Mismatch, Rematch, and Investment

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Matching Matters

- Private and social payoffs to many activities depend not only on one's own attributes, but also on those of one's partners (in schools, firms, marriages...)
- These attributes often result of prior choice (early childhood investments, skills, ...)

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- Private and social payoffs to many activities depend not only on one's own attributes, but also on those of one's partners (in schools, firms, marriages...)
- These attributes often result of prior choice (early childhood investments, skills, ...)
- Expected payoffs for attributes, in form of monetary remuneration and accessibility of later peers, colleagues, and spouse will affect investment incentives.

Policy discussion

- "Excessive" segregation and social exclusion, addressed by rematching policies such as affirmative action.
- Economic rationale?
  - Degree of segregation in labor market affects expected investment return.
  - Consequence: disadvantaged groups may invest (too) little, advantaged groups (too) much; may generate (too) high, persistent inequality in income and investments.
  - Potential for over-/under-investment in aggregate, adverse consequences for TFP and growth.
- If segregation excessive due to market failure: rematching individuals (by constraining choice of colleagues, partners, peers) could raise total surplus compared to laissez faire.

Market Failure

- This project examines incentive effects of rematching policies, focusing on a particular source of market failure: **Rigidities in sharing joint payoffs within firms** (e.g. moral hazard within firms, incomplete contracts, credit constraints, reputational payoffs, renegotiation, risk aversion, "behavioral" reasons like envy or equity).
- Other sources: Externalities (Benabou, 1993, 1996; Epple-Romano, 1998, Fernandez-Rogerson, 2001), self-confirming beliefs (Coate-Loury, 1993); search costs.
- Status quo reversion as prima facie evidence for relevance of "nontransferabilities" for understanding market matching outcomes and rematching policies

Model

- Continuum of individuals, characterized by achievement $a \in \{\ell; h\}$ and socio-economic background $b \in \{u; p\}$ (e.g. access to resources, markets, Assaad, 1997, Fafchamps, 2000).
- a is outcome of (education) investment e at cost $e^2/2$: $a = h$ with probability e, otherwise $a = \ell$.
- Production in firms of size 2:

$$\underbrace{z(ab, a'b')}_{\text{Output}} = \underbrace{f(a, a')}_{\text{Production}} \cdot \underbrace{g(b, b')}_{\text{Peer Effects}} .$$

- $f(\ell, \ell) = 0$, $f(h, \ell) = f(\ell, h) = 1$ und $f(h, h) = 2$.
- $g(u, u) = \delta/2$, $g(p, u) = g(u, p) = \delta$ und $g(p, p) = 1$.
- δ captures desirability of diversity.

Investment Choice

- Individuals invest anticipating (endogenous) market prices for attributes $w(ab)$.
- Investment choice by individual of background b satisfies:

$$\max_e ew(hb) + (1-e)w(\ell b) - e^2/2$$

- Optimal effort reflects private benefit:

$$e = w(hb) - w(\ell b).$$

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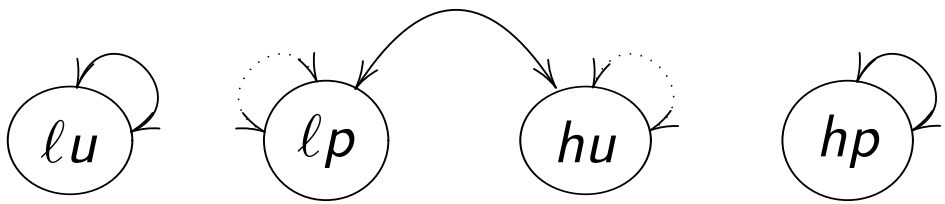
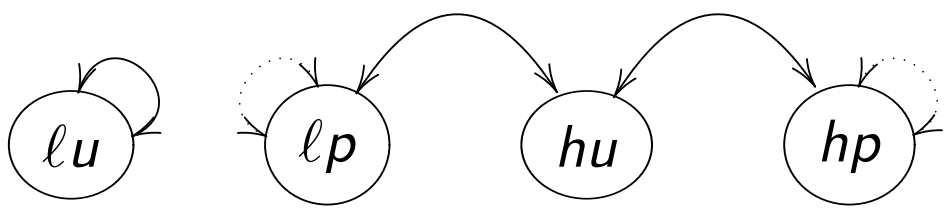
- $w(hb)$, $w(\ell b)$ depend on the matches that hb and ℓb obtain in the market assignment.
- Efficient market: $w(hb) - w(\ell b)$ is social benefit of high achievement, signals scarcity.

First Best Allocation (TU)

Allocations under fully transferable utility (TU) maximize aggregate surplus (incl. investment cost):



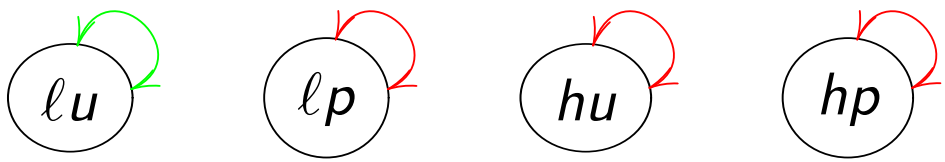
for $1/2 < \delta \leq 2/3$.



for $\delta > 2/3$. From now let $\delta > 2/3$.

