

A Gender Agenda  
or  
From the Lab to the Field to Policy

Muriel Niederle

*Stanford University, SIEPR and NBER*

# Competitiveness

- Competitiveness: new behavioral trait
  - Design, Robustness
- Economic Relevance of Competitiveness
  - Can competitiveness predict education choices?
  - Can gender differences in competitiveness help account for gender differences in education choices?
- Behavioral Market Design
  - Some institutional designs may reward competitiveness more than others
  - Unintended consequences for the gender gap in education choices
  - Reexamine effect of Quota-like Affirmative Actions
    - Gender gap in competitiveness may be reduced in single sex tournaments, affecting the costs and benefits of implementing quotas
  - Empirical Evidence of Trickle-Down Affirmative Action
    - France implemented Affirmative Action at the top club level in 1990,

# Policy Implications

Extreme measure:

“Changing the Women” (Lean in)

Can we manipulate/affect competitiveness and would it change educational choices?

- What else does competitiveness affect?
- Caution: Sometimes lean in can backfire, see Exley, Niederle and Vesterlund, 2016.

# Behavioral Market Design

## Policy Implication

- Educational institutions may differ in how they reward competitiveness
  - Even when we want to select on ability
- This may have (unintended) consequences on how many women study math

### Different School Systems

- Netherland School system
  - Once-and-for-all choice: very inflexible
  - Large gender gap in math education
- US School system:
  - Flexible
  - No gender gap in Math Education

# Choosing the Hard Task

Niederle and Yestrumskas (2008)

How do women and men decide whether to choose a hard or an easy task?

- What institutional designs affect those choices?

Experiment:

- Subjects perform in an easy version of a task
- Subjects choose difficulty level for the next two tasks
  - only one counts for payment: randomly determined

Treatment 1: Once-and-for-all choices (Dutch system)

Treatment 2: Sequential choices (US system)

# Choosing Challenging and Hard Tasks

Need: Easy and Hard Task

- Want this to be common knowledge

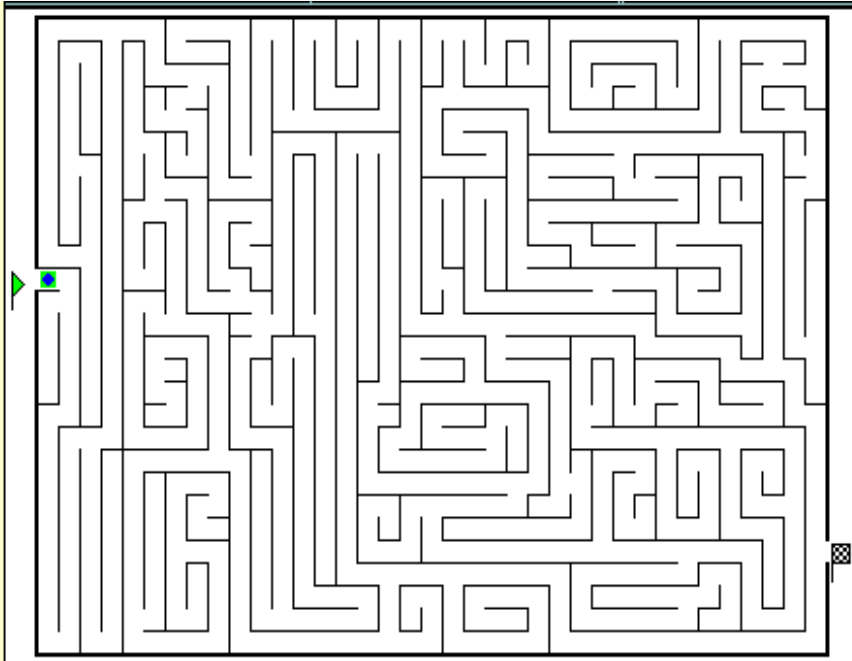
For each participant: Measure performance level

- **High:** on average **higher earnings** from **hard** task
- **Low:** on average **higher earnings** from **easy** task

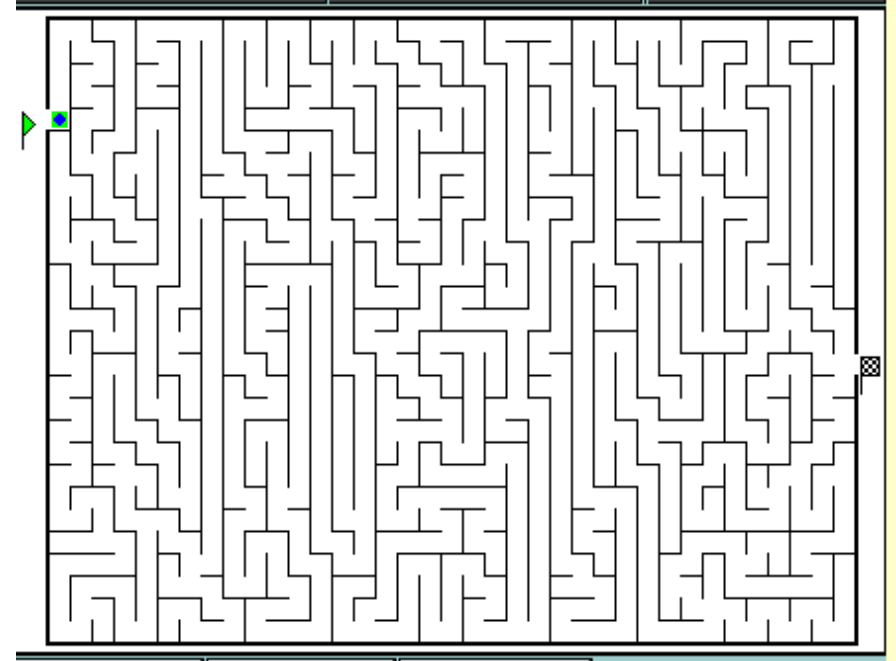
Challenge:

1. Create such an environment
2. Measure performance level of participants without them learning their performance level.

# The Easy and the Hard task



Easy: \$0.5 per maze



Hard: per maze  
1-4: \$0.25; 5+ : \$3.50

# Benchmark (Calibration) Treatment

Task 1: 10 min. easy mazes a \$0.25 each

Task 2: 10 min. easy mazes a \$0.5 each

Task 3: 10 min. hard mazes a: 1-4: \$0.25 each, 5<sup>th</sup>  
+: \$3.50 each.

Earnings: Task 1;

Task 2 *or* Task 3;

Beliefs.

31 women and 30 men.



# Performance in Benchmark

For 60/61 participants:

**11 + mazes in Task1:** More money from Task 3: Hard mazes

**10 – mazes in Task 1:** More money from Task 2: Easy mazes

True, for both women and men.

**High performance level:** solve 11+ in easy task 1  
(roughly top 40% of participants).

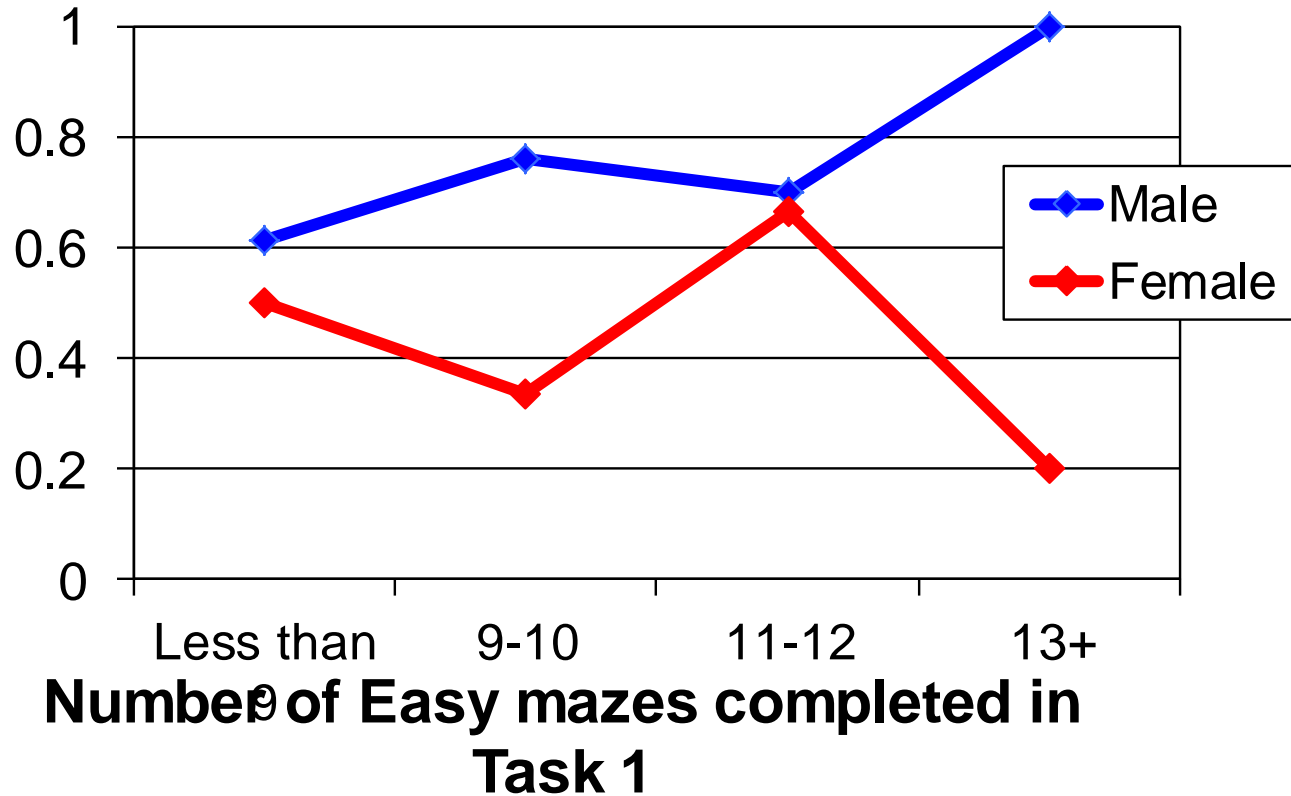
**Low performance level:** solve 10- in easy task 1

