Congestion and Signaling

The entry-level market for clinical psychologists (Roth and Xing 1994)

- one-day market

- transactions by telephone

- Programs want to make offers to candidates that are likely to accept

College admissions (Avery and Levin 2009)

- early action and early decision

- colleges want to admit students who are enthusiastic about attending

Job market for new Ph.D. economists

- each candidate can send signals up to two departments

- signals are private

Online dating

- what do we want in a signal?

How can a signal be useful?

1. Transmit information about a candidate's preferences
2. Alleviate the coordination problem

When can a signal be useful?

1. Candidates have different (idiosyncratic) preferences
2. Congested markets

Example 1 (Coles, Kushnir, and Niederle 2010)

- 2 firms and 2 workers
- Preferences
  - firm f_j: $\frac{1}{2}(w_1 \succ_{f_j} w_2) \oplus \frac{1}{2}(w_2 \succ_{f_j} w_1)$, i.i.d.
  - worker w_i: $\frac{1}{2}(f_1 \succ_{w_i} f_2) \oplus \frac{1}{2}(f_2 \succ_{w_i} f_1)$, i.i.d.
- Cardinal utility of agent a
  - top choice $\Rightarrow 1$
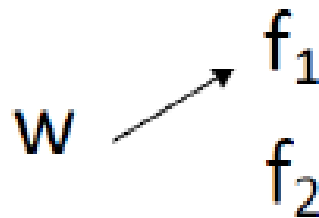 - second choice $\Rightarrow x, 1 > x > 0$
  - unmatched $\Rightarrow 0$

An example (Coles, Kushnir, and Niederle 2010)

1. Preferences are realized. Each worker can send *one* signal to one firm.
2. Each firm can make *one* offer to one worker.
3. Each worker chooses an offer to accept among available offers.

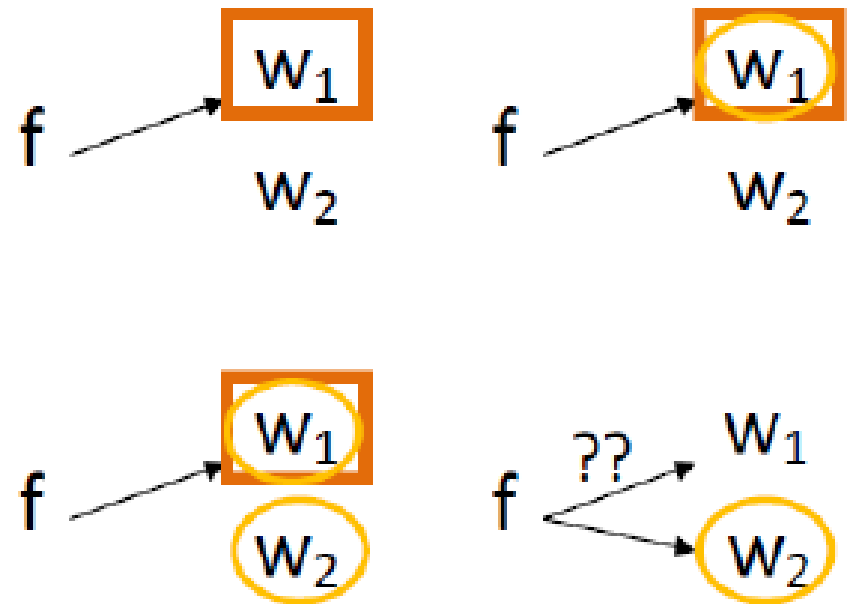# An example (Coles, Kushnir, and Niederle 2010)

Observe:

- signals are voluntary

- no perverse equilibria (under proper refinement)

- there exist babbling equilibria

- if firms play **symmetric** strategies workers send their **signals** to their **top firms**

$$w \nearrow \begin{array}{l} f_1 \\ f_2 \end{array}$$

An example (Coles, Kushnir, and Niederle 2010)
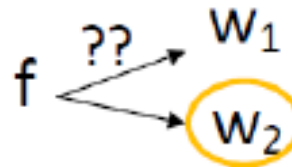
Each firm receives $|h_f|$ **signals**

- $|h_f| = 0 \Rightarrow$ top ranked worker (TRW)
- $|h_f| = 2 \Rightarrow$ top ranked worker (TRW)
- $|h_f| = 1 \Rightarrow$??

An example (Coles, Kushnir, and Niederle 2010)

Reduced game. Firm 1 receives a signal from its second choice

- **(respond, respond)** is always an equilibrium.
  - if firm 2 is responding, firm 1 must respond!
- **(Ignore, Ignore)** is also an equilibrium if $x < 0.5$

$$f \xrightarrow{??} W_1$$
$$f \searrow W_2$$

firm 1 \ firm 2	respond	Ignore
respond	x	x
Ignore	0	$\frac{1}{2}*1$

An example (Coles, Kushnir, and Niederle 2010)

Welfare

- (respond, respond)
  - $u_f = \frac{5}{8} + \frac{1}{4}x$, $u_w = \frac{3}{4}$, $\mu = \frac{7}{4}$ (expected number of matches)
- (Ignore, Ignore)
  - $u_f = \frac{3}{4}$, $u_w = \frac{1}{2} + \frac{1}{4}x$, $\mu = \frac{3}{2}$