Laissez Faire Outcome?

- Suppose rigidities have a bite, for the talk team $(ab, a'b')$ splits the joint surplus $z(ab, a'b')$ equally (e.g. due to partnership problem).
- Equilibrium concept: stable match of individuals in teams (firms) of size 2.
- Outcome: Segregation in attributes ab:



- Intuition: less attractive agents cannot compensate more attractive matches!

Investment Incentives

Determined by $w(hb) - w(\ell b)$, which depends on equilibrium match of agents hb, ℓb.

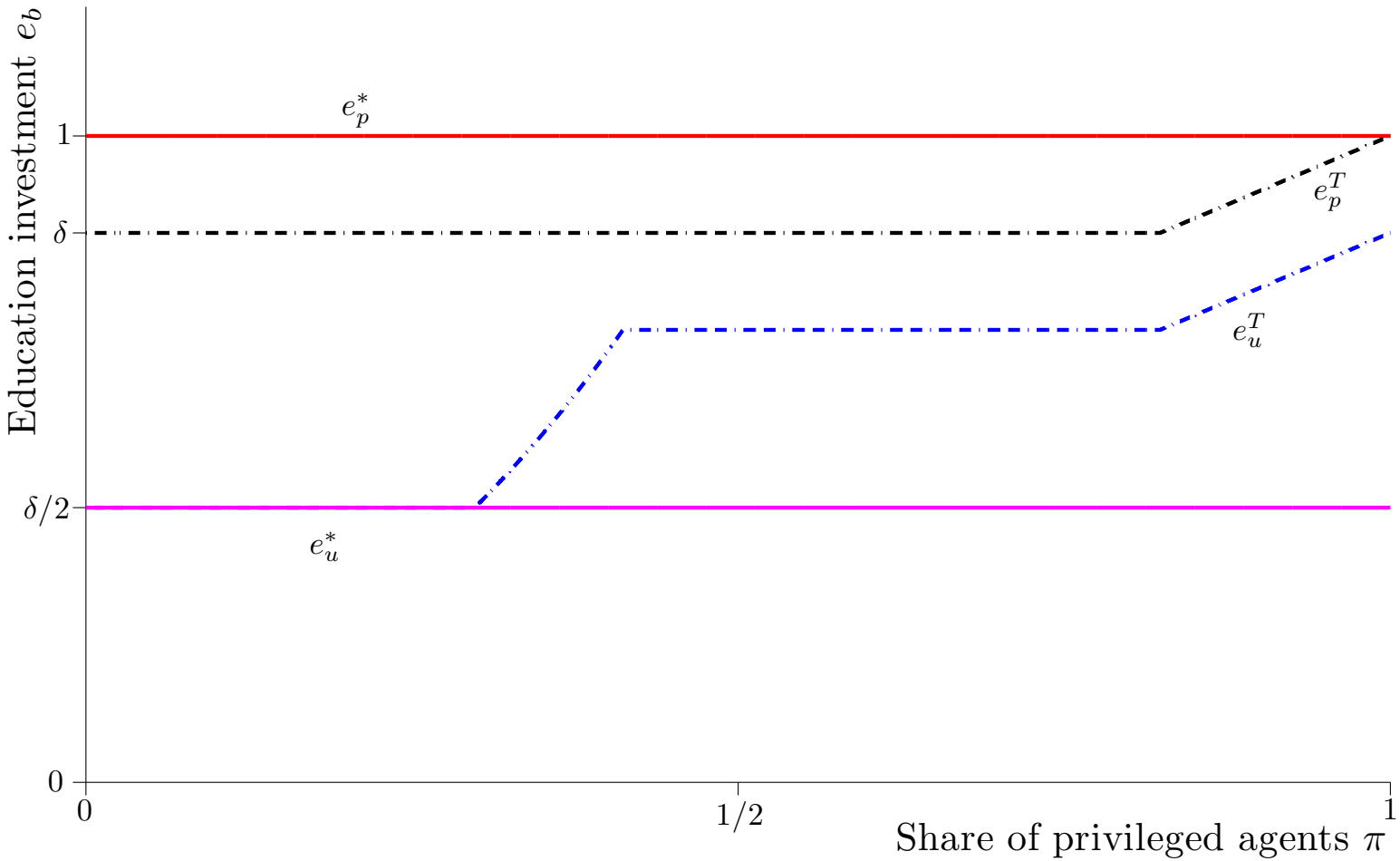
First Best Benchmark

- Privileged: marginal hp matches in (hu, hp), then (hp, hp) firm, ℓp in $(\ell p, hu)$, then $(\ell p, \ell p)$ firm.
- Underprivileged: marginal hu matches in $(hu, \ell p)$, then (hp, hu), then (hu, hu) firm, ℓu in $(\ell u, \ell u)$.

