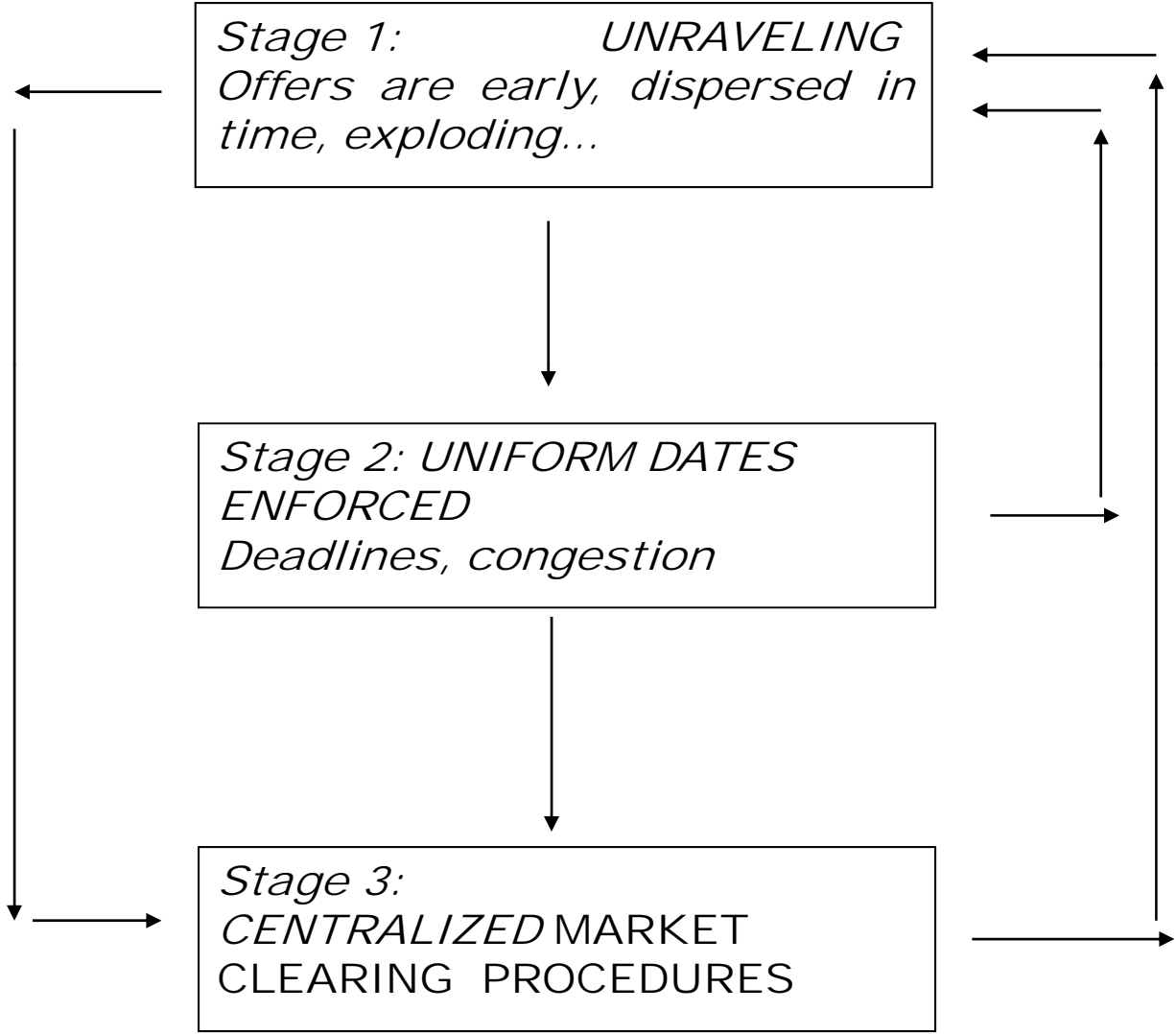


Unraveling

# Stages and transitions observed in various markets with timing problems



# What are the effects of a Match

- There have been some attempts at theory models of unraveling, early offers, and the effects of a centralized match. To judge those attempts, I'll show you some evidence that may help us think about what are important ingredients of a good theory and what are the questions to look at.
- We have seen that at some point in the history of many entry level labor markets, hiring decisions start to be made earlier and earlier, and employment agreements are made often quite far before actual employment starts.
- Unraveling is typically a dynamic process, so that offers are made earlier from year to year, often as exploding or short fuse offers. An applicant has to accept or reject such an offer before she can gather all (or sometimes any) other offers she might receive. Employers who leave their offers open for even a little time, and are eventually rejected, will often find that their next choices have already accepted offers elsewhere. Therefore employers have an incentive to make exploding offers themselves, and the trend towards exploding offers becomes self-reinforcing.
- Efforts to halt unraveling by imposing uniform appointment dates: are mostly unsuccessful.
- Some markets start to use a centralized match. We have seen, a key ingredient seems to be that the outcome of the centralized procedure is stable.

Market	Stable	Still in use (halted unraveling)
• NRMP	yes	yes (new design in '98)
• <i>Edinburgh ('69)</i>	<i>yes</i>	<i>yes</i>
• <i>Cardiff</i>	<i>yes</i>	<i>yes</i>
• <i>Birmingham</i>	<i>no</i>	<i>no</i>
• <i>Edinburgh ('67)</i>	<i>no</i>	<i>no</i>
• <i>Newcastle</i>	<i>no</i>	<i>no</i>
• <i>Sheffield</i>	<i>no</i>	<i>no</i>
• Cambridge	no	yes
• London Hospital	no	yes
• Medical Specialties	yes	yes (~30 markets, 1 failure)
• Canadian Lawyers	yes	yes (Alberta, no BC, Ontario)
• Dental Residencies	yes	yes (5 ) (no 2)
• Osteopaths (< '94)	no	no
• Osteopaths (≥ '94)	yes	yes
• Pharmacists	yes	yes
• Reform rabbis	yes (first used in '97-98)	yes
• Clinical psych	yes (first used in '99)	yes

So stability looks like an important feature of a centralized labor market clearinghouse.

# The need for experiments

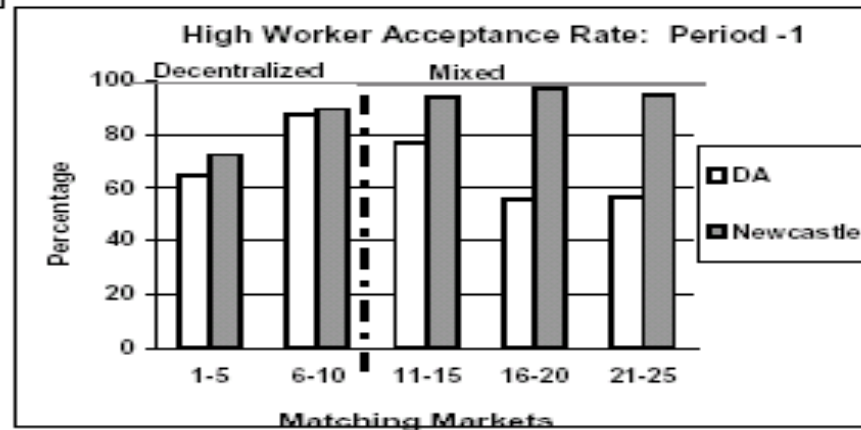
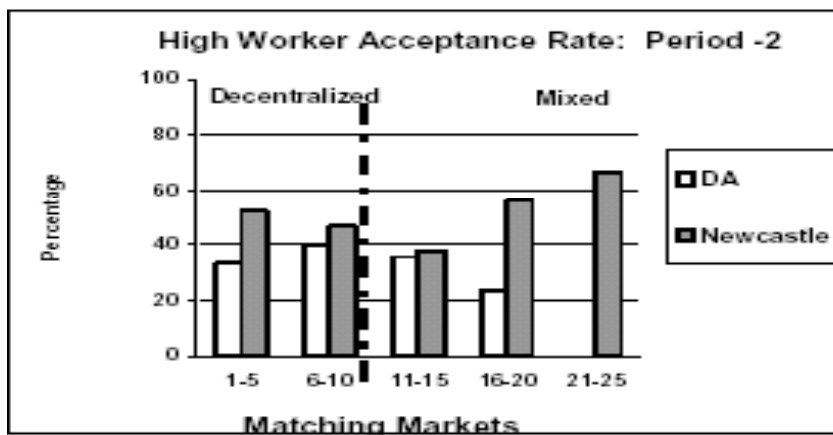
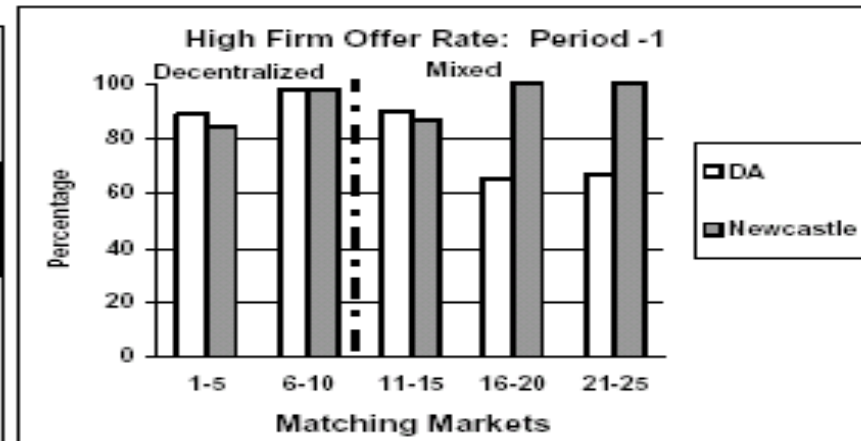
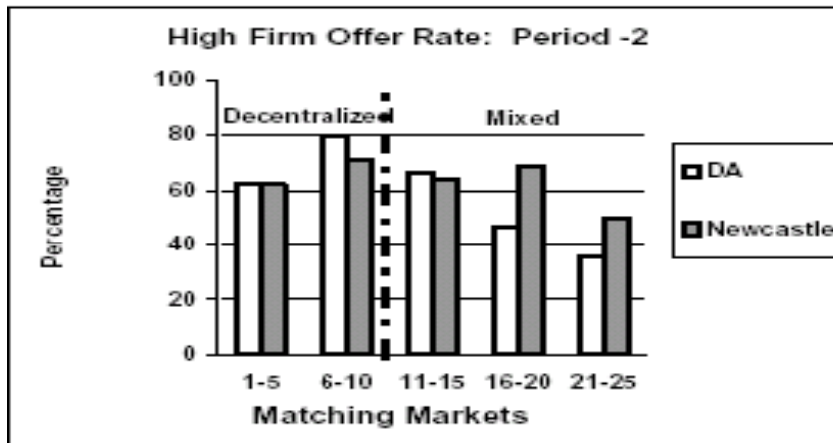
- How to know if the difference between stable and unstable matching mechanisms is the key to success?
  - There are other differences between e.g. Edinburgh and Newcastle
- The policy question is whether the new clearinghouse needs to produce stable matchings (along with all the other things it needs to do like handle couples, etc. )
  - E.g. rural hospital question...

# A matching experiment

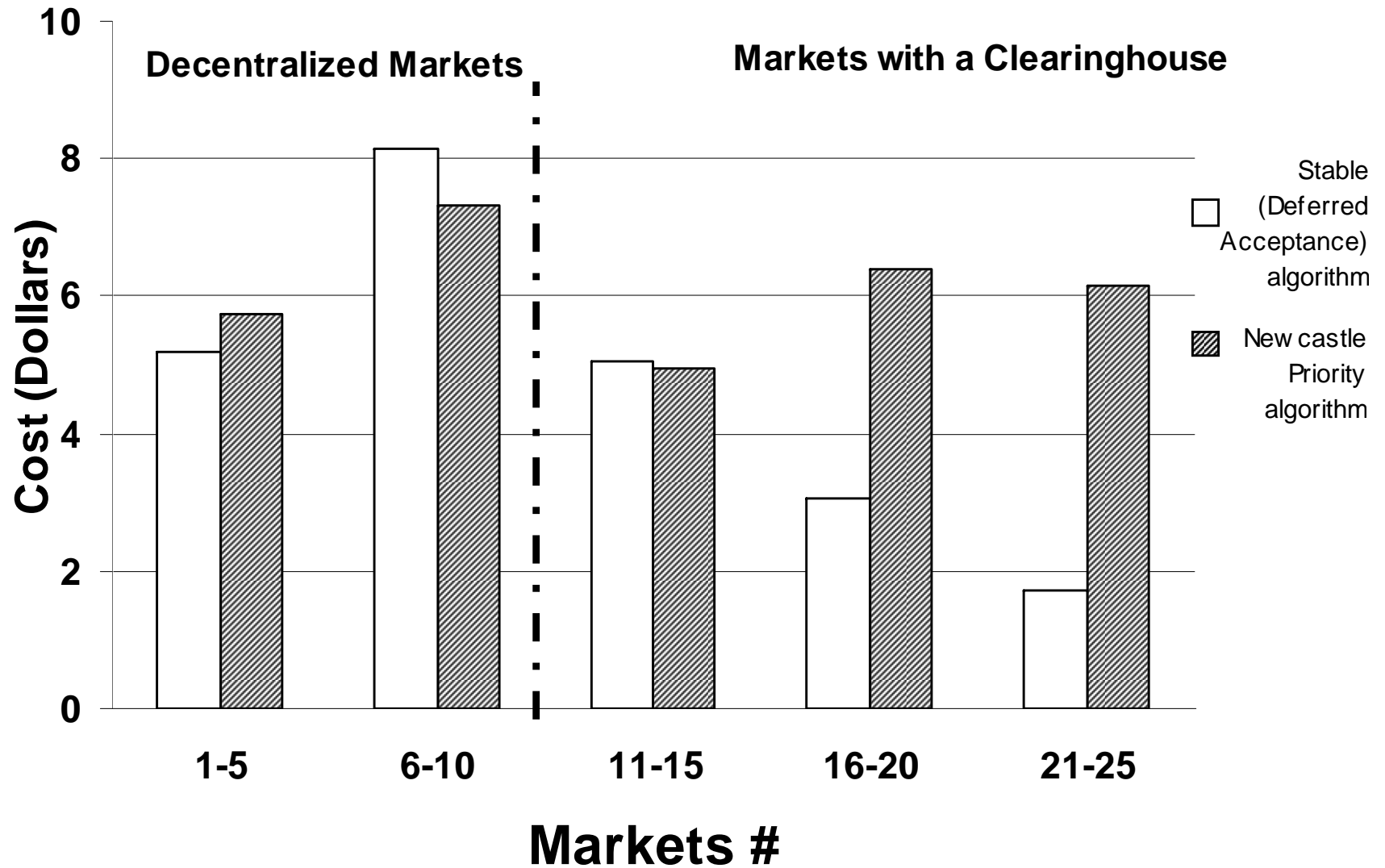
(Kagel and Roth, QJE 2000)

- 6 firms, 6 workers (half "High productivity" half "low productivity")
- It is worth \$15 plus or minus at most 1 to match to a high
- It is worth \$5 plus or minus at most 1 to match to a low
- There are three periods in which matches can be made: -2, -1, 0.
- Your payoff is the value of your match, minus \$2 if made in
- period -2, minus \$1 if made in period -1
- Decentralized match technology : firms may make one offer at any period if they are not already matched. Workers may accept at most one offer. Each participant learns only of his own offers and responses until the end of period 0.
- After experiencing ten decentralized games, a centralized matching technology was introduced for period 0 (periods -2 and -1 were organized as before).
- Centralized matching technology: participants who are still unmatched at period 0 submit rank order preference lists, and are matched by a centralized matching algorithm.
- Experimental variable: Newcastle (unstable) or Edinburgh (stable) algorithm.