An example (Coles, Kushnir, and Niederle 2010)

- **Firm strategies are strategic complements**
    - if firm 1 responds more to signals, then firm 2 is weakly better off from responding more to signals
- **Equilibrium ranking**
    - $(ignore, ignore) \succ_f (respond, respond)$
    - $(respond, respond) \succ_w (ignore, ignore)$
    - $\#$ of matches in $(respond, respond) > \#$ of matches in $(ignore, ignore)$

An example (Coles, Kushnir, and Niederle 2010)

Game with signals versus **game without signals**

- $\mu_{sig} \geq \mu_{no\_sig}$
- $(u_w)_{sig} \geq (u_w)_{no\_sig}$
- $(u_f)_{sig} \lessgtr (u_f)_{no\_sig}$

Example 2 – harmful signaling (Kushnir 2010)

- 3 firms and 3 workers
- $\theta_{f_j} = (w_1, w_2, w_3)$
- $\theta_{w_i} = (1 - \varepsilon)\,\theta_0 \oplus \varepsilon\,\theta_{a_i}, \; i.i.d.$
  - $\varepsilon << 1$
  - $\theta_0 = (f_1, f_2, f_3)$ - "typical"
  - $\theta_{a_i} \sim U(\Theta_s)$ - "atypical"
- No signals
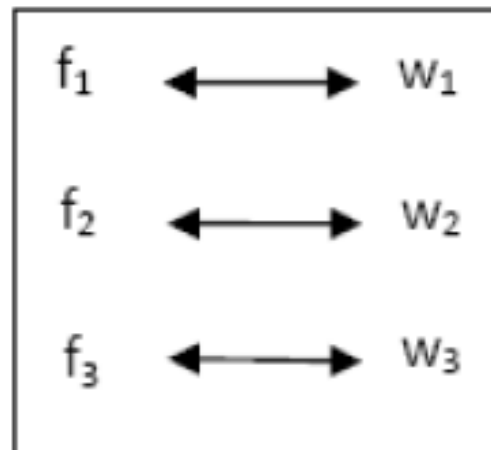
Example 2 – harmful signaling (Kushnir 2010)

► With signals
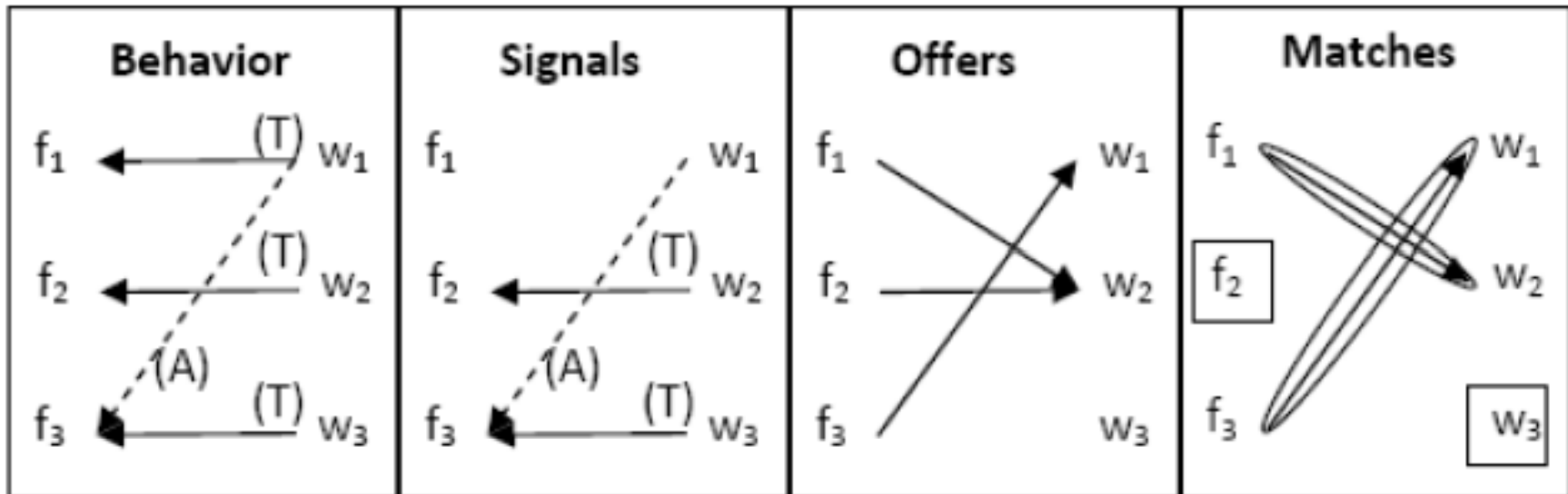
Anecdotes from the AEA Job Market

- (school #1): One open position; secretary accidentally copies all *700* applicants to confirm receipt of applications. Scary!

- (school #2): Only reads half the applications; happy with the 20 best candidates it finds.