Laissez Faire

- Privileged: marginal hp matches in (hp, hp), ℓp in $(\ell p, \ell p)$.
- Underprivileged: marginal hu matches in (hu, hu) firms, ℓu in $(\ell u, \ell u)$.

Investments in Laissez Faire e^* and optimal allocation e^T



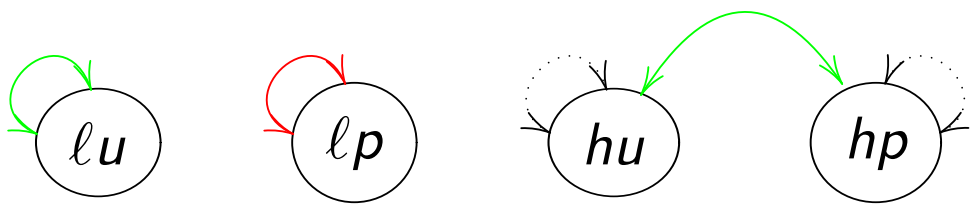
Over-investment at the top, under-investment at the bottom if $\pi > \bar{\pi}$, where $\bar{\pi} < 1/3$.

OTUB: Over-investment at the Top, Under-investment at the Bottom

- Intuition: complementarity between background diversity and returns to achievement (generalization possible)
- Higher inequality in human capital investment in laissez faire outcome, agent for increasing social polarization.
- Income inequality: higher in laissez faire for intermediate π.
- Aggregate income/output: lower (higher) in laissez faire for low (high) π, i.e. privileged economies produce too much, underprivileged too little!
- Policy implications — rest of this paper
- Future work: long-run dynamic interaction of sorting, distribution, and socio-economic status

