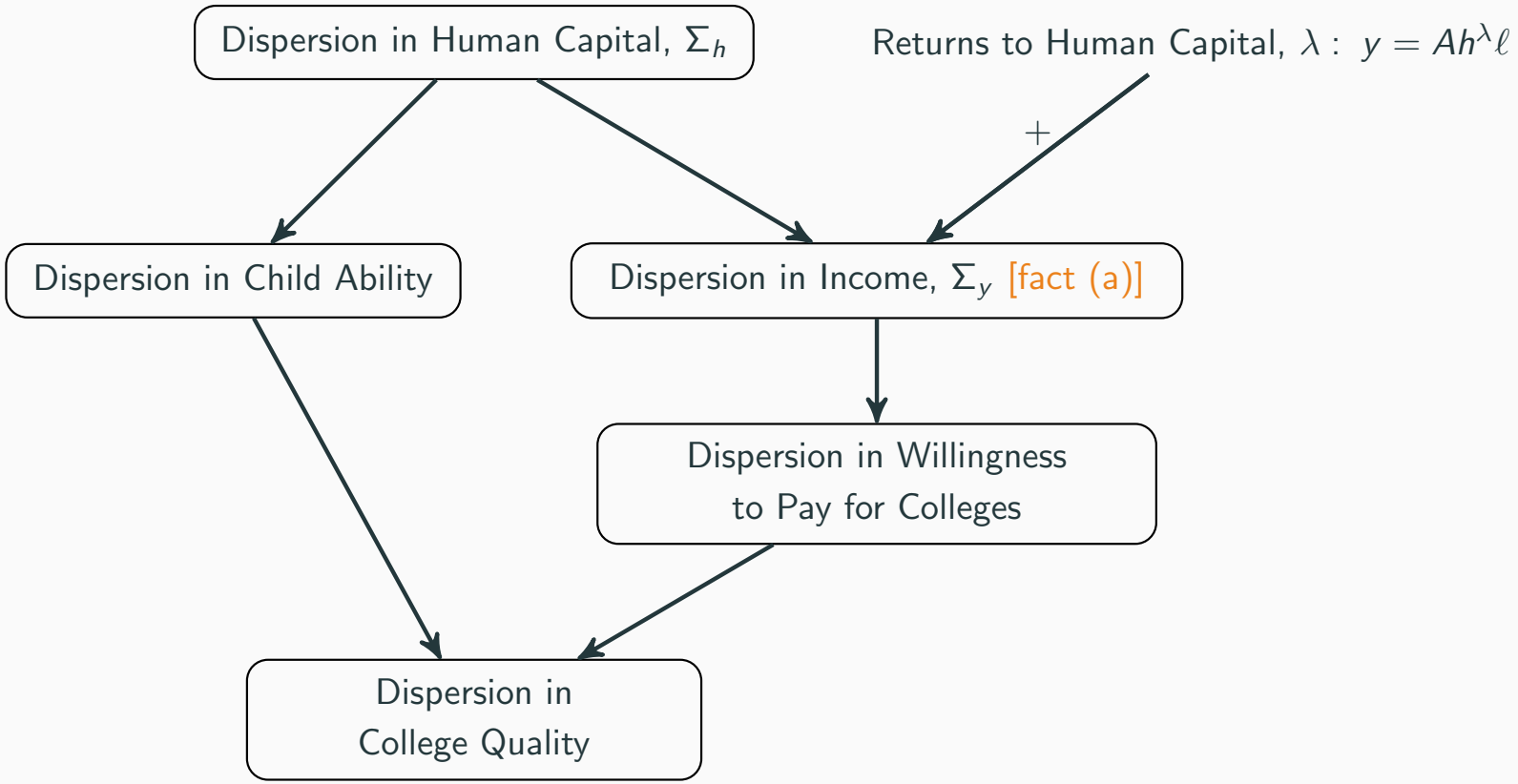
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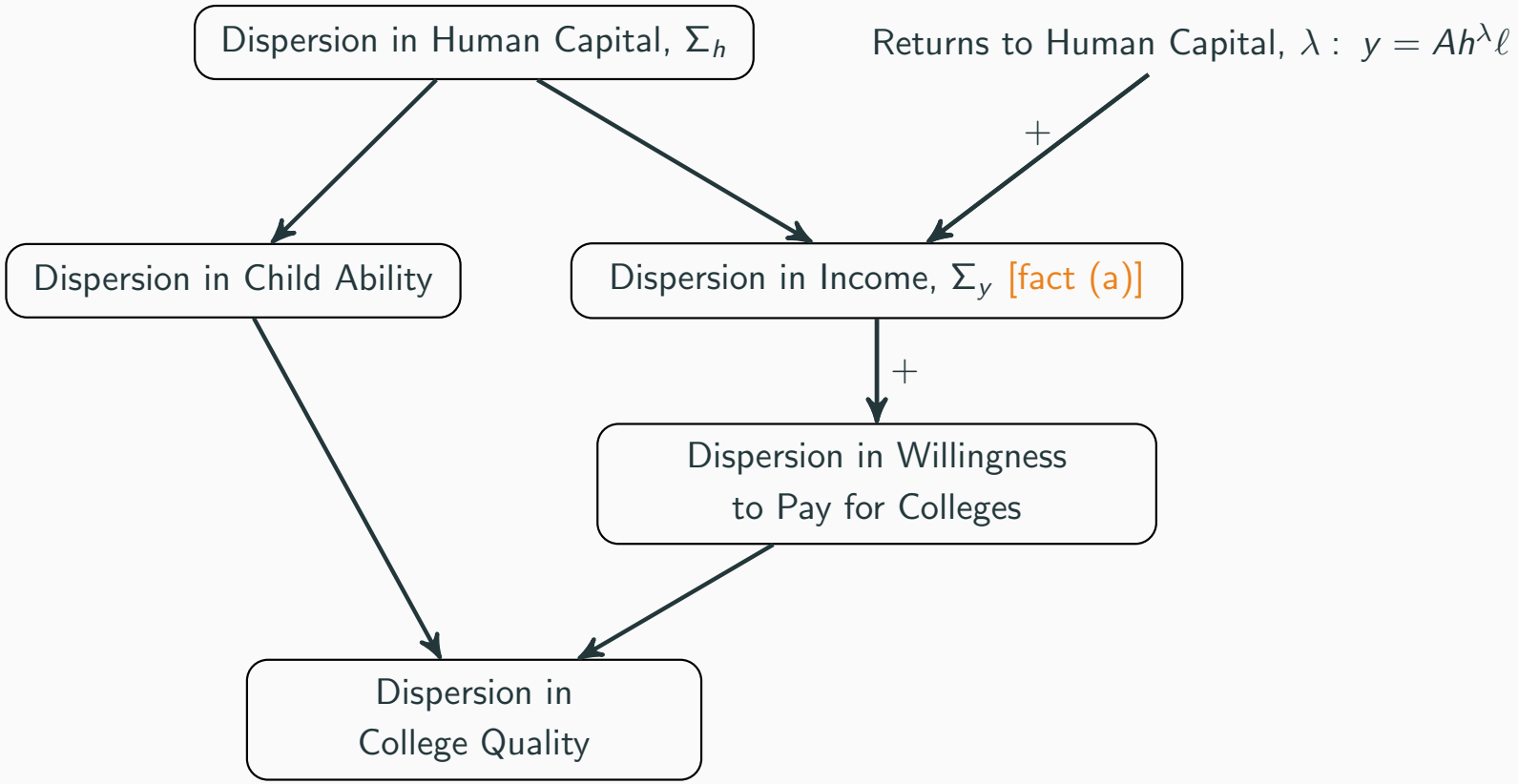
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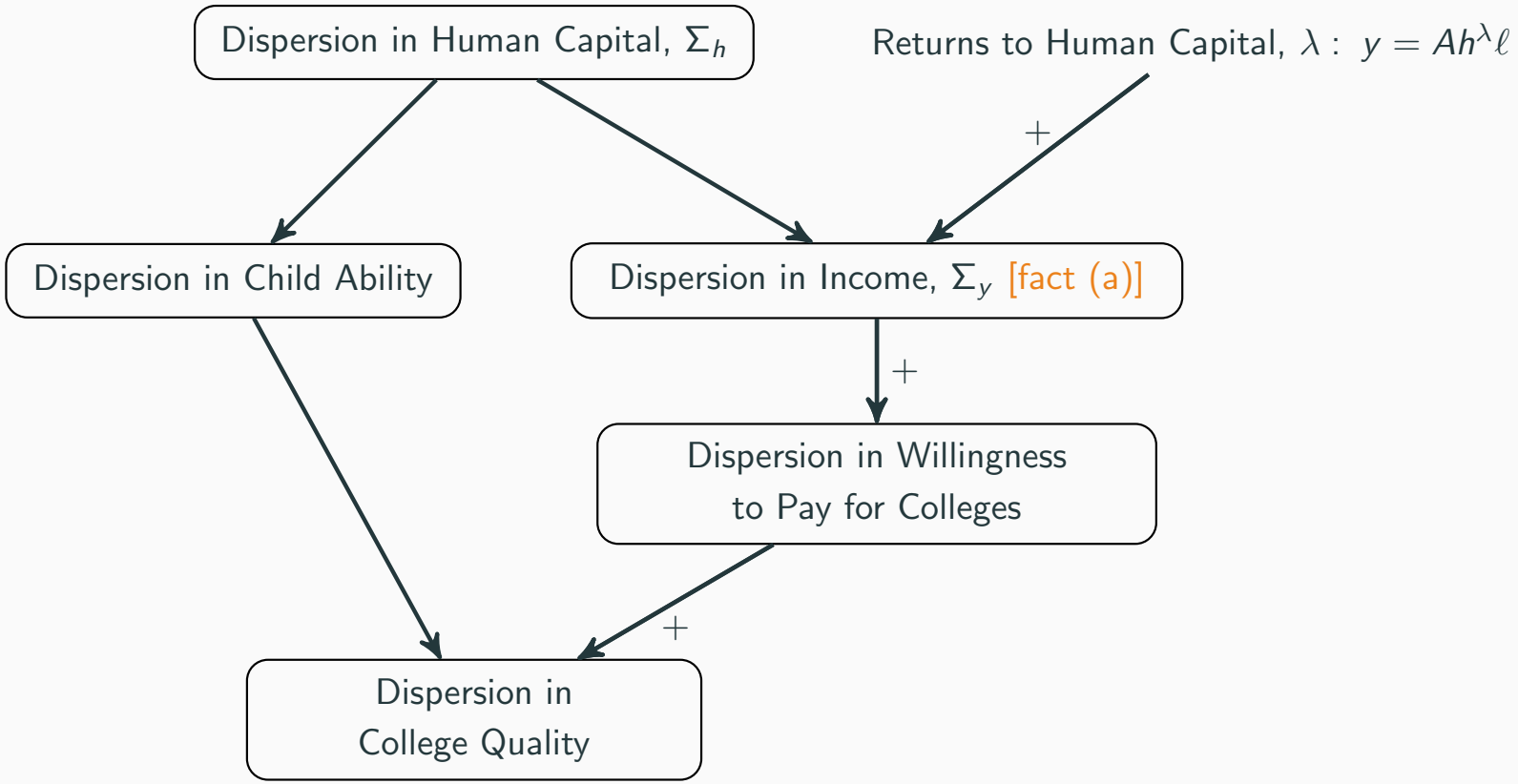
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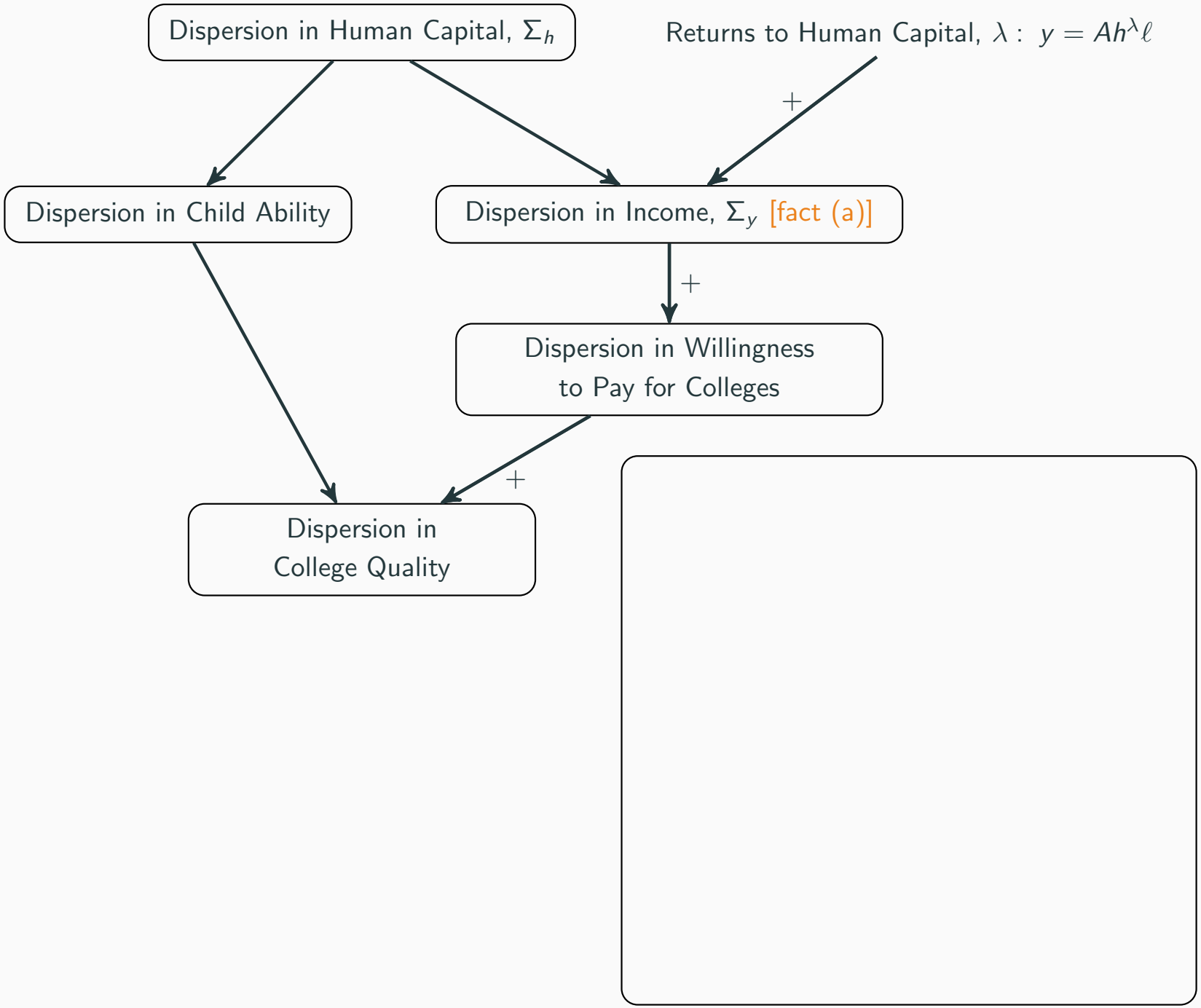
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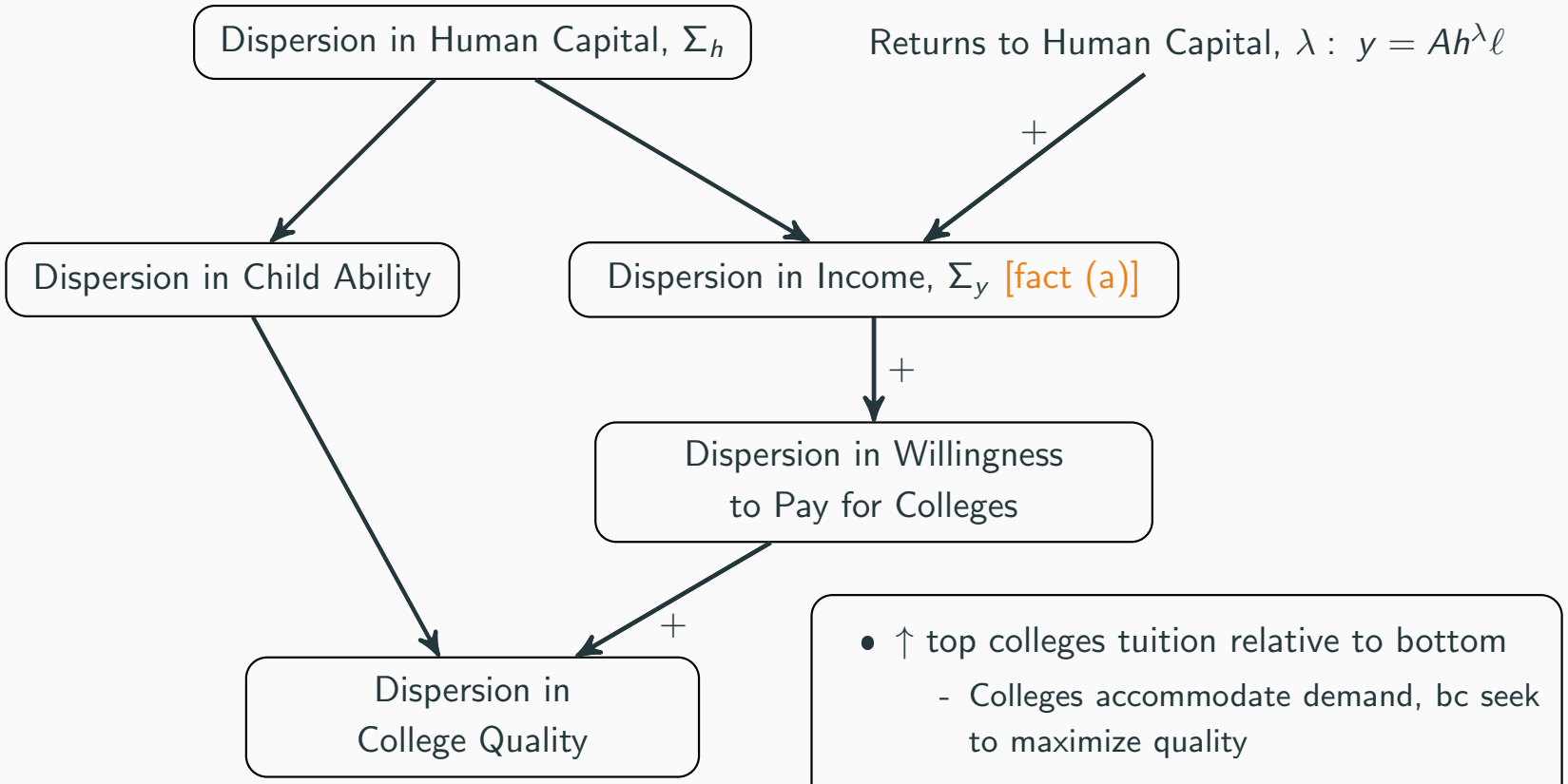

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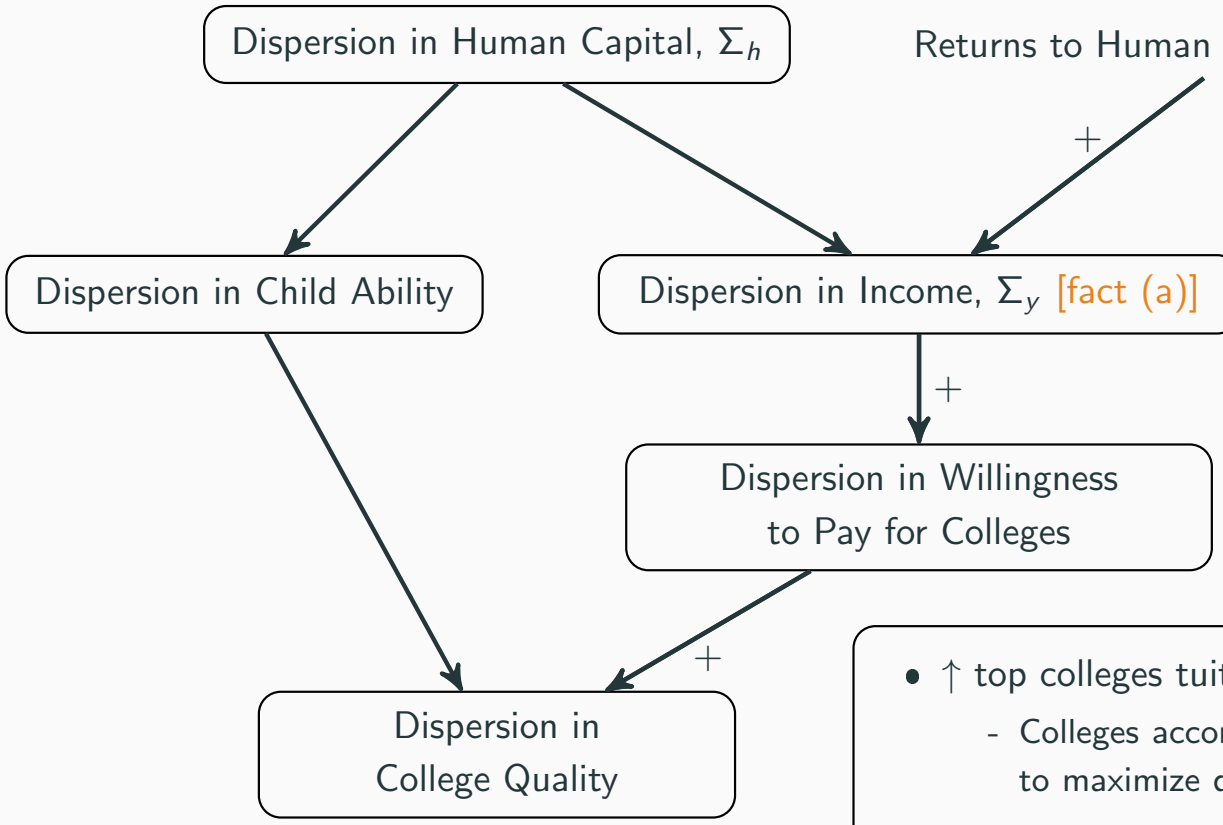

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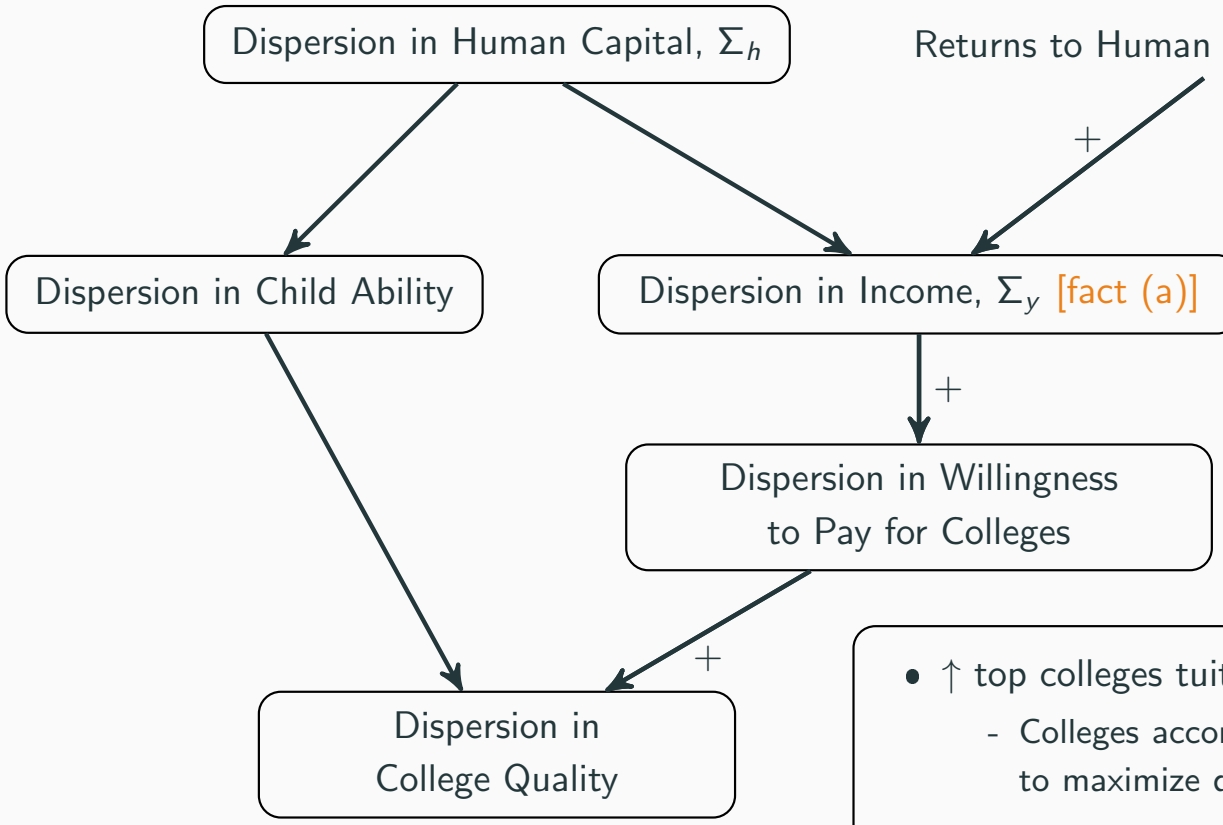

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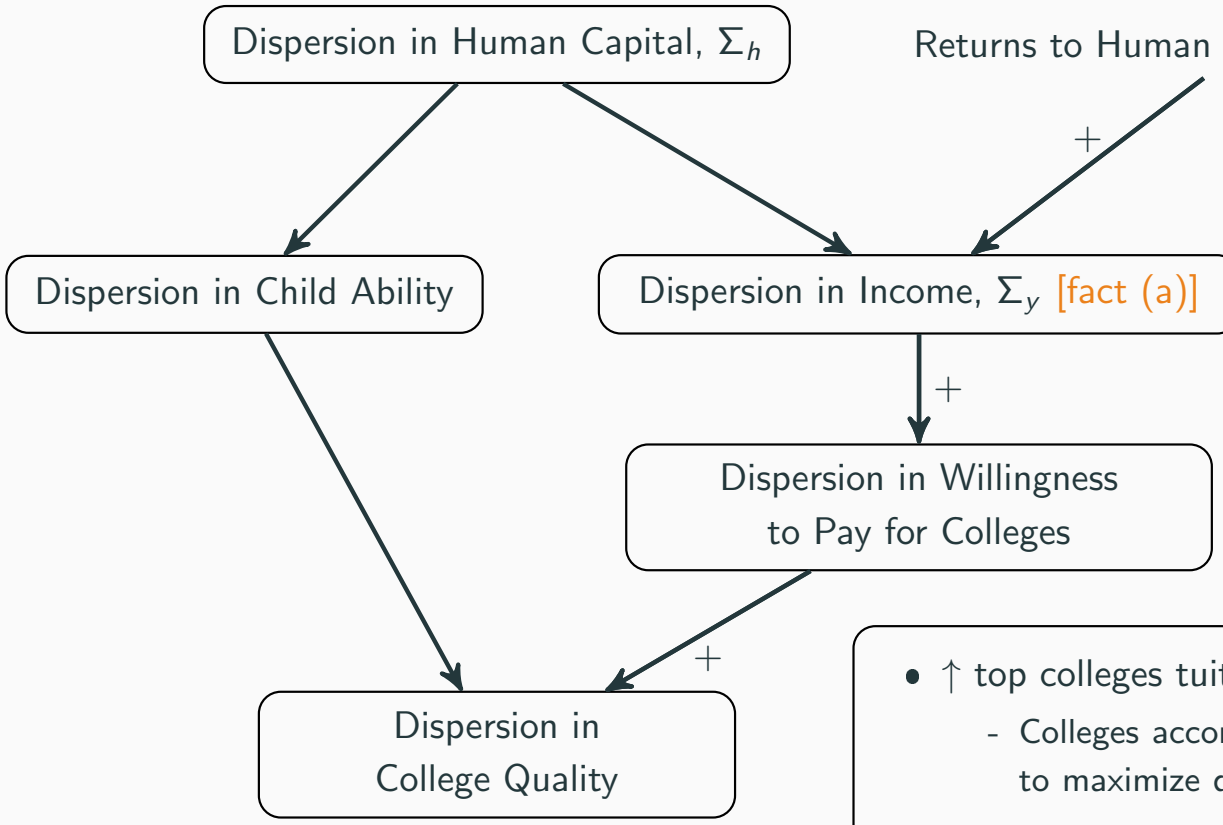
- Poor but high ability students priced out of top colleges
  1. ↑ relative tuition at top colleges
  2. ↓ relative parents' income



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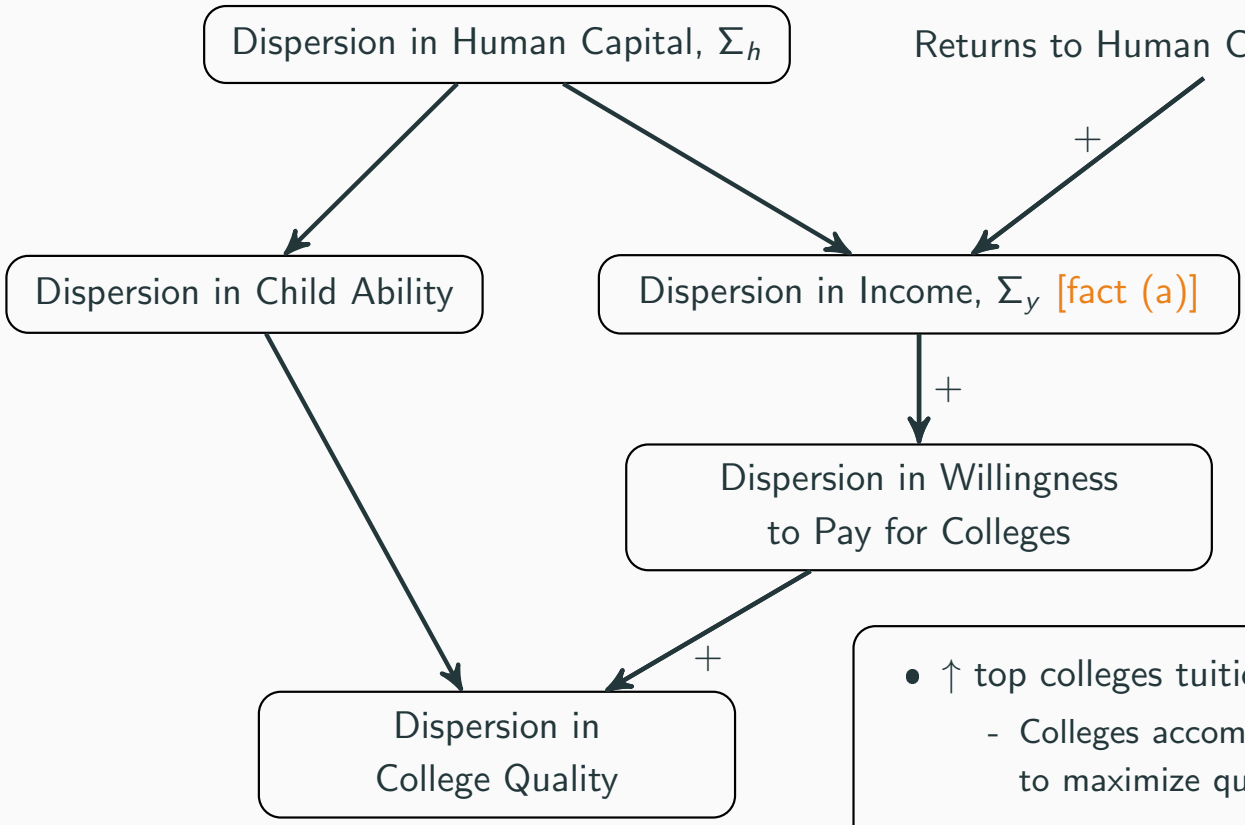

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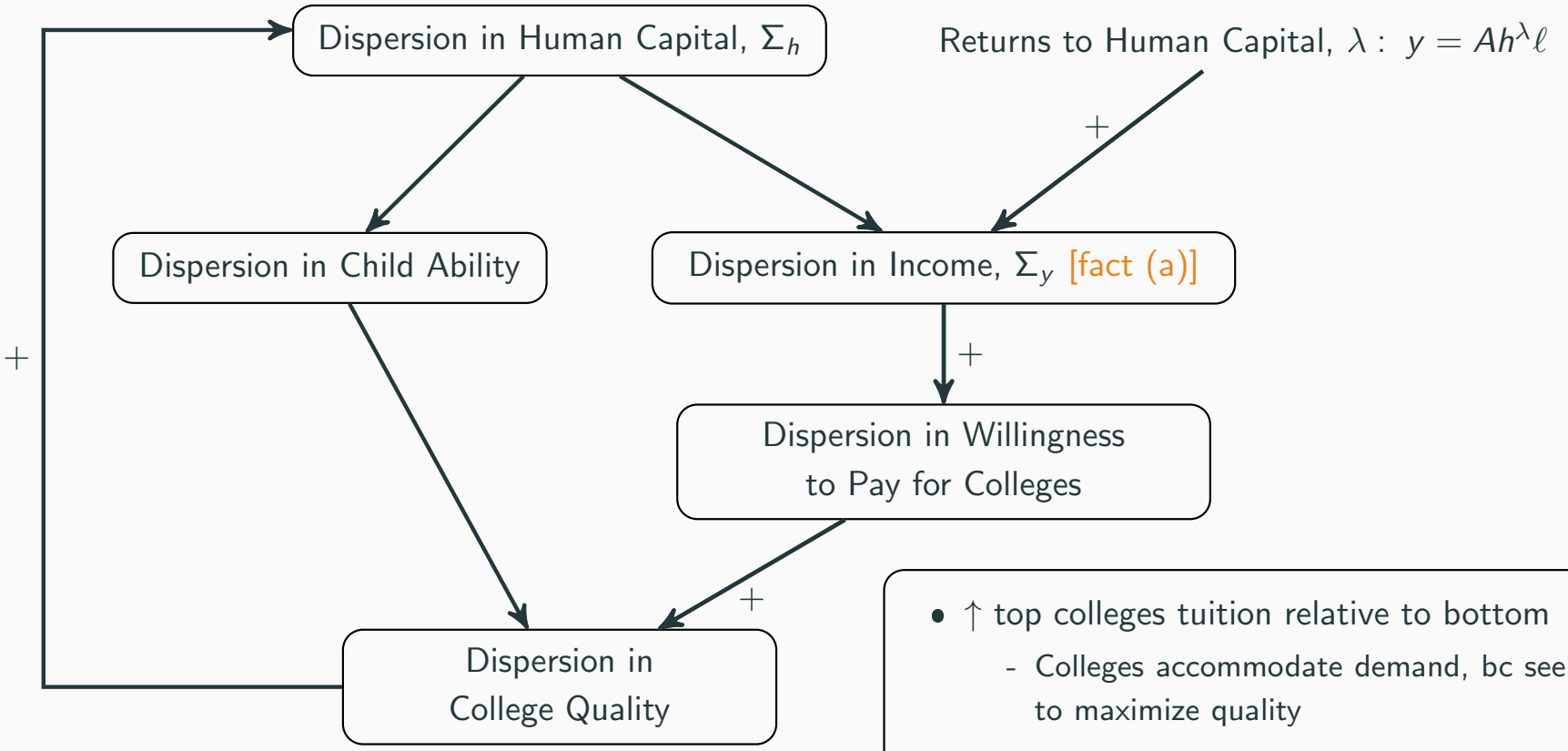

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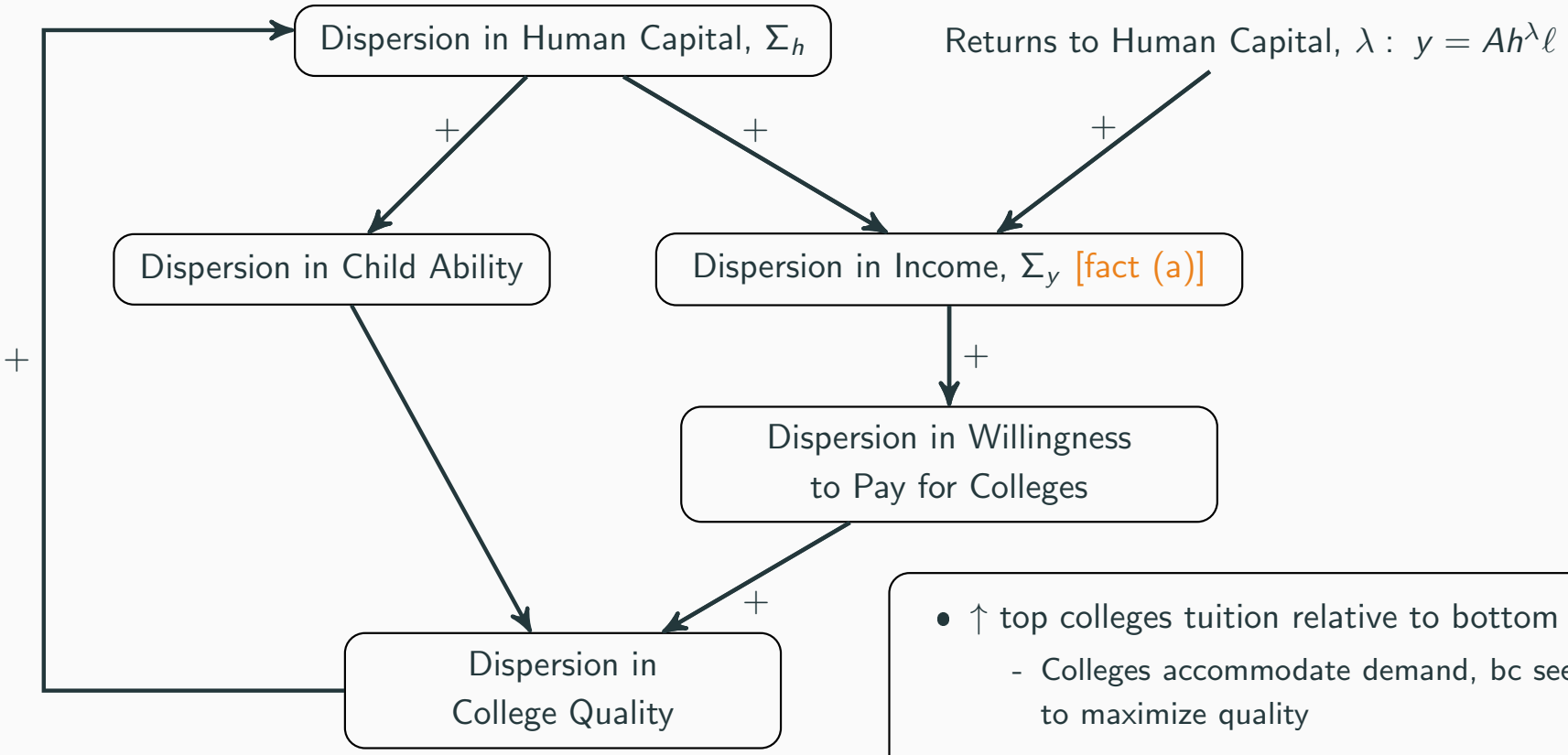

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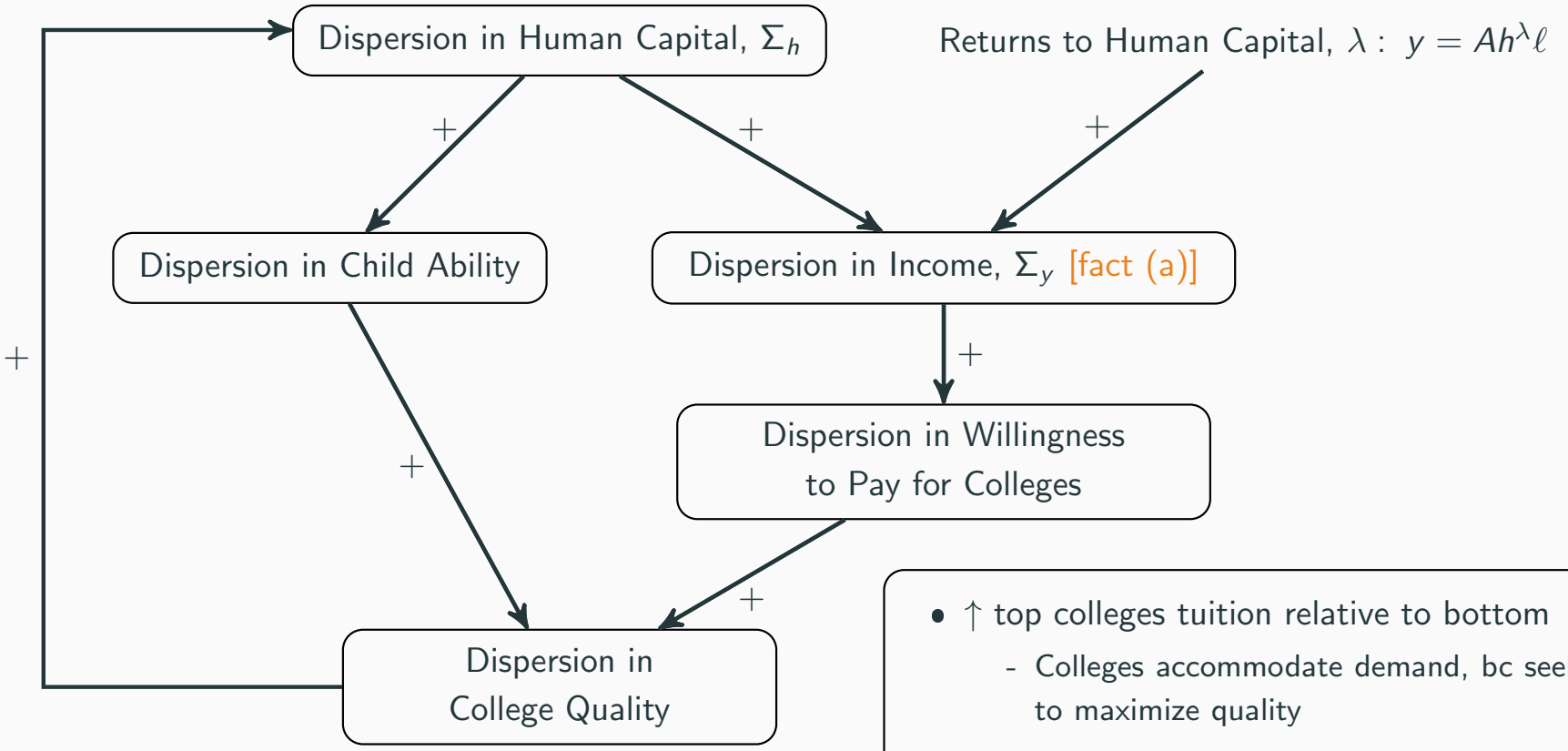

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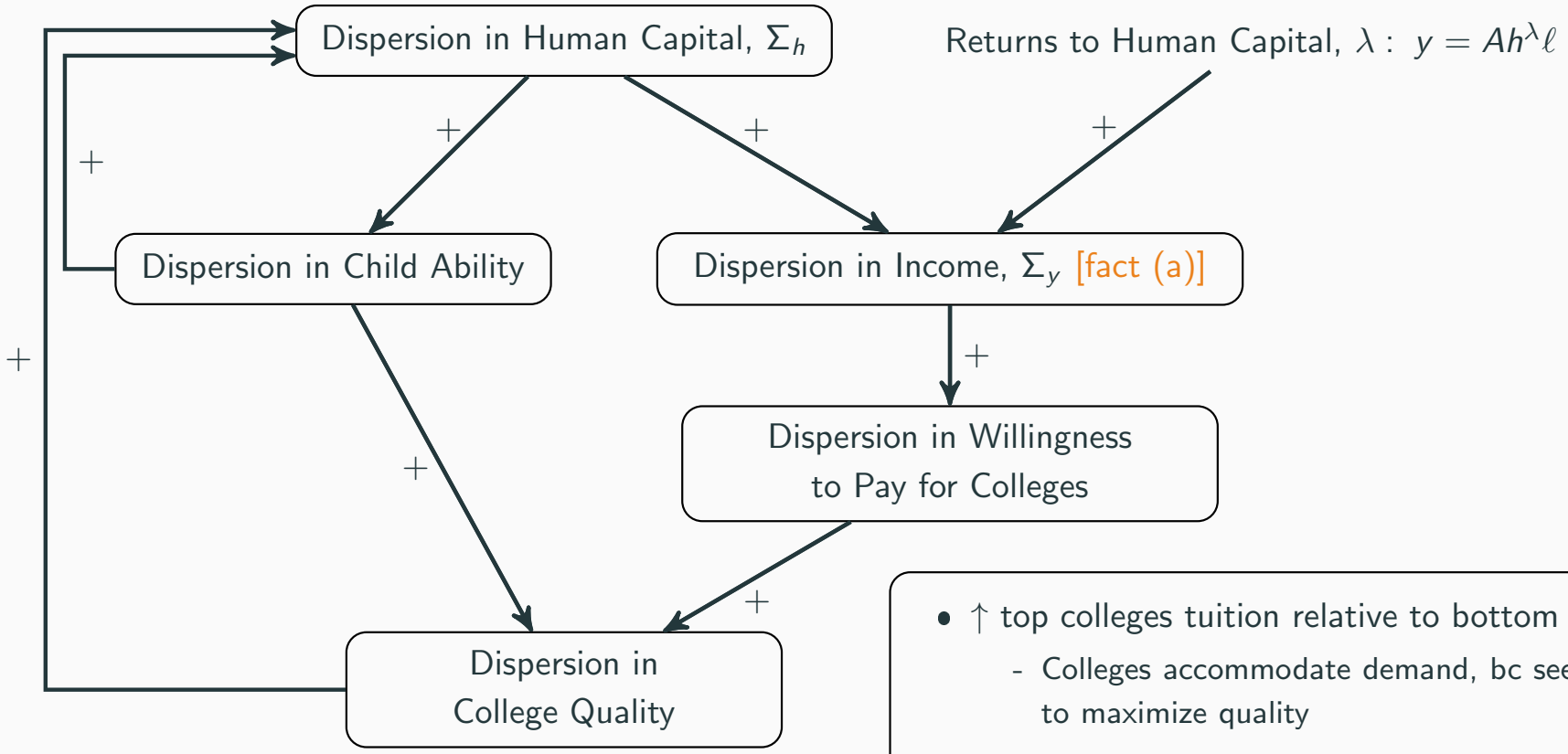

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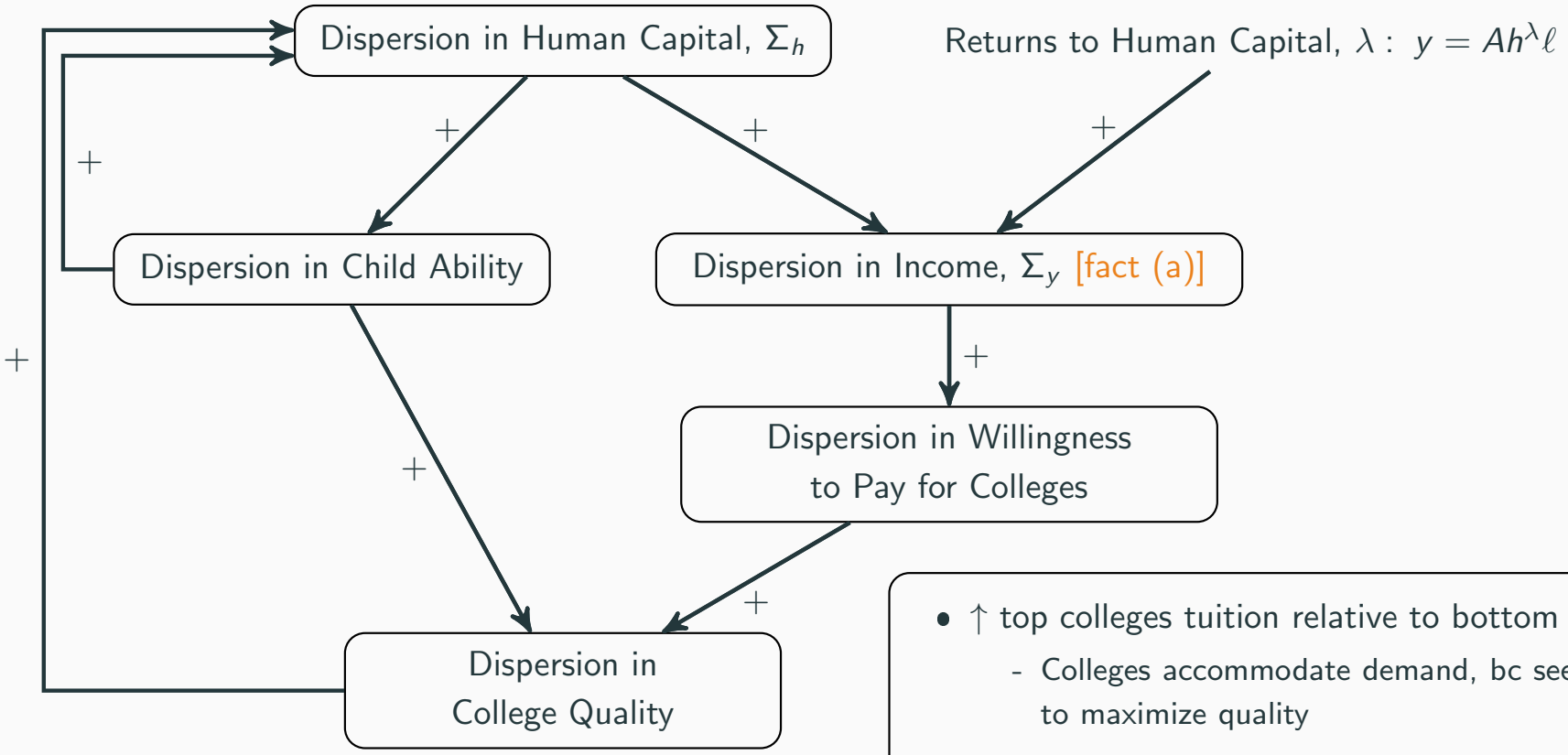

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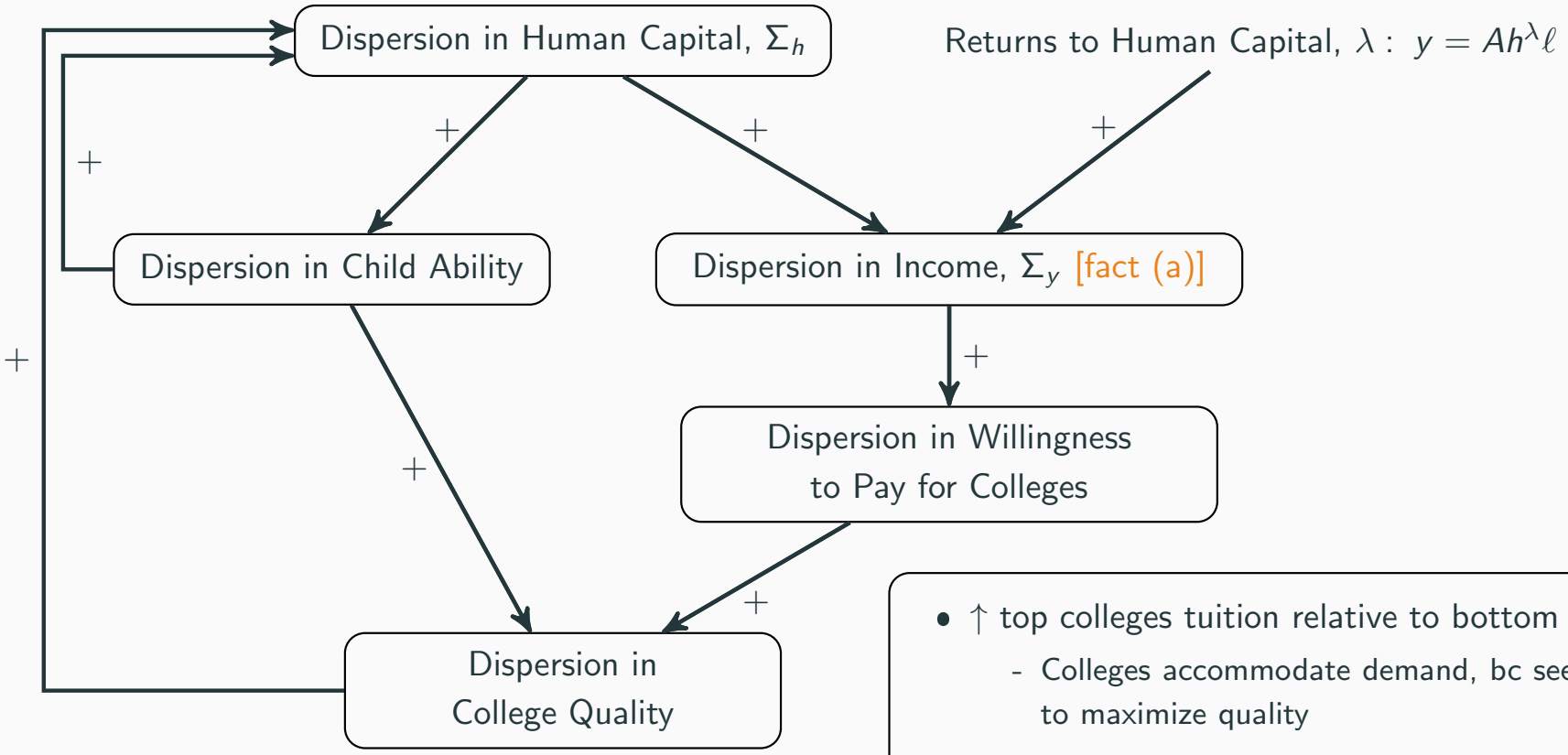

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Normative Analysis: Sorting, Efficiency and Welfare

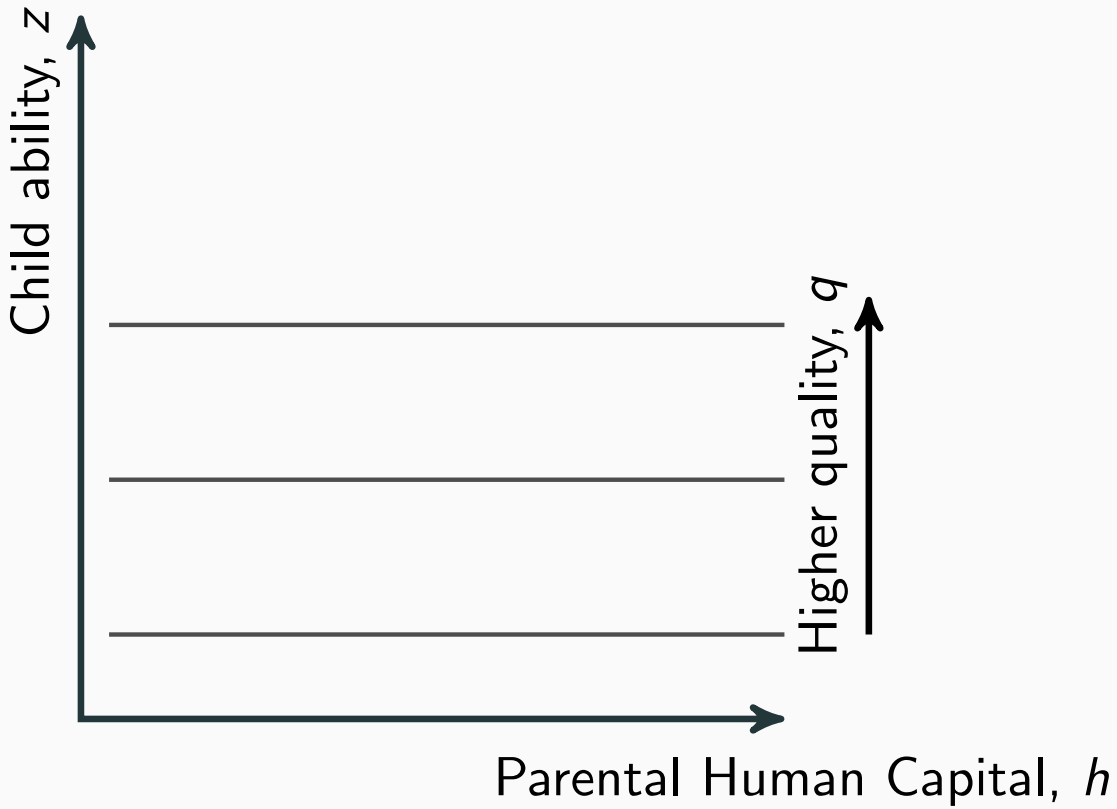
Allocative Benchmark and Inefficiencies

First-best features perfect stratification (P-PAM) by abilities

Eq. w/ Complete Financial Markets features P-PAM

Eq. w/ Borrowing Constraint: Imperfect-PAM

$\rightarrow$ Misallocation of students and financial resources



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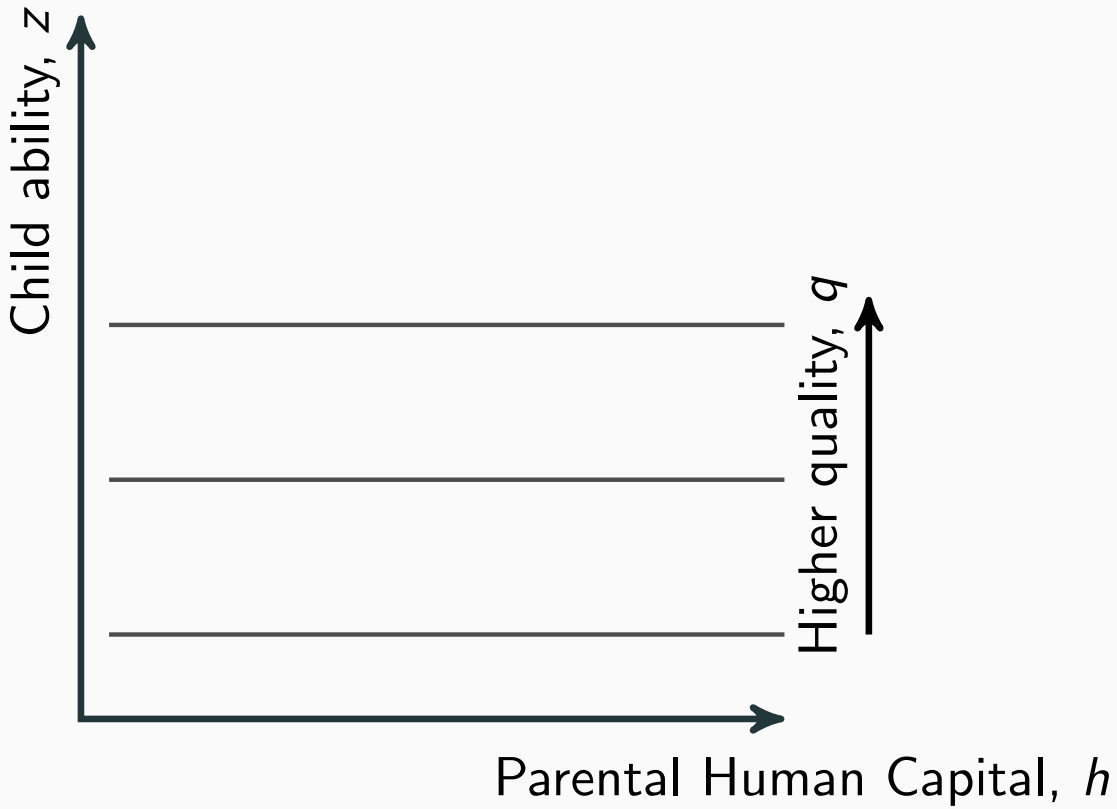

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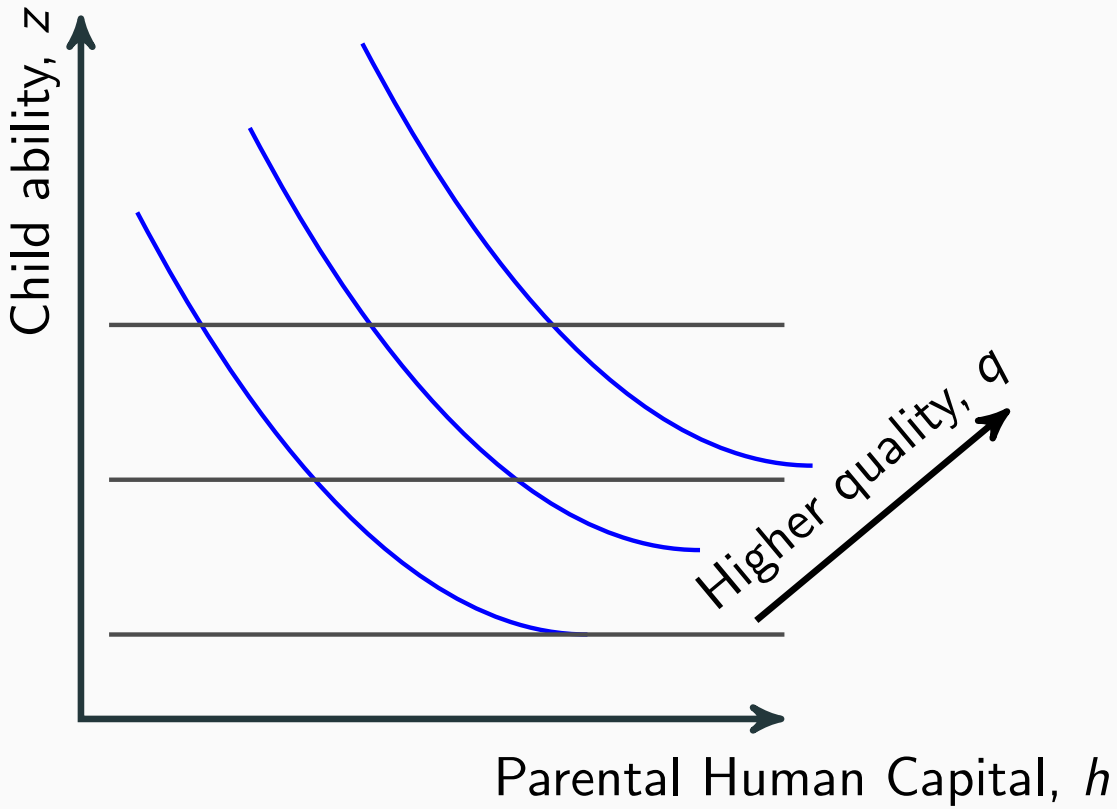

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IGE: $\alpha_h = \alpha_1 + \alpha_2(\underbrace{\alpha_1(\omega_2 \qquad\qquad)}_{\text{Ability-Sorting Channel}} + \underbrace{(\omega_1 \qquad\qquad\qquad)}_{\text{Income-Sorting Channel}} \qquad \lambda)$

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   - Use higher education as an intergenerational insurance + redistributional mechanism (alleviate distorsions from non-linear income tax)

Quantitative Analysis: Policy Experiments

Extension - Data - Strategy

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  - allows for some intergenerational transfers of wealth
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IGE-Gini | Coll for All | More

	Peers	Spending
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Laissez-faire		

P-PAM=Perfect Positive Assortative Matching

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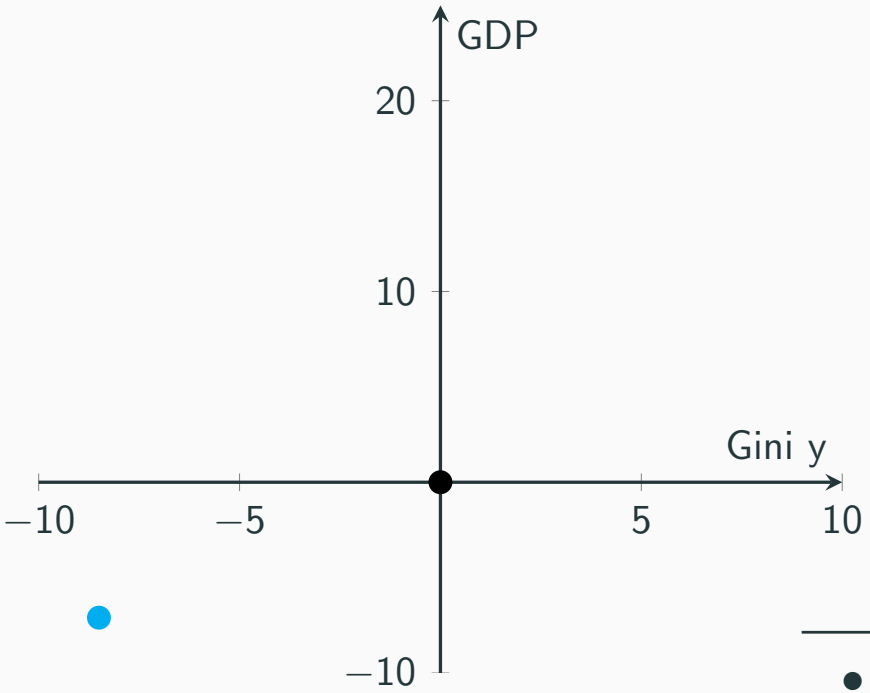

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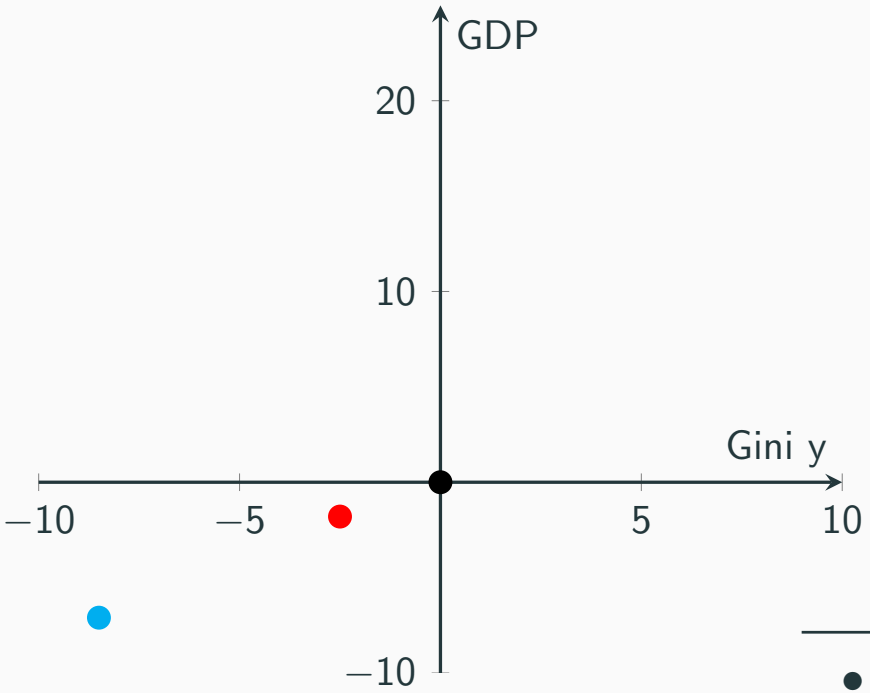

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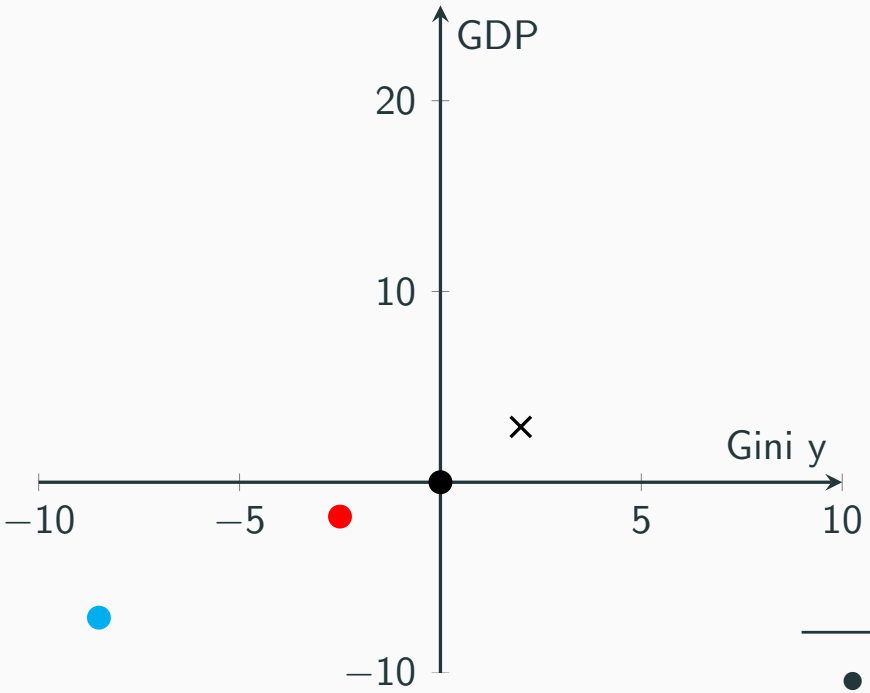

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  - Progressive fin. aid by colleges may *increase* inequality
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Thank you very much!