Prestige Concerns in College Admissions

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Introduction

- Individuals appear to care about the "prestige" in a variety of decision-making contexts:
  - Colleges: *USN&WR Rankings*
  - Majors: *Economics* $\succ$ *Poli Sci* $\succ$ *Sociology ...*
  - Graduate schools: *Top five* $\succ$ *...*
  - Rookie jobs: *Top five* $\succ$ *...*
  - Academic journals: *Top five* $\succ$ *...*
- Signaling perspective: The prestige of a program reflects the *selectivity of the program* (on top of its quality) and can thus be used as a *signal about the hidden ability of individuals in the program*.

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- Bentley et al (2017) use data from a natural experiment in the country of Colombia to confirm a positive effect of college reputation on wages.
- Korean studies:
  - Employers discriminate in recruiting and promotion based on the relative standing of colleges graduated (Hong, 2002; Kim and Kim, 2012).
  - A significant fraction of students pick majors based on the selectivity of programs rather than their interest or aptitude, and a significant percentage regrets their major choice (Chae, 2013).

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  - coarseness of the selection criteria
  - inequalities between groups in test preparation
- Draw welfare and policy implications
- Provide some empirical evidence for the prestige effect

(Stylized) Model

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- Types: Each individual has type $(\epsilon_A, \epsilon_B, v)$, where
  - ϵ_j: iid idiosyncratic aptitude/preference for program $j = A, B$.
  - v: a common score—an unbiased estimate of student's true ability θ. (NOTE: θ is mean preserving spread (MPS) of v.)
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  - v is only observable for the admission purpose while θ is never observable.
- Let $\mathbb{E}[v_j] =$ the average score of students enrolling in j.
  - The unbiasedness implies $\mathbb{E}[v_j] = \mathbb{E}[\theta_j]$, where $\mathbb{E}[\theta_j]$ is the average ability of students enrolling in j.
  - Thus, $\mathbb{E}[v_j] =$inferred ability of any student enrolling in j

Model-Preferences

- A type $(\epsilon_A, \epsilon_B, v)$'s utility from entering a program $j = A, B$ is

$$q_j + \epsilon_j + \tau(\mathbb{E}[v_j] - \mathbb{E}[v]),$$

where

  - q_j: common program quality. We let $q_A = q + \frac{1}{2}\Delta$ and $q_B = q - \frac{1}{2}\Delta$, where $\Delta \geq 0$ parameterizes "quality gap" or stratification/polarization of programs.
  - $\mathbb{E}[v_j] - \mathbb{E}[v]$: program j's prestige.
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  - $\mathbb{E}[v_j] - \mathbb{E}[v]$: program j's prestige.
  - $\tau \geq 0$ parameterizes the prestige effect.
- Note: neither Δ nor τ has "direct" effect on the (utilitarian) welfare, since the total amount of 'quality' and 'prestige' is fixed and has a zero-sum nature.
  - For instance, $\mathbb{E}[v] = 1/2\mathbb{E}[v_A] + 1/2\mathbb{E}[v_B]$.

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2. Programs admit students based on v
3. Those admitted by both programs pick the program that gives them higher utility.

Equilibrium Analysis

- We focus on the equilibrium **prestige gap** $\delta := \mathbb{E}[v_A] - \mathbb{E}[v_B]$. Focus on $\delta \geq 0$. (Recall: $\mathbb{E}[v_j]$ = mean of v for students enrolling $j = A, B$).

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  - Fix any $\delta \geq 0$.

  $\Rightarrow$ There exists a cutoff $\hat{v}_A$ by program A (B's cutoff is zero) such that
    - each program fills its seats
    - an individual of type $(\epsilon_A, \epsilon_B, v)$ chooses A iff $v \geq \hat{v}_A$ and

$$q_A + \epsilon_A + \tau(\mathbb{E}[v_A]) \geq q_B + \epsilon_B + \tau(\mathbb{E}[v_B])$$

$$\Leftrightarrow \alpha := \epsilon_A - \epsilon_B \geq -(\Delta + \tau\delta).$$

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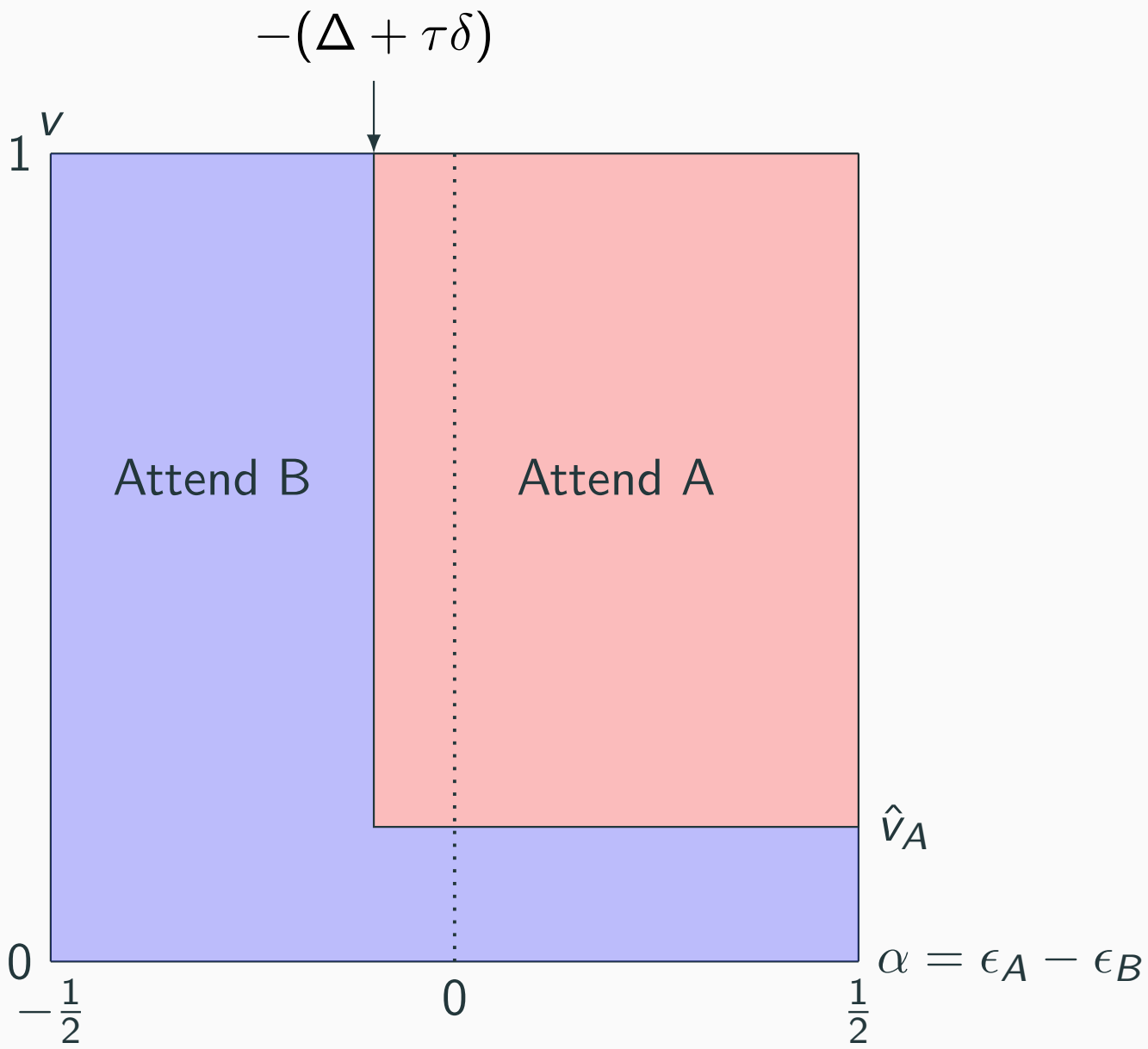
Lemma (Existence)

The self-map ϕ is nondecreasing and thus admits a fixed point δ^*.