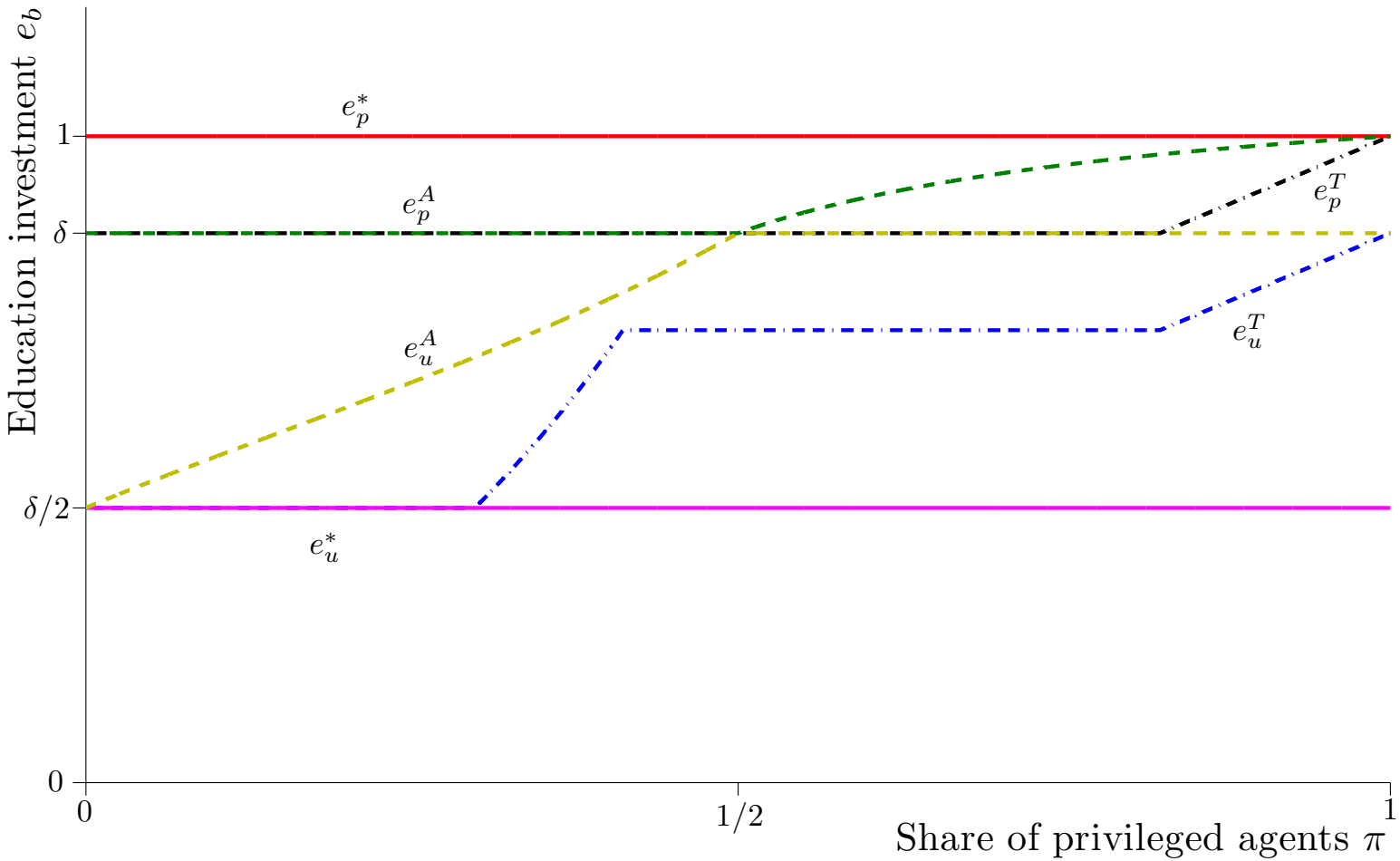
Policy: Affirmative Action

- Preference for underprivileged for *given* achievement: (ap, ap) firm only possible if no au agent strictly prefers (ap, au) to their match.
- Accurately reflects policy used in many countries.
- Market outcome under policy:



- Incentive effects: encourages the underprivileged (increased marginal benefit of effort through hp match), discourages the privileged.

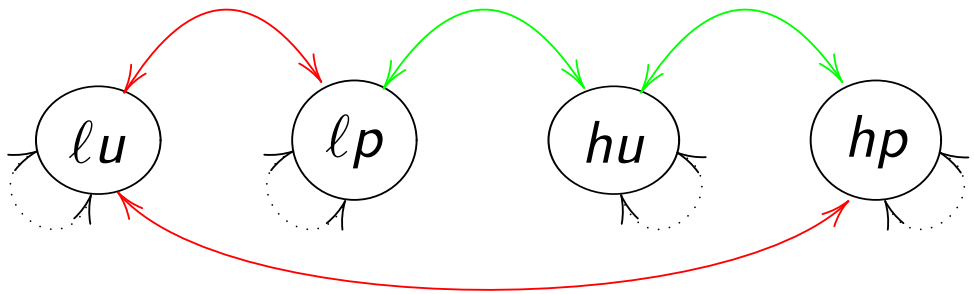
Investments under Affirmative Action e^A



Investment incentives: "correction" for the privileged, "overshooting" for the underprivileged.