# Choosing the Hard Task: Dutch System

## Once-and-For-All Choice

- Participants first perform in the easy task, so we know their performance level.
- They are informed of the calibration:
  - Top 40% performers on average have higher earnings from hard task,
  - others from the easy task.
- Participants choose the difficulty level for the next 2 tasks (one of which is paid).

# Proportion of “Hard” Choices



Hard task: More profitable for 11+ performers, else easy task is more profitable.

Ability cannot account for the gender difference in choice.

# Choosing the Hard Task: US System

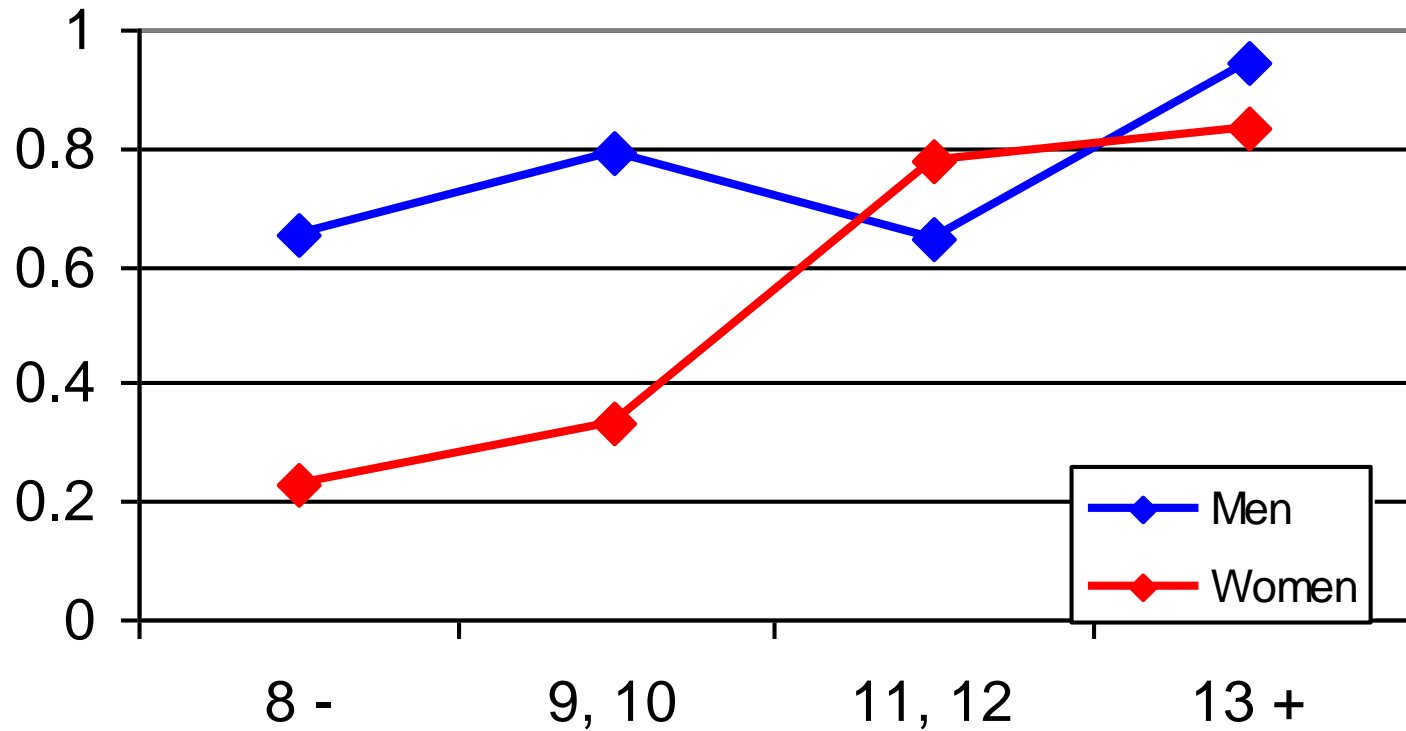
## Flexible Choice

- Participants first perform in the easy task, so we know their performance level.
- They are informed of the calibration:
  - Top 40% performers on average have higher earnings from hard task,
  - others from the easy task.

### Participants

- choose the difficulty level for second task and perform
- choose the difficulty level for third task and perform
  - One of task 2 and task 3 is paid: randomly chosen.

# Choosing the hard task: Flexible Choice



- High performing women and men choose Hard task.
- Low performing men also choose Hard task.

# Policy Implication: Institutional Changes

Niederle and Yestrumskas (2008)

Among high performing participants:

- Large gender differences in choosing the hard task when choices are once-and-for-all rigid choices (like education choices in the Netherlands)
- Almost no gender differences among high performers when choices are gradual (like education choices in the US)

# Open Research Question

What is the relation between:

- Women who shy away from Competition
- Women who shy away from Hard Tasks

# Policy Implication

Should we change the education system in Europe to be less rigid?

Fuchs-Schuendeln, Niederle, Yang (in progress):  
Are more rigid school systems correlated with

- (i) fewer women going to university,
- (ii) fewer women studying math and science

First “dirty” cross-country regression suggests yes!



# Policy Implication

Should we change the education system in Europe to be less rigid?

Fuchs-Schuendeln, Niederle, Yang (in progress):  
Are more rigid school systems correlated with

- (i) fewer women going to university,
- (ii) fewer women studying math and science

First “dirty” cross-country regression suggests yes!

- This would be a LARGE policy change...

# Affirmative Action

Niederle Vesterlund (2007): Tournament entry:

- suboptimal,
- no issue of discrimination in selection of winners

Questions:

- Does affirmative action affect the decision to enter a tournament?
- Does this result in Affirmative Action to be less costly than predicted?

# AA-quota tournament

Niederle, Segal and Vesterlund, 2013

**Standard tournament:** 2 best of 3 men and 3 women win.

**AA Tournament:** Best woman wins, best person of the remaining five (2 women and 3 men) wins.

- A woman wins if she is *either* among the best women or among the top performers
- A man wins if he is *both* among the best men and among the top performers

# AA-quota tournament

Why might AA tournament attract more women?

- Change the probability of winning
- Gender specific competition (yes)
  - Beliefs within gender differ from those across gender.
  - Gender specific competition can alter the *pleasure or fear* of competition.
- Mention of AA (some)

# Effect of AA tournament

What are the effects of Affirmative on Tournament Entry?