- (student): Writes 100 enthusiastic cover letters; other students feel compelled to do the same.

=> Finding the right match is hard.

Congestion: Where?

Congestion arises in three stages in the market process:

1. Interviews (departments have a limited number of interview slots)
2. Flyouts
3. Offers

Economics Job Market Stylized "Facts"

- Preferences over students, schools are correlated.
- Which schools most likely do *not* experience congestion?
  - The top schools.

- Other schools respond to congestion:
  - Most preferred candidates may be unlikely to accept an offer. (-> Truncation at the top)
  - A number of candidates may be similar, and the department has to decide which one of those to interview. (-> Randomization among candidates)

Congestion → Market Failure

- Congestion leads to bad outcomes:
  - Suboptimal matches
  - No match
- Market Failure Examples:
  - *"Falling through the cracks"*
  - *Coordination problem* (a few candidates collect many interviews, while similar candidates do not)

The Problem: Credible Expression of Preferences

- Irony of improved information transmission
  - The cheaper and easier it is to submit applications, the harder it is for the market to find the right match
- Where else do we see this?
  - dating sites
  - job sites
- Special case of general problem of information overload
  - web pages; blogs

→Address problem with clever market design

The AEA Job Market Committee

- The Committee: John Cawley, Peter Coles, Phil Levine, Muriel Niederle, Al Roth, John Siegfried
- Activities of the Committee
  - Scramble
  - Platform for Postings / Applications
  - **Signaling**

Proposal: Signaling Mechanism

- AEA website offers employers the opportunity to receive "signals" from candidates
- Candidates offered opportunity to send up to two signals
- In early December, signaling mechanism closes, signals are sent to employers
- Scarce, credible, equitable

2006 Survey Results

Questions to students:

Would you have welcomed such a signaling mechanism? (Yes: 86%) Do you think it is helpful in general? (Yes:86%)

Questions to Departments:

Do appropriate schools sometimes decline to interview [...] some of your students because they view them as excessive long shots (even though your assessment suggests otherwise)? Yes: 83%

Would signaling [..] help alleviate the problem in some cases? Yes: 79%

Would students benefit from such a system? Yes: 86%

In both cases, most negative opinions thought it is useless, as such mechanism are already in place through the advisor and letters.

American Economic Association
Job Market Signaling

Welcome

If you are registered, please log in.
If you did not register yet, please register.
If you forgot your password, please click here.

Signaling for Interviews in the Economics Job Market

The AEA has introduced a mechanism through which applicants can signal their interest in receiving an interview at the January meetings. From mid-November, until December 4, shortly after the December JOE comes out, each applicant on the economics job market can designate no more than two departments (or other employers) to whom to send a signal of particular interest. On December 6, the AEA will transmit these signals to the departments a candidate has chosen. (Signals will not be made public.) See Terms of Use and Privacy Policy.

How it Works:

Applicants: Job applicants interested in sending a signal will be asked to register at the JOE site, with their full name, email address, year of Ph.D. (or other degree), degree granting institution, and current position (if not graduate student). The deadline for registration is December 3. They will then receive a confirmation email and a password.

Up to midnight on Monday, December 4, Eastern time, applicants can decide which two employers should receive their signals of particular interest. Applicants will enter the JOE advertisement number for each of the two places they wish to signal (or fill in information for a job that has no JOE ad). Applicants also enter the email address to which they wish the signal sent (either an email address from the ad to which they are responding, or the email of the department chair, etc.) They may also, if they wish, send one line of text message, which could be used, for example, to indicate for which of the multiple jobs in a particular ad the signal is intended. The AEA will enforce that each applicant sends no more than two signals, by comparing names and other data provided by the applicant.

Departments will receive the signals by email by December 6 (all signals sent to the same email address will be aggregated, so that departments will receive all signals together to the extent possible). Departments should not ask candidates to which (other) departments they sent their signals.

Advice to Departments:

Applicants can only send two signals, and may send none, so if a department doesn't get a signal

Done

File   Edit   View   Go   Bookmarks   Tools   Help   http://www.aeaweb.org/joe/signal/register/register.php   Go

American Economic Association
Job Market Signaling

Home
Login
Register

To register for the AEA Job Market Signaling, please fill in the form below. Note that fields marked with a '*' are mandatory.

The information that you enter will be sent along with your signals.

After you click the 'Register' button, a confirmation email will be sent to you containing your password and a link to the login page. From the login page, you will be able to enter and/or change the signals you wish to send.

First and middle name*:   Peter Andrew

Last name*:   Coles

E-mail address*:   pcoles@hbs.edu   Please use the e-mail
                                                               address from your CV.
Repeat E-mail*:   pcoles@hbs.edu

URL: (optional)
                   Note: You must include http:// at beginning of URL.