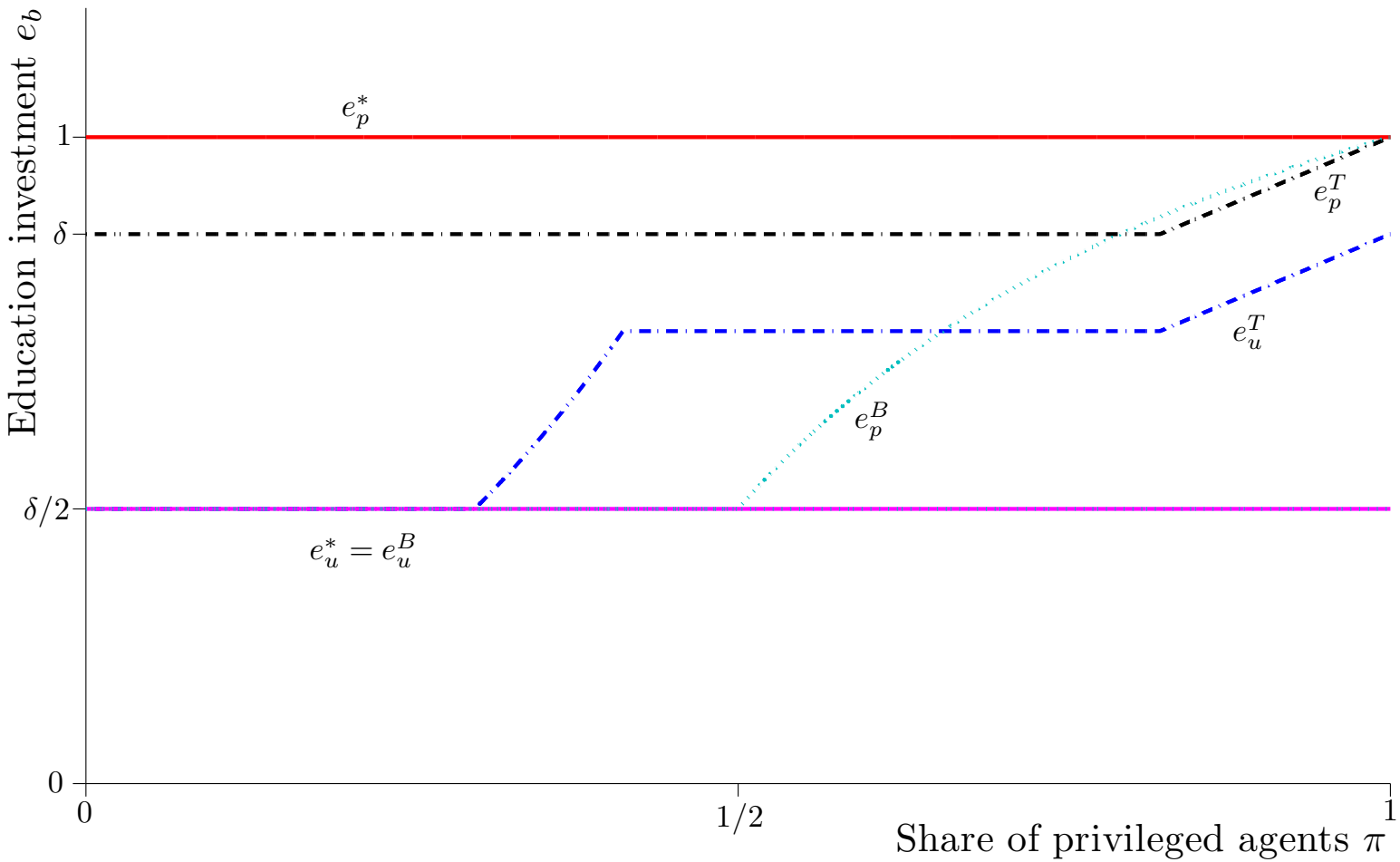
Policy: Busing

- Background integration: u agents have priority access to p agents *ignoring* achievement.
- Effect: expected team composition = population measures, reflects quota-based affirmative action.
- Market outcome under policy:



- Incentive effects: discourages privileged more, encourages underprivileged less than A policy (because ℓ agents now have access to h agents) compared to first best.

Investments under Busing e^B



Investment incentives: "undershooting" for the privileged, no encouragement for the underprivileged.

Policy Comparison

Aggregate Surplus

- Both A and B policies generate higher total surplus than laissez-faire if diversity desirable (δ high enough).
- A policy dominates B policy.