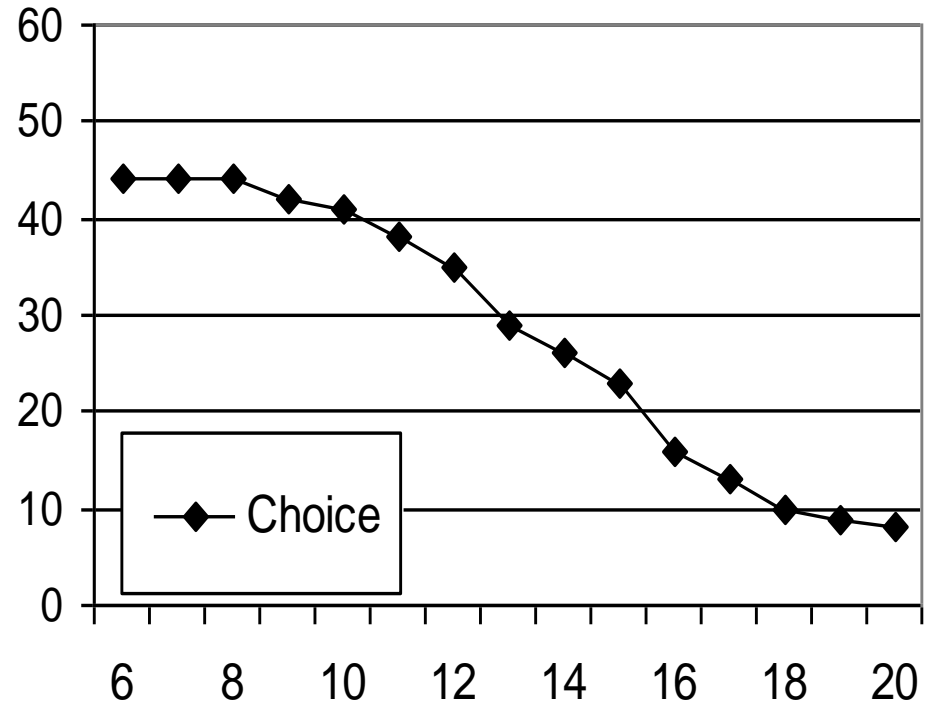
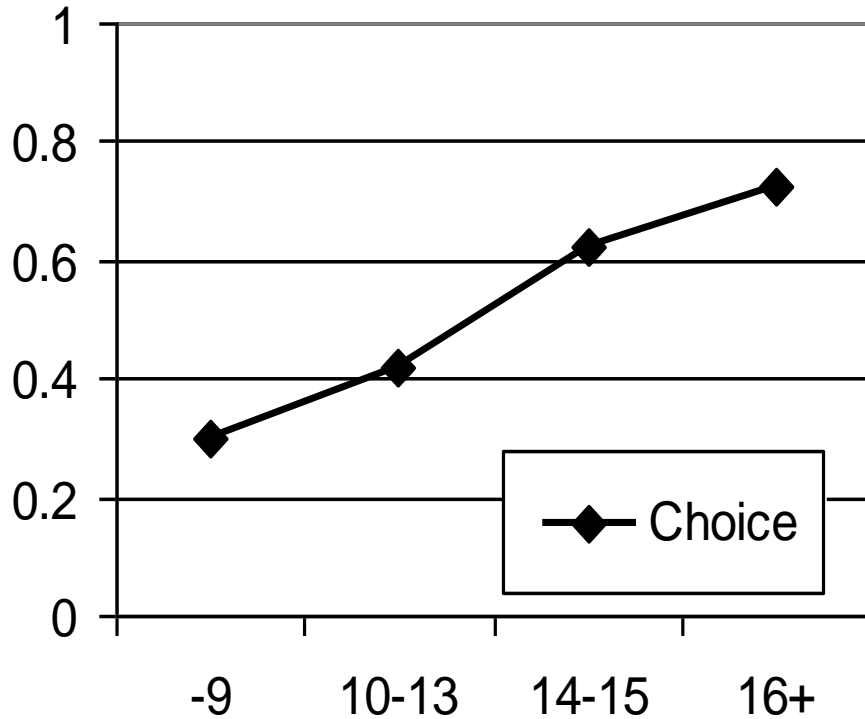
Consider the pool of tournament entrants under the standard tournament and the AA tournament.

To describe changes: Think of this pool as the set of applicants to a competitive job.

Compare costs of a quota when

- Quota is secretly implemented (using standard tournament entrants)
- Quota is announced (using AA tournament entrants)

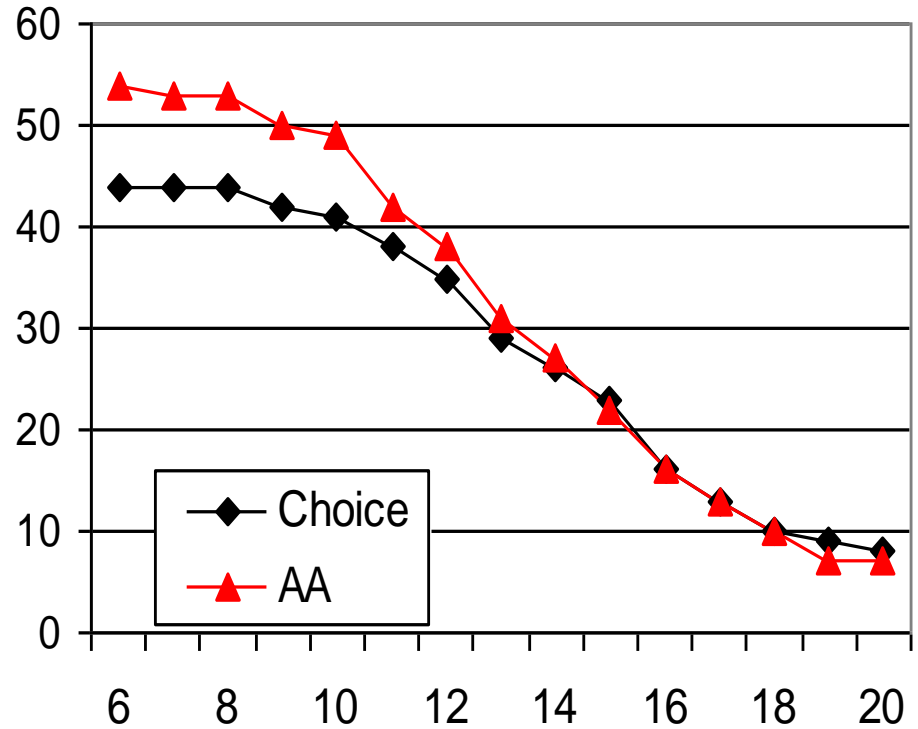
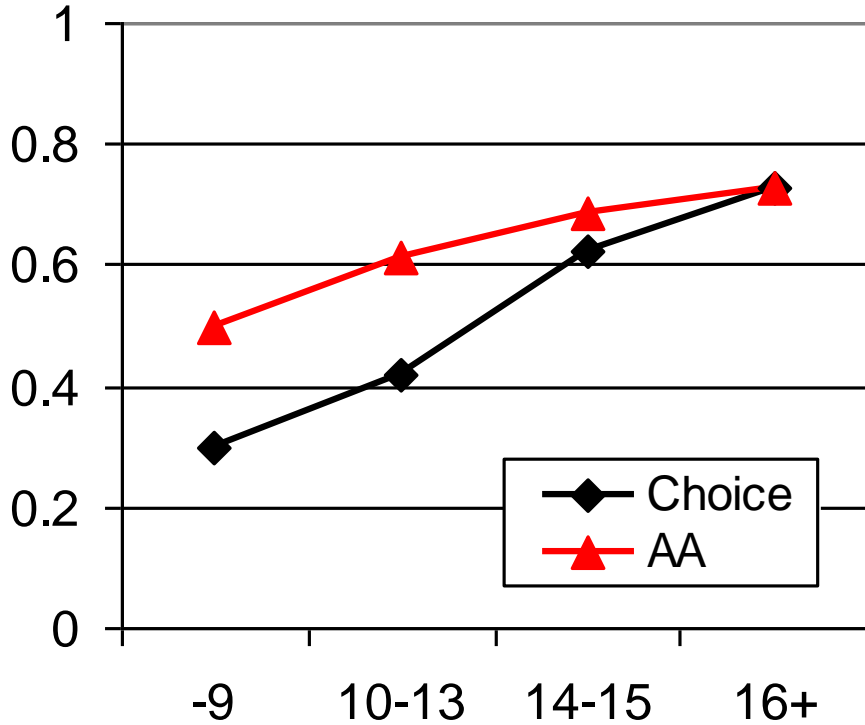
# Performance of tournament entrants



For each performance group:  
proportion of participants  
who enter the tournament

For each performance level:  
number of entrants with at  
least that performance

# Performance of tournament entrants



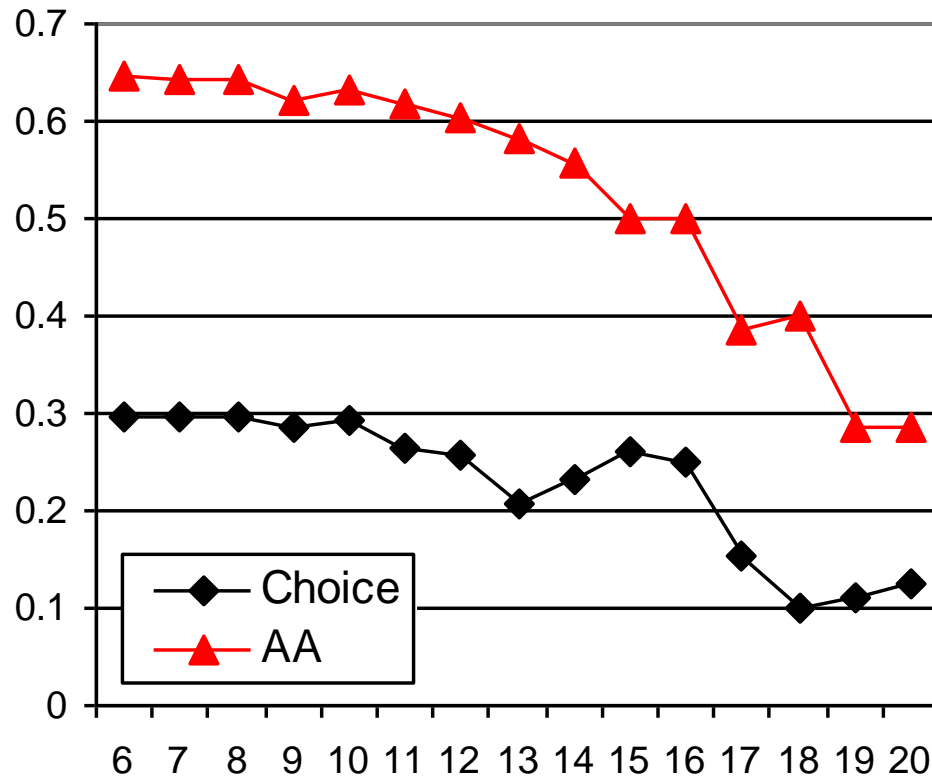
For each performance group:  
proportion of participants  
who enter the tournament