Monotonicity of ϕ



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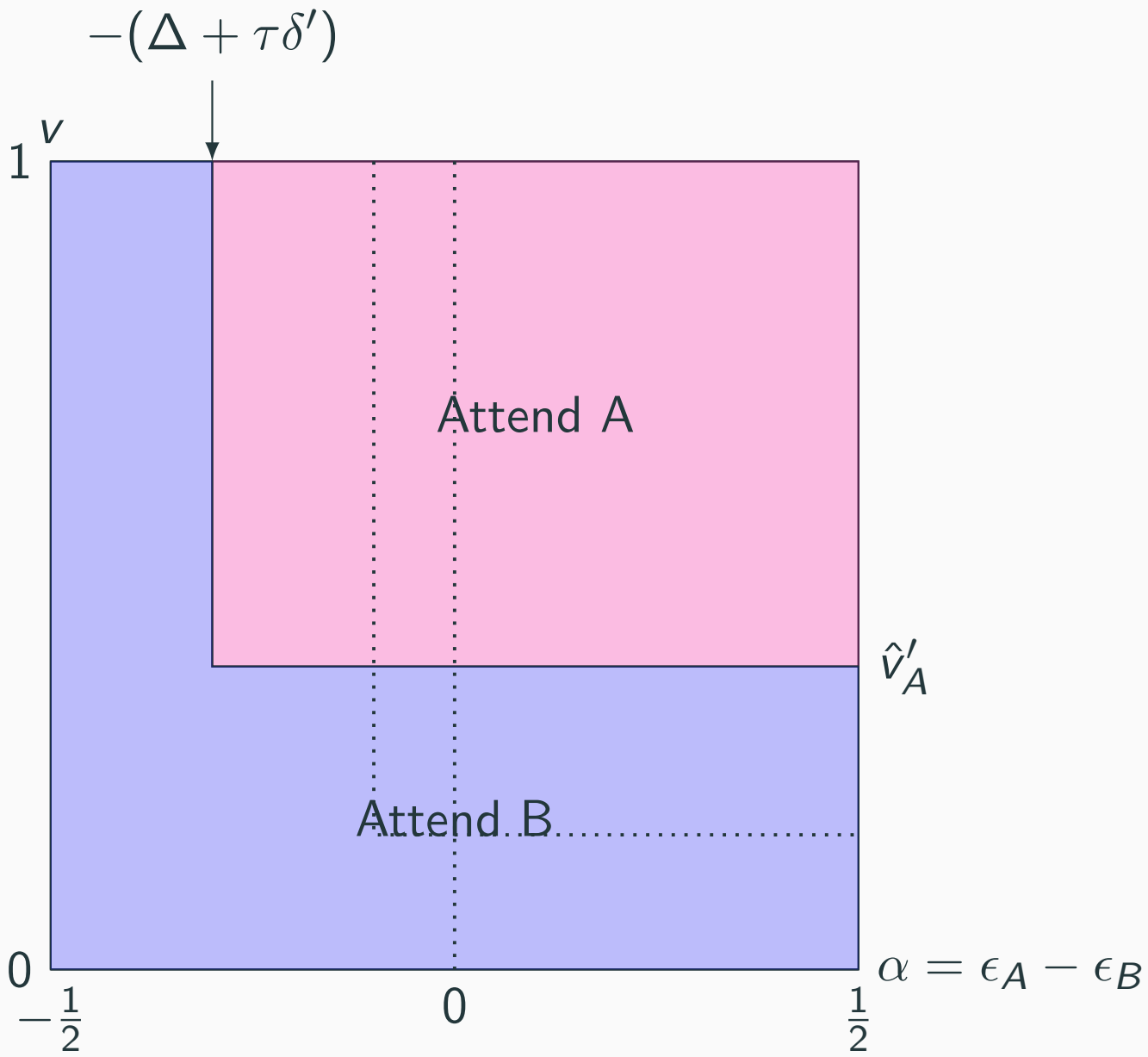

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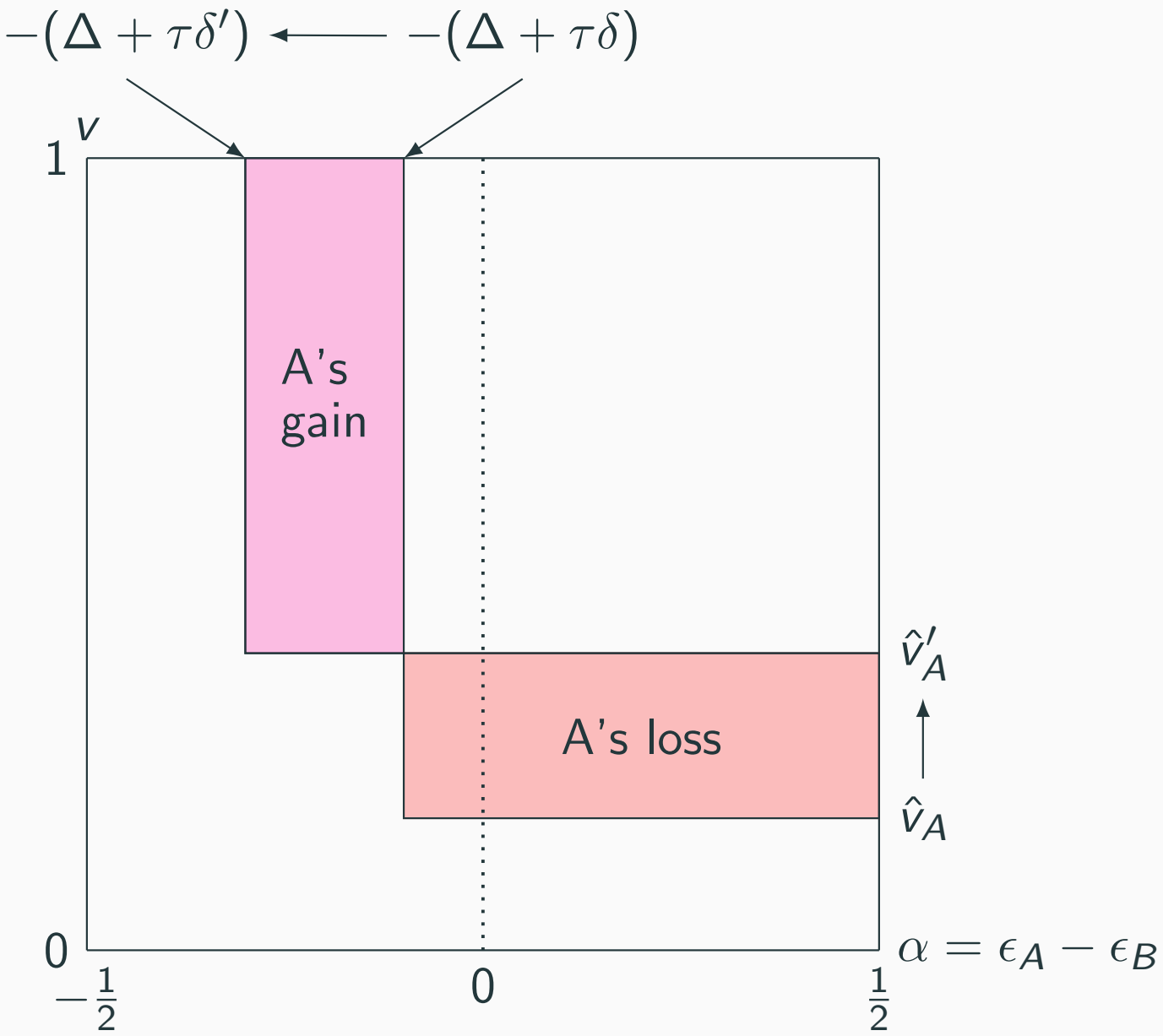
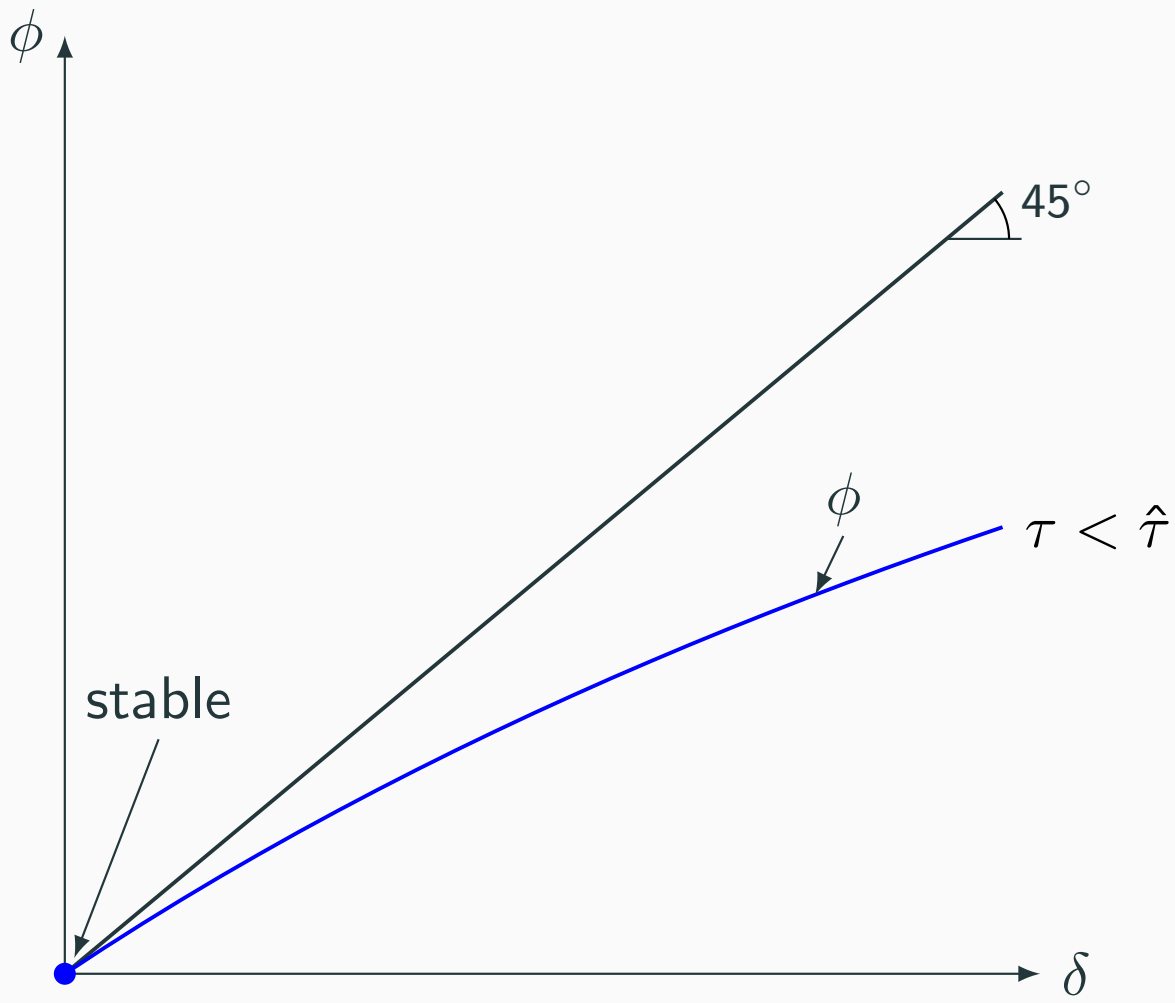