# Offers and acceptances



# Average Cost of Early Markets





# Gastroenterologists

- The failure of a stable match is a rare event.
- Why did the Gastroenterology fellowship match fail?
- Why are failures such a rare event?
- What are the effects of a match: Looking at gastroenterology and other markets.

# History of the Gastroenterology fellowship market

Gastroenterology (2-3 years): subspecialty of Internal Medicine (3 years).

Before 1986: Decentralized Process.

- Residents apply for fellowship positions, receive interviews, and offers from hospitals.
- However, they experienced market failure in terms of unraveling (early, dispersed, exploding offers).
- Interim attempts to solve the problem: “Setting guidelines for interviewing candidates and negotiating positions was tried, and it was unsuccessful. Some applicants and programs received calls asking them for decisions three months before the deadline. Since it was only a recommended policy, directors say, it was terribly abused, which is why the training directors developed the match. Many felt that there was a chaotic atmosphere.”

Common kind of failure for entry-level labor markets (Roth & Xing '94)

# 1986-~1996: The Match (MSMP)

Applicants (and hospitals) submit rank order lists over hospitals (and applicants).

The MSMP uses a version of a hospital proposing Gale Shapley algorithm which yields stable outcomes.

Empirically: Matches that yield stable matches have failed very rarely.

# The Collapse of the GI Match

Gastroenterology, in '93-94 (the midst of health care reform): Manpower analysis. Meyer et al 1996: JAMA:

- US healthcare system, and gastroenterologists, would benefit from a reduction in GI fellows.
- 25-50% reduction of GI fellows (over the next 5 years) endorsed as goal by GI leadership council.
- Starting with summer 1996: 3 years of GI fellowship required for board certification eligibility

# The demise of the Match

Year	Percent withdrawn	Posts in Match	Percent Matched	Applicants per Position
'92	--	377	96.6	1.75
'93	- 6.7	399	94	1.6
'94	--	369	93	1.6
'95	4	337	88.7	1.3
'96	4.8	298	74.8	0.9
'97	<b>16.1</b>	213	85	1.1
'98	44.3	99	77.8	1.5
'99	60	14	--	--

Within 4 years the Match collapsed.

Since 1997, they are effectively not using the match, and since 2000 were not anymore offered the possibility of a match.

# Why did the Match break down? And why are such failures so rare?

## **Some Hypotheses**

- A centralized Match only works when there are more applicants than positions.
  - There may not be enough “high quality” applicants to fill high quality positions.
  - Shortages may be believed to exist on both sides of the market...
- The match failed because of the shock that reduced the demand of positions below the supply.
- The match failed because, when this shock occurred, fellowship programs were aware of it, but applicants were not.
  - Programs could update their priors when they saw how many applications they received.

# How to sort among these hypotheses?

- Each of them is consistent with the historical data.
- And, since stable match failures are rare, there isn't a good possibility of a cross-market comparison.
- But in the laboratory, we can shock a market in different ways, and try to make a stable matching mechanism fail.

## A simple experimental environment

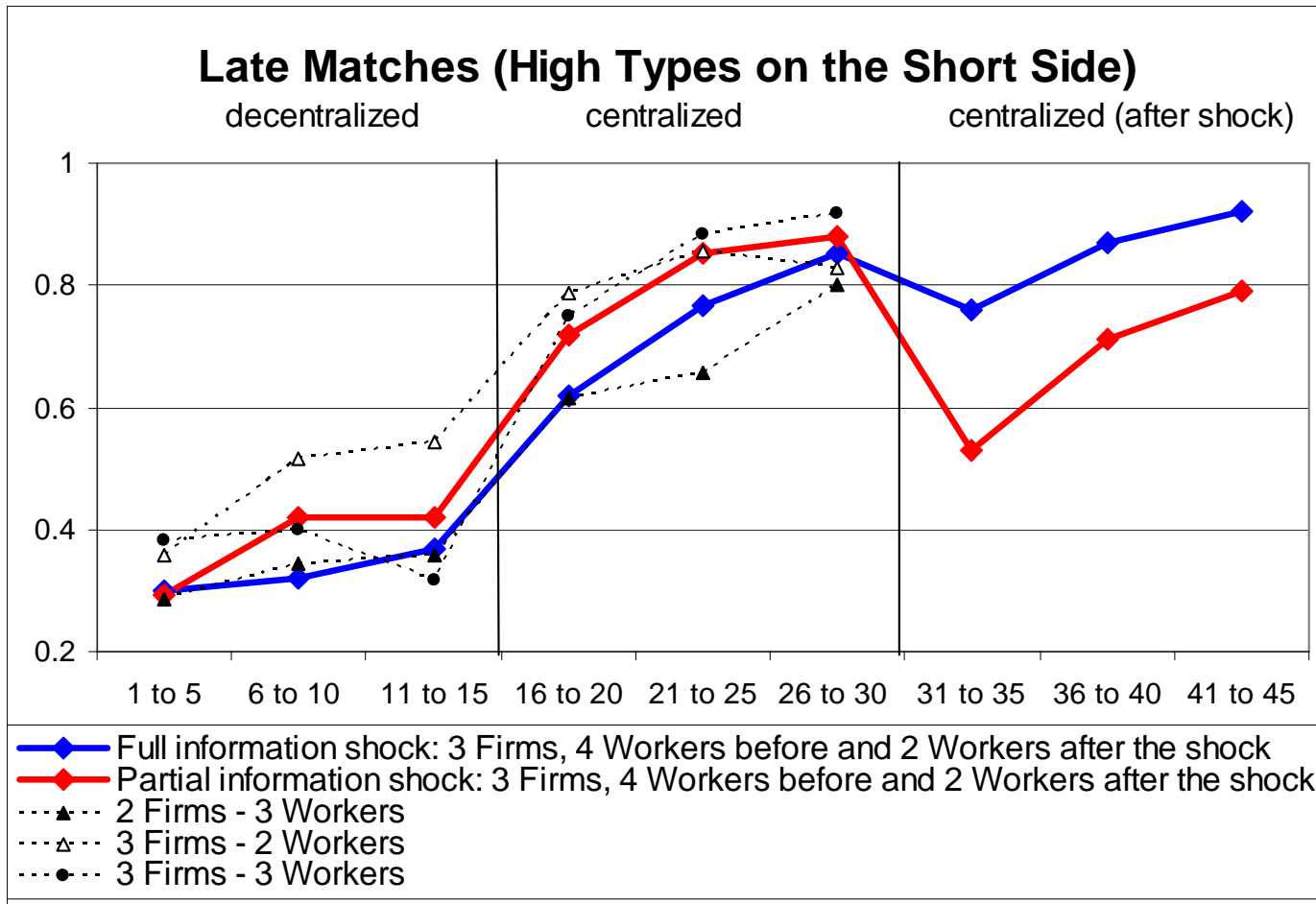
- 2 types of firms and workers; "High" and "low" productivity
- Matching to a High type is worth 150 points + private value: in  $[-10, 10]$ .
- To a low type is worth 50 (+ private value)
- There are three periods in which to match: **-2, -1, 0.**
- Your payoff is the value of your match, minus 20 points if made in period -2, minus 10 points if made in period -1
- *Decentralized match technology*: firms may make one offer at any period if they are not already matched. Workers may accept at most one offer. Each participant learns only of his own offers and responses until the end of period 0. (no period 0 eq.)
- After experiencing ten decentralized games, a centralized matching technology was introduced for period 0 (periods -2 and -1 were organized as before).
- *Centralized matching technology*: participants who are still unmatched at period 0 submit rank order preference lists, and are matched by a centralized (stable) matching algorithm.



# Experimental conditions

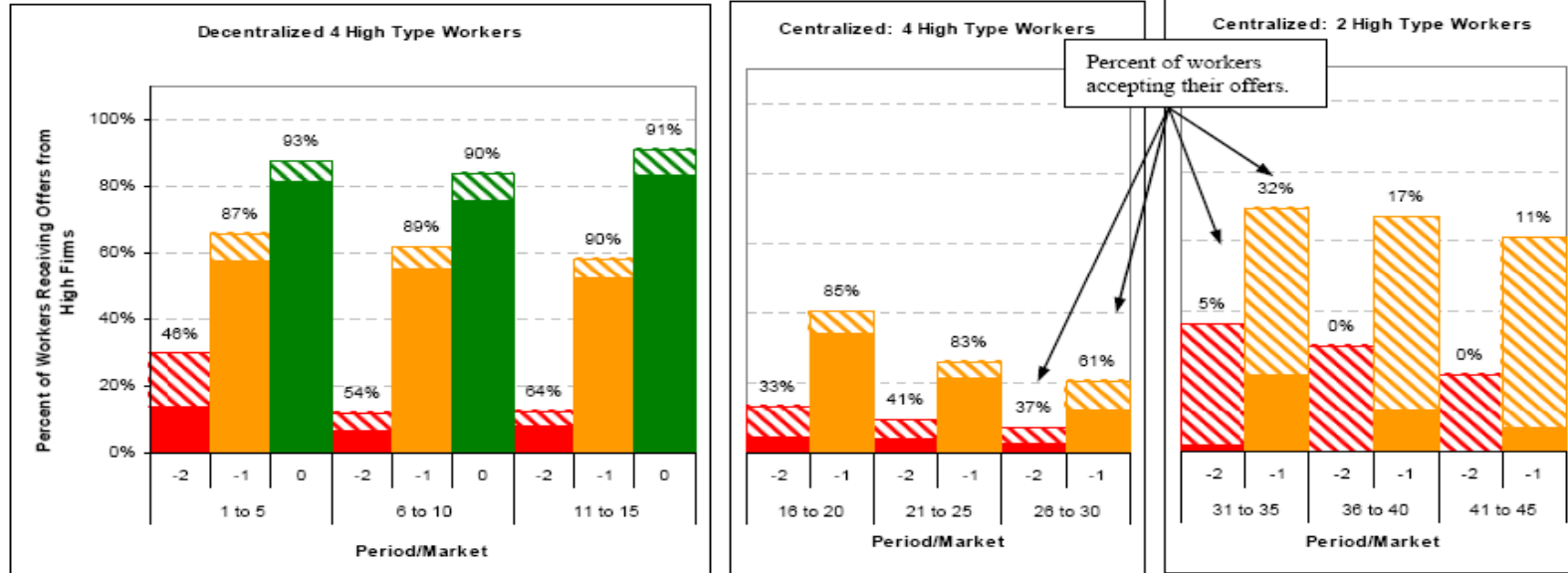
- Decentralized and Centralized matching (within subject)
- Different supply and demand (between subjects variable)
- Shocks that change the long side of the market (within subject variable)
  - 3 H firms, 4H workers → 2 H workers
- Different information conditions (symmetric or asymmetric between firms and workers) (between subject variable)

# Experimental Results

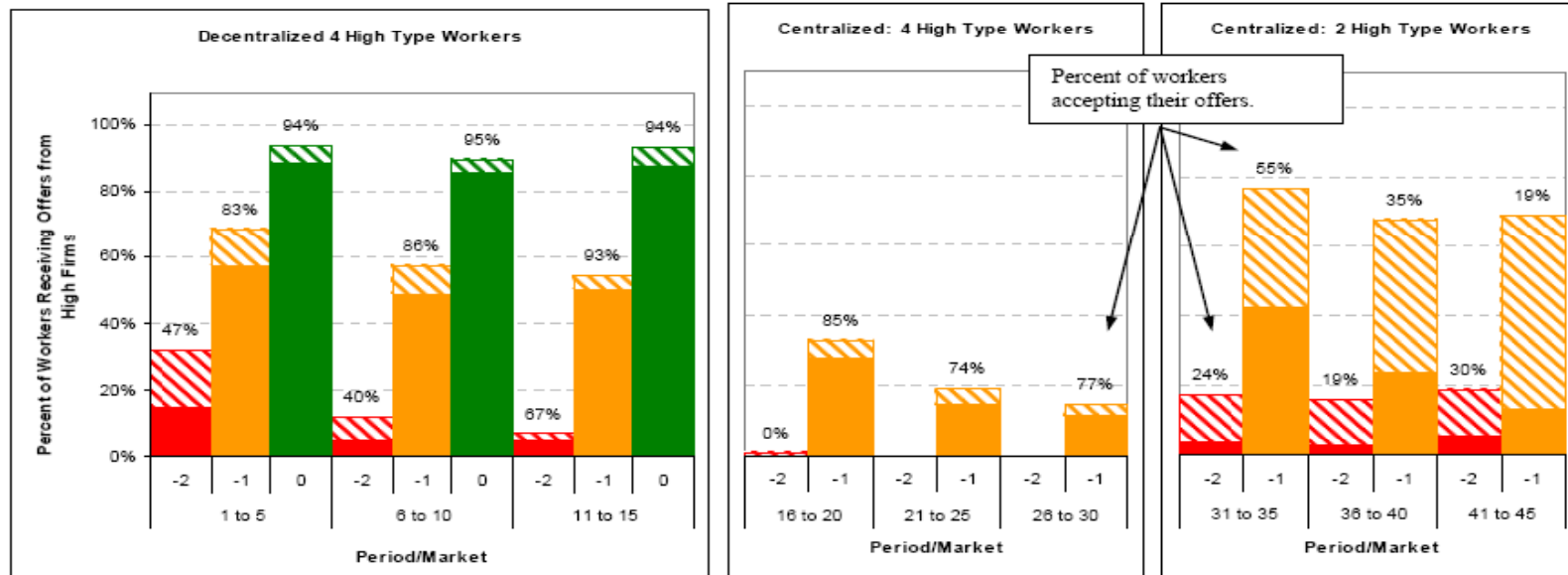


- Simple demand/supply imbalances have no effect.
- Shocks disturb the match, especially when applicants are not aware of them.
- Gradual adoption of the match...