For each performance level:  
number of entrants with at  
least that performance

No large overall differences in number of entrants that should  
have entered the original tournament

# Gender composition of the pool

For each performance level: Proportion of women among tournament entrants with at least that performance



Much larger proportion of women among high performing entrants in the AA tournament.



# Effect of Affirmative Action

- Affirmative action, when not announced:
  - Very costly.
- Announcing Affirmative Action changes the gender composition of tournament entrants:
  - Lower than expected cost of affirmative action due to supply effect.

# Quota Affirmative Action Conclusion

Affirmative Action can have positive effects on the decision of women to enter competitive environments.

Positive effects of Affirmative Action in an environment in which there is no discrimination.

New view of Affirmative Action due to new insights into preferences for competitive environments of women and men.

# From the Lab to the Field

Niederle, Segal Vesterlund: 2013

- Laboratory
  - also a real world, just a different one: real money involved, real people...
- No investment into skills
  - This could magnify or reduce positive effects of announced affirmative action
- No discrimination

Question: Can positive benefits mirroring those in the lab be found in the field?

# Affirmative Action in the Field

NSV(2013) Quota Affirmative Action changed the applicant pool.

In a field setting does affirmative action lead to

- Better selection into the applicant pool?
- Higher investment (benefits) of a whole group and not just those selected?

Very hard to document and measure ability and investment: lots of null results...

Bertrand, Black, Jensen and Lleras-Muney: Breaking the Glass Ceiling? The Effect of Board Quotas on Female Labor Market Outcomes in Norway

# Affirmative Action in the Field

Can we find an area where there is

- Clear and announced affirmative action policy
- Where we have a good measure of “ability” or “performance” even of people who did not directly benefit from affirmative action (yet).

# Chess

## De Sousa and Niederle (in progress)

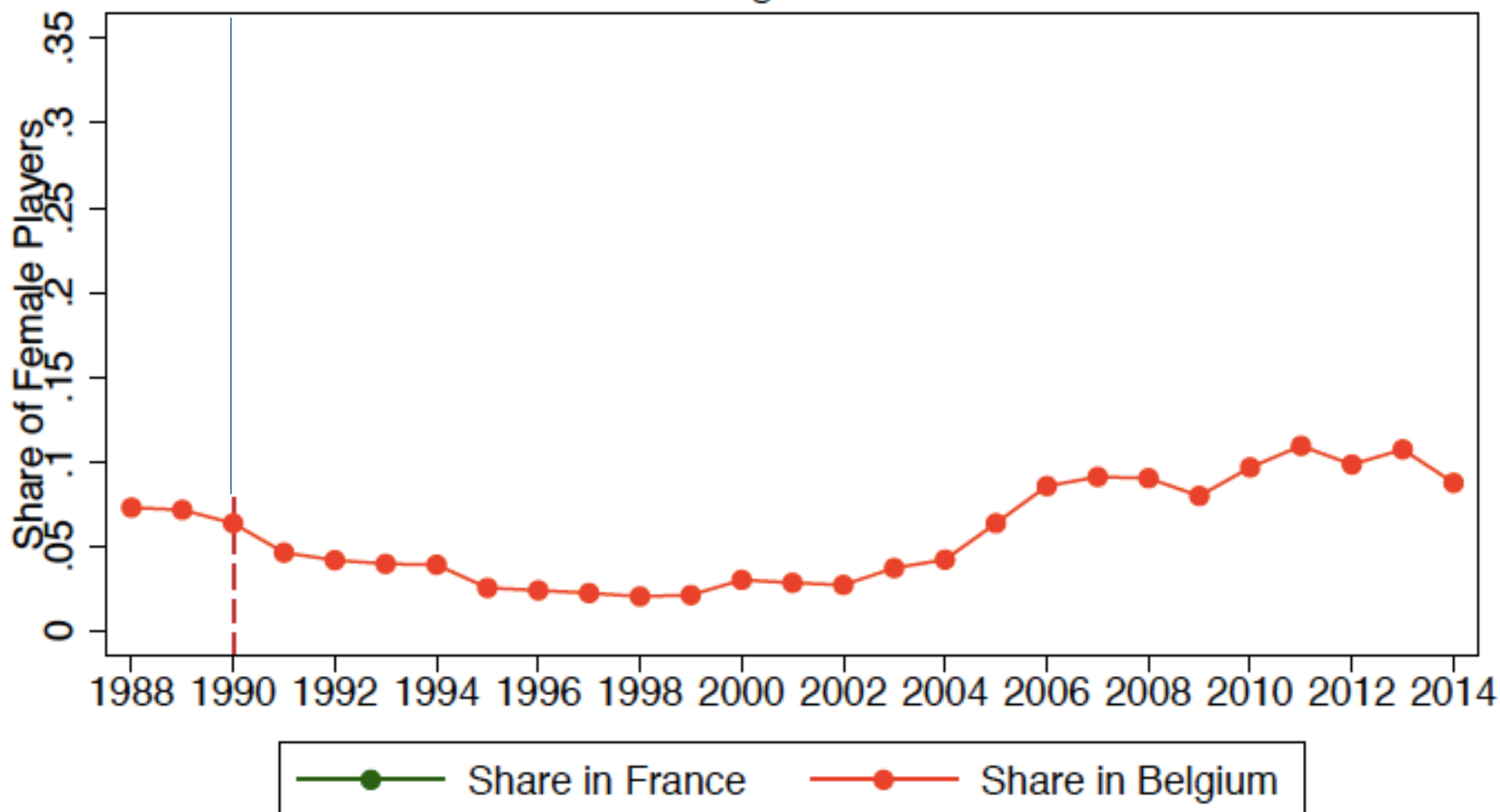
- ELO rating: Great measure of ability.
- Huge female “problem”
  - Of 1530 Grandmasters: 2% are female
  - Oct-May: Elo rating of best female chess player < Elo rating of 100<sup>th</sup> best male chess player (though in June: best female: no 85 of world)
  - Judit Polgar: Only woman to qualify for a World Championship tournament. First, and to date, only woman with Elo rating above 2700, her peak was 2735 (would put her in June 2017 as No. 23) and peak world ranking was No. 8.
- Attitudes towards female chess players:
  - Kasparov about Judit Polgar "She has fantastic chess talent, but she is, after all, a woman. It all comes down to the imperfections of the feminine psyche. No woman can sustain a prolonged battle."
  - "My sister Susan -- she was 16 or 17 -- said that she never won against a healthy man. After the game, there was always an excuse: 'I had a headache. I had a stomach ache.' There is always something" Judit Polgar, 2001.
- Would the introduction of Affirmative Action lead to more good and overall better female chess players?

# Chess in France

- Chess players in France (and elsewhere) play for clubs.
- Club competitions: Play against each other once a year
  - 8 players of a club compete against 8 of another.
  - Basically: Best plays against best etc...
- Top level: 12 best clubs.
- In 1990: Introduce Affirmative Action: Top level: Every club had to bring 9 players and at least one had to be a French female player.
- For a long time, the female player would be 9<sup>th</sup> (lowest ranked in her club team)
- What is the evolution of French female chess players over time, and how does this compare to Belgium?