Equilibrium with $\Delta = 0$ (no intrinsic quality gap)



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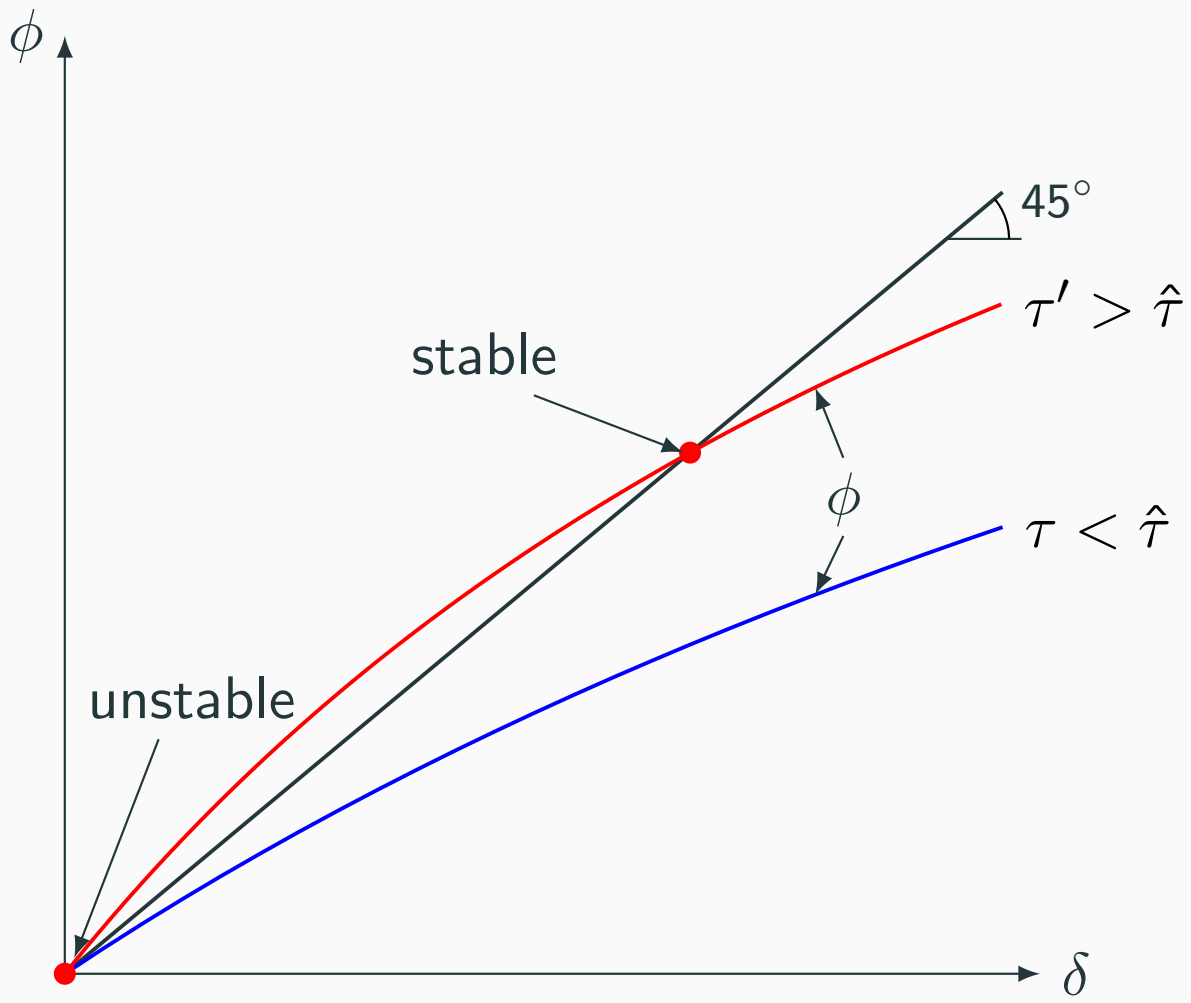


Main Result

Proposition (Comparative Statics)

Suppose (τ, Δ) *rise to* (τ', Δ') $[> (\tau, \Delta)]$. *That is, prestige matters more and programs are more stratified. Then, at an extreme—largest or smallest in* δ*—equilibrium,*

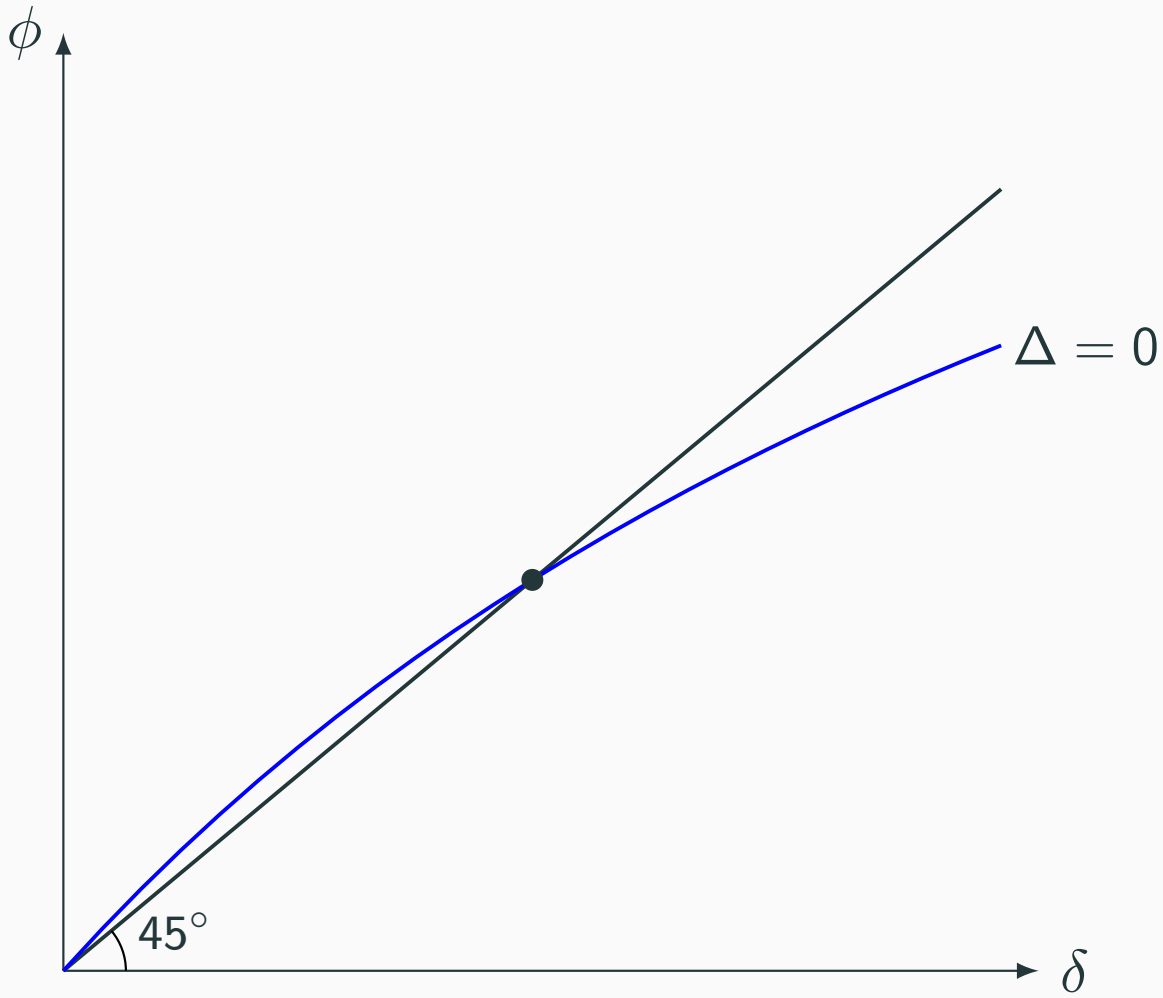
(i) *the prestige gap rises;*

(ii) *program A becomes more selective;* $\hat{v}_A$ *rises;*

(iii) *the utilitarian welfare falls.*

In particular, given $\Delta = 0$ *(symmetry),* $\delta = 0$ *is a "stable" equilibrium if and only if* $\tau < \hat{\tau}$ *for some* $\hat{\tau} > 0$.