Degree*:   ◉ Ph.D.   ○ Other:

Field*:   ◉ Economics   ○ Other:

Year of degree*:   2006

Degree granting institution*: Stanford University

Country*:   United States of America

Please list your current   Assistant Professor
status/position.*   with current employer (or graduate institution):
                             Harvard Business School

[Register]   [Reset Form]

Support: aea_signals@aeaweb.org

Done

American Economic Association
Job Market Signaling

Logout

Introduction   Instructions   Personal Data   **Signals**   Summary

For each of your 2 signals, you may enter either a JOE ad number as listed on the JOE website or, in case the employer did not issue a JOE ad, the institution's name. Then, click 'Save signal data' to enter further information.

You may revise your signals at any time using the 'Reset Signal' buttons, up until midnight December 4, Eastern Standard Time.

SIGNAL 1
Send signal to:

      Issuer of JOE ad number: [＿＿＿＿] Search JOE. (Link opens in new window.)

OR

      the following institution: [＿＿＿＿＿＿＿＿＿＿]

SIGNAL 2
Send signal to:

      Issuer of JOE ad number: [＿＿＿＿] Search JOE. (Link opens in new window.)

OR

      the following institution: [＿＿＿＿＿＿＿＿＿＿]

[Save signal data]

Support: aea_signals@aeaweb.org

Done

AEAWEB

AEAweb: JOE

- AEAweb
- Job Openings
- About JOE
- JEL Classification
- Submit a Listing
- Recent Issues

American Economic Association

JOE
October 2006

UNIVERSITY OF ALASKA SOUTHEAST, Juneau, AK

View: previous | next | by employer | with categories | by category | by location | JOE home

Z0 Political Economy

The Department of Social Science invites applications for a tenure track assistant professor in Political Economy to begin August 2007. Position requires a Ph.D. in Economics or Political Science with Economics as a second field. Other requirements include teaching experience and evidence of commitment to research and publishing, and training that relates economics to other social sciences, for example, international political economy (IPE). A detailed position announcement is available through the University of Alaska Human Resources website (https://www.uakjobs.com). Select 'Search Job Postings,' 'Faculty,' and 'Juneau.' Application materials are submitted on-line and must include: cover letter, curriculum vita, names of three professional references, copies of graduate transcripts with degrees conferred. Review of applications will begin November 15, 2006 and will continue until filled. An equal opportunity-affirmative action employer.
[JOE ID# 20061000201]

American Economic Association
Job Market Signaling

Message: Changes saved.

Logout

Introduction   Instructions   Personal Data   **Signals**   Summary

---

Message: Please provide a contact e-mail address to which signal 1 will be sent.

For each of your 2 signals, you may enter either a JOE ad number as listed on the JOE website or, in case the employer did not issue a JOE ad, the institution's name. Then, click 'Save signal data' to enter further information.

You may revise your signals at any time using the 'Reset Signal' buttons, up until midnight December 4, Eastern Standard Time.

SIGNAL 1

Send signal to:

Issuer of JOE ad number: `20061000201`

[Reset Signal 1]
[Save signal data]

UNIVERSITY OF ALASKA SOUTHEAST, Juneau, AK, October 2006

Job clarification: `_____`

In case the JOE ad to which you are responding lists multiple positions, use this field to indicate briefly to which position you are applying.

Contact e-mail address: `recruiting@alaskaSE.edu`

Your signal will be sent to this e-mail address.
- Please enter the contact e-mail address as listed in the JOE ad.
- If no contact e-mail address is provided, check the employer's web site for an appropriate contact email address (human resources or the department chair).

SIGNAL 2

Send signal to:

Issuer of JOE ad number: `_____`   Search JOE. (Link opens in new window.)

OR

Done

case the employer did not issue a JOE ad, the institution's name. Then, click 'Save signal data' to enter further information.

You may revise your signals at any time using the 'Reset Signal' buttons, up until midnight December 4, Eastern Standard Time.

SIGNAL 1

Send signal to:

Issuer of JOE ad number: `20061000201`

Reset Signal 1
Save signal data

UNIVERSITY OF ALASKA SOUTHEAST, Juneau, AK, October 2006

Job clarification: `[                    ]`

In case the JOE ad to which you are responding lists multiple positions, use this field to indicate briefly to which position you are applying.

Contact e-mail address: `recruiting@alaskaSE.edu`

Your signal will be sent to this e-mail address.
- Please enter the contact e-mail address as listed in the JOE ad.
- If no contact e-mail address is provided, check the employer's web site for an appropriate contact email address (human resources or the department chair).

SIGNAL 2

Send signal to:

the following institution: `Lake Wobegon University`

Reset Signal 2
Save signal data

Job clarification: `[                    ]`

Use this field to indicate briefly to which position you are applying.

Contact e-mail address: `gkeillor@lwu.edu`

Your signal will be sent to this e-mail address.
- Please enter the contact e-mail address as listed in the institution's job ad.
- If no contact e-mail address is provided, check the employer's web site for an appropriate contact email address (human resources or the department chair).