# Share of Top Female National Players

France and Belgium -- 1988 - 2014

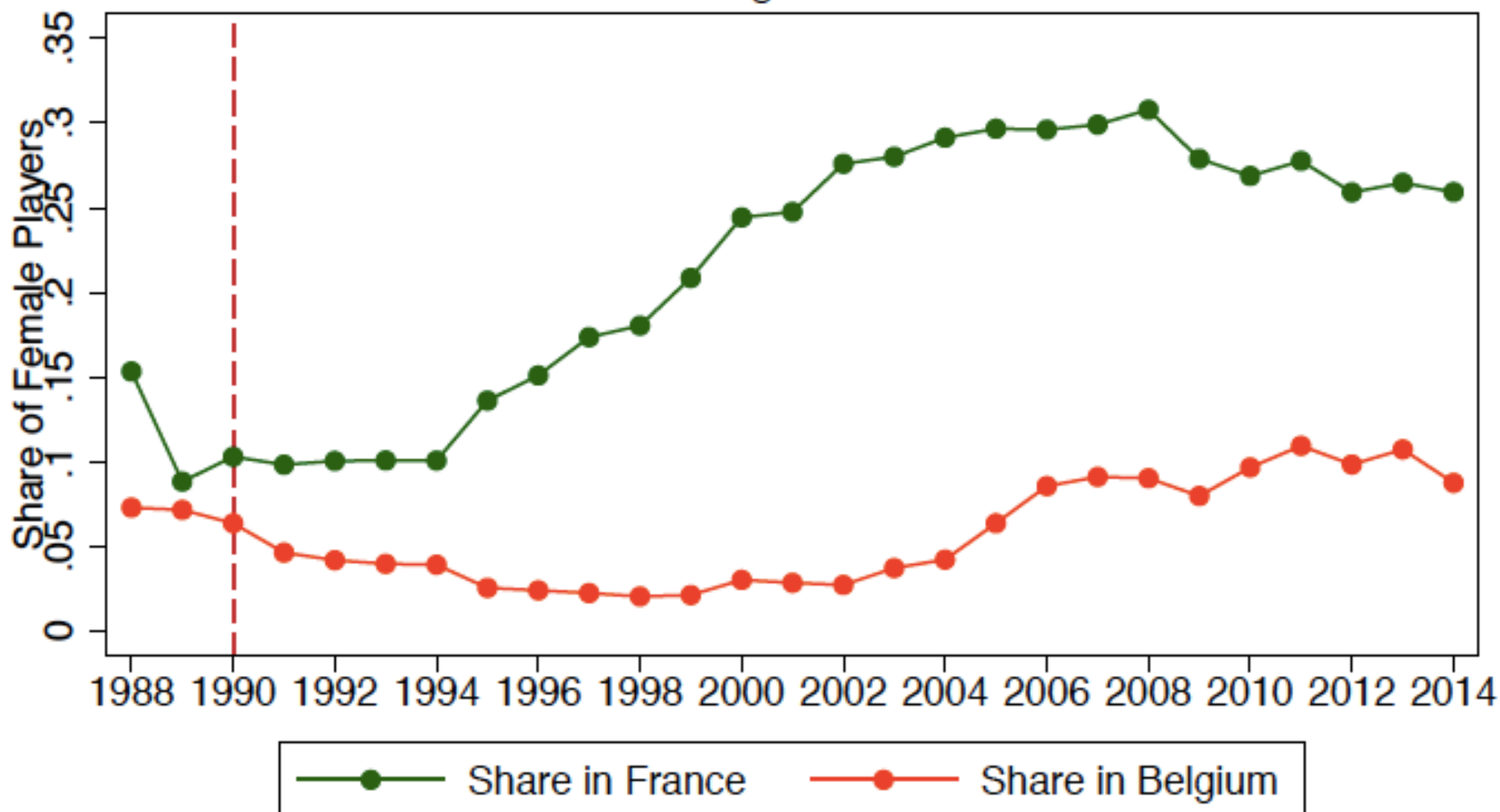


Notes: Vertical dashed line indicates the first year of the affirmative action in favor of French female players.  
Only active, top rated and national players in each country.  
Top rated players are defined as  $Elo \geq 1805$  for females and  $Elo \geq 2205$  for males.



# Share of Top Female National Players

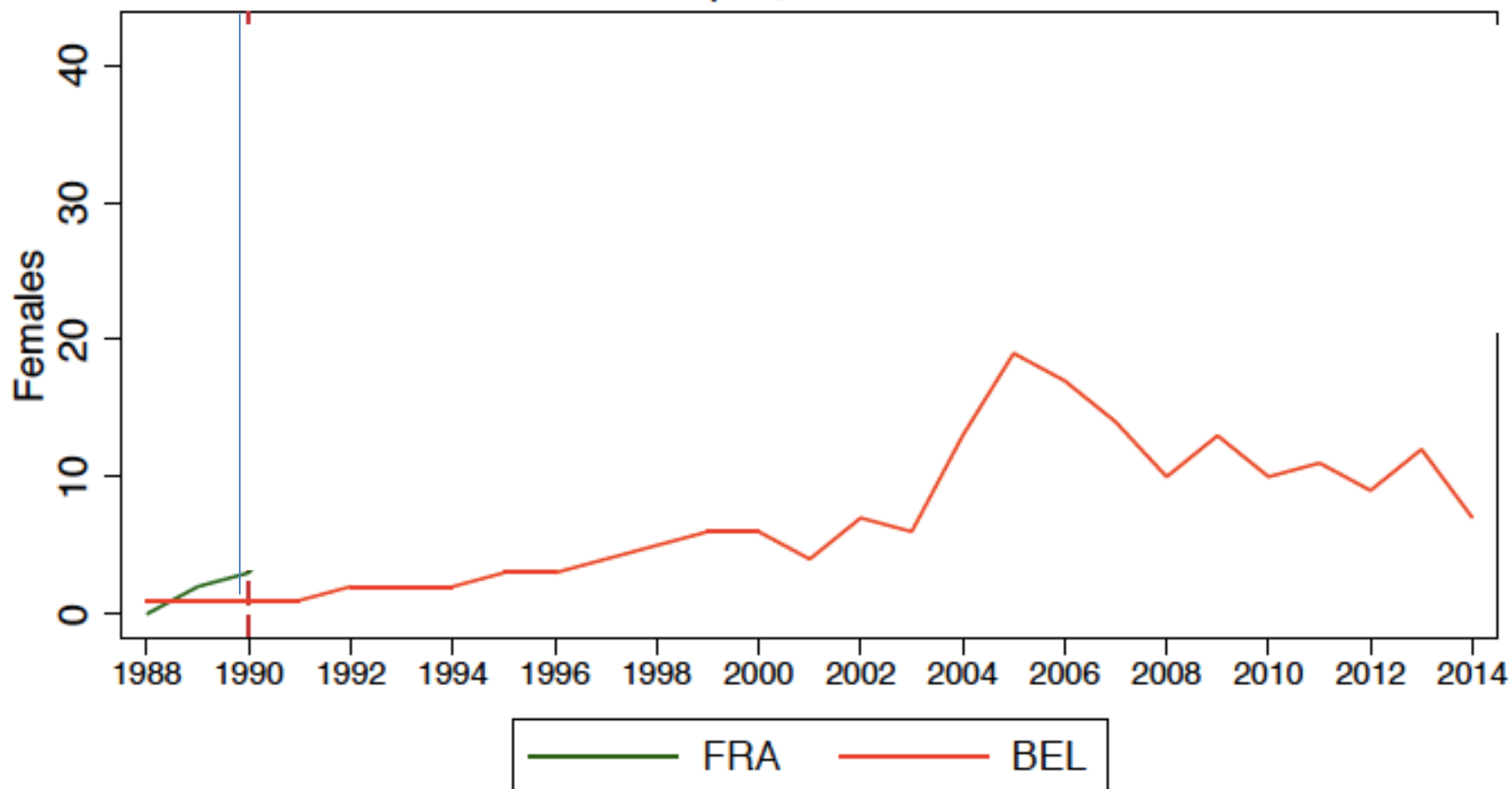
France and Belgium -- 1988 - 2014



Notes: Vertical dashed line indicates the first year of the affirmative action in favor of French female players.  
Only active, top rated and national players in each country.  
Top rated players are defined as  $Elo \geq 1805$  for females and  $Elo \geq 2205$  for males.