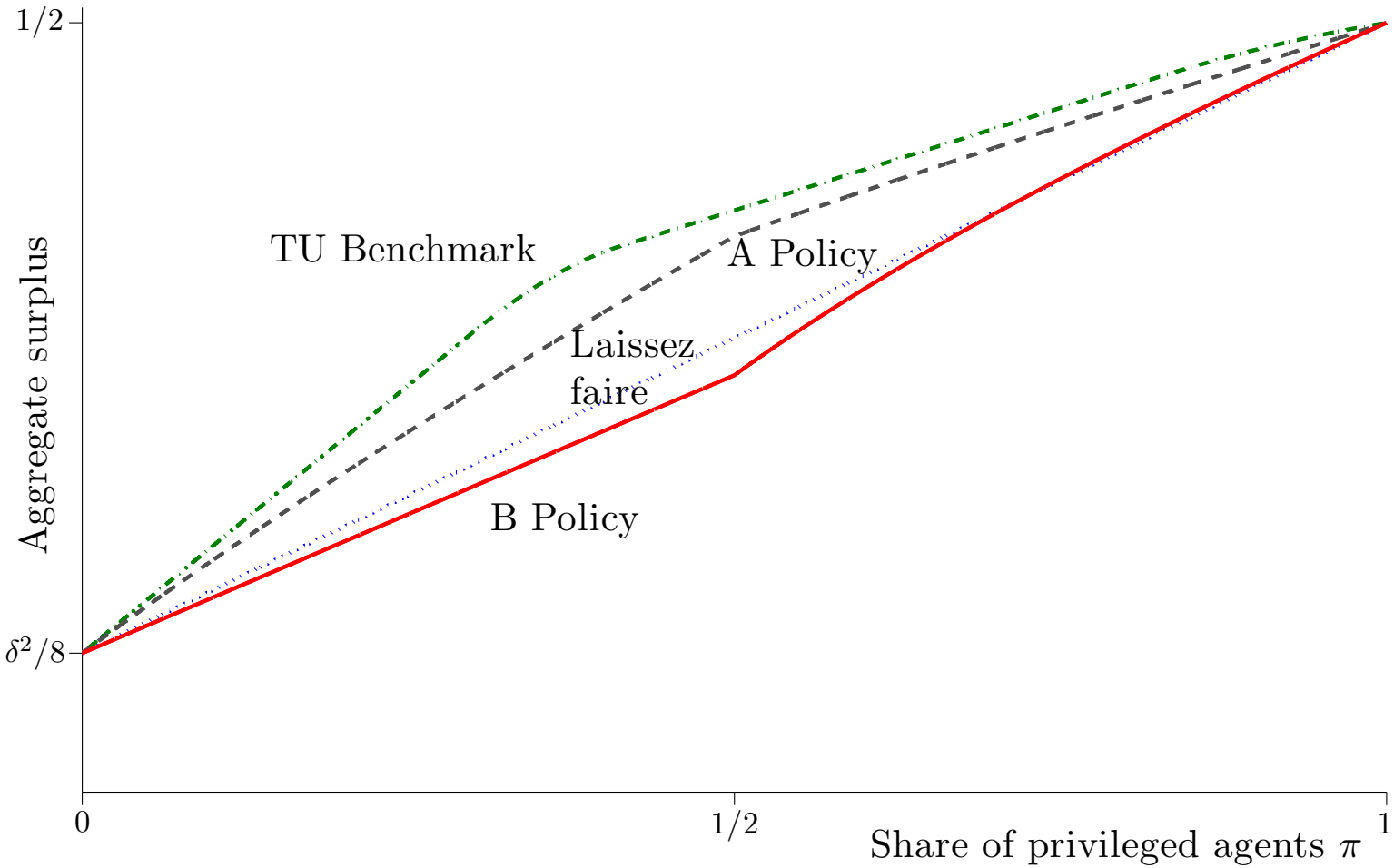
Aggregate Income/Output

- A policy generates higher total output than laissez faire, which generates higher aggregate output than B policy.

Investment and Income Inequality

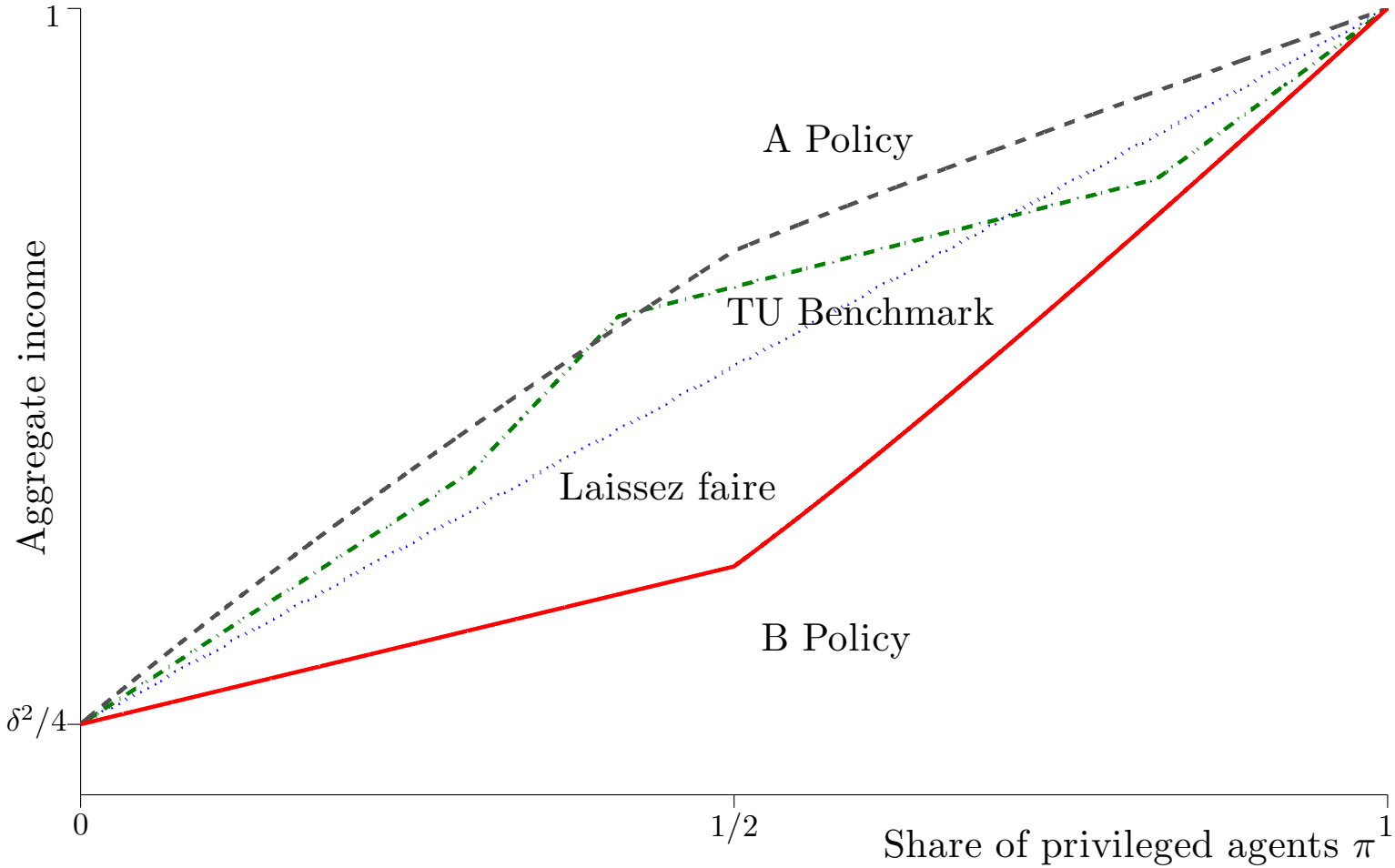
- B policy dominates A policy and laissez faire when the privileged are few ($\pi < 1/2$).
- A policy dominates B policy and laissez faire when $\pi > 1/2$.