Save signal data

American Economic Association
Job Market Signaling

Logout

Introduction   Instructions   Personal Data   Signals   **Summary**

Summary

Name: Peter Andrew Coles
E-mail address: pcoles@hbs.edu
Homepage:

Degree: Ph.D. in Economics, 2006
From: Stanford University, United States of America

Currently employed: as Assistant Professor at Harvard Business School

Signal 1:   to recruiting@alaskaSE.edu
                   regarding
                   JOE 20061000201, UNIVERSITY OF ALASKA SOUTHEAST, Juneau, AK, October 2006

Signal 2:   to gkeillor@lwu.edu
                   regarding
                   Lake Wobegon University

**Please make sure that an email address appears for each of your signals.
If no email address is present, no signal will be sent.**

Support: aea_signals@aeaweb.org

Done

How Would You Use Your Signals?

?

Advice From the AEA Website…

- 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… …depts don't normally recruit from his university…

http://www.aeaweb.org/joe/signal/signaling.pdf

The Groucho Marx Problem

"**PLEASE ACCEPT MY RESIGNATION. I DON'T WANT TO BELONG TO ANY CLUB THAT WILL ACCEPT ME AS A MEMBER**." -Julius Henry (Groucho) Marx

Might signals convey to schools candidates' "unworthiness?"

Assumption: Candidate has private information, above and beyond what can and is conveyed in letters and by the job market paper about their "true" ability…

The "Double Signal"

(letter to the AEA)

To whom it may concern:

I have a question regarding the job market signaling process which does not appear to be addressed on your webpage. If I choose to send both of my signals to the same institution...

Who Signaled?

Year	# Signalers	#Signals	#Employers Signaled To	# JOE Ads Signaled To	# JOE Ads	% of JOE Ads Signaled to
2006/7	969	1890	534	672	2643	25.4%
2007/8	1021	2011	560	722	2914	24.8%
2008/9	977	1926	450	784	2643	27.2%

- Participation rate (candidates) 66%

Demographics

Country (of Degree   83% US
Granting Institution)   17% Intl

Degree   98.5% PhD

                            1.5%   Other

Field   97% Economics + subfields

                            1%   Finance

                            2%   Other

Employment Status

	Total
Grad Student	65%
Assistant Professor	13%
Associate Professor	2%
Full Professor	1%
Post Doctoral Researcher	6%
Lecturer	3%
Instructor	3%
Other	7%

Universities

			Cumul EP
1	Harvard U	USA	719.9
2	U California - Berkeley	USA	572.5
3	U Chicago	USA	552.3
4	Massachusetts Institute of Technology (MIT)	USA	501.0
5	U Pennsylvania	USA	499.4
6	Princeton U	USA	480.9
7	London School of Economics (LSE)	UK	459.6
8	Northwestern U	USA	434.4
9	New York U (NYU)	USA	415.3
10	Yale U	USA	404.5
11	Stanford U	USA	391.8
12	U California - Los Angeles (UCLA)	USA	364.9
13	Columbia U	USA	348.6
14	U Michigan - Ann Arbor	USA	332.1
15	U Maryland - College Park	USA	302.0
16	Cornell U	USA	293.3
17	Boston U	USA	290.3
18	U Rochester	USA	289.1
19	U Wisconsin - Madison	USA	270.9
20	U Toulouse I (Sciences Sociales)	France	250.5
21	Brown U	USA	246.9
22	U Texas - Austin	USA	239.2
23	Tilburg U	Netherlands	238.8
24	U Illinois - Urbana-Champaign	USA	234.5
25	U California - San Diego	USA	232.2
26	U British Columbia	Canada	227.6
27	Ohio State U	USA	223.3
28	Tel Aviv U	Israel	220.0
29	U Southern California	USA	213.3
30	U Minnesota	USA	211.8
31	University College London	UK	202.5
32	Oxford U	UK	193.4
33	European U Institute	Italy	190.3
34	U North Carolina - Chapel Hill	USA	180.2
35	Carnegie Mellon U	USA	174.6
36	Boston College	USA	173.3
37	Warwick U	UK	172.4
38	Penn State U	USA	171.2
39	U Carlos III Madrid	Spain	168.4
40	Michigan State U	USA	163.7
41	Johns Hopkins U	USA	162.4