# Number of female active players

Group A, 1988-2014

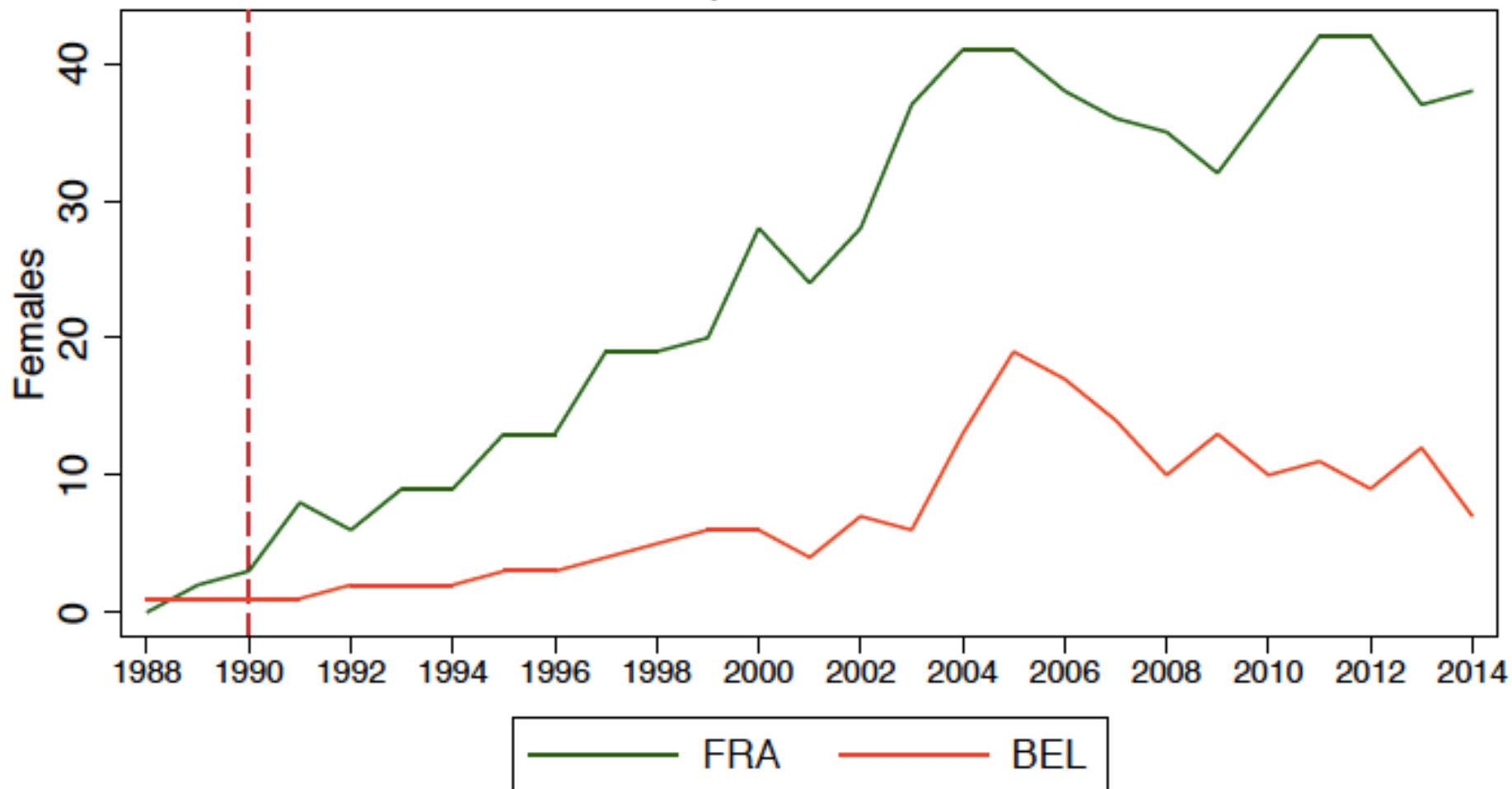


Notes: Vertical dashed line indicates the first season (1990-91) of the affirmative action in favor of French female players.

Group A: Elo 2205.

# Number of female active players

Group A, 1988-2014



Notes: Vertical dashed line indicates the first season (1990-91) of the affirmative action in favor of French female players.

Group A: Elo 2205.

# Affirmative Action in Chess

- Chess: very special, but has the clear advantage of having a great performance measure
- Implementation of a quota affirmative action in 1990
- Large increase of French female chess players at high levels but especially also at the very top!

# Where to go next?

- Relating competitiveness to other traits
  - Ambition, Grit, Choosing Hard Task
  - Verbal question that measures competitiveness?
- Relating competitiveness to choosing hard and challenging tasks
- Gender Differences in Negotiation
  - Exley, Niederle, Vesterlund (2016)
- Other institutional designs that favor (inadvertently) competitiveness
- Understanding the role of beliefs and confidence, and what drives gender differences
  - Mobius, Niederle, Niehaus and Rosenblat, 2010.

# Competitiveness

## From the Lab to the Field and to Policy

- Competitiveness: new behavioral trait
  - Design, Robustness
- Economic Relevance of Competitiveness
  - Competitiveness predicts education choices
  - Gender differences in Competitiveness help account for gender differences in education choices
- Behavioral Market Design
  - Some institutional designs may reward competitiveness more than others
  - This could lead to unintended consequences for the gender gap in education choices
  - Reexamine effect of Quota-like Affirmative Actions
    - Gender gap in competitiveness is reduced in single sex tournaments, affecting the costs and benefits of implementing quotas
  - Empirical Evidence of Trickle-Down Affirmative Action
    - France implemented Affirmative Action at the top club level in 1990: Large boost for French female chess players

# Other recent work on gender differences

- Learned “helplessness:” What is the role of repeated competitions, do gender differences in tournament entry shrink or widen?
- Contributing ideas and speaking up: Are the gender differences in contributing ideas and speaking up?
- Gender differences in confidence: How do gender differences in confidence arise, change over time?
- Gender differences in non-promotable tasks

# Learned helplessness

Buser & Yuan: “Do women give up competing more easily?”

Real effort task: adding up five two digit numbers

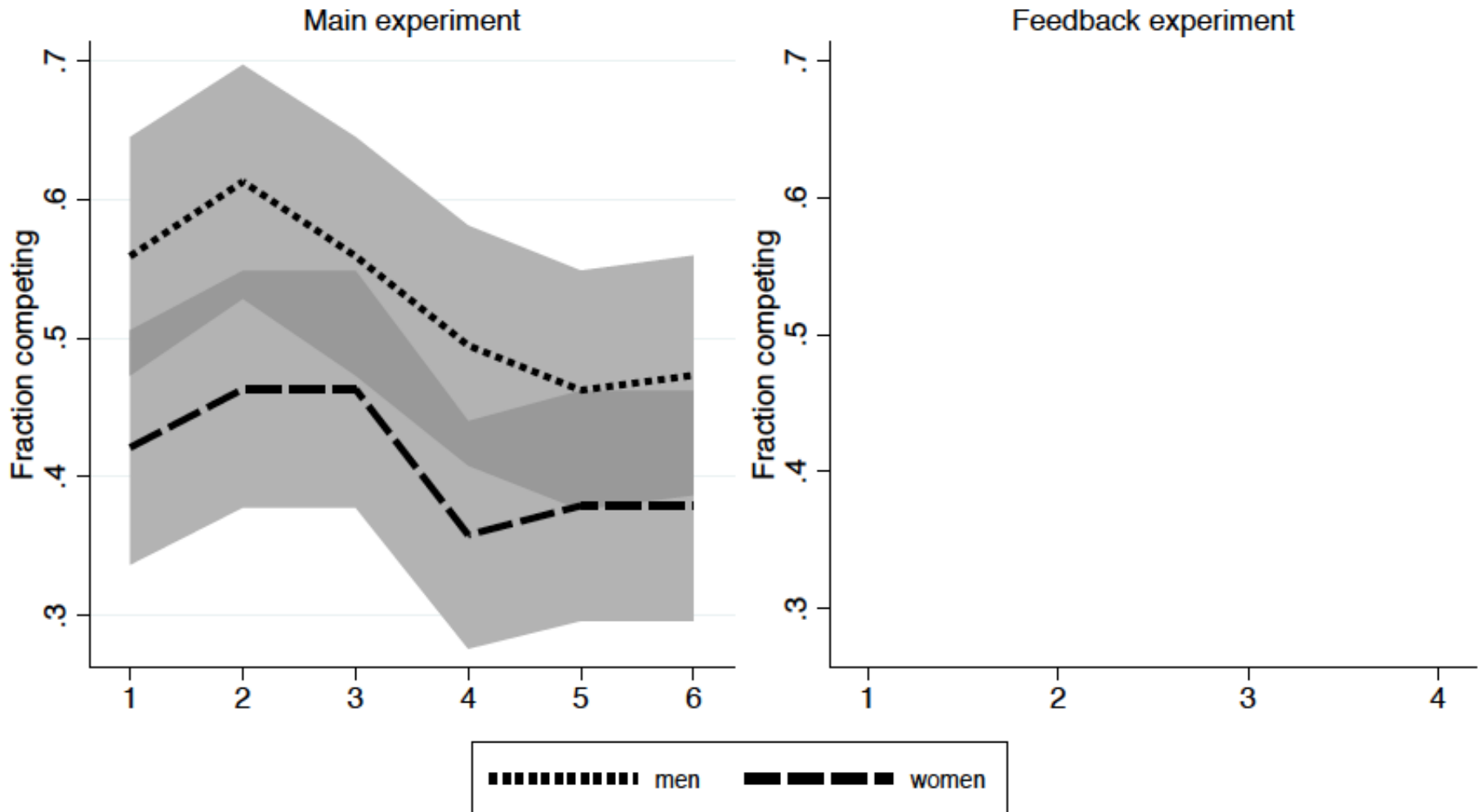
New random opponent each round

1. Measure confidence: rank compared to other participants present in the lab.
2. Choose between piece rate and tournament
  - Piece rate: 1 pt per correct answer
  - Tournament: 2 pts per correct answer if higher than opponent.
3. Perform in task
4. Feedback

3 treatments: **Main, Feedback** (learn whether win even if choose piece rate) **Risk** (winning and losing is random).