# Full Information



# Partial Information



After the shock firms start making more early offers to workers.

Workers:

- Before the shock: high type workers eagerly accept early (-1) high offers.
- After the shock: firms are in excess supply, workers have no big incentive to accept early offers.
- Workers only know this when they are informed of the shock, and indeed in that case accept early offers with much lower propensity.

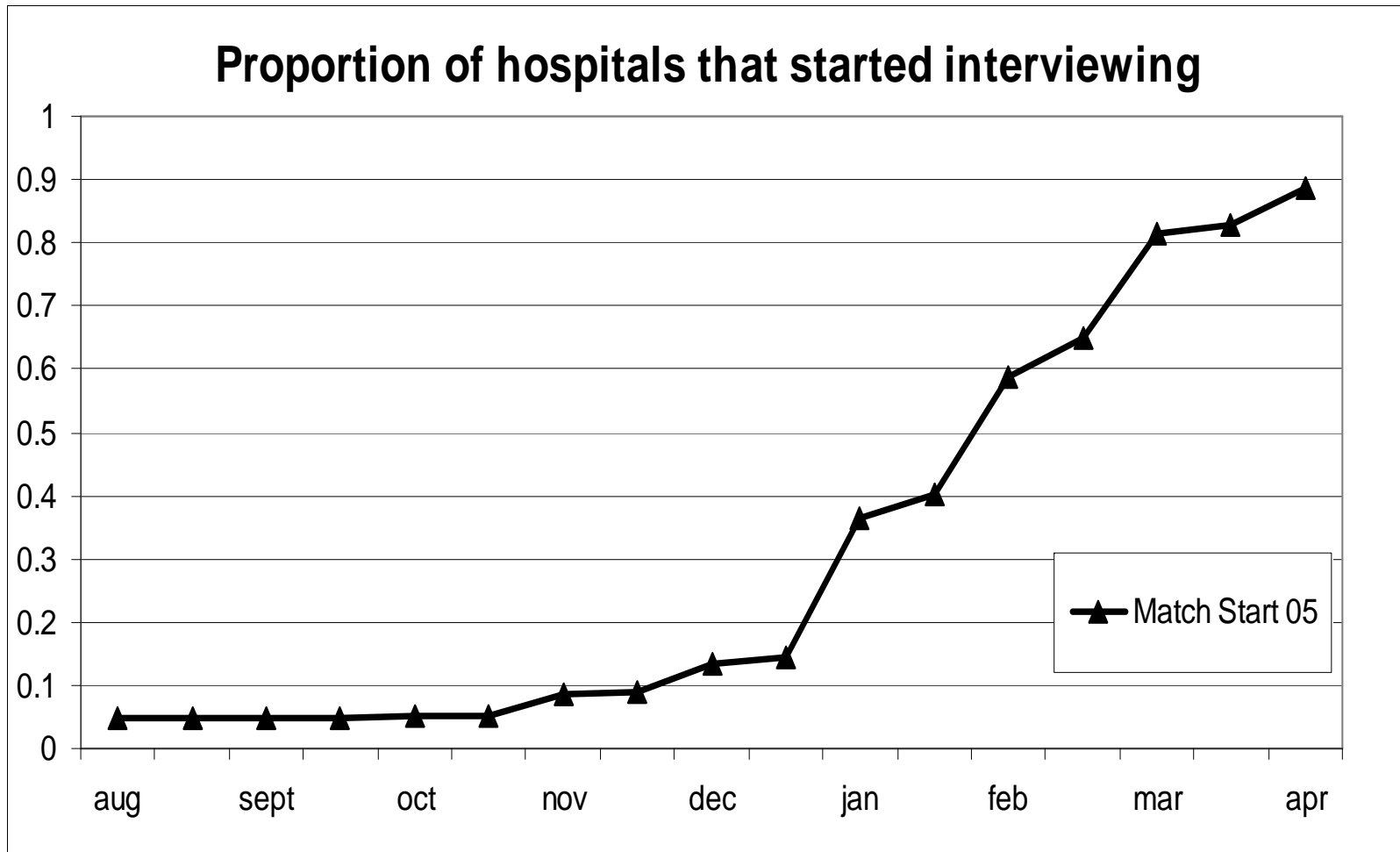
No other specialty experienced such shocks:

- Cardiovascular: from 1990 to 1998 the ratio of applicants to positions offered varied from a high of 1.6 to a low of 1.3.
- Pulmonary disease those ratios varied from a high of 1.5 to a low of 1.1,
- For Infectious disease (from 1994 to 1998) those ratios vary from a low of .68 to a high of .92.

# What can we learn for other markets?

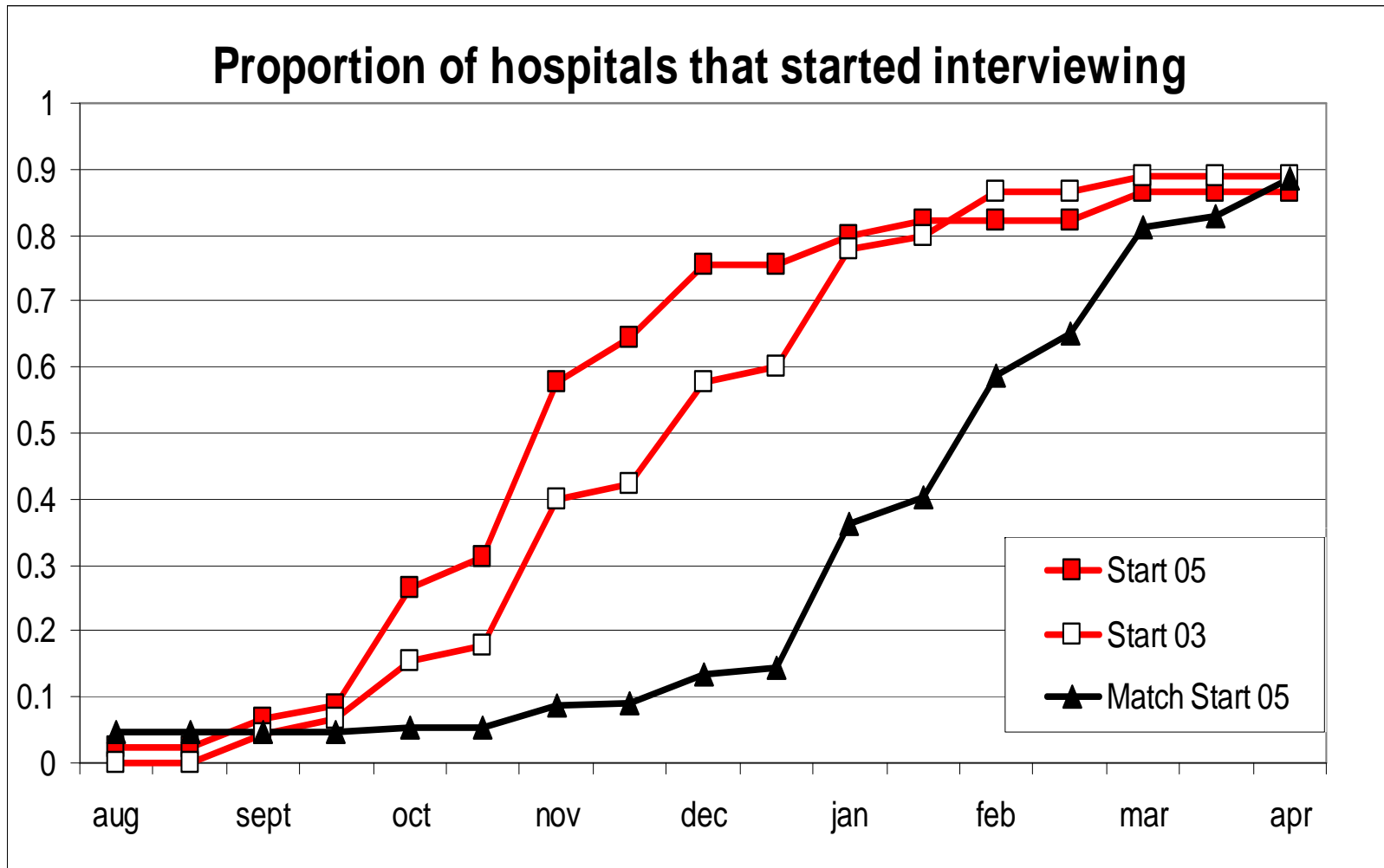
- How does a Market work when it is not centralized?
- Does having a centralized system affect the final outcome of the market:
  - Timing:
    - When are offers made
    - What kind of offers are made
  - Who matches with whom
    - What is the importance of “Networks”
  - Wages
    - Class Action Lawsuit: A match reduces wages by reducing competition...

# Timing of Interviews: Unraveling



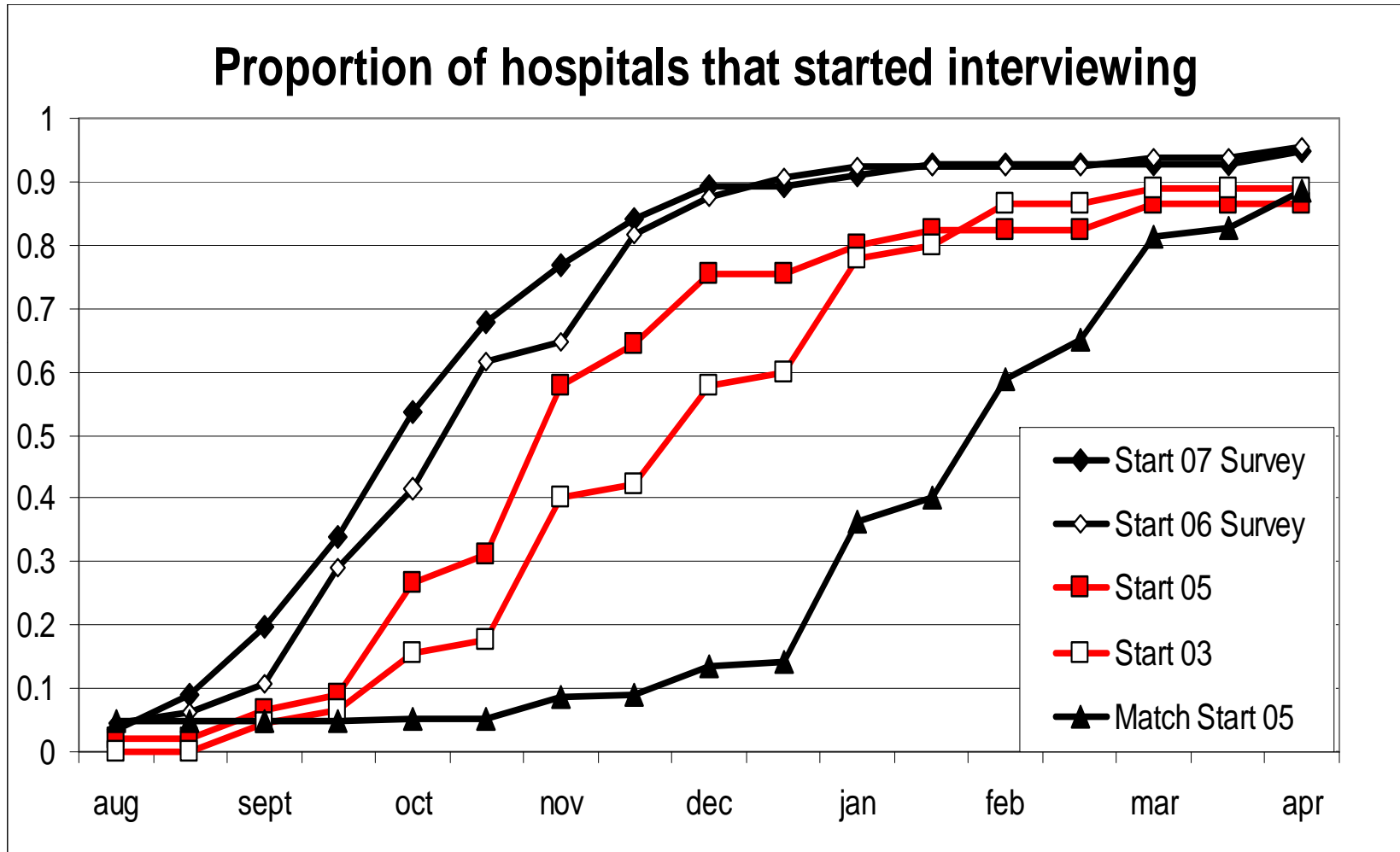
Interviews for positions starting in 05 for specialties in Match.