Research & Professional Organizations

			Cumul EP
1	IMF	USA	266.2
2	World Bank	USA	260.7
3	Federal Reserve System Board of Governors	USA	207.7
4	Federal Reserve Bank - Minneapolis	USA	108.6
5	Federal Reserve Bank - New York	USA	105.1
6	Institute for Fiscal Studies	UK	78.0
7	Federal Reserve Bank - Cleveland	USA	58.5
8	Federal Reserve Bank - Chicago	USA	56.6
9	RAND Corporation	USA	54.6
10	US Dept of Labor - Bureau of Labor Statistics	USA	52.4
11	US Dept of Treasury - Administration	USA	49.2
12	National Institute of Agr. Econ. Research (INRA) - Paris	France	48.9
13	Federal Reserve Bank - San Francisco	USA	47.0
14	Federal Reserve Bank - St Louis	USA	42.8
15	Centre for Research in Econ. & Statistics (CREST-INSEE)	France	40.7
16	International Food Policy Research Institute	USA	40.4
17	US Dept of Agriculture - Economic Research Service	USA	36.1
18	Resources for the Future	USA	35.3
19	American Enterprise Institute	USA	35.0
20	Federal Reserve Bank - Kansas City	USA	34.5
21	Inter-American Development Bank	USA	34.5
22	Federal Reserve Bank - Dallas	USA	34.3
23	Institute for International Economics	USA	32.8
24	Federal Reserve Bank - Atlanta	USA	32.0
25	Max Planck Institute for Research into Economic Systems	Germany	30.4
26	Urban Institute	USA	30.1
27	Deutsche Bundesbank	Germany	30.0
28	Lexecon Strategy Group	USA	26.1
29	Brookings Institution	USA	25.2
30	US Dept of Treasury - Office of Tax Analysis	USA	23.8
31	Federal Reserve Bank - Philadelphia	USA	23.3
32	US Dept of Commerce - Bureau of the Census	USA	23.2
33	Bank of Portugal (Banco de Portugal)	Portugal	22.4
34	Bank of Spain (Banco de Espana)	Spain	22.3
35	Federal Reserve Bank - Richmond	USA	21.1
36	Congressional Budget Office	USA	19.2
37	National Bank of New Zealand	New Zealand	18.7
38	Institute for the Study of Labor (IZA)	Germany	18.6
39	European Bank for Reconstruction & Development	UK	18.3
40	Federal Reserve Bank - Boston	USA	17.8