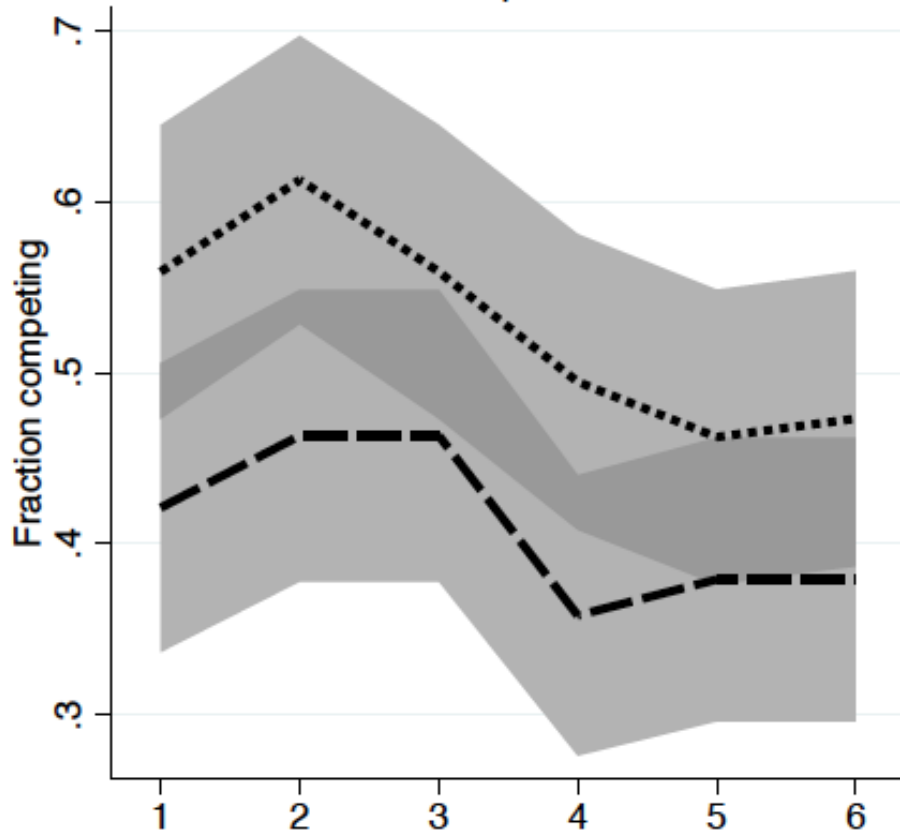


# Willingness to compete per round

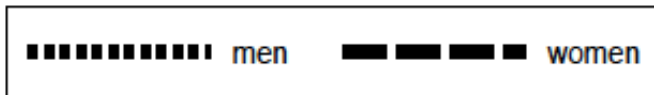
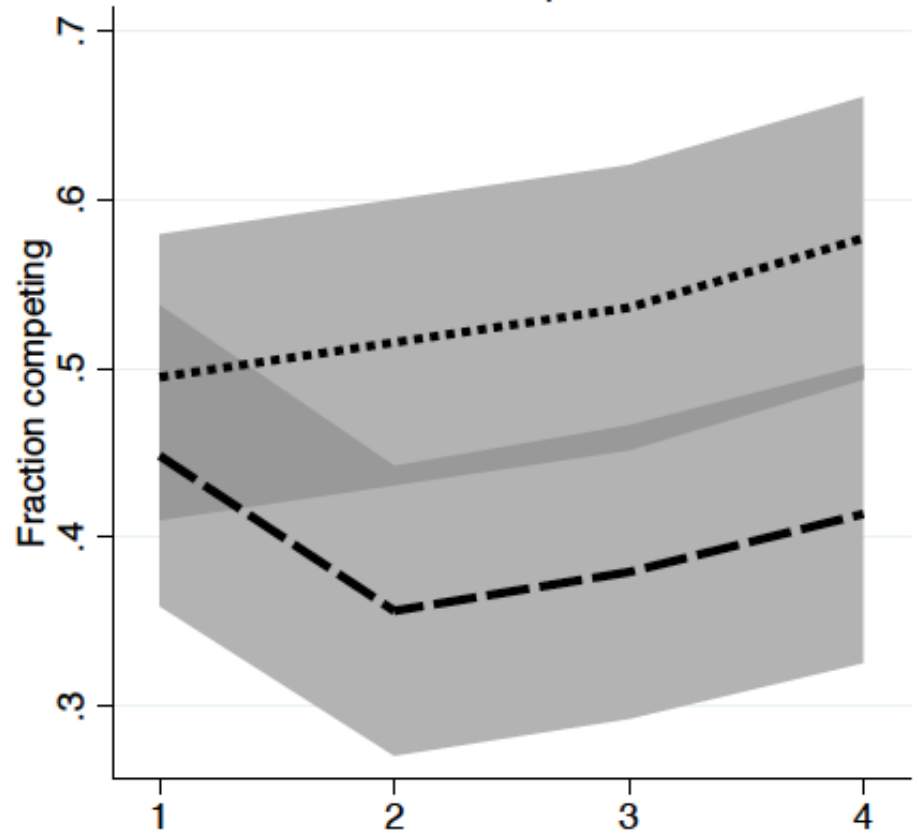