Intuition: Quality gap and prestige gap are mutually reinforcing



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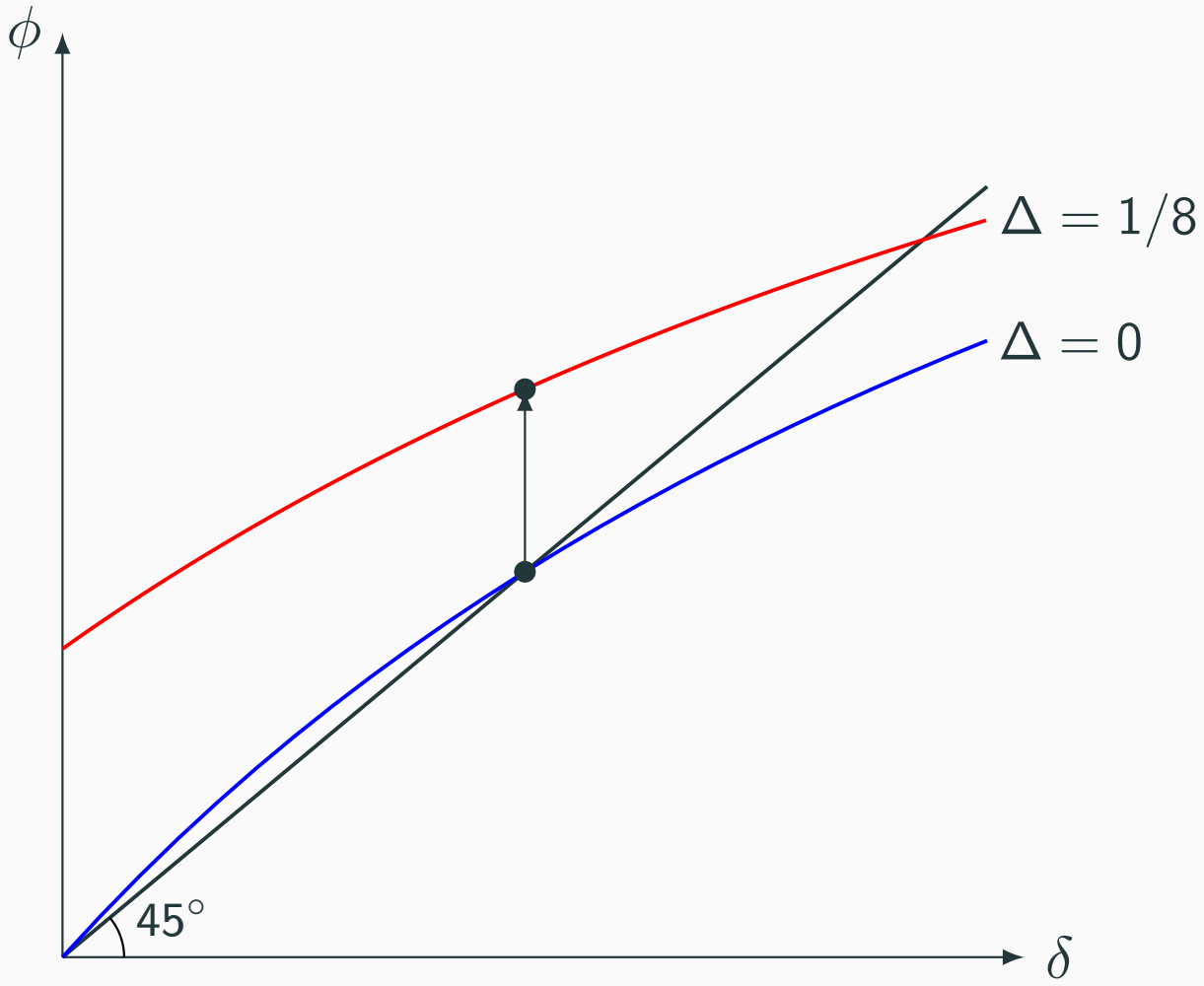

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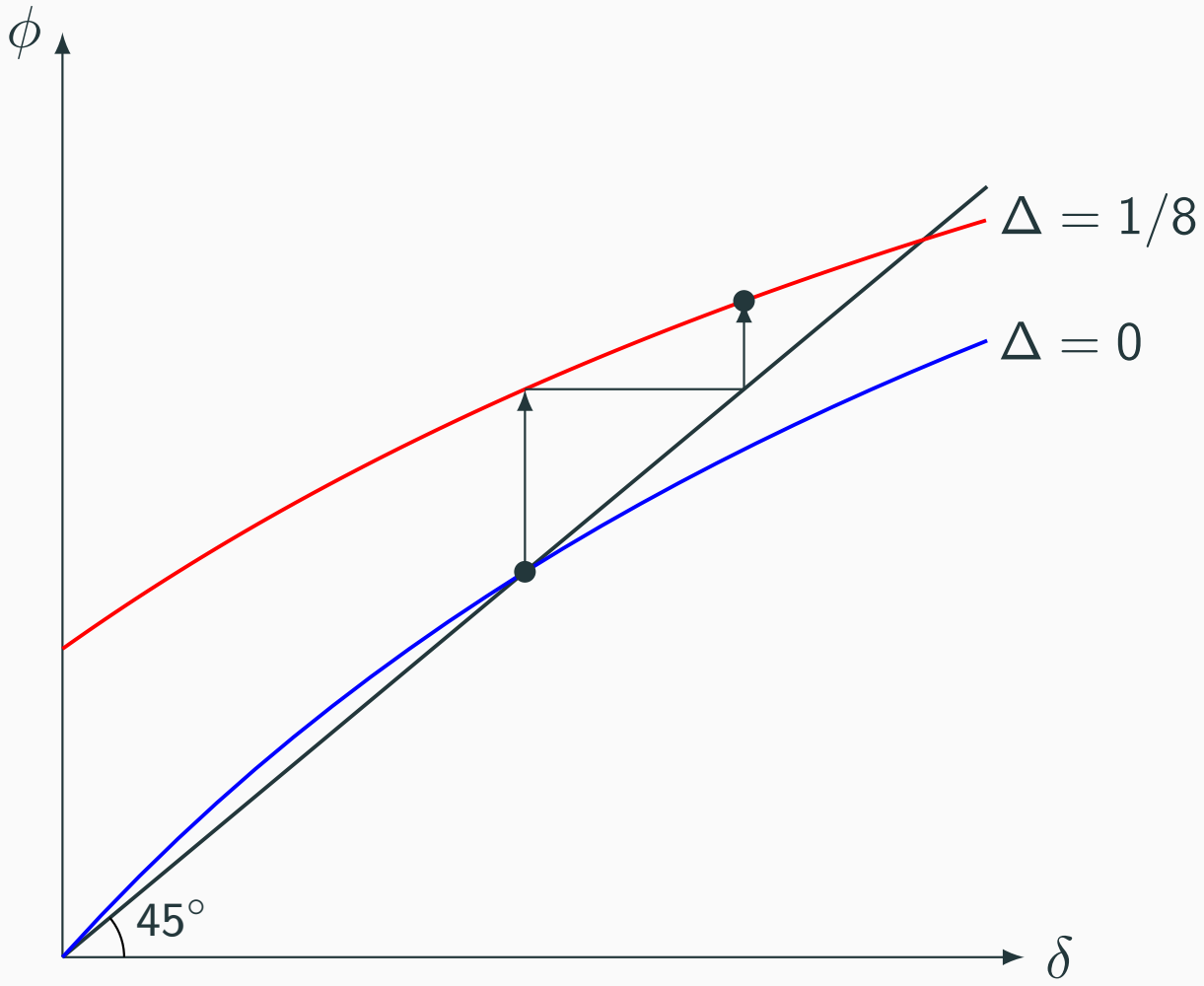