# Timing of Interviews: Unraveling



Interviews are happening earlier and earlier

# Timing of Interviews: Unraveling



Interviews are happening earlier and earlier



# Timing of Offers

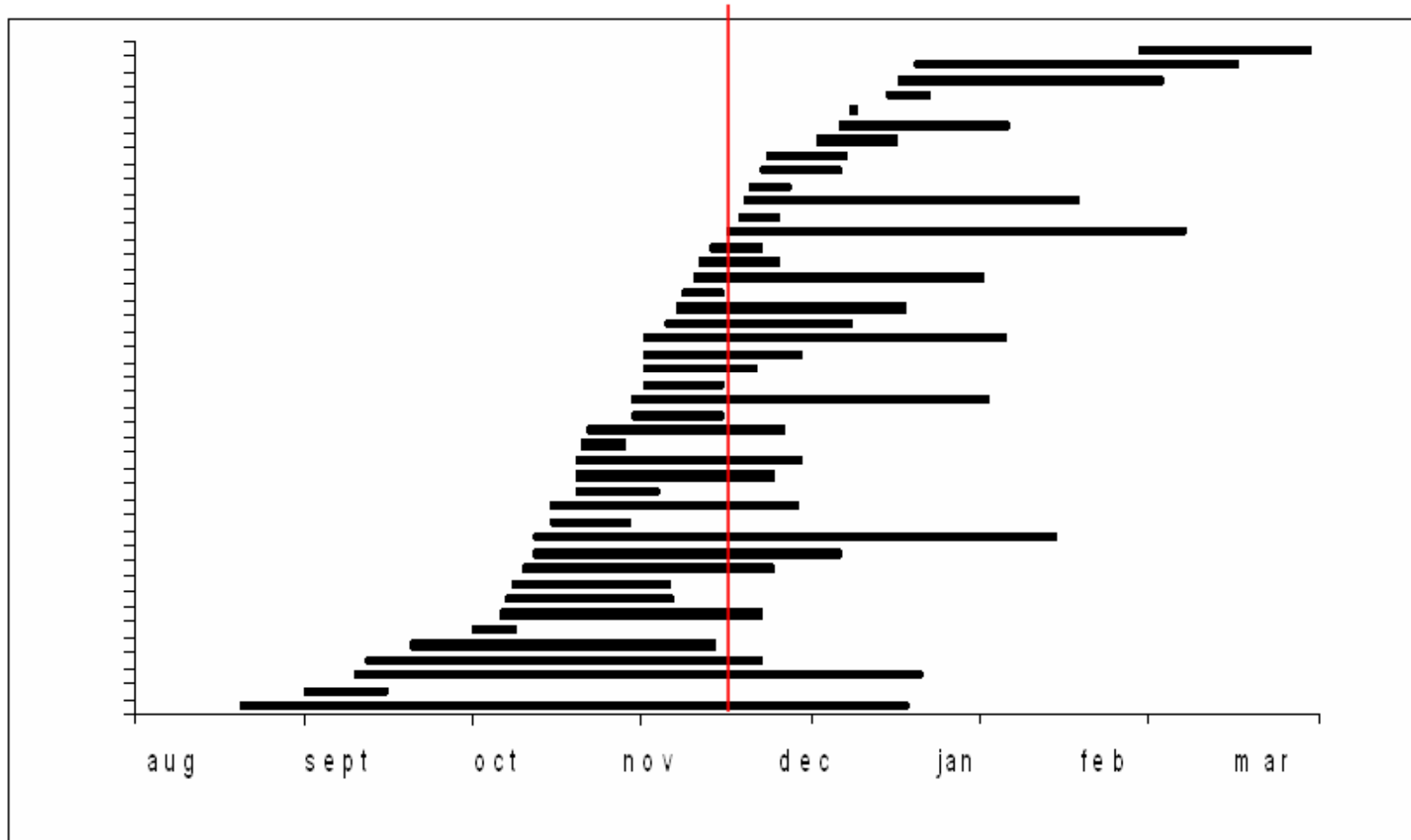
For each of 44 programs:

Use date of first and last offer, and assume that last offer is the longest open offer: Overestimate length of time they are on the market.

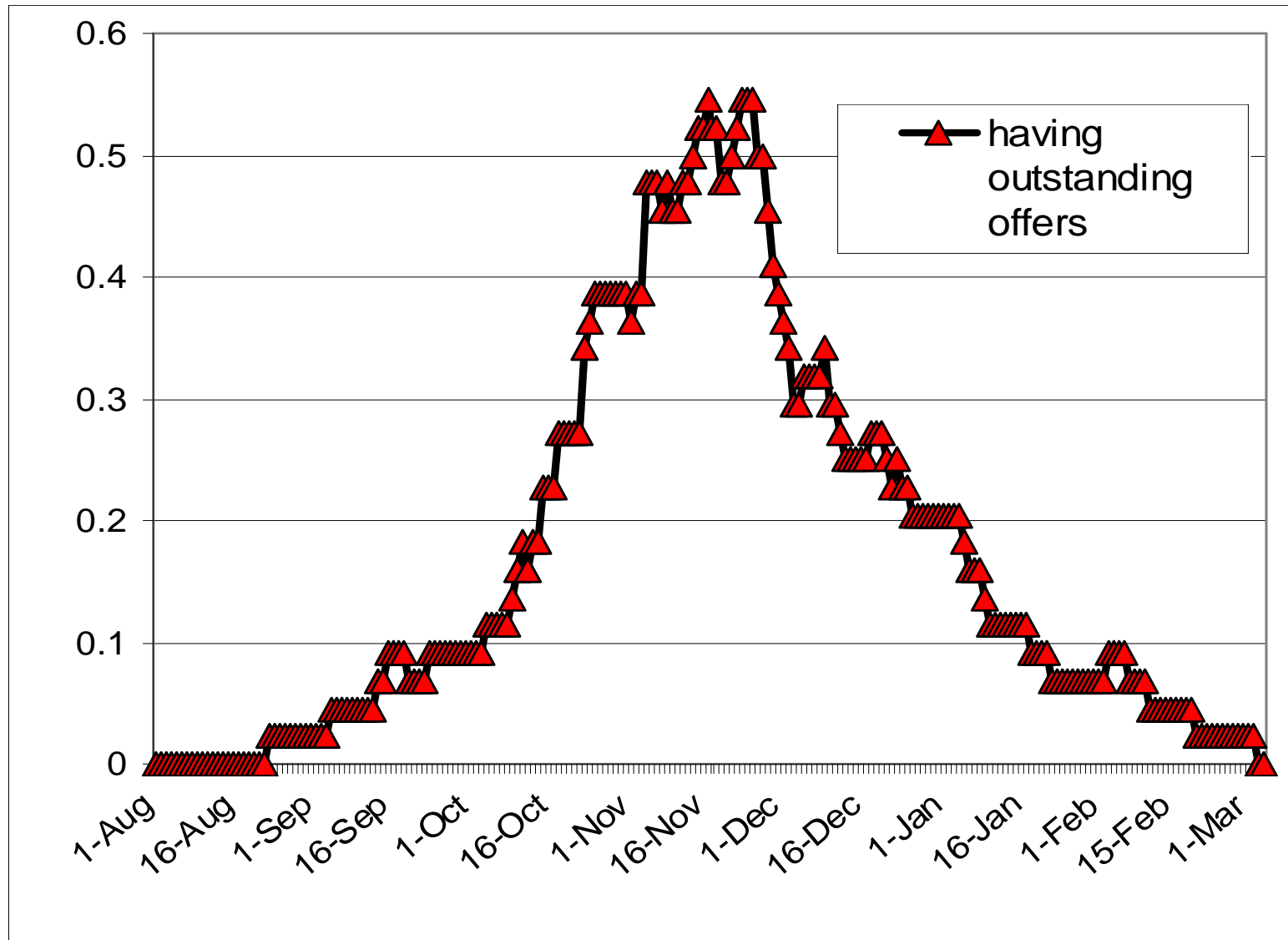
Each program is represented by one line.

Dates during which fellowship programs were making offers. Each program is represented by one of the horizontal lines, indicating the (maximal) dates during which it could have had outstanding offers (2005 survey data, n=44).

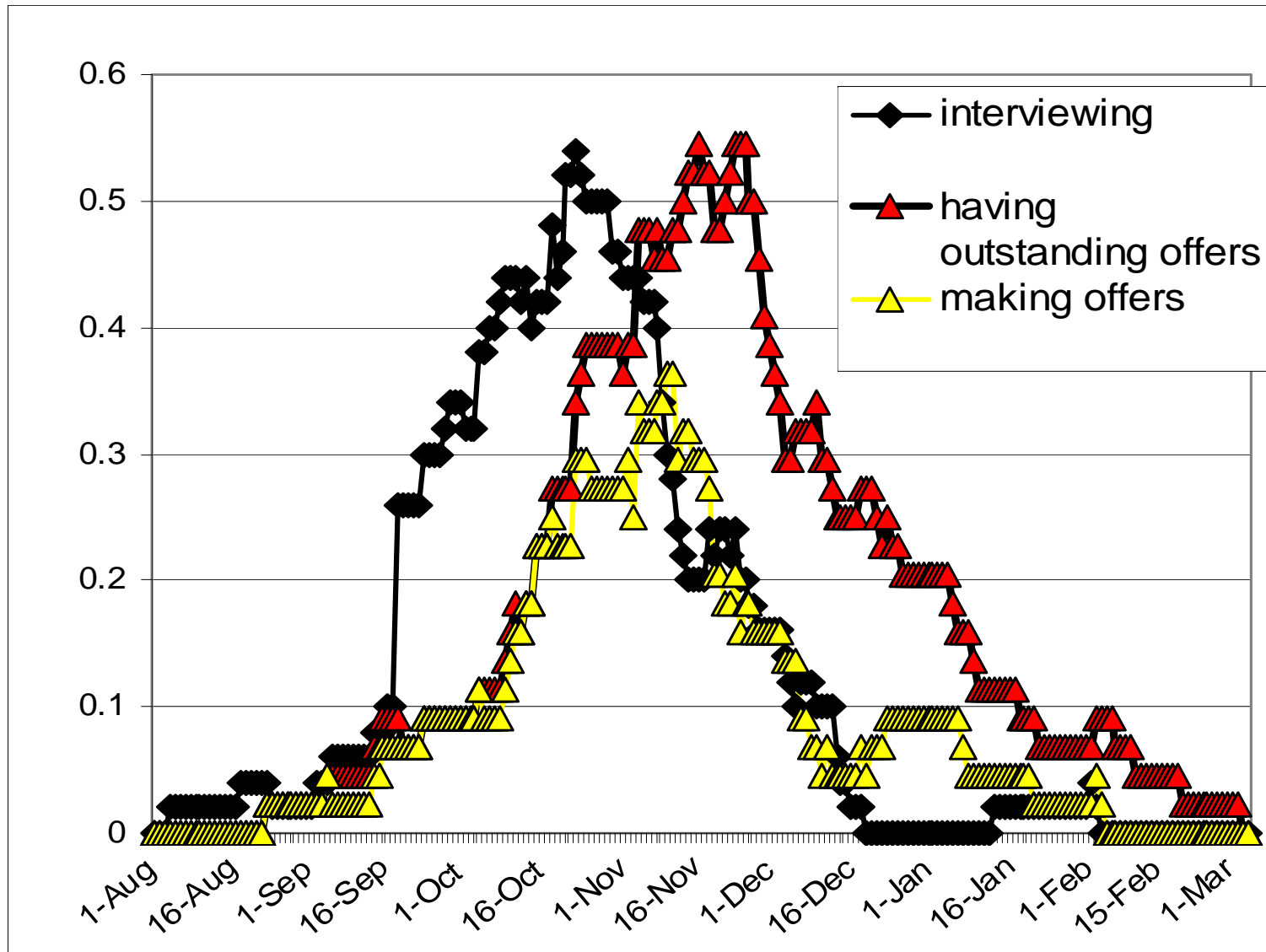
(As of November 15, 11 (27%) programs had already finished making offers, 12 (25%) had not yet started, and 21 (48%) were in the midst.)



# Market is very dispersed in time...



# Market is very dispersed in time...



# Questionnaire

87% of programs had applicants cancel interviews.  
Almost 40% experienced 5 or more of such cancellations.

46% make offers before they finish interviewing (and 6% had all slots filled by the time of their last interview).

56% of programs give deadlines of a week, and 93% of 2 weeks or less.

31% take the chance of acceptance into account when making a offer

45% speed up offers for applicants who have a short term offer in hand.

21%: longest time it took to accept an offer: one hour

- What are the effects of the loss of the match on the outcome, apart from the timing of offers?
- In labor markets, efficiency is hard to measure, there are however other markets in which we can see the affect of a loss of information:
- College football bowls are a three sided market (two teams and a bowl), but they make the evolution of information clear.
- For many years the NCAA attempted to organize this as a stage 2 market, with a date before which agreements should not be made between bowls and teams.
- After the 1990 season, the NCAA gave up (and the market subsequently moved to a more centralized system of matching teams to bowls).
- But the costs of matching early in that market are easy to see, since matching early sacrifices important information, and makes mismatches more likely. (This is a market in which the tv contracts have clauses relating payments to match quality, with special interest in a game between the teams ranked numbers 1 and 2 at the end of the regular season.)