Aggregate Surplus



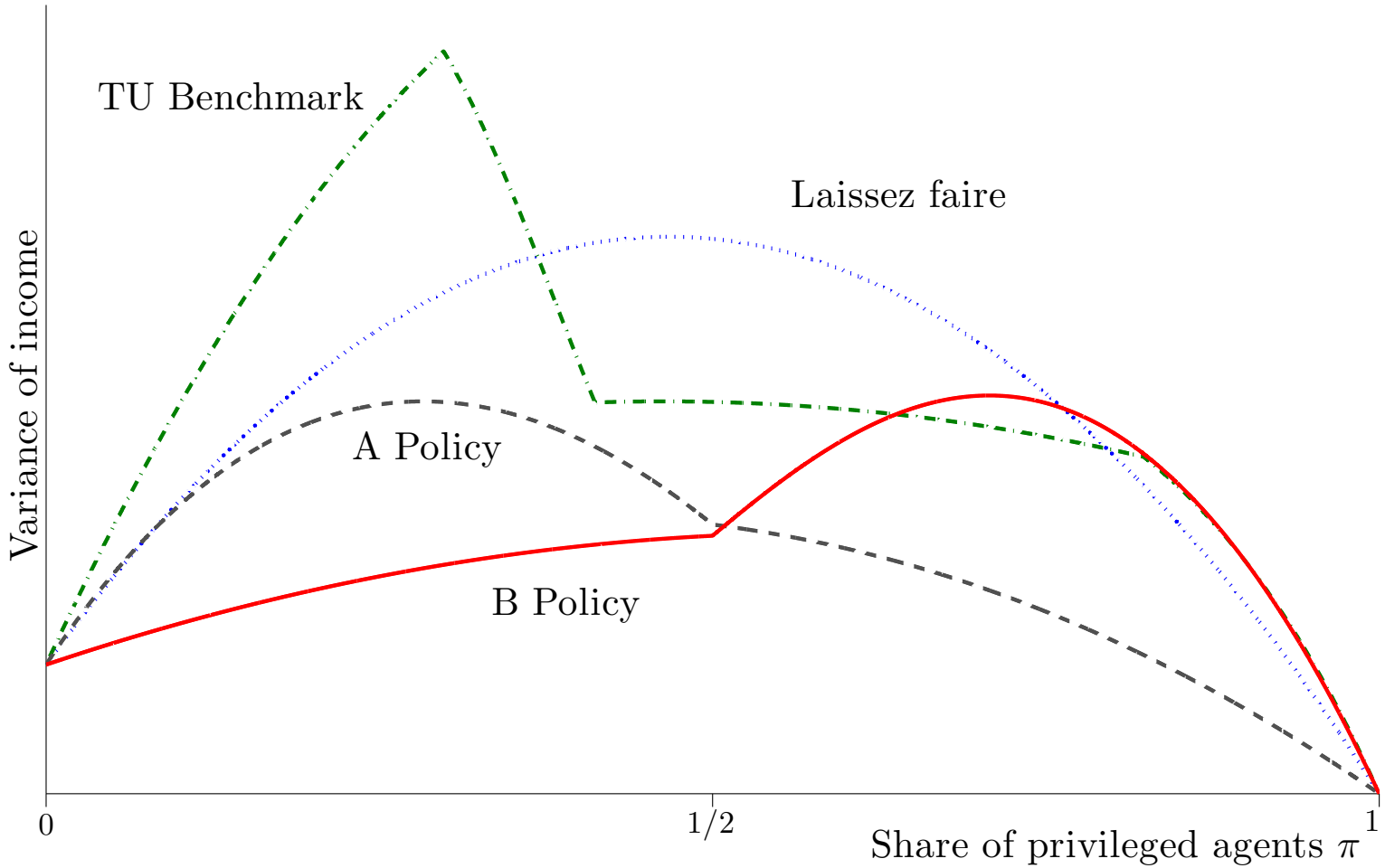
Aggregate surplus (incl. investment cost) in the different regimes.

Aggregate Income



Aggregate income (= output) in the different regimes.