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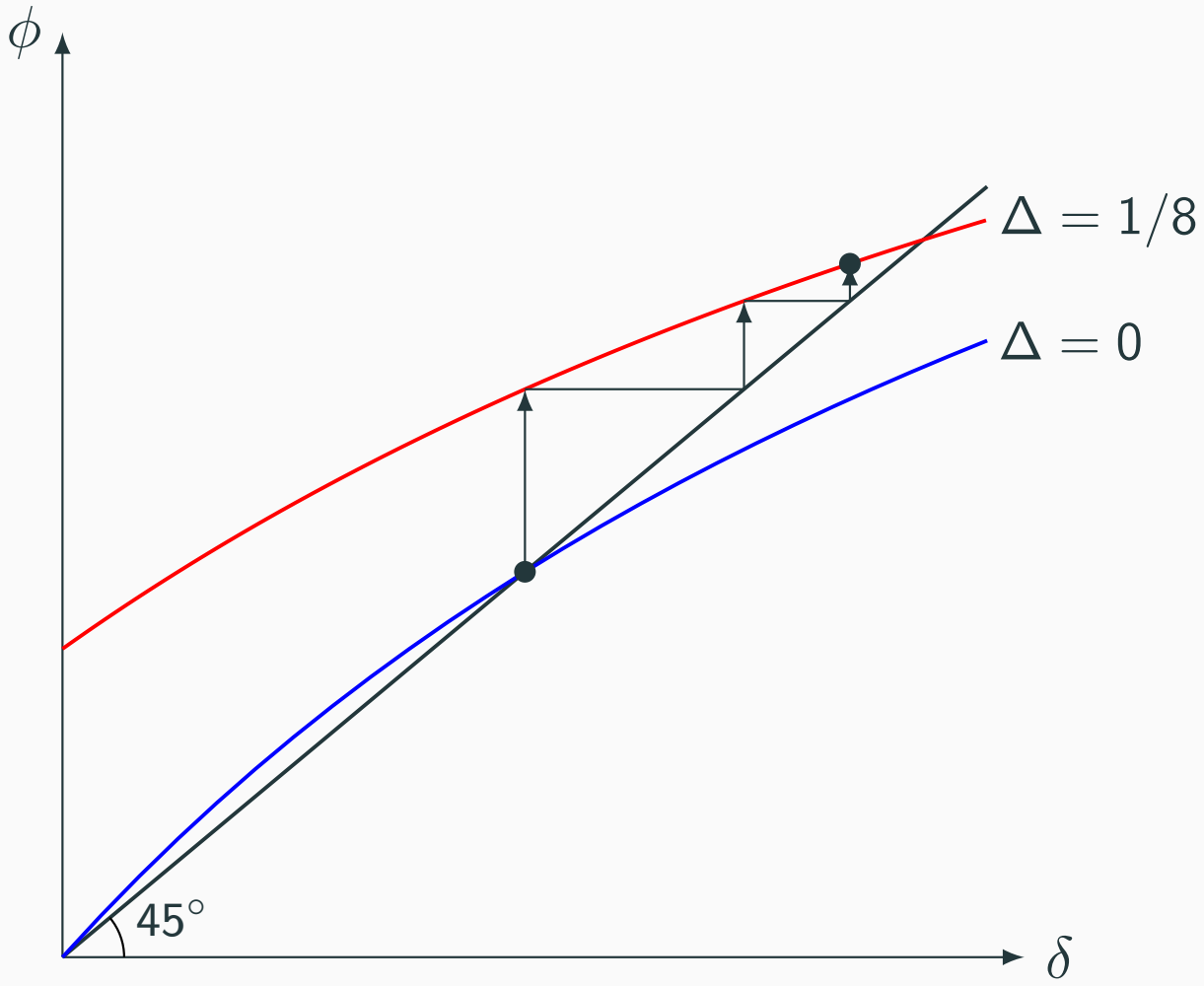

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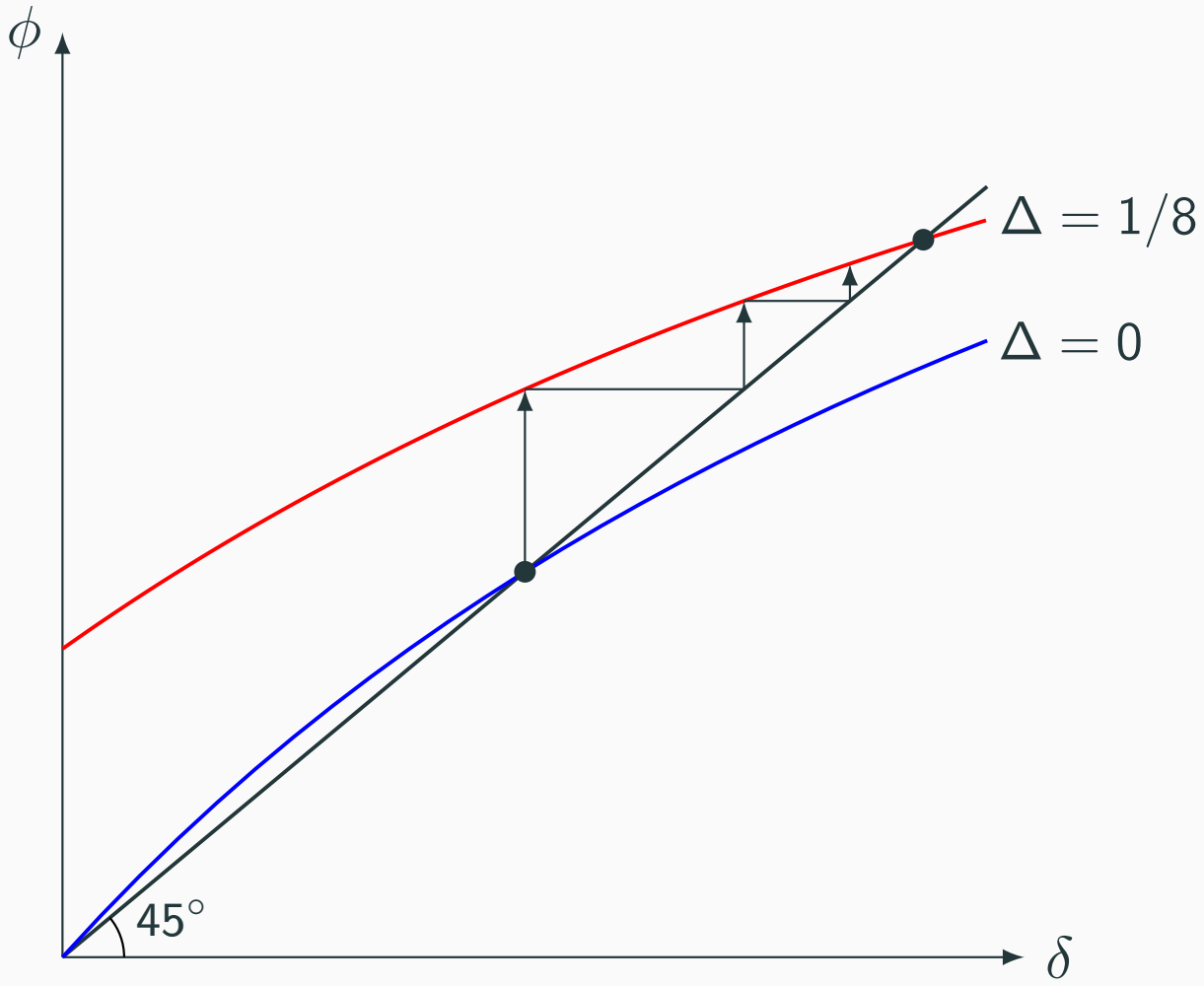
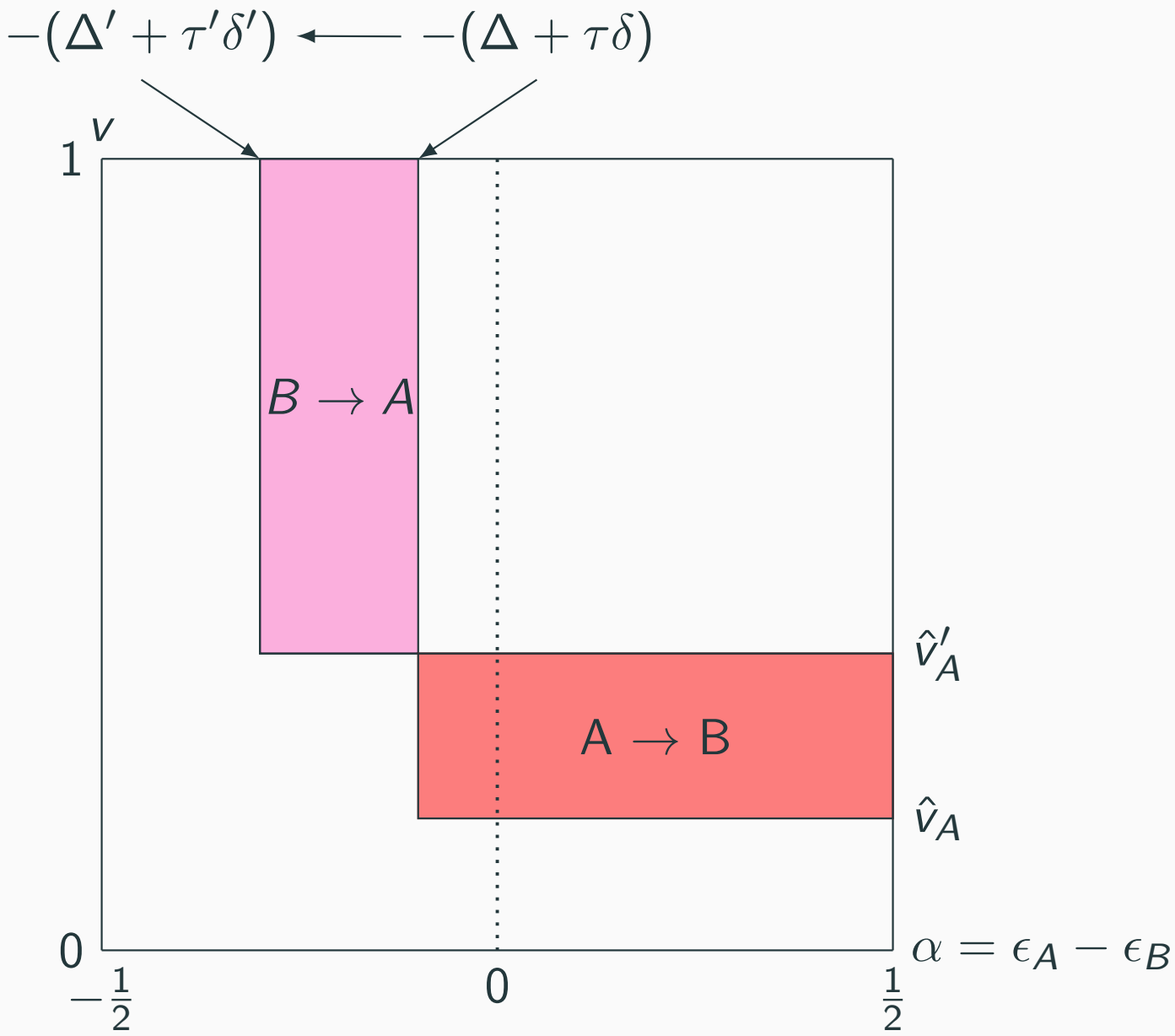