# 1990 College Football Bowl Games: Ratings

Bowl	Match	Ratings (Writers' Poll)											
		Post-Game	12/04	11/27	11/2	11/13	11/06	10/30	10/23	10/16	10/09	10/02	09/25
Rose	Washington (Pacific-10)	5	8	9	9	10	2	7	7	13	17	17	
	Iowa (Big Ten)	18	17	18	13	13	6	13	15	22	25	-	
Orange	Notre Dame (Independent)	6	5	7	7	1	1	2	3	6	8	1	
	Colorado (Big Eight)	1	1	1	1	2	4	9	10	14	14	12	
Sugar	Virginia (Atlantic Coast)	23	-	-	17	8	11	1	1	1	2	4	
	Tennessee (Southeastern)	8	10	12	14	14	9	11	11	3	5	6	
Cotton	Miami (Independent)	3	4	3	2	3	5	8	8	2	3	9	
	Texas (Southwest)	12	3	5	6	7	14	14	13	19	-	-	
Fiesta	Louisville (Independent)	14	18	17	20	20	22	25	-	-	-	-	
	Alabama (Southeastern)	-	25	-	-	-	-	-	-	-	-	-	
Citrus	Nebraska (Big Eight)	24	19	19	10	11	13	3	4	4	7	8	
	Ga.Tech (Atlantic Coast)	2	2	2	3	4	7	16	16	11	18	23	
Gator	Michigan (Big Ten)	7	12	13	15	16	19	20	20	10	1	3	
	Mississippi (Southeastern)	21	15	15	21	15	16	17	17	18	24	-	
Hall of Fame	Clemson (Atlantic Coast)	9	14	14	16	16	18	18	19	22	15	16	
	Illinois (Big Ten)	25	16	16	22	22	17	5	5	8	11	13	
Holiday	Texas A & M (Southwest)	15	-	-	-	-	-	-	-	25	20	19	
	B.Y.U. (Western)	22	13	4	4	5	8	10	9	12	13	11	

Legal Bid Date  
(6:00 p.m.  
Saturday,  
November 24)

Notre Dame to Orange Bowl  
Virginia to Sugar Bowl  
Miami to Cotton Bowl



# Probability of top 2 teams ending the season as top 2 in AP Poll

	<b>1 Week Prior</b>	<b>2 Weeks Prior</b>	<b>3 Weeks Prior</b>	<b>4 Weeks Prior</b>
Probability	.690	.586	.310	.345
Standard Error	.086	.091	.086	.088
Number of Obs.	29	29	29	29



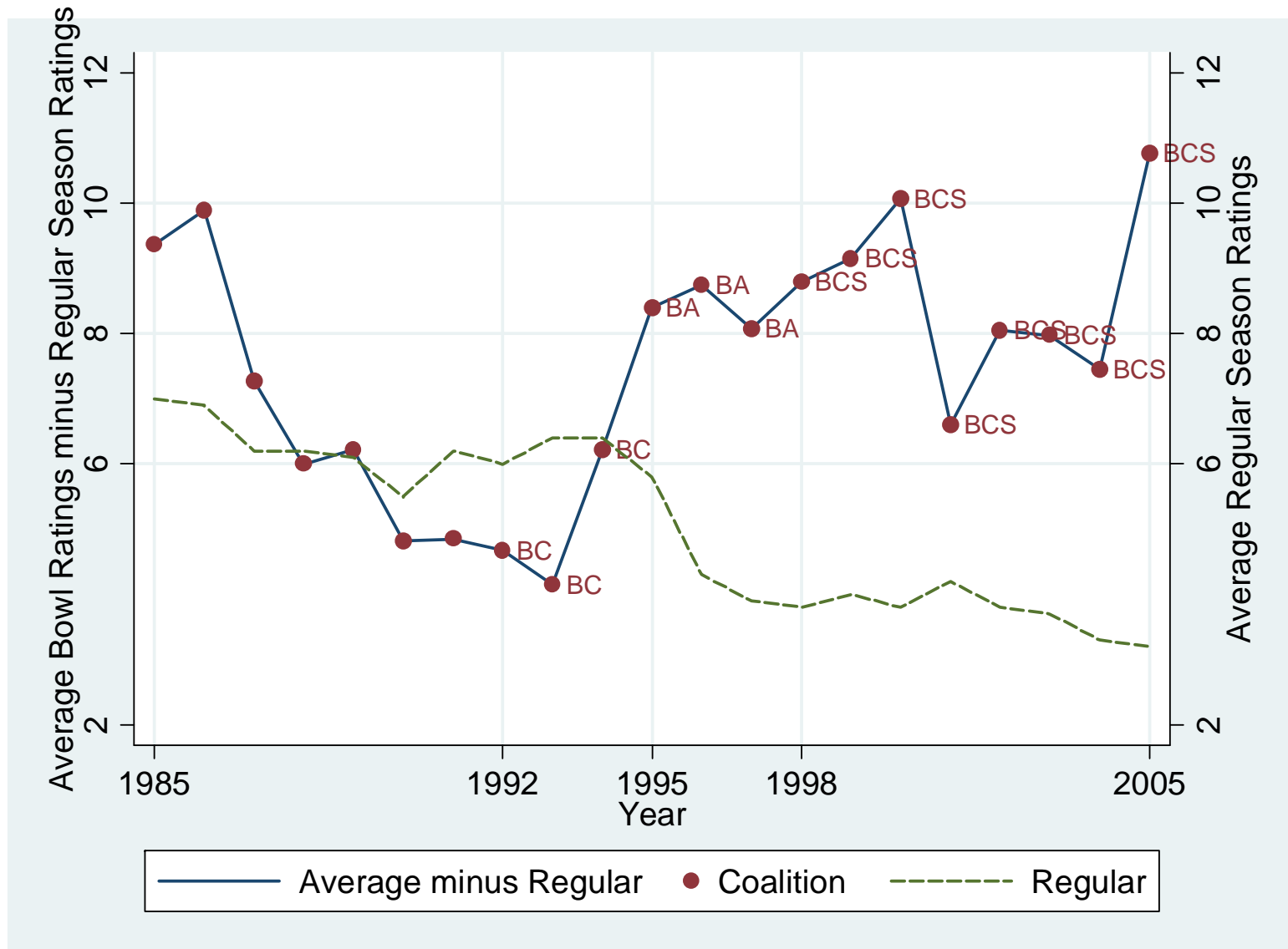
## Summary of College Bowl arrangements after the NCAA abandoned its attempt to control the market after 1991

		<b>Rose Bowl</b>	<b>Fiesta Bowl</b>	<b>Orange Bowl</b>	<b>Sugar Bowl</b>	<b>Cotton Bowl</b>
<b>Starting Year</b>		<b>1902</b>	<b>1971</b>	<b>1935</b>	<b>1934</b>	<b>1937</b>
<b>Matchups prior to Bowl Coalition Era (- 1992)</b>	<b>First Team</b>	Since 1947 - Champion of Big Ten Conference	Until 1978 – Champion of Western Conference Starting 1978 – At Large Team	Champion of Big Eight (Twelve) Conference	Champion of Southeastern Conference	Champion of Southwest Conference
	<b>Second Team</b>	Since 1947 - Champion of Pacific Ten (Coast or Eight previously) Conference	At Large Team	At Large Team	At Large Team	At Large Team
<b>Matchups in Bowl Coalition Era (1992-1994)</b>	<b>BC Bowl?</b>	No	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
	<b>First Team</b>	Champion of Big Ten Conference	At Large Team possibly to create 1 – 2 matchup	Champion of Big Eight (Twelve) Conference	Champion of Southeastern Conference	Champion of Southwest Conference
	<b>Second Team</b>	Champion of Pacific Ten Conference	At Large Team possibly to create 1 – 2	At Large Team possibly to create 1 – 2	At Large Team possibly to create 1 – 2	At Large Team possibly to create 1 – 2

<b>Matchups in Bowl Alliance Era (1995-1997)</b>	<b>BA Bowl?</b>	No	Yes	Yes	Yes	No
	<b>First Team</b>	Champion of Big Ten Conference	2 At Large Teams, ACC, Big East, Big – Twelve, Southeastern conference champions possibly to create 1-2 matchup in one of these bowl games			First Team from Big – Twelve Conference not going to BA Bowls
	<b>Second Team</b>	Champion of Pacific Ten Conference				A team from Pacific Ten or Western Conferences out of BA Bowls
<b>Matchups in Bowl Championship Series Era (1998-)</b>	<b>BCS Bowl?</b>	Yes	Yes	Yes	Yes	No
	<b>First Team</b>	<i>ACC, Big East, Big – Twelve, Big Ten, Pacific Ten, Southeastern conference champions, up to 2 highly ranked other conference or at large teams (with Notre Dame having priority) always to create always 1-2 matchup in BCS rankings in one of these bowl games</i>				First team from Big – Twelve Conference out of BCS Bowls
	<b>Second Team</b>					A comparable team from Southeastern Conference

During this time the membership of the various conferences also changed, and a number of independents joined conferences.

...and increased the efficiency of the market:  
 Average Normalized Nielsen Ratings in BCS Bowls



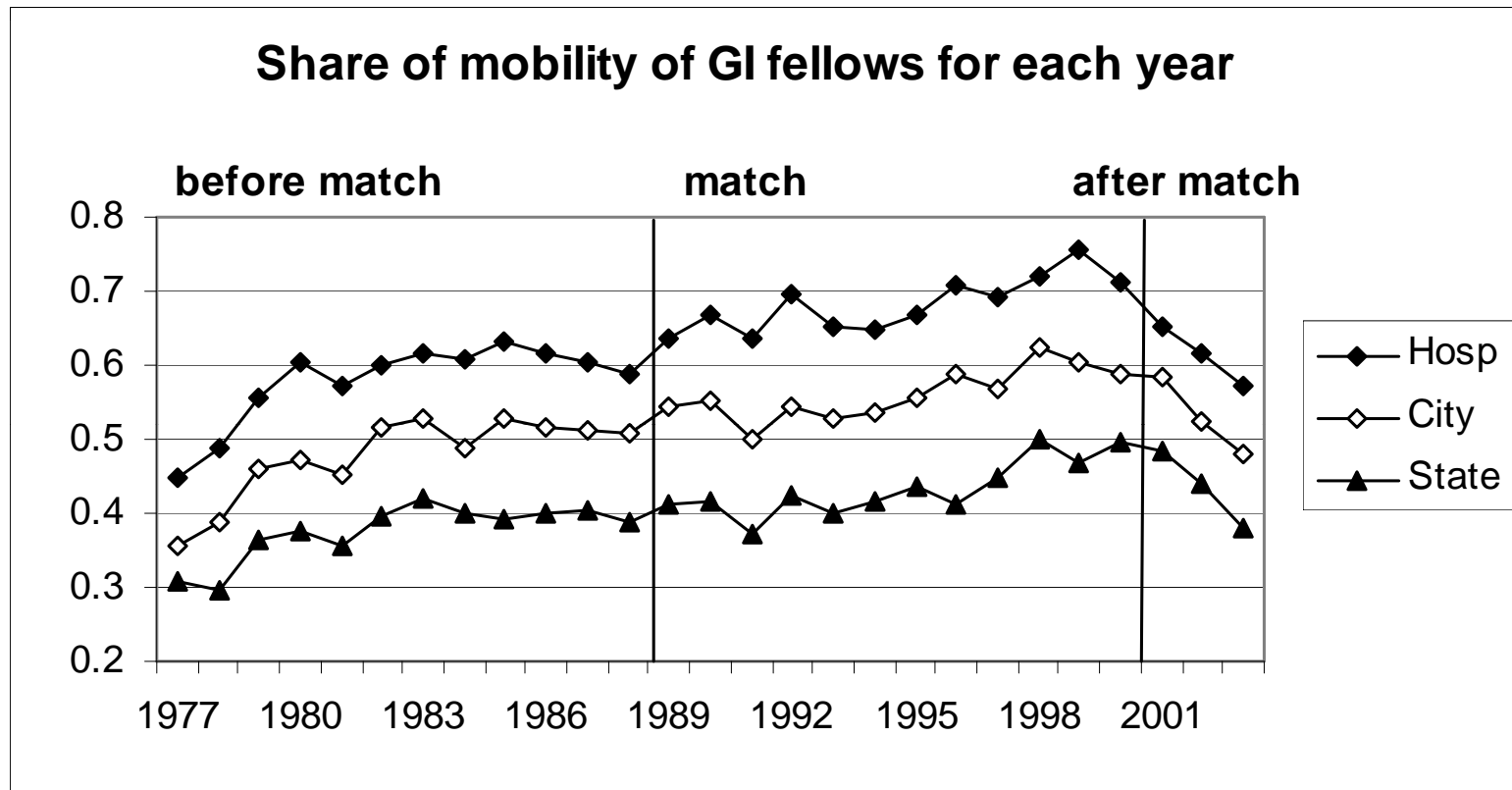
- Are there other effects of a breakdown of a match in terms of who matches to whom?
- Niederle, Muriel and Alvin E. Roth, “Unraveling reduces mobility in a labor market: Gastroenterology with and without a centralized match,” *Journal of Political Economy*, 111, 6, December 2003, 1342-1352.

Casual evidence: When markets unravel, participants seem to rely more on their personal networks, because they are:

- Sources of otherwise scarce information
- Can facilitate transactions when they must be completed quickly
- Can enhance the credibility of commitments made years in advance.
- We can track mobility of GI fellows during the match and compare it with mobility before and after the demise of the match.

First direct evidence that the use of a centralized clearinghouse leads to different matchings, and that unraveling may reduce the *scope* of the market.

# Effects of a Match: Mobility



With a Match, fellows are more mobile.

This effect is more pronounced for large hospitals.

(Data: 9180 of 15,187 gastroenterologists who completed residency and fellowship in US after 1977.)

What is the effect of a Match (and of unraveling) on wages?