Count of Signalers by Department Rank; 2007+2008[*,**]
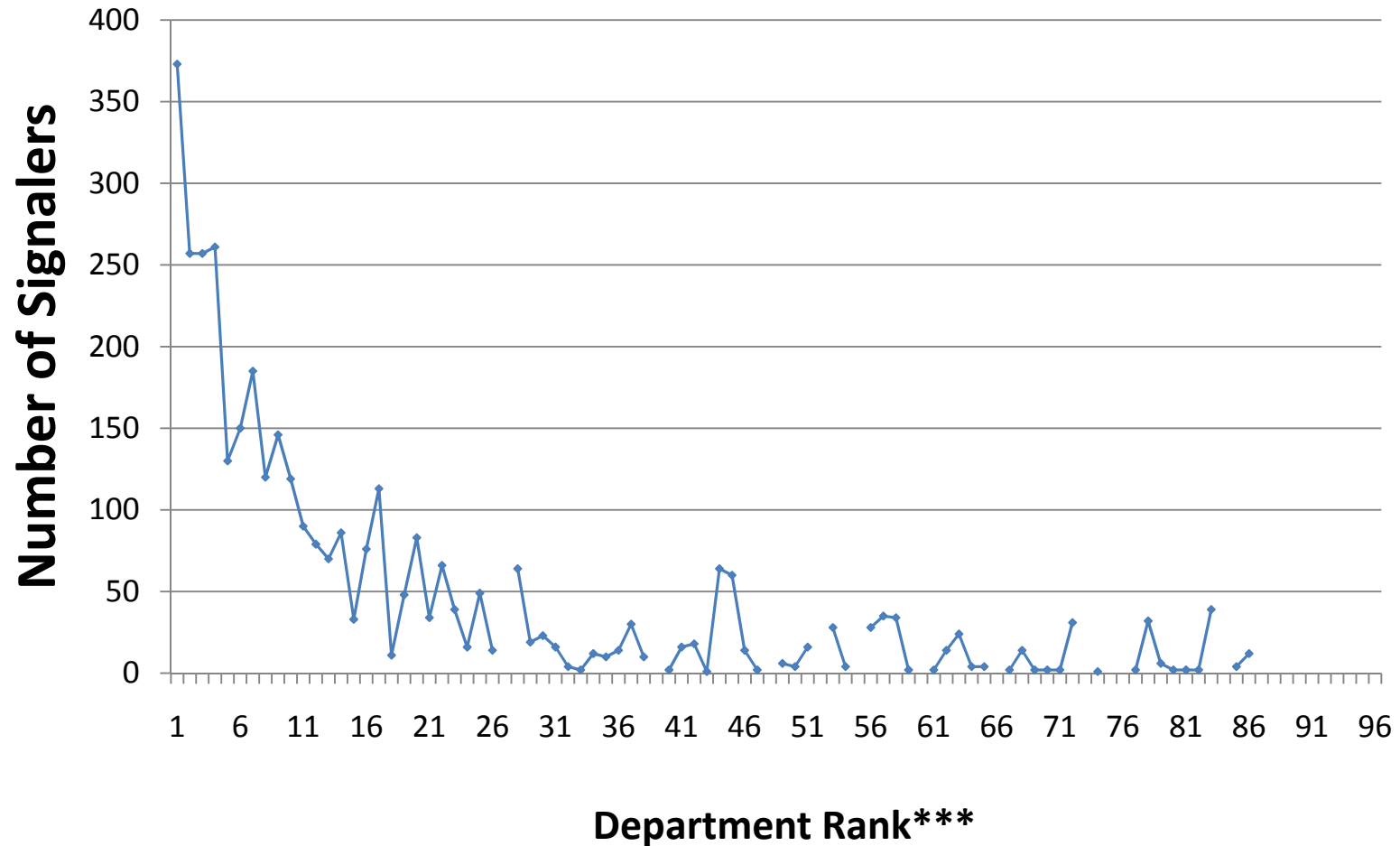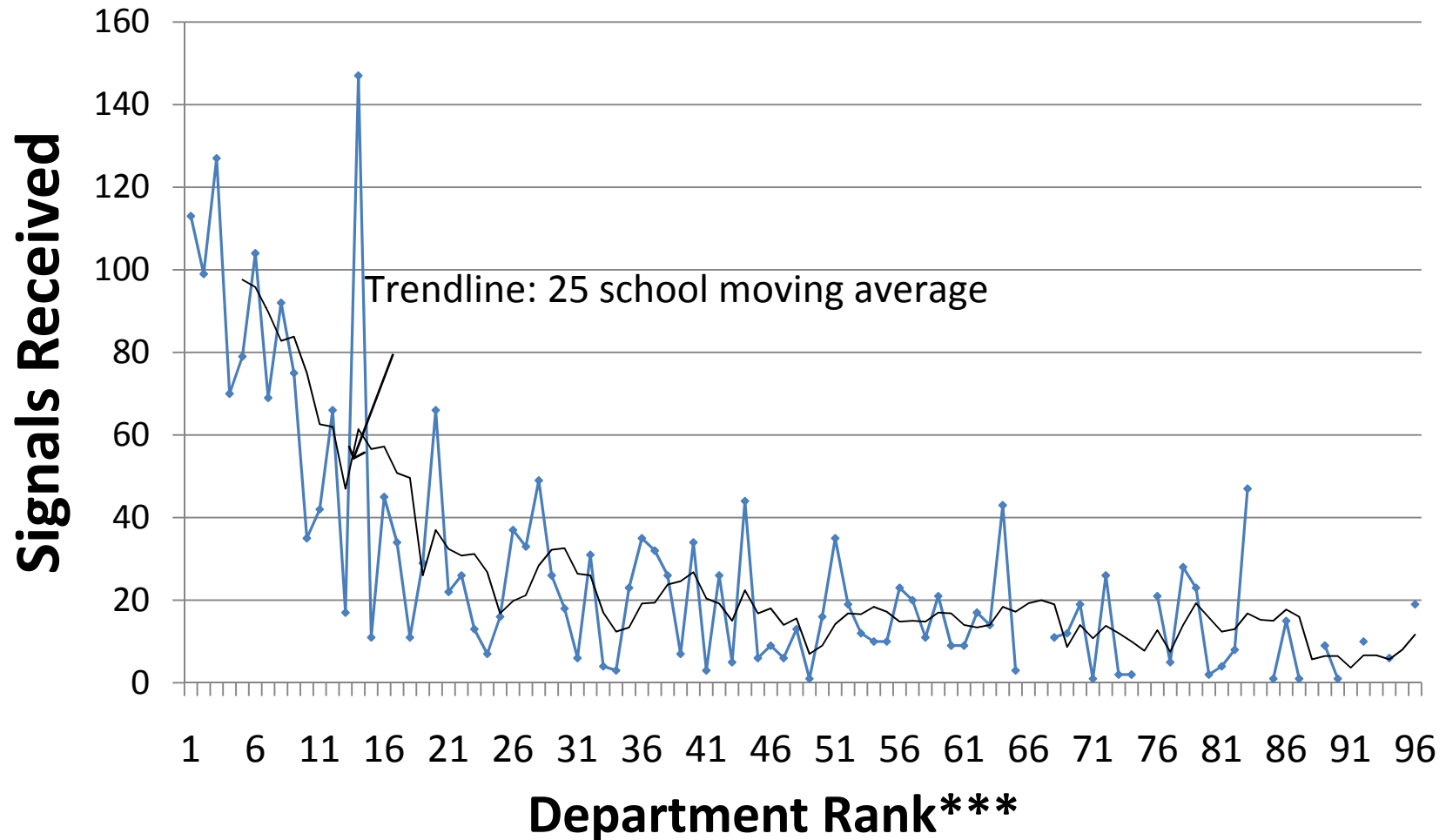

Number of Signalers (y-axis)

Department Rank*** (x-axis)

*Includes Economics departments, business schools, and other academic programs.
**An additional 291 signalers came from unranked schools.
***In blocks of five; 1 =(dept's ranked one through five) etc.

Signals Received by Department Rank; 2007+2008[*],[**]

Trendline: 25 school moving average

Signals Received (y-axis)

Department Rank*** (x-axis)

*Includes Economics departments, business schools, and other academic programs.
**An additional 1500 signals were received by unranked schools.
***In blocks of five; 1 =(dept's ranked one through five) etc.

Signal Flow*,**

From↓ To →	Tier 1	Tier 2	Tier 3	Tier 4	UNRANKED	TOTAL
Tier 1	81	189	135	48	75	528
Tier 2	68	225	276	221	334	1124
Tier 3	24	72	161	201	364	822
Tier 4	8	47	54	97	295	501
UNRANKED	4	29	29	41	120	223
TOTAL	185	562	655	608	1188	3198

*   Tiers 1-4 are depts. ranked 1-10, 11-50, 51-150, and 151-480 respectively
** Includes signals to economics departments only

Is Signaling Effective?