Welfare Decrease



Signal Accuracy

- Does more accurate signal exacerbate the prestige distortion?
  - Policy responses: Coarsening, use of diverse (possibly nonacademic) measures.
- Signal Order: Signal v is more integral precise than signal w if $v = \int \theta dF_{\tilde{v}}(\theta|v)$ is a **mean preserving spread (MPS)** of $w = \int \theta dF_{\tilde{w}}(\theta|w)$ (Ganuza and Penalva, 2010).

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Proposition (Effect of Signal Precision)

As the signal becomes more integral precise,

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- A holistic admission, which selects students based on both v and α, has a similar effect to reducing the signal precision.

Group Inequality

- How does prestige-seeking behavior affect group inequality—the access to desired programs by underprivileged group?
- Formally, there are two groups:
  - "The Privileged" of mass m_P: High SES; $v \sim P(\cdot)$
  - "The Underprivileged" of mass m_U: Low SES; $v \sim U(\cdot)$
- P likelihood-ratio dominates U, where $F(v) = m_P P(v) + m_U U(v), \forall v$, with $m_P + m_U = 1$.

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Proposition (Effect on Group Inequality)

Suppose (τ, Δ) *rise to* (τ', Δ') $[> (\tau, \Delta)]$. *Then, at an extreme—largest or smallest in* δ*—equilibrium,*

(i) *the share of the underprivileged in A falls.*

(ii) *the welfare of the underprivileged falls.*

College-Based vs Department-Based Admissions

Two colleges with equal capacity (=1/2), College 1 and College 2, and two majors, A and $B \Rightarrow$ 4 Depts, $1A$, $1B$, $2A$, and $2B$.

- Let $q_{kj} :=$ quality of Dept kj, $\Delta_k q := q_{kA} - q_{kB} > 0, k = 1, 2$ and $\Delta_j q := q_{1j} - q_{2j} > 0, j = A, B$.
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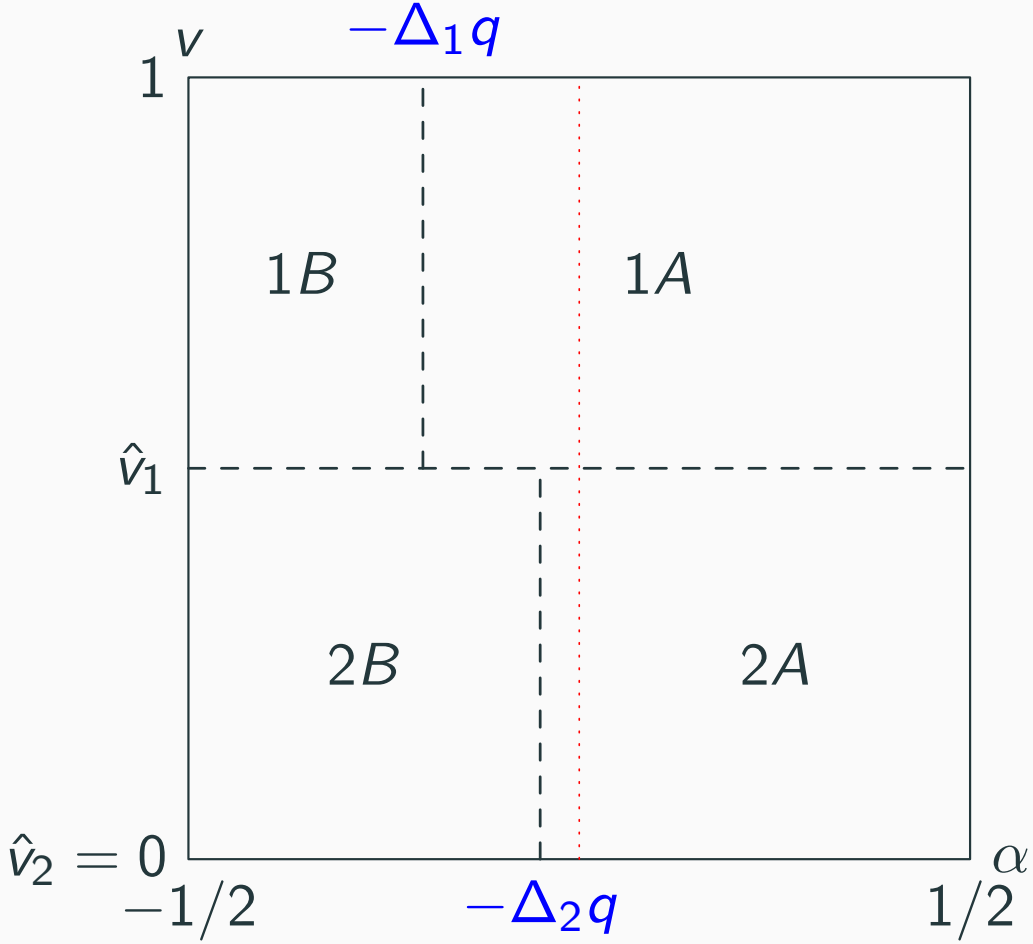
    - The preference heterogeneity likely smaller across colleges than across majors.
- College-based admission (CBA): Students enroll in colleges and then freely choose their majors (or departments).
    - *no capacity constraint* for departments
- Department-based admission (DBA): Students enroll in departments.
    - the capacity for each Dept kj is given *exogenously* as κ_{jk}.