Motivation:

- In 2002, 16 law firms filed a class action law suit, representing 3 former residents, arguing that the NRMP violated antitrust laws and was a conspiracy to depress resident's wages. They sought to represent the class of all current and former residents, against a class of defendants including the NRMP, many other medical organizations, and all hospitals that employ residents.
- “Defendants and others have illegally contracted, combined and conspired among themselves to displace competition in the recruitment, hiring, employment and compensation of resident physicians, and to impose a scheme of restraints which have the purpose and effect of fixing, artificially depressing, standardizing and stabilizing resident physician compensation and other terms of employment.”

What do fellows think of this situation:

- For example, GI Fellows Bauer, Fackler, Kongara, Matteoni, Shen and Vaezi, 1999, comment in a letter on the effects of the demise of the match.
- *“Of recent concern is the deterioration of the match process for candidates applying for fellowship positions over the past two years. Our junior colleagues are concerned that they may not be able to wait safely to interview with the institution of their choice while a position is offered elsewhere early in the decision process. The absence of the match benefits the programs a great deal more than their applicants.”*

## Some design issues for restarting a match

- Match may not be a Pareto improvement (Ehrinpreis AJG 2004)
  - We are most likely to choose from among our own residents [..]. Indeed, some GI programs no longer solicit applications from other programs' residents. Program directors at these institutions know that they are still disappointing some of their own very good residents, and try hard to promote their virtues to other programs. However, programs hesitate to recruit fellows from a pool of residents rejected by the GI program at the residents' own institutions.
- If many programs hire early, it is difficult to wait for a (not yet established) match, despite the advantages of late hiring at a uniform time.



## Transition to a later market

- In May 2005, the American Gastroenterological Association (AGA), the American College of Gastroenterology (ACG), the American Society for Gastrointestinal Endoscopy (ASGE) and the American Association for the Study of Liver Diseases (AASLD) decided to reintroduce a GI fellowship match, starting in 2006, for positions beginning in July 2007.
- How to manage the transition?
  - Rates of participation
    - Concern among programs about whether their chief competitors will participate.
  - Change of dates to June 2006 (from as early as July 2005)
  - How to reassure programs that other programs will wait for Match? (Without a congested transition like 1945-50)<sup>41</sup>

- In June 2005, Debbie Proctor, the gastroenterologist who took the lead in reorganizing the match, sent to the market designers working on a new match an email saying, in part:
- “I’m answering 3-4 emails per day especially on this issue. ‘I want to make sure MY competition is in the match and that they don’t cheat.’ Well, this is another way of saying that if they cheat, then I will too!...Have you ever seen this before? The distrust amongst program directors? I find it hard to believe that we are unique. Maybe this is [a] social science phenomenon?”

# Which markets are unraveled? Market design

- It appears that markets in which transactions are made at early, uncoordinated times are markets in which there are both
  - Exploding offers
  - Binding commitments
- Many markets have institutions that directly address when offers can be made and accepted, and what it means for an offer to be accepted.

Organizations concerned with the timing of when offers are made,  
accepted, rejected

- **Council of Graduate Schools (CGS): graduate admissions,**
- National Association for College Admission Counseling (NCAC): undergraduate admissions, (early action, early decision...)
- National Resident Matching Program (NRMP): entry level medical residencies, (also Canadian Resident Matching Service – CaRMS – and various regional matches in Britain)
- **Specialty Matching Services (SMS): advanced medical residencies and fellowships,**
- Association of Psychology Postdoctoral and Internship Centers (APPIC): clinical psychology positions,
- National Association for Law Placement (NALP) for positions in law firms,
- **Judicial Conference of the United States and various ad hoc committees of judges for federal judicial clerkships,**
- Provincial Law Societies in Canada.
- National Association of Colleges and Employers (NACE) for US college undergraduates,
- **NCAA: formerly for postseason college football bowls, now regulated by the Bowl Championship series (BCS),**
- NCAA for recruitment of college athletes, and various drafts...
- National Panhellenic Conference for sorority matching
- The Japan Federation of Employers' Associations (Nikkeiren) for Japanese university graduates



**Council of  
Graduate Schools**

**Resolution Regarding Graduate  
Scholars, Fellows,  
Trainees, and Assistants**

**“Students are under no obligation to respond to offers of financial support prior to April 15; earlier deadlines for acceptance of such offers violate the intent of this Resolution. In those instances in which a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may submit in writing a resignation of the appointment at any time through April 15.**

# The need for experiments

- Note that a simple experimental environment will be quite different from the markets in the table, and from the gastroenterology market.
- The laboratory environment, because it is so simple, is different from each of these markets in more transparent ways than they are different from one another.
  - while it is always somewhat risky to draw inferences about the effect of a rule change in one market from the effects in a different market, the inferences may be clearer when one of the markets is simple.
- And in the experiment, the rules are an exogenous experimental variable, so that their influence can be readily observed.

# An experiment allows us to view different offer regimes in a controlled environment

- 5 firms, 6 applicants, 9 periods.
- In each period, a firm may make an offer to at most one applicant. Firms make offers, applicants decide upon the offers they receive.
- *Firms and applicants are assigned “qualities.”*
- *If firm of quality  $x$  hires an applicant of quality  $y$ , both firm and applicant will receive a payoff of  $xy$  points each.*
- *Firms’ qualities are simply their assigned participant number, 1,2,3,4,5.*
- *Uncertainty about applicants’ quality is only resolved over time:*
- *In periods 1, 4 and 7, each applicant receives a “signal,” an integer between 1 and 10, each equally likely.*
- *In period 7, the relative ranking of the sum of the 3 signals determines the applicants’ quality. The applicant with the highest sum of 3 signals has a quality of 6... Ties are broken randomly.*
- Firms see all signals, applicants see only their own signals (as they become available over time) and their ranking in period 7.

(Note that in this experiment the cost of early matching is bad matches due to uncertainty about quality.)

# Experimental treatments: 3 “market cultures”

**Exploding offers:** Firms can make exploding offers and acceptances are binding.

**Renegue:** Firms can make exploding offers, but applicants can renege on their acceptance, for a small fee (1 point).

**Open offers:** Firms can only make open offers.

(Many equilibria:

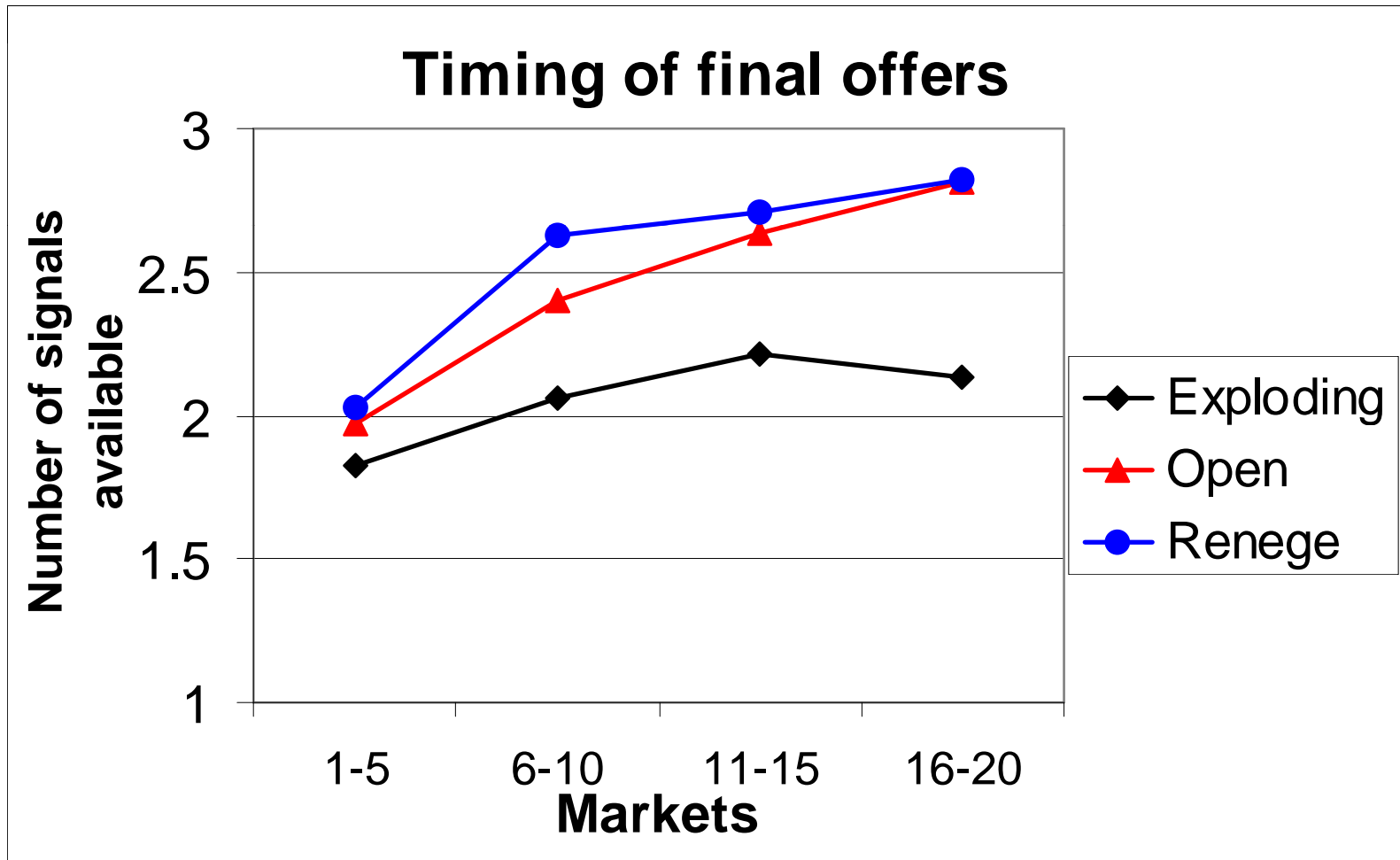
One in which all matches are agreed upon inefficiently early.

All environments have a perfect equilibrium with efficient late matching.

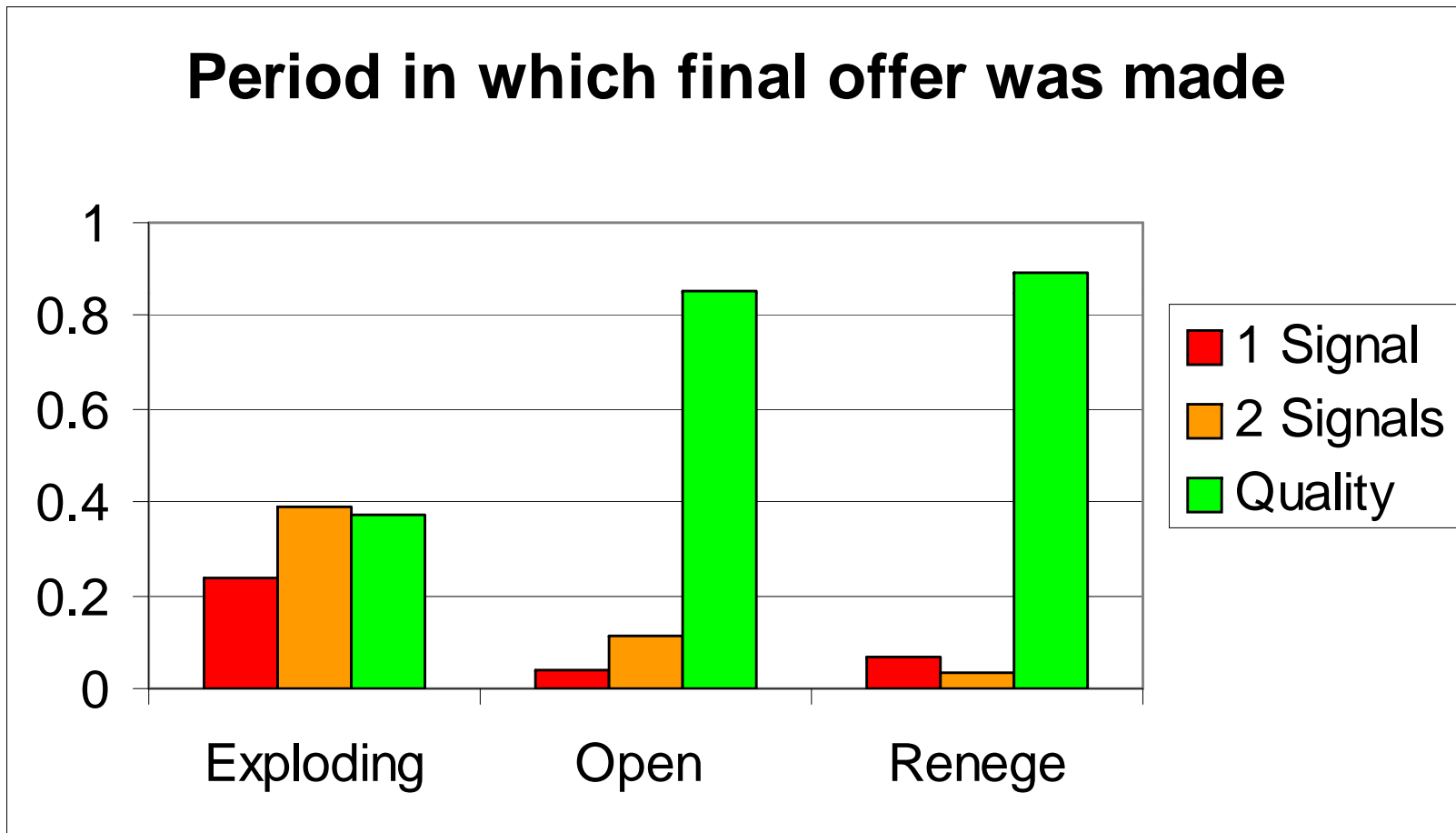
But the late matching equilibrium is more fragile when offers are exploding and acceptances are binding.)



