University Competition, Grading Standards and Grade Inflation

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Grading Policies Are Not Bestowed Upon

	Harvard U	U Illinois
1967	2.8	2.77
1999	3.42	3.12
2005	3.45	3.19

- S. Rojstaczer, GradeInflation.com: Grades definitely rise.
  - Students get smarter?
  - Grade inflation?..
- GPAs go up faster in better universities.

Universities Can Adjust Policies

- Bar & Zussman (2011): registered republican professors grade differently from registered democrat.
- Bagues, Labini and Zinovyeva (2008): Italian universities respond to funding shocks by changing grading policies.

What Other People Do?

- Yang & Yip (2003): grade inflation leads to people with good grades and people with bad grades earn same product.
- Dubey & Geanakoplos (2010): discrete grading makes sense if you want students to exercise effort.
- Ostrovsky & Schwarz (2010): optimal information revelation might require to give out same grades to people of different abilities.
- Zubrickas (2010): optimal grading schedule to milk out effort involves revelation in the middle and giving the same grade at the right tail.

Results Preview

- Grading standards are lower in better universities.
- Social planner sets higher grading standards in better universities.
- Grading standards go down faster in better universities.

The World

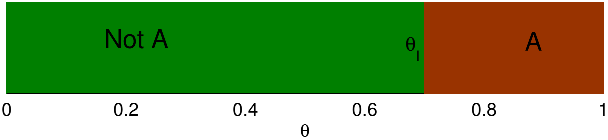
- We study the market of fresh alumni.
- Students attend two kinds of universities — H and I.
  - University type represents the academic ability distribution of its student.
  - We use a continuum of universities to model that the labor market effect of one university is negligible.

The World

- We study the market of fresh alumni.
- Students attend two kinds of universities — H and I.
  - University type represents the academic ability distribution of its student.
  - We use a continuum of universities to model that the labor market effect of one university is negligible.
- Students are getting employed in two kinds of jobs — good and bad jobs.
- Employers use grades and interviews to give wages.
- Universities understand the effect of their own grading on the placement.

Universities

- There are two kinds of universities — *H* and *I*.
- Universities choose grading policies as academic ability cutoff for “A” grade, $\hat{\theta}_u, u \in \{H, I\}$.



- Universities maximize the total wage received by alumni.

Students

- Students are characterized by *academic* and *social* abilities, $(\theta, \mu) \in [\underline{\theta}, \bar{\theta}] \times [\underline{\mu}, \bar{\mu}]$.
- Social ability μ is independent of academic ability θ, $\mu \sim G(\cdot)$.
- Academic ability θ of students of university u has distribution $F_u(\cdot)$.

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- Academic ability θ of students of university u has distribution $F_u(\cdot)$.
- There is α of H students and $1 - \alpha$ of l students.
- F_H has a better upper tail than F_l, for every point where one cuts the upper tail.

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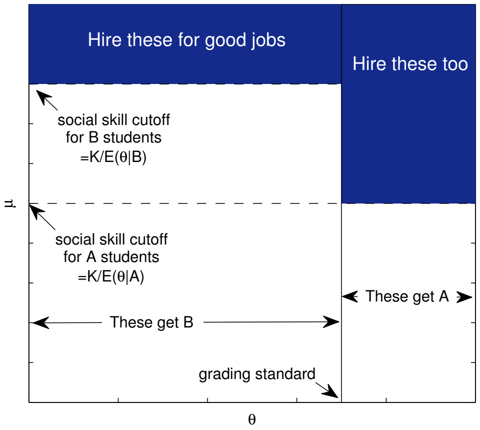
- There is a measure Γ of good jobs.
- Good jobs pay W, bad jobs pay w, $W > w > 0$.

Employment



K is chosen so that total quantity of students employed on good jobs is Γ.

Motivation

Social planner:

- Maximizes total output.

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- Universities realize how they affect employers.

Social Planner's Problem

$$\max_{\hat{\theta}_H,\hat{\theta}_I} \alpha \overbrace{\int_{\hat{\mu}_{HA}}^{\bar{\mu}} \int_{\hat{\theta}_H}^{\bar{\theta}} \mu\theta dF_H dG}^{\text{Total productivity of HA}} + (1-\alpha) \overbrace{\int_{\hat{\mu}_{IA}}^{\bar{\mu}} \int_{\hat{\theta}_I}^{\bar{\theta}} \mu\theta dF_I dG}^{\text{Total productivity of IA}} +$$

$$\underbrace{\alpha \int_{\hat{\mu}_{HB}}^{\bar{\mu}} \int_{\underline{\theta}}^{\hat{\theta}_H} \mu\theta dF_H dG}_{\text{Total productivity of HB}} + (1-\alpha) \underbrace{\int_{\hat{\mu}_{IB}}^{\bar{\mu}} \int_{\underline{\theta}}^{\hat{\theta}_I} \mu\theta dF_I dG}_{\text{Total productivity of HB}}$$

subject to

$$\alpha \int_{\hat{\mu}_{HA}}^{\bar{\mu}} \int_{\hat{\theta}_H}^{\bar{\theta}} dF_H dG + (1-\alpha) \int_{\hat{\mu}_{IA}}^{\bar{\mu}} \int_{\hat{\theta}_I}^{\bar{\theta}} dF_I dG +$$

$$\alpha \int_{\hat{\mu}_{HB}}^{\bar{\mu}} \int_{\underline{\theta}}^{\hat{\theta}_H} dF_H dG + (1-\alpha) \int_{\hat{\mu}_{IB}}^{\bar{\mu}} \int_{\underline{\theta}}^{\hat{\theta}_I} dF_I dG = \Gamma$$