- Hit rate: Given an application to an employer, what is the likelihood of getting an interview?
  - Overall: 15%
  - Applications with signals 29%
- Problem: Selection in choice of signal
  - Solution: Hypothetical third signal
  - Solution: Surveys to non-signalers

Hypotheses

- Signaling is effective for certain categories of employers
  - Liberal Arts,
  - International
  - Rural, Unranked, Southern, Non-Academic…

- Signaling is effective when signals are chosen wisely
  - Signal to schools where a signal would be pivotal in getting an interview
  - Don't "reach" too far

May 2009 AEA Signaling Survey Results

SIGNALS (1st and 2nd Choice)		Interview	Flyout	Offer	Acceptance
n = 567	y	162 (28.6%)	72 (12.7%)	38 (6.7%)	22 (3.9%)
	n	405 (71.4%)	495 (87.3%)	529 (93.3%)	545 (96.1%)

HYPOTHETICAL SIGNALS (3rd Choice)		Interview	Flyout	Offer	Acceptance
n = 162	y	38 (23.5%)	12 (7.4%)	6 (3.7%)	3 (1.9%)
	n	124 (76.5%)	150 (92.6%)	156 (96.3%)	159 (98.1%)

Liberal Arts Breakdown:

ACTUAL SIGNALS		Interview	Flyout	Offer	Accept
n = 103	y	42 (40.8%)	13 (12.6%)	6 (5.8%)	3 (2.9%)
	n	61 (59.2%)	90 (87.4%)	97 (94.2%)	100 (97.1%)

HYPOTHETICAL SIGNALS		Interview	Flyout	Offer	Accept
n = 37	y	7 (18.9%)	2 (5.4%)	2 (5.4%)	1 (2.7%)
	n	30 (81.1%)	25 (94.6%)	35 (94.6%)	36 (97.3%)

SIGNALS (NON-LIB ARTS, ACADEMIC)		Interview	Flyout	Offer	Accept
n = 400	y	102 (25.5%)	51 (12.8%)	29 (7.3%)	16 (4.0%)
	n	298 (74.5%)	349 (87.3%)	371 (92.8%)	384 (96.0%)

HYPOTHETICAL SIGNALS (NON-LIB ARTS, ACADEMIC)		Interview	Flyout	Offer	Accept
n = 113	y	26 (23.0%)	8 (7.1%)	3 (2.7%)	1 (0.9%)
	n	87 (77.0%)	105 (92.9%)	110 (97.3%)	112 (99.1%)

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Sample	Econ. Dept.	Econ. Dept.	Econ. Dept.	Econ. Dept.	Econ. Dept.	All Employers	Econ. Dept.
Dependent Variable	Interview	Interview	Interview	Interview	Interview	Interview	Interview
Specification	RE OLS	RE OLS	RE OLS	RE OLS	RE OLS	RE OLS	RE OLS
Panel Data Grouping	Candidate	candidate	candidate	position	position	candidate	candidate
Signal	.069 (.027)***	.034	.059	.071	.157	.064	.086
		(.030)	(.029)**	(.029)**	(.0432)***	(.026)**	(.028)***
Applied to lib. arts school		-.047					
		(.057)					
Liberal arts*signaled		.182 (.066)***					
Applied to int'l school			-.028				
			(.064)				
International*signaled			.057				
			(.072)				
Received int'l degree				-.047			
				(.065)			
Int'l degree* signaled				-.013			
				(.071)			
Is a graduate student					.176		
					(.0466)***		
Grad. student*signaled					-.098		
					(.054)*		
Applied to non-academic						.129	
						(.075)*	
Non-academic*signaled						-.119	
						(.082)	
Received many signals							.003
							(.030)
Many signals*signaled							-.077
							(.039)**
Constant	.246	.258	.251	.253	.113	.253	.245
	(.025)***	(.028)***	(.027)***	(.027)***	(.037)***	(.024)***	(.039)***
R^2	.003	.012	.004	.005	.013	.003	.007
N	**1553**	**1553**	**1553**	**1553**	**1544**	**1868**	**1553**

Signal Flow con't.

- **P (interview) = $\beta_1$signal + β_2 Deg Rank Tier+ β_3(Deg Tier – Ad Tier)+ β_4(Deg Tier – Ad Tier)*signal + C + ε**

  - β_1= -0.004, p=0.924
  - β_2= -0.027, p=0.102
  - β_3= -0.013, p =0.540
  - β_4= -0.036, p =0.134
  - C = 0.301, p=0.000

  - Tiers: 1-5, 6-50, 51-100, 101-480, unranked.
  - 2.7 percentage point / tier (of candidate degree-granting institiuion.
  - Signaling upwards by one tier will have a negative effect of 3.5%, while signaling down a tier will have a positive effect of 3.5%.

Implications / Wrap

- Has this mechanism yielded any improvements?
  - survey results; analysis
- How to report outcomes?
  - choice of feedback is part of the design problem
  - example: report on liberal arts schools; intl schools
- Implications for other markets