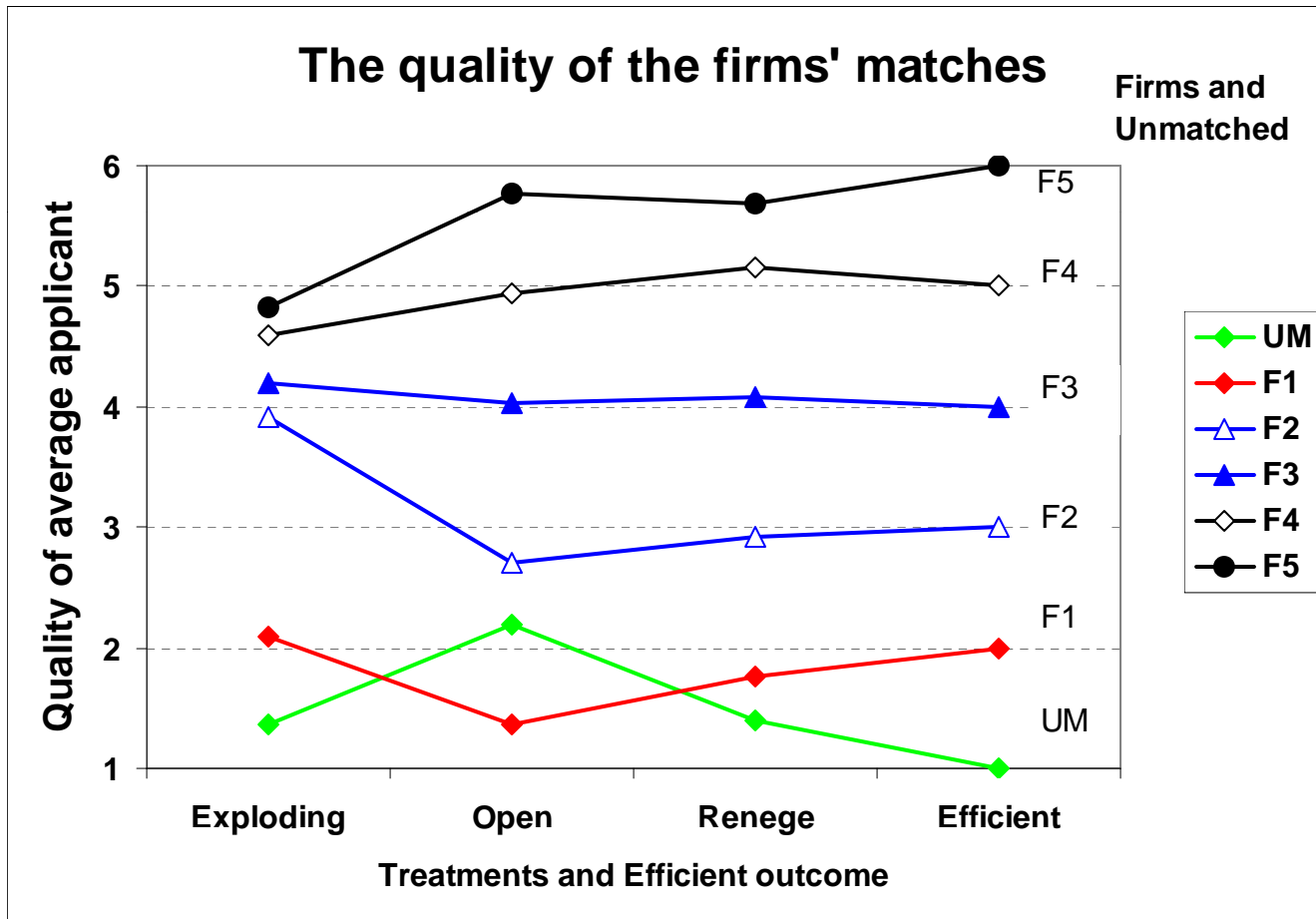
Timing of final offers (offers that were accepted and not renege upon for the renege treatment) in terms of the number of signals that were observed.



In last five periods...



Not everyone loses... (so it can be hard to get consensus on reversing unraveling:)





## **Resolution Regarding Gastroenterology Fellowship Applicants, Including all Research and Clinical Fellowship Applicants and Positions**

This resolution concerns the conditions surrounding gastroenterology fellowship offers to applicants, acceptance by applicants of such offers, and participation by applicants and programs in the gastroenterology fellowship Match. The general spirit of this resolution is that each applicant should have an opportunity to consider all programs before making a decision and be able to participate in the Match. ... The intention of this resolution is to ensure uniformity so that everyone participates fairly and to establish the principle that all positions should be filled through the Match or after Match Day. It therefore seeks to create rules that give both programs and applicants the confidence that applicants and positions will remain available to be filled through the Match and not withdrawn in advance of it.

This resolution addresses the issue that some applicants may be persuaded or coerced to make commitments prior to, or outside of, the Match. Early offers and acceptances, and offers outside of the Match, are violations of the rules and of this resolution and are not condoned. Any applicant may participate in the matching process by registering for the Match to interview and consider match-participating programs; however, an applicant who accepts a position prior to, or outside of, the Match must comply with the National Resident Matching Program/Specialty Matching Services (NRMP/SMS) Match Participation Agreement by either resigning the accepted position if he/she wishes to submit a rank order list of programs or by withdrawing from the Match prior to the rank order list certification deadline, which is the first week in June. In addition, no program may withdraw a position from the Match after the quota change deadline to offer that position outside the matching process. ... The spirit of this resolution is to make it unprofitable for program directors to press applicants to accept early offers, and to give applicants an opportunity to consider all offers as well as to provide uniform and widely acceptable rules that protect both applicants and fellowship programs.

The gastroenterology match for 2007 fellows was held June 21, 2006, and succeeded in attracting 147 of the 151 eligible fellowship programs, 13 of which withdrew before the match.

The final participation rate: 89%

98% of the positions offered in the match were filled through the match.

Early movers couldn't impose a big negative externality on those who waited for the match, since pre-match exploding offers would not necessarily remove candidates from the market. This made it easier for everyone to wait for the match.

The second year of the centralized match was successfully run in June 2007, and the third in 2008.

# Orthopedic surgery has the same problem

- But aspiring surgeons may not be able to turn down early offers after accepting them, even if the orthopedic organizations were to adopt a policy like the gastroenterologists'.
- However, while the (15) orthopedic professional organizations also cannot directly prevent employers from making early offers, unlike the gastroenterologists, they feel they can effectively punish employers who make early offers, by not allowing them to present papers at professional meetings.
- So it looks like the orthopedic organizations are going to try to adopt a clearinghouse by instituting a series of penalties for employers who don't participate according to the rules.

## Federal judges hiring law clerks have a similar problem

- This market has also unraveled.
- Like orthopedic surgeons, law students can't change their minds no matter how early the offer (law students are not in a position to break promises to federal judges).
- Like the gastroenterology organizations, the judicial conferences have no way to prevent judges from hiring early, or from making exploding offers, or punishing those who do.
- There are now discussions underway among judges and law schools about the possibility of instituting a clearinghouse like the ones used by doctors.
- But until some way is found to address the issue of early and exploding offers before a clearinghouse, the chances of success are small.
- It appears that judges may have to become willing to do some "community enforcement" of norms against early exploding offers before a clearinghouse will work for them.<sup>55</sup>

Avery, Christopher, Christine Jolls, Richard A. Posner, and Alvin E. Roth, "The Market for Federal Judicial Law Clerks", *University of Chicago Law Review*, 68, 3, Summer, 2001, 793-902.

- The market for clerkships starting in 2003 cleared in the September 2001, i.e. at the very beginning of the first semester of the second year of law school; nearly two years before the start of employment.

This introduces several potential causes of inefficiency.

- because the market clears so early, it clears before information becomes available (e.g. students' second and third year grades, law review articles, etc.) that can help produce efficient matches of particular clerks and judges.
- because competition among judges to hire earlier than their competitors makes the market fast, chaotic, and thin, many students and judges have little opportunity to consider a wide range of options, but rather have to transact quickly, before options can be developed.



# The proximate cause of that study:

Memo from the Administrative Office of the United States Courts, to All United States Judges, October 7, 1998.

“At its September 15, 1998 session, the Judicial Conference of the United States rescinded its September 1993 policy recommending to all judicial officers that March 1 of the year before a clerkship begins be the benchmark starting date for law clerk interviews. This action was taken because the policy on law clerk interviews has not been universally followed...”

## Over the next few years, we observed

- interviews led very quickly to offers
- offers produced very quick responses
- responses were generally acceptances; and
- many scheduled interviews were canceled as a result.

Thus, students and judges tended to pair off quickly with those with whom they have early interviews. As a result,

- many students limited the judges to whom they apply to avoid being paired off early with a less preferred judge
- We also witnessed complex but binding verbal contracts.
- Offers became earlier from year to year (moving back from February to September of the second year).

Avery, Christopher, Christine Jolls, Richard A. Posner, and Alvin E. Roth,  
“The New Market for Federal Judicial Law Clerks”, *University of Chicago  
Law Review*, 74, Spring 2007, 447-486

**Proximate Cause for the Study  
UNITED STATES COURTS OF APPEALS**

**March 11, 2002**

Dear Dean:

We are pleased to report that the federal appellate judges have voted overwhelmingly in favor of a new Plan for Law Clerk Hiring. The Plan includes: **(1) a moratorium on law clerk hiring during the Fall of 2002, (2) an arrangement ensuring that the hiring of law clerks will not be done earlier than the Fall of the third year of law school, and (3) an agreement that the focus of law clerk hiring will be on third year law students and law graduates.**

The precise terms of the new Plan are set forth in the attached "Summary," and the history leading to the Plan's adoption appears in the appended "Background" statement. More than two-hundred federal appellate judges considered the Plan. Ninety-two percent (92%) of the judges either supported the Plan or indicated that they would not oppose it. Thus, the "substantial consensus" requirement that was needed to put the Plan into operation was easily satisfied. 59

## Judges' memo, cont.

“There are numerous advantages to a law clerk hiring system that focuses on third year students and law graduates. Law clerk candidates will be able to present more information with their applications and be judged more fairly. Thus, for example, applicants who are in their third year of law school will be able to offer

- a transcript showing performance during four semesters of school in a good variety of courses;
- information on law journal selection, journal publications, and election to a journal editorial board;
- writing samples from seminar courses;
- information regarding experience gained in clinical courses and public interest endeavors;
- references from law professors for whom the student has worked as a research assistant or a teaching assistant;
- recommendations associated with judicial internships;
- significant recommendations from Summer employers;
- information on moot court competitions; and
- information on selection or election to positions in student government.

# Initial FAQ (accompanying judges' memo)

**Q** Does the Plan endorse Summer interviewing?

**A No.** Many judges would have opposed the Plan had it endorsed Summer interviewing. There was a concern that Summer interviews would be very inconvenient for many people. The reasons are manifold: many judges are away on vacation during the Summer; law clerk applicants are otherwise occupied with Summer jobs, vacations, foreign travel, and bar examinations (for recent graduates); law professors often are away on vacation and thus unavailable to furnish references; and law schools do not release grades on any uniform schedule, so official student transcripts from some law schools are not available until near September. **However, the Plan does not forbid a law student who, say, is from Virginia and working in Tulsa during the Summer from talking with a judge who is otherwise available to chat.** This has happened under existing hiring arrangements and the judges saw no reason to prohibit it under the new Plan. The main point, however, is that the formal hiring process will take place in the Fall when applications will be submitted and materials and references from the law schools will be sent to the judges.

## Initial FAQ, cont.

**Q** How is "Fall" determined under the Plan?

**A** **There is no fixed definition of Fall, nor is there any fixed starting date for the hiring season.** Under existing arrangements, some judges do their hiring in September, some in October, and others do it even later. The Plan does not change this.

**Q** Are judges forbidden from making "exploding offers," i.e., offers that require an applicant to respond promptly to an offer?

**A** **The Plan does not purport to address how an offer is given by a judge.** This is for each judge to determine. However, no applicant is obliged to act on an offer if the terms are unacceptable, nor is an applicant obliged to accept the first offer that he or she receives.

# Subsequent refinements of rules

- From year to year, changes have been made to
  - Put precise start dates for applications (after Labor Day—already specified by start of market in 2003)
  - Specify later precise dates for
    - Scheduling interviews
    - Conducting interviews and making offers
  - No rules regarding exploding offers

# 2004 modifications

The critical dates under the Revised Law Clerk Hiring Plan are as follows:

- **After Labor Day:** Third year law students and law school graduates may submit law clerk applications and letters of reference may be submitted on their behalf.
- **From the Day After Labor Day Through the Second Sunday After Labor Day** (September 7 - 19 in 2004): Reading period.
- **Beginning on the first Monday after Labor Day** (September 13 in 2004): Judges may schedule interviews to be held after the reading period.
- **Beginning on the Second Monday After Labor Day** (September 20 in 2004): Judges may conduct interviews and extend offers.

Subsequent modification of dates in 2005.



This year

**FEDERAL JUDGES LAW CLERK HIRING PLAN**

**Critical Dates Under the Law Clerk Hiring Plan for 2009**

<b>Event</b>	<b>Fall 2009</b>
<b>First date when applications may be received:</b>	<b>Tuesday, September 8, 2009 (OSCAR release: 10:00 a.m. (EDT))</b>
<b>First date and time when judges may contact applicants to schedule interviews:</b>	<b>10:00 a.m. (EDT), Friday, September 11, 2009</b>
<b>First date and time when interviews may be held and offers made:</b>	<b>8:00 a.m. (EDT) Thursday, September 17, 2009</b>

# Data

They have repeated the surveying of both federal appellate judges and applicants that they did in their prior study.

- Federal appellate judges surveyed in fall of 2004 and fall of 2005.
- Third year law students at the four law schools that provide the greatest number of clerks surveyed in fall of 2004, fall of 2005, and fall of 2006.
- About a 50% response rate from both federal appellate judges and students. On the key measure of judge reports of adherence versus nonadherence to the start dates, if anything selection bias should lead us to underestimate the level of nonadherence.