Equilibrium of CBA and DBA

In a 'unique' equilibrium of CBA, students are assigned as in



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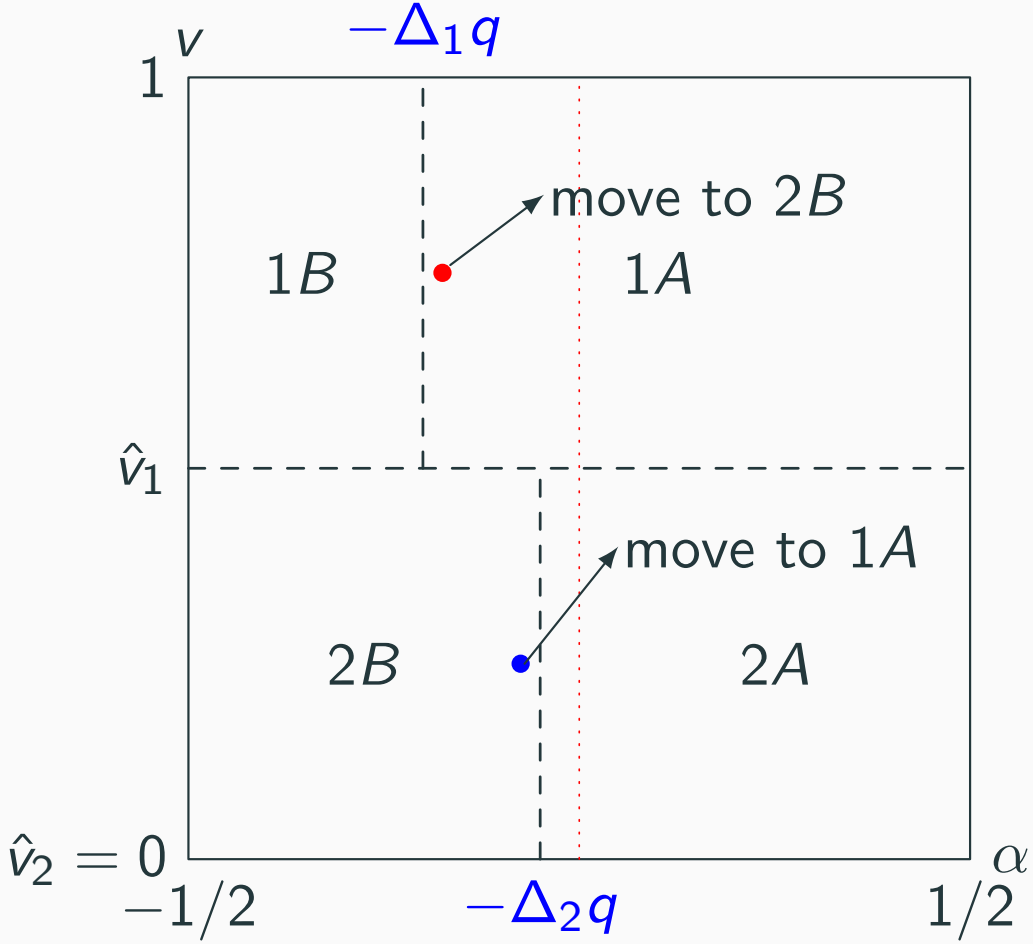

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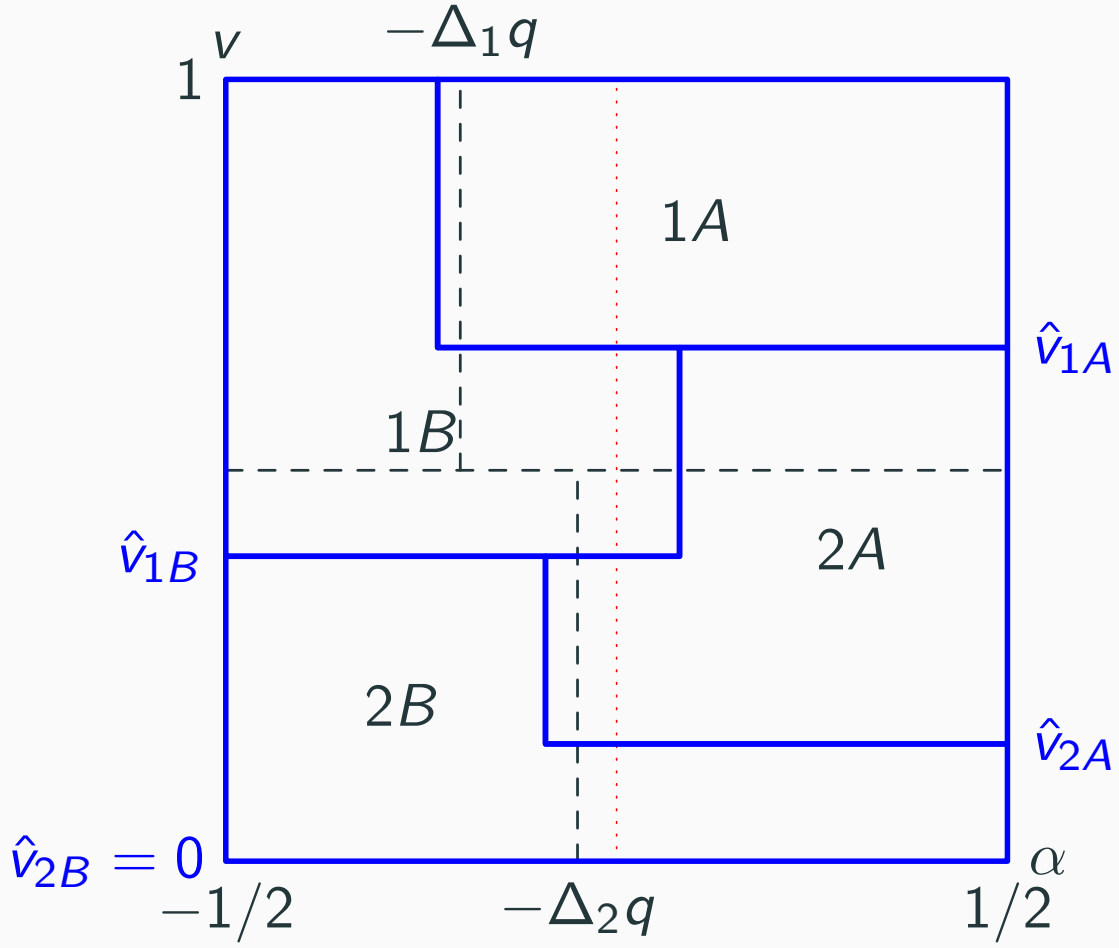