University u's Problem

$$\max_{\hat{\theta}} \int_{\hat{\mu}_{uA}}^{\bar{\mu}} \int_{\hat{\theta}_u}^{\bar{\theta}} dF_u dG + \int_{\hat{\mu}_{uB}}^{\bar{\mu}} \int_{\underline{\theta}}^{\hat{\theta}_u} dF_u dG$$

subject to

$$\hat{\mu}_{uA} E[\theta | u, \theta > \hat{\theta}_u] \geq K,$$

$$\hat{\mu}_{uB} E[\theta | u, \theta < \hat{\theta}_u] \geq K.$$

Equilibrium

- Labor market works as described.
- Universities choose standards as best responses to each other.

Proposition

Equilibrium exists. It is unique with respect to who gets employed on good jobs.

"A" Students Are Always Employed

Proposition

University's best response involves acquiring a good job for a positive mass of students.

That means every equilibrium implies hiring some *HA* and some *IA* guys for good jobs.

Simple Model: $\bar{\mu} = \underline{\mu} = 1$

This assumption means that interviews do not matter.
If the amount of good jobs is too small, then equilibrium will have to include only *HA* and *IA* students.
Interior equilibrium condition when only A students get a good job:

$$E[\theta|H, \theta > \hat{\theta}_H^*] = E[\theta|I, \theta > \hat{\theta}_I^*].$$

Equilibirum and Social Planner

Proposition

Social planner picks equal grading standard.

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When the measure of good jobs is not large, the grading standard in H is lower than in I.

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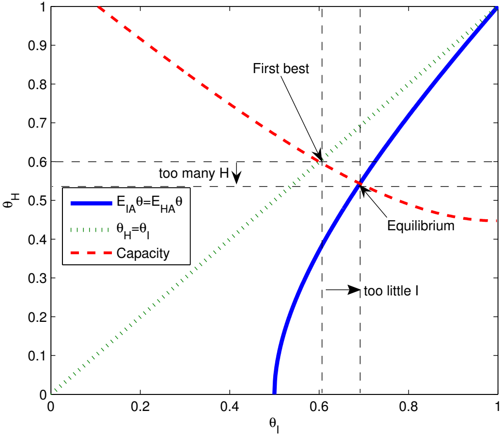
Corollary

There are too many H students employed on a good job, and too few I students in equilibrium.

First-Best vs Equilibrium



Note: $\Gamma = 0.25$, $\alpha = 0.5$. $f_H(x) = 2x$, $f_I(x) = 2 - 2x$.

Linear Density Family

$$f(x|b) = 1 - \frac{b}{2} + bx, x \in [0, 1]$$

Proposition

When only “A” students are getting a good job, grading standards go down faster in H than in I.

Limited Heterogeneity in Social Skills

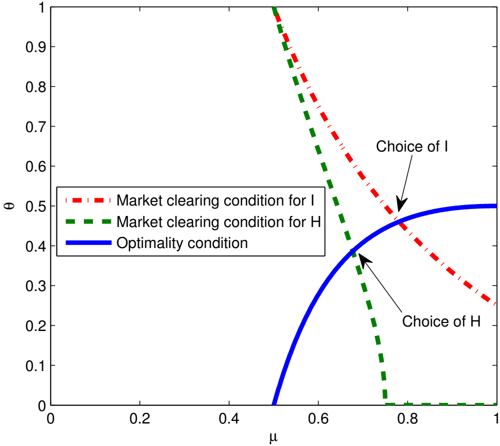
No “B” students get good jobs.
Also, some “A” students with low social skills may not get a good job.

Proposition

When $\mu^2 g(\mu)$ is increasing, in equilibrium H universities have lower grading standards and lower social skill cutoff for hiring at good jobs.

$$\hat{\theta} = K\left[\frac{1}{\hat{\mu}_u} - \frac{1 - G(\hat{\mu}_u)}{g(\hat{\mu}_u)\hat{\mu}_u^2}\right] = R(\hat{\mu}) \qquad \hat{\mu}E[\theta|\theta > \hat{\theta}] = K$$

Equilibrium



μ is uniform on $[0, 1]$, $f_H(x) = 2x$, $f_I(x) = 2 - 2x$, $[\underline{\theta}, \bar{\theta}] = [0, 1]$.

