

# Signaling

Market Design Mini-Course, HUJI  
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# Signaling

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- ▶ Based on Coles, Kushnir and Niederle (AEJ: Micro, forthcoming).
- ▶ Two types of signaling:
  - ▶ Quality signaling
  - ▶ **Preference signaling**
- ▶ Examples of relevant markets:
  - ▶ Job market for new Ph.D. economists (Coles et al., 2010)
  - ▶ Informal preference signaling (Roth and Xing, 1994)
  - ▶ Internet dating markets (Lee and Niederle, 2011)
  - ▶ College admissions (Avery and Levin, 2009).

# Signaling

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- ▶ **Simple example:**
  - ▶ Two firms and two workers
  - ▶ Preference on matching with other side are drawn at random (each order with probability  $\frac{1}{2}$ ).
  - ▶ Utilities: top choice  $\Rightarrow 1$ , second choice  $\Rightarrow x$ , unmatched  $\Rightarrow 0$ .
  - ▶ One offer from each firm, then workers choose among offers.
- ▶ Without signals (eq. with anonymous strategies): each firm offers to best worker, and gets it with probability  $\frac{3}{4}$ ,  $u_f = \frac{3}{4}$ ,  $u_w = \frac{1}{2} + \frac{1}{4}x$ .
- ▶ Now suppose workers simultaneously send signals before firms offer positions: each worker sends to better firm, firm proposes to a worker who is going to accept, matching probability is 1,  $u_f = \frac{1}{2} + \frac{1}{2}x$ ,  $u_w = \frac{3}{4} + \frac{1}{4}x$ .
- ▶ Note that there are also other equilibria.

# Signaling

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- ▶ In congested markets, a signaling mechanism:
  - ▶ Increases the expected number of matches
  - ▶ Increases the welfare of workers
  - ▶ Ambiguously changes the welfare of firms
  
- ▶ The value of signaling mechanism:
  - ▶ is high for balanced markets
  - ▶ decreases when there are additional periods of interaction

# More on the AEA job market

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- ▶ Why is it necessary in this market? (schools not reading all applications, students submit a lot of enthusiastic applications, truncation from the top and coordination problem)
- ▶ How does it work?
  - ▶ How many signals to provide?
  - ▶ Signaling mechanism is open until December
  - ▶ Signals are scarce, credible and equitable
- ▶ Where should people send signals:
  - ▶ Candidate 1 already has already attracted some interest from very competitive universities...
  - ▶ Candidate 2 is a strong but not flashy candidate...
  - ▶ Candidate 3 has an unusual background... departments don't normally recruit from his university...

# More on the AEA job market

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## Signal Flow (2006-2009)\*,\*\*

From↓ To →	Tier 1	Tier 2	Tier 3	Tier 4	UNRANKED	TOTAL
Tier 1	101	368	274	105	159	1007
Tier 2	111	478	521	385	646	2141
Tier 3	40	165	339	385	706	1635
Tier 4	15	84	116	179	603	997
UNRANKED	13	51	54	62	232	412
TOTAL	280	1146	1304	1116	2346	6192

\* Tiers 1-4 are depts. ranked 1-10, 11-50, 51-150, and 151-480 respectively

\*\* Includes signals to economics departments only

# More on the AEA job market

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- ▶ **Where are signals effective?**
  - ▶ Liberal arts colleges
  - ▶ Departments in towns (population < 50,000)
  - ▶ “Unranked” schools (including internationals!)
  - ▶ For non-current PhDs
  - ▶ Departments that do not receive many signals