# Willingness to compete per round

Main experiment

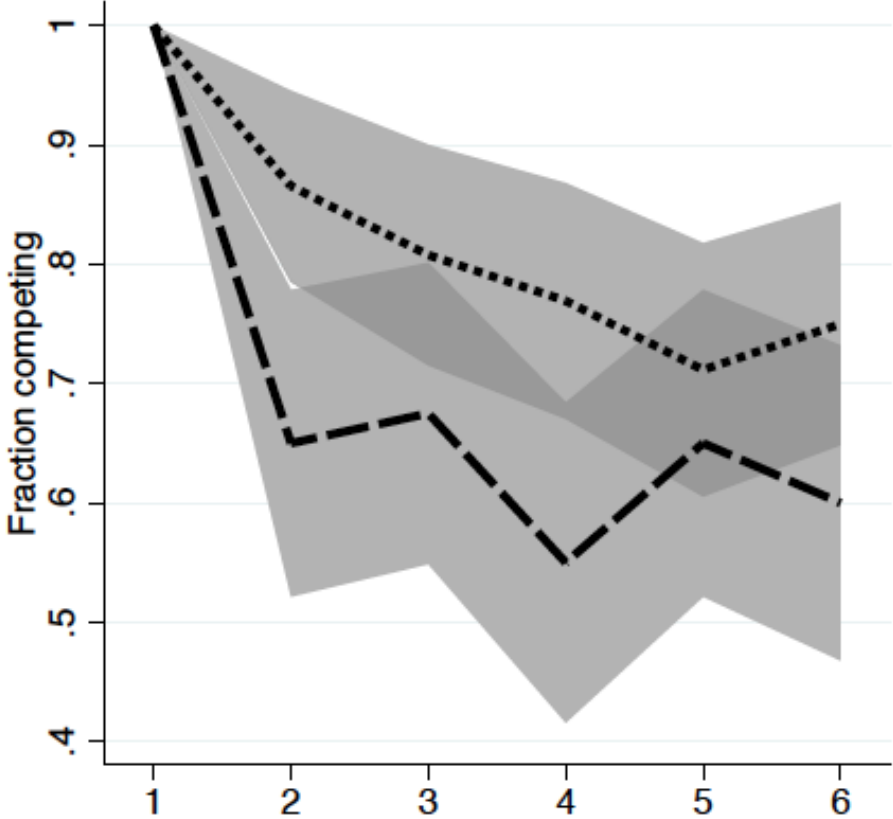


Feedback experiment

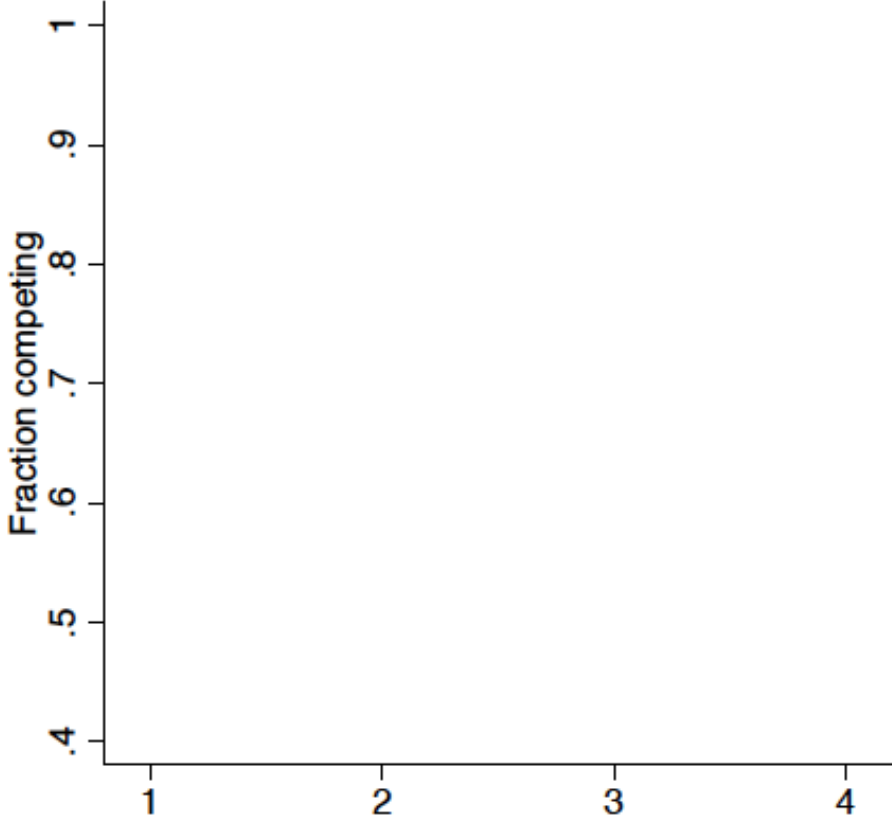


# Subjects who compete in round 1

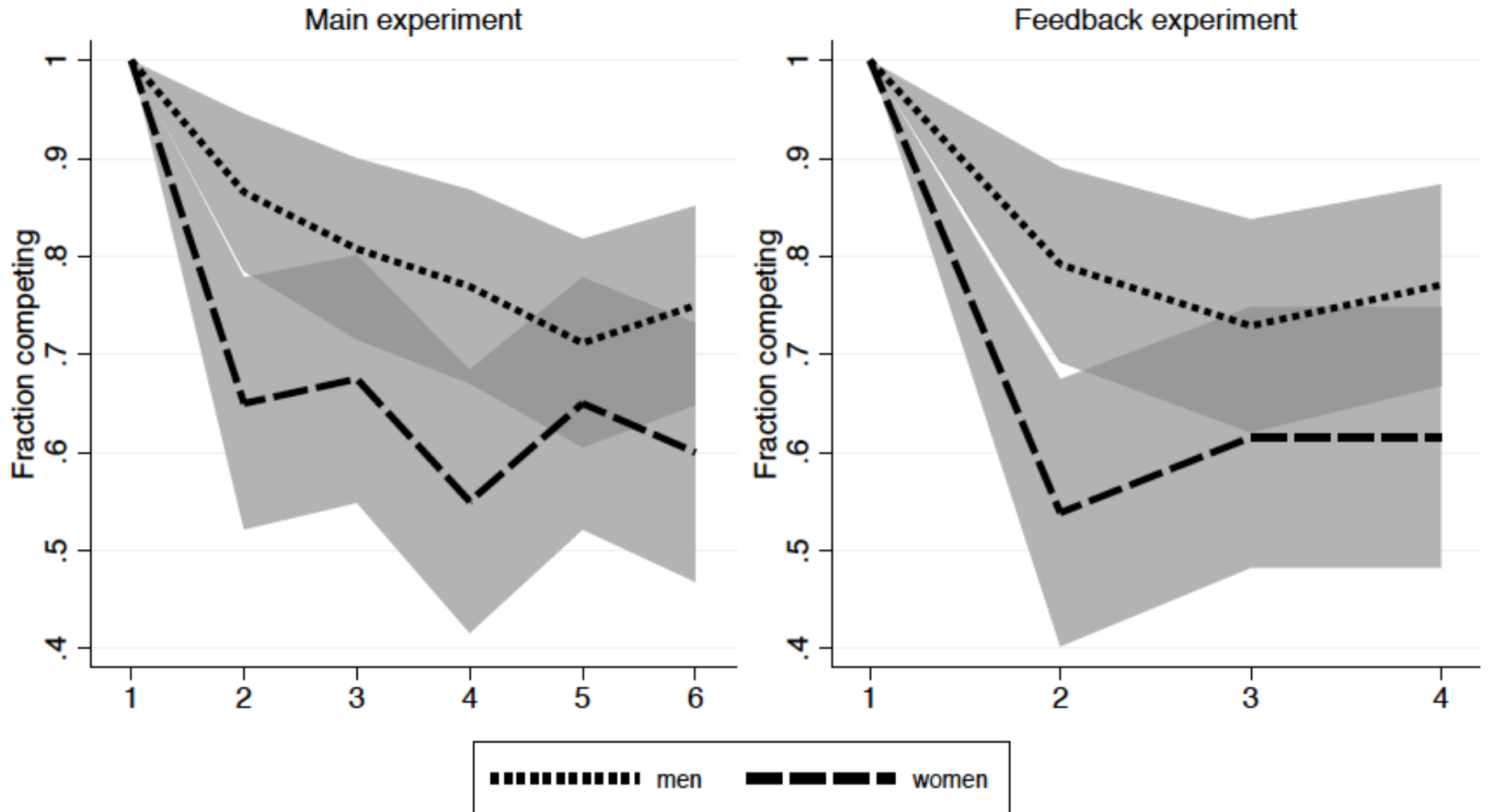
Main experiment



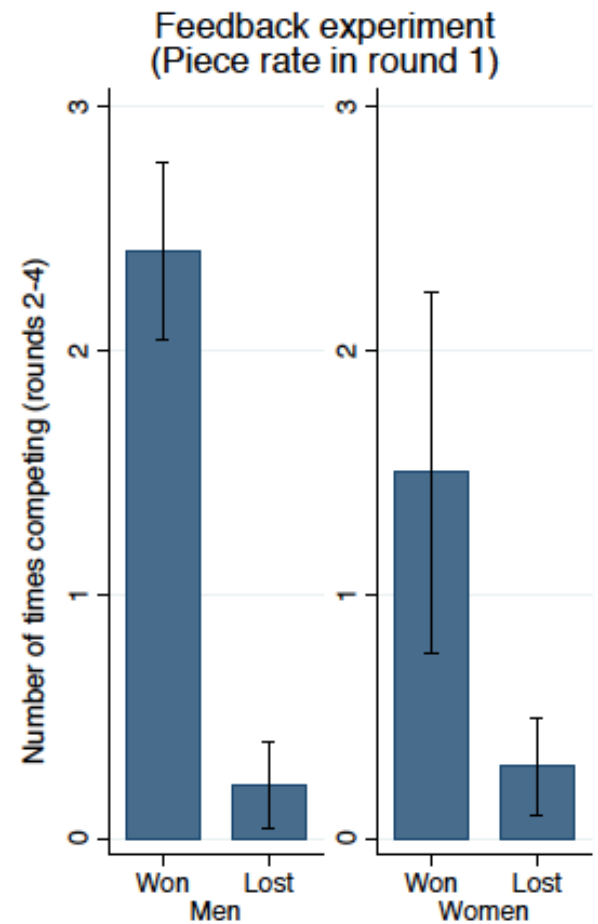
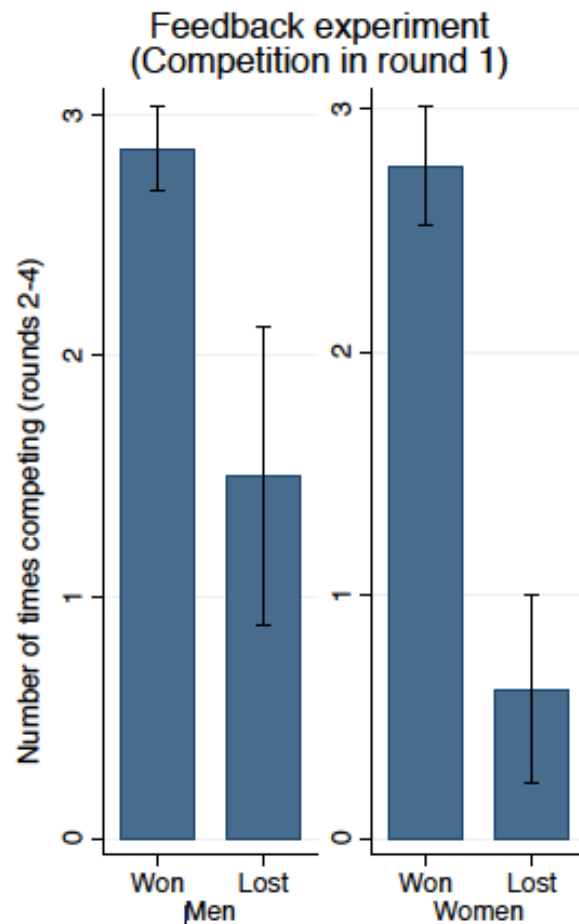