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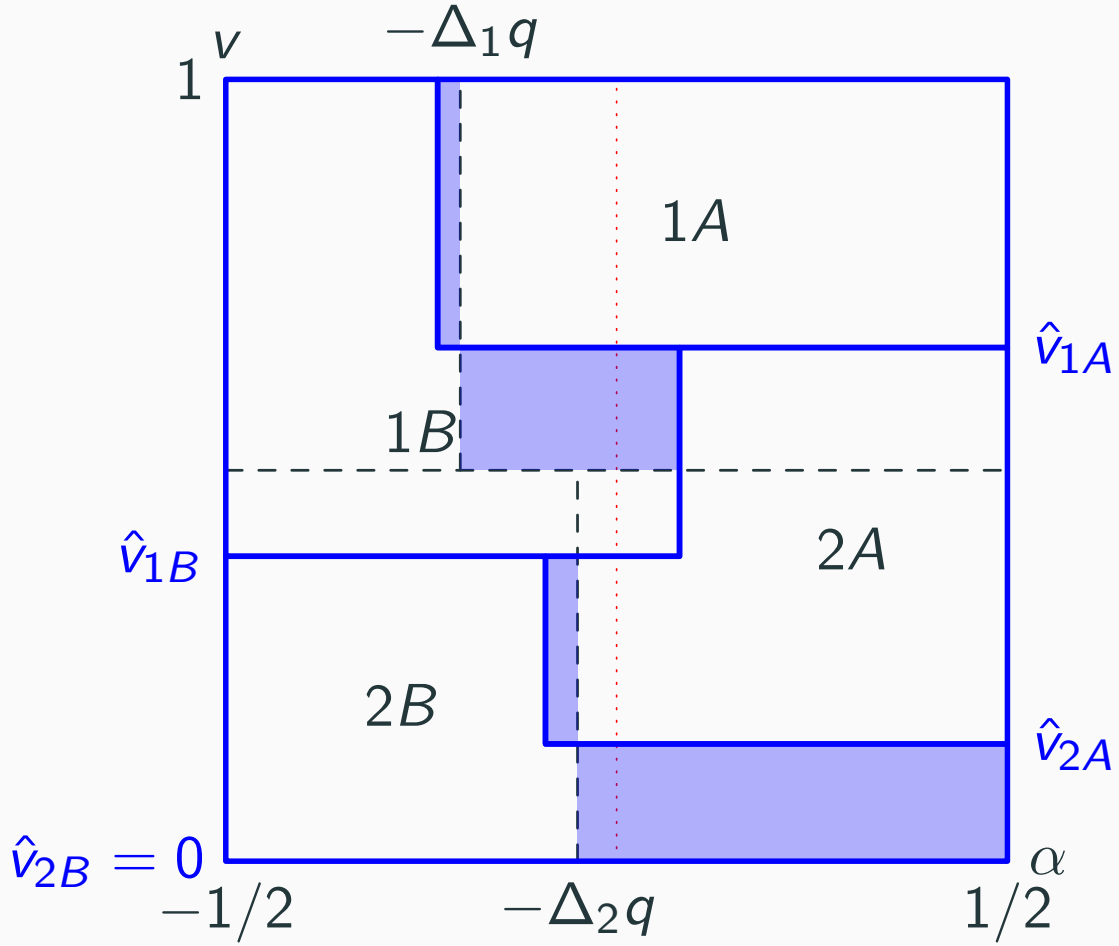
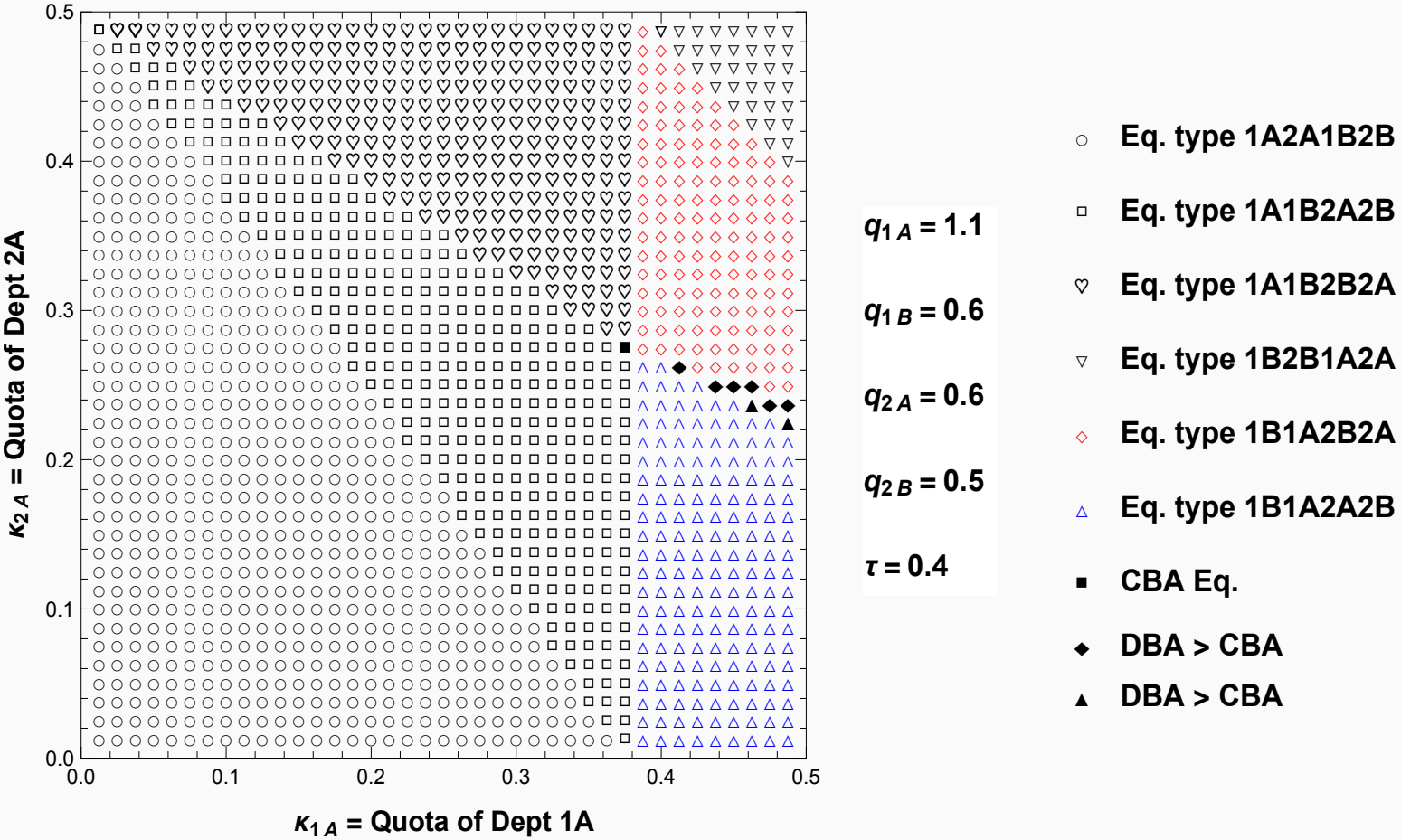


Both within-college and across-college distortions

Comparison of Welfare under CBA and DBA

- DBA generating higher student welfare than CBA is a very rare incidence, at least according to this numerical example:



(Each eq. type is labeled according to the order of cutoff scores.)

Comparison of Welfare under CBA and DBA

Proposition (Student Welfare under CBA vs DBA)

The students' welfare is higher in the unique equilibrium of CBA

1. *than in any equilibrium of DBA if* $\kappa_{1A} \leq \kappa_{2A}$*;*
2. *than in any equilibrium of DBA with* $\hat{v}_{1A} > \hat{v}_{1B}, \hat{v}_{2A}, \hat{v}_{2B}$ *if* $\kappa_{1A} \leq \kappa_{1A}^*$*, where* κ_{1A}^* *is Dept* $1A$*'s size under CBA.*

- This result and the above numerical analysis suggest that the distortion due to prestige concern could be alleviated only in the case the "elite program (i.e., Dept 1A)" is relatively large.

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- Why department-based admission?: One explanation is *enrollment protection for unpopular departments*. But theory suggests DBA hurts selection for them.
- University of Melbourne's switching from major choice to *faculty choice* is largely regarded as a success.

Case Study for the Prestige Effect in Major Choice

- Universities in Korea mostly followed the "department-based admission" until late 2000, when some universities (including SNU) began to assign part of their quotas to the "College of Liberal Studies (LS)":
  - In one private university, more than 90% of students in the LS program have chosen "business administration" as their major.
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  - After choosing a major, each student became affiliated with the department of his/her major.
  - SNU adopted a different system, resulting in different outcomes, which we argue suggest the prestige concern.

Case Study for the Prestige Effect in Major Choice

- Difficult to identify prestige from preference for quality.
- Unique institutional features of SNU: Three admissions tracks leading to a social science major, which are
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  1. Department-based admission: Econ is more selective than other social sciences;
  2. Admission into College of Social Science (SS): Students choose out of social science majors in 2nd year, earning the same diploma as and thus indistinguishable from the first track;
  3. Admission into College of Liberal Studies (LS): Students choose out of all majors in 2nd year, earning different diploma and thus distinguishable from the first two tracks.
- Key difference:
  - Econ students under LS are associated with the entire class of LS, and the selectivity thereof.
  - Econ students under SS pool with the first track, and the selectivity thereof.

Case Study for the Prestige Effect in Major Choice

Table 1: Major Choice (in percentages) in the College of Social Science (SS) and College of Liberal Studies (LS) at SNU

	2014		2015		2016 Spring	
	LS	SS	LS	SS	LS	SS
Total	(254)	(109)	(331)	(93)	(204)	(92)
Other Majors	(130)	N/A	(207)	N/A	(142)	N/A
Social Science	(124)	(109)	(124)	(93)	(62)	(92)
Economics	46.8 (58)	79.8 (87)	49.2 (61)	79.6 (74)	37.1 (23)	83.7 (77)
Poli Sci/IR	16.9 (21)	7.3 (8)	13.7 (17)	11.8 (11)	16.1 (10)	8.7 (8)
Sociology	6.5 (8)	0.9 (1)	4.8 (6)	1.1 (1)	4.8 (3)	3.3 (3)
Anthropology	4.0 (5)	0 (0)	3.2 (4)	1.1 (1)	6.5 (4)	1.1 (1)
Psychology	10.5 (13)	4.6 (5)	14.5 (18)	3.2 (3)	17.7 (11)	1.1 (1)
Geography	0 (0)	0.9 (1)	1.6 (2)	1.1 (1)	0 (0)	0 (0)
Social Welfare	1.6 (2)	0 (0)	2.4 (3)	0 (0)	1.6 (1)	0 (0)
Communication	3.2 (4)	6.4 (7)	4.0 (5)	2.2 (2)	9.7 (6)	2.2 (2)
Integrated Studies	10.5 (13)	N/A	6.5 (8)	N/A	6.5 (4)	N/A

Remaining Works

- On the theory front, we consider
  - Endogenizing the decision of colleges to invest in their qualities.
    - Excessive investment at equilibrium when students have prestige concerns (if college preferences are aligned with students' welfare).
    - Overinvestment by US colleges has been an issue lately.
  - More than two (or continuum) colleges
  - Early admission vs regular admission
- Much work remains at the empirical front.
  - Survey data from SNU: Measure students' preference/aptitude for their majors and combine them with GPA data.
  - Some structural estimation.

Thank You!