Social Planner

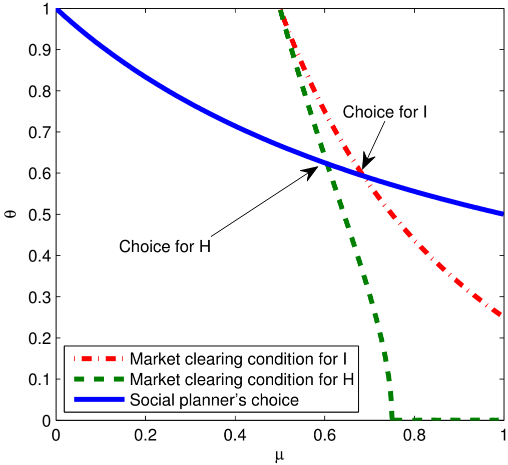
Proposition

Social planner's choice is interior when Γ is small enough.

Proposition

Social planner: $\hat{\theta}_H^{\mathcal{P}} > \hat{\theta}_I^{\mathcal{P}}$, $\hat{\mu}_{HA}^{\mathcal{P}} < \hat{\mu}_{IA}^{\mathcal{P}}$.

Social Planner



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Better in μ Dimension

Some people argue that students with better μ have better chances at getting to better schools, so H university should have $F_H \succ_C F_I$ and $G_H \succ_C G_I$.

Proposition

When $F_u = F_{u'}$ and $G_{u'} \succ_C G_u$, $\theta^*_u < \theta^*_{u'}$.

Better in μ Dimension

Some people argue that students with better μ have better chances at getting to better schools, so H university should have $F_H \succ_C F_l$ and $G_H \succ_C G_l$.

Proposition

When $F_u = F_{u'}$ and $G_{u'} \succ_C G_u$, $\theta_u^* < \theta_{u'}^*$.

$$\begin{cases} \hat{\theta}_u^* &= K\left[\frac{1}{\hat{\mu}_u^*} - \frac{1}{(\hat{\mu}_u^*)^2}\frac{1-G_u(\hat{\mu}_u^*)}{g_u(\hat{\mu}_u^*)}\right] \\ \hat{\mu}_u^* &= \frac{K}{E[\theta|u,\theta>\hat{\theta}_u^*]} \end{cases}$$

Better School Better G

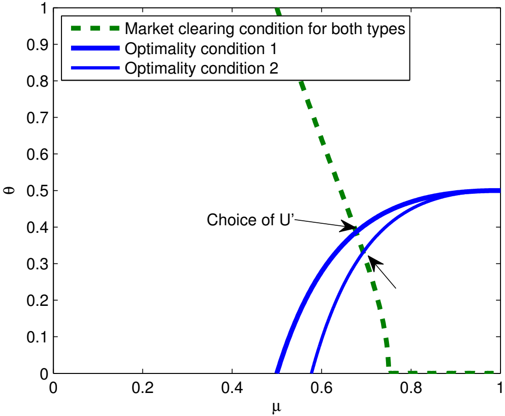

Figure: Equilibrium outcomes. μ is uniformly distributed on $[0, 1]$ for U', and density of the social skill distribution is 2μ for U; $f_U(\theta) = f_{U'}(\theta) = 2\theta$, $[\underline{\theta}, \bar{\theta}] = [0, 1]$.

Better in Both Dimensions

Corollary

When both $\mu^2 g_H(\mu)$ and $\mu^2 g_I(\mu)$ are increasing, and $F_H \succ_C F_I$ and $G_H \succ_C G_I$, $\theta^*_H < \theta^*_I$.

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When both $\mu^2 g_H(\mu)$ and $\mu^2 g_I(\mu)$ are increasing, and $F_H \succ_C F_I$ and $G_H \succ_C G_I$, $\theta^*_H < \theta^*_I$.

To prove, consider a type H', with $F_{H'} = F_H$ and $G_{H'} = G_I$.

Better F and Better G

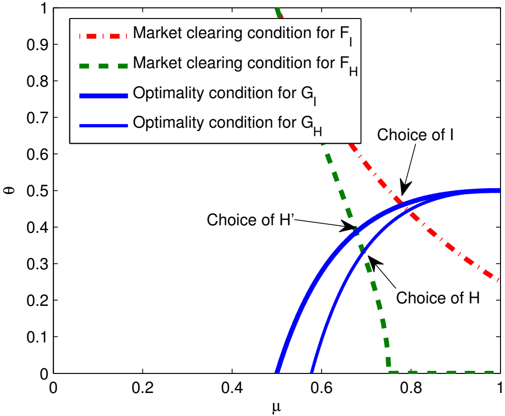

Figure: Equilibrium outcomes. μ is uniformly distributed on $[0, 1]$ for H' and I, and density of the social skill distribution is 2μ for H; $f_{H'}(\theta) = f_H(\theta) = 2\theta$, $f_I(\theta) = 2 - 2\theta$, $[\underline{\theta}, \bar{\theta}] = [0, 1]$.

Summing Up

- Socially optimal standards are more demanding to H.
- Equilibrium might result in H being less demanding to students than I for a big class of $g(\cdot)$.
- Grade inflation can be caused by:
  - increase in Γ — then eventually H will become much stricter than I.
  - increasing gap between $F_H(\cdot)$ and $F_I(\cdot)$.
- Model predicts faster grade inflation in better universities.