## Adherence to start dates (2004 judge survey; gray areas = nonadherence)

	Number and (in parentheses) cumulative percentage of responding judges				
	Before September 7	September 7–12	September 13–19	September 20–26	After September 26/Not yet
<b>Date of first interview</b>	11 (9%)	6 (15%)	22 (33%)	66 (91%)	11 (100%)
<b>Date of first offer</b>	5 (4%)	9 (12%)	11 (21%)	67 (78%)	26 (100%)

# Judges' perceptions: 2004

Number and (in parentheses) cumulative percentage of responding judges					
	Overall				Within Circuit
	Relatively few judges adhered	To responding judge's knowledge, many judges adhered but a substantial number did not	To responding judge's knowledge, almost all judges adhered	To responding judge's knowledge, all judges adhered	At least one judge in Circuit did not adhere
<b>Start date for scheduling interviews</b>	3 (3%)	34 <b>(36%)</b>	41 (75%)	26 (100%)	36 (69%)
<b>Start date for conducting interviews and making offers</b>	5 (5%)	43 <b>(46%)</b>	40 (85%)	16 (100%)	36 (73%)

# Judges' perceptions: 2005

Number and (in parentheses) cumulative percentage of responding judges					
	Overall				Within Circuit
	Relatively few judges adhered	To responding judge's knowledge, <b>many judges adhered but a substantial number did not</b>	To responding judge's knowledge, almost all judges adhered	To responding judge's knowledge, all judges adhered	At least one judge in Circuit did not adhere
<b>Start date for scheduling interviews</b>	5 (6%)	40 <b>(52%)</b>	27 (84%)	14 (100%)	35 (87%)
<b>Start date for conducting interviews and making offers</b>	4 (5%)	44 <b>(58%)</b>	23 (86%)	12 (100%)	34 (81%)

# Student reports: 2004

(gray areas = nonadherence)

	Number and (in parentheses) cumulative percentage of responding students				
	Before September 7	September 7–12	September 13–19	September 20–26	After September 26/Not yet
<b>Date of first scheduling of interview</b>	8 (5%)	39 <b>(31%)</b>	94 (92%)	8 (97%)	5 (100%)
<b>Date of first interview</b>	9 (6%)	7 (11%)	18 <b>(23%)</b>	101 (91%)	13 (100%)
<b>Date of first offer</b>	4 (3%)	3 (5%)	8 <b>(12%)</b>	84 (77%)	29 (100%)

# Student reports: 2005

(gray areas = nonadherence)

	Number and (in parentheses) cumulative percentage of responding students				
	Before September 6	September 6–14	September 15–21	September 22–28	After September 28/Not Yet
<b>Date of first scheduling of interview</b>	12 (9%)	35 <b>(35%)</b>	80 (95%)	1 (96%)	5 (100%)
<b>Date of first interview</b>	8 (6%)	10 (13%)	24 <b>(31%)</b>	83 (93%)	9 (100%)
<b>Date of first offer</b>	3 (3%)	7 (9%)	5 <b>(13%)</b>	89 (89%)	13 (100%)

# Student reports: 2006

(gray areas = nonadherence)

	Number and (in parentheses) cumulative percentage of responding students				
	Before Sept. 5	Sept. 5-13	Sept. 14-20	Sept. 21-27	After Sept. 27/Not Yet
<b>Date of first scheduling of interview</b>	13 (11%)	31 <b>(38%)</b>	68 (97%)	3 (99%)	1 (100%)
<b>Date of first interview</b>	13 (11%)	6 (16%)	18 <b>(32%)</b>	77 (97%)	3 (100%)
<b>Date of first offer</b>	10 (9%)	3 (12%)	10 <b>(22%)</b>	69 (87%)	14 (100%)



# Exploding offers remain a problem: Some representative quotes

- “I received the offer via voicemail while I was in flight to my second interview. The judge actually left three messages.  
First, to make the offer.  
Second, to tell me that I should respond soon.  
Third, to rescind the offer.  
It was a 35 minute flight.”
- “I had 10 minutes to accept.”
- “I asked for an hour to consider the offer. The judge agreed; however thirty minutes later [the judge] called back and informed me that [the judge] wanted to rescind my offer.”

# Exploding and short-fuse offers: **judges'** reported deadlines

	<b>1998-1999 and 1999-2000 markets</b>	<b>2004-2005 and 2005-2006 markets</b>
<b>Within one day</b>	<b>23%</b>	<b>34%</b>
<b>Within two days</b>	<b>36%</b>	<b>42%</b>
<b>Within a week</b>	<b>67%</b>	<b>76%</b>
<b>Number of responding judges</b>	<b>193</b>	<b>163</b>

# Fast market clearing: student responses

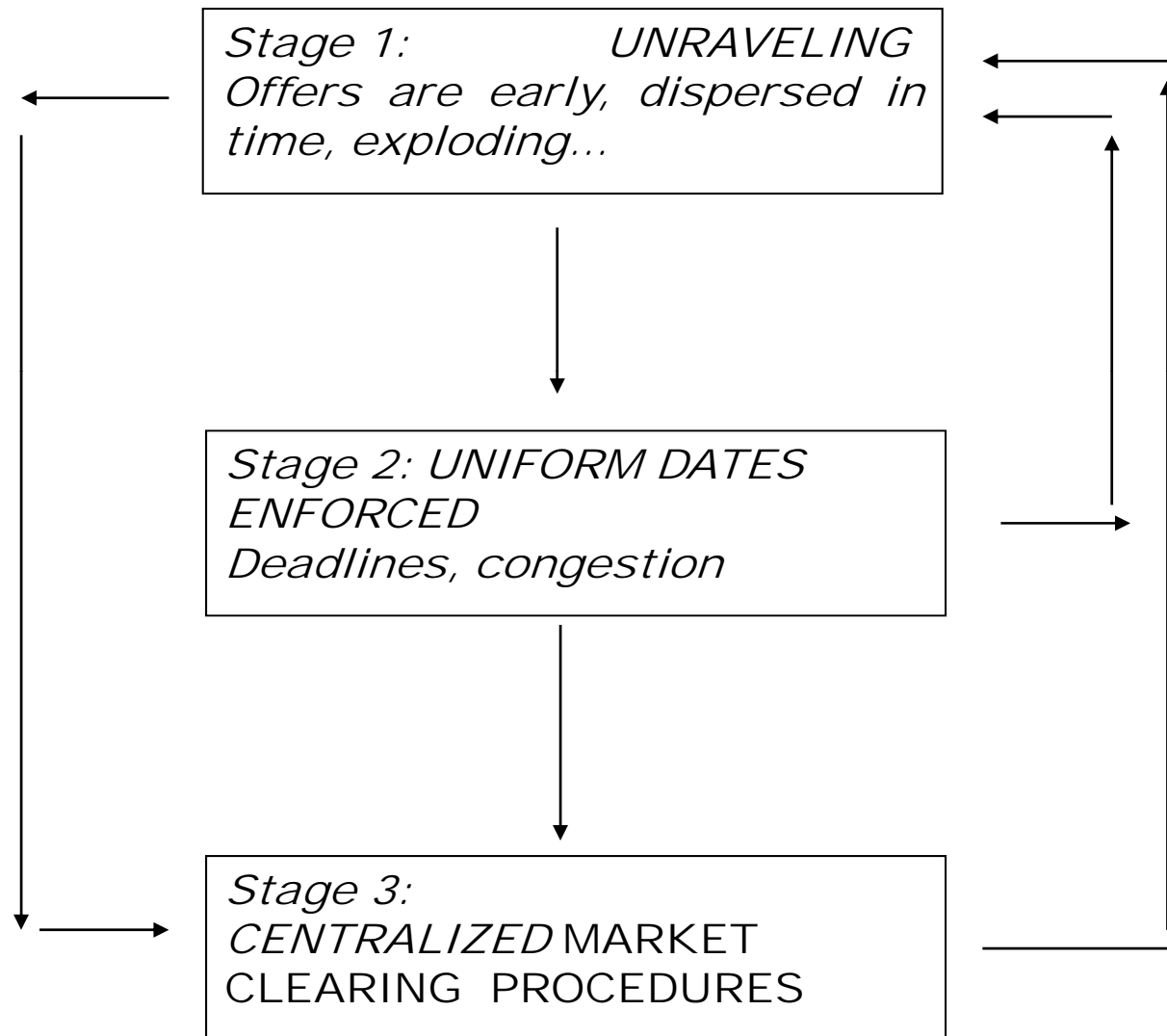
	<b>Fall of 2004</b>	<b>Fall of 2005</b>	<b>Fall of 2006</b>
<b>First offer received on start date for interviewing and making offers</b>	<b>38</b>	<b>51</b>	<b>45</b>
<b>First offer received after start date for interviewing and making offers</b>	<b>59</b>	<b>52</b>	<b>38</b>
<b>Of first offers received on start date for interviewing and making offers, percentage accepted on start date</b>	<b>42%</b>	<b>63%</b>	<b>62%</b>

So, for a nontrivial proportion of students, the market ends after the first interview (and some offers come even before the start date). Similarly for judges, the market is not thick.

# Recap

- The market has now successfully held the late date (fall of third year of law school) for several years in a row (2003- ).
  - This yields an advantage due to better information
  - This certainly helps the many non-complying judges who make the earliest offers, and apparently also helps many of the complying judges.
- But congested interviewing, exploding offers are still a problem
  - This means that for many participants, the market still isn't in fact thick.
- What are the prospects for the future?

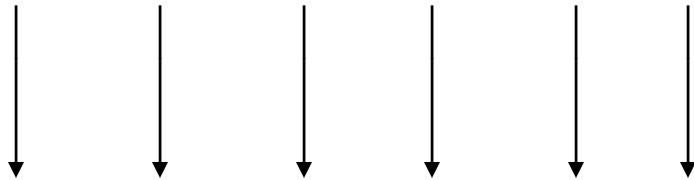
# Stages and transitions observed in various other markets with timing problems



# Uniform start dates in the law clerk market

Stage 1: UNRAVELING

1983, 1986, 1989, 1990, 1993, 2002



Stage 2: UNIFORM  
DATES ENFORCED

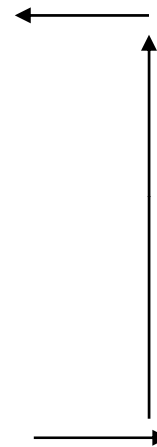
1983: Sept 15 of 3<sup>rd</sup> year, abandoned in '84

1986: April 1 of 2<sup>nd</sup> year

1989: March 1, not adopted

1990: May 1, 12:00 Noon

1993: March 1 (not formally abandoned until 1998)



# Thoughts on the future evolution of the clerk market

- It has cycled between stage 1 and stage 2 multiple times
- Comparison to other markets,
  - Stage 2 markets
    - Psych—25 years in stage 2.
    - Japanese universities
- The current arrangement has formally held together longer than the previous longest (1993-97) stage 2 arrangement. But there's lots of 'non-compliance'.
- Discussions are underway about market design...

# Which markets are unraveled?

## Supply and demand.

- Li and Rosen, Li and Suen, ...insurance
- Halaburda
- Niederle, Roth and Unver
  - In some markets unraveling is attributed to an imbalance of supply and demand
  - But to get unraveling you need two things:
    - Firms have to be willing to make early offers
    - Workers have to be willing to accept them
  - This is most likely to occur when both firms and workers can plausibly think of themselves as being on the long side of the market...a common state of mind in the markets we study...



# Simple supply and demand hypothesis

- ***Excess supply or demand (in the relevant part of the market) increases competition, which causes inefficiently early transactions.***
  - Menard (book review, 2003), on college admissions:  
"There are many reasons that college admission has become so complex, but the main one is demand..(In 1932 Yale admitted 72% of applicants, now 13%)".
  - Avery, Fairbanks, and Zeckhauser (book, 2003, p32) quote a 1990 U.S. News and World Report story.  
"Many colleges, experiencing a drop in freshman applications as the population of 18-year-olds declines, are heavily promoting early-acceptance plans in recruiting visits to high schools and in campus tours in hopes of corralling top students sooner."
  - Roth (JPE 1984) about the market for new physicians around 1900,  
"The number of positions offered for interns was, from the beginning, greater than the number of graduating medical students applying for such positions, and there was considerable competition among hospitals for interns. One form in which this competition manifested itself was that hospitals attempted to set the date at which they would finalize binding agreements with interns a little earlier than their principal competitors."

# *Comparable* supply and demand hypothesis

- Early transactions require both that firms should want to make early offers, and workers should want to accept them.
- So too much imbalance in supply and demand should *not* be associated with unraveling.

In many markets, both sides feel they are on the long side...

College admissions	Fewer positions at “elite” colleges than students eager to enroll.	Many positions available at unselective colleges
Federal court clerkships	Many more law grads than judges	Fewer Law Review editors than Federal appellate judges
American medical residents	Many more first year positions than graduates of American med schools	Many more interested foreign medical graduates than American positions
Medical subspecialties	More board-certified applicants than positions	Fewer “top” and research oriented applicants than positions
Postseason College Football Bowls (before BCS)	More teams than bowls	Fewer “top” teams than “top” bowls

# Law Clerks (Wald, 1990)

- "But why the fervent competition for a handful of young men and women when our law schools spawn hundreds of fine young lawyers every year? Very simply, many judges are not looking just for qualified clerks; they yearn for neophytes who can write like Learned Hand, hold their own in a discussion with great scholars, possess a preternatural maturity in judgment and instinct, are ferrets in research, will consistently outperform their peers in other chambers and who all the while will maintain a respectful, stoic, and cheerful demeanor.... Thus, in any year, out of the 400 clerk applications a judge may receive, a few dozen will become the focus of the competition; these few will be aggressively courted by judges from coast to coast. Early identification of these "precious few" is sought and received from old-time friends in the law schools -- usually before the interview season even begins."