Income Inequality



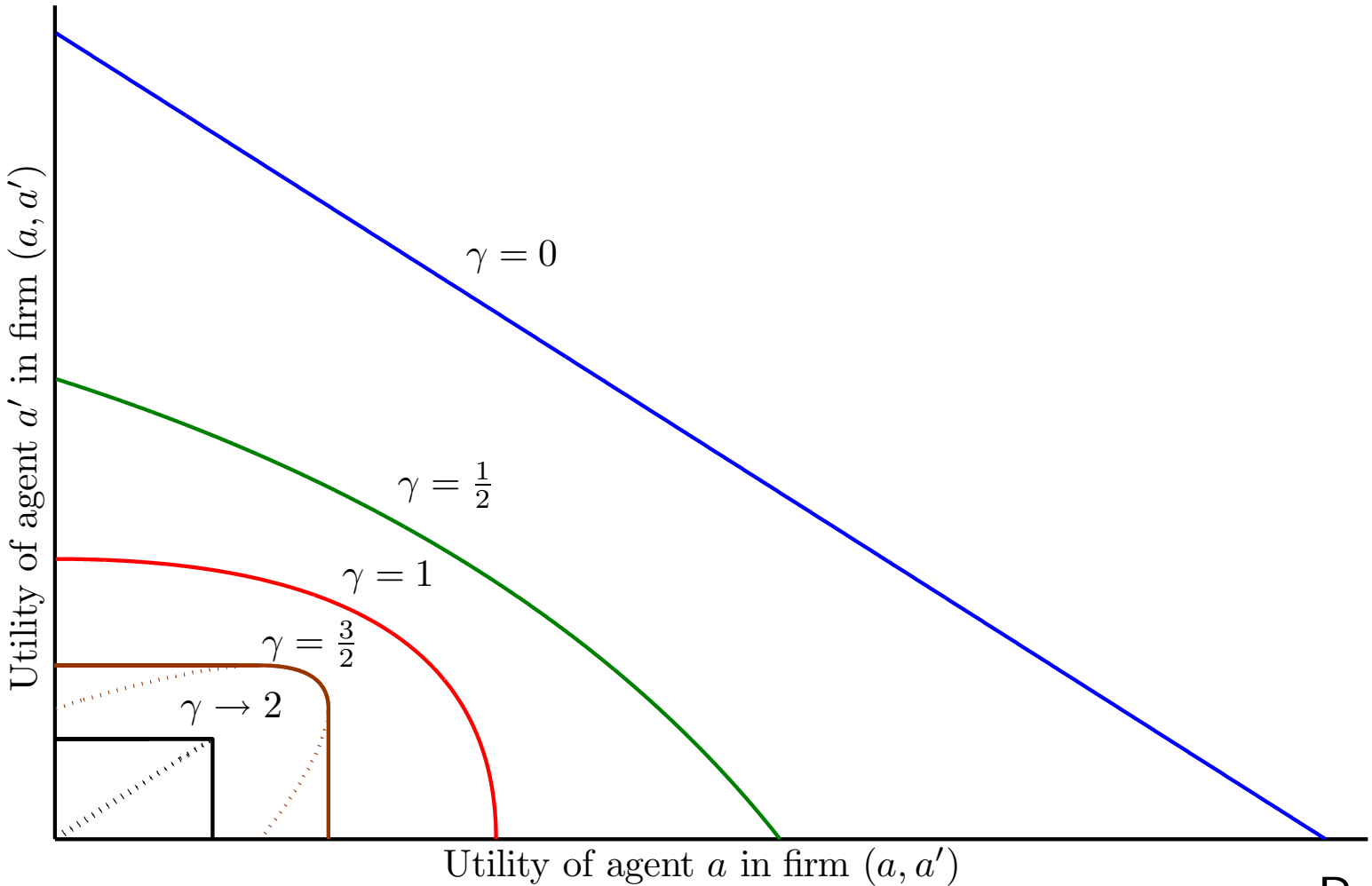
Income inequality in the different regimes.

Summary

- Rigidities may generate excessive segregation, inequality, and distorted investment incentives (OTUB)
- Rematching policies, in particular affirmative action, change market sorting and thus incentives, possibly increasing surplus and output, and decreasing inequality.
- Tractable model for policy analysis, easily incorporated in other frameworks
  - Multi-stage matching (school then labor market)
    - Should rematching occur early, late, both?
    - Hybrid policies that condition late matches on early ones create new sorting incentives and may improve on "pure" policies (e.g., Texas Top Ten Percent rule: project with Fernanda Estevan)
  - Background as gender: "glass ceiling" effects
  - Dynamics: future π or δ may be affected by market outcomes (project with Debbie Goldschmidt)

A Partnership Problem and NTU

Partnership problem: output with probability $(x + x')^\gamma$, x, x' nonverifiable effort at quadratic cost.



Back

General OTUB?

- Let $s \in \{\ell u; \ell p; hu; hp\}$ with a natural order, satisfying $\ell u < \ell p, hu$ and $hp > hu, \ell p$.
- Let $z(s, s')$ satisfy a weak form of monotonicity.
- Diversity is desirable:

$$2z(s, s') > z(s, s) + z(s', s'). \qquad \text{(DD)}$$

- Diversity and returns to education are complements:

$$2[z(hu, s) - z(\ell u, s)] \geq z(hu, hu) - z(\ell u, \ell u), s \in \{hp, \ell p\}. \quad \text{(C)}$$

Proposition

Suppose properties (DD) and (C) hold. Then there is $\underline{\pi} > 1/2$ *such that for all* $\underline{\pi} < \pi \leq 1$ *under laissez-faire the privileged over-invest* ($e_p^* > e_p^T$), *and the underprivileged under-invest* ($e_u^* < e_u^T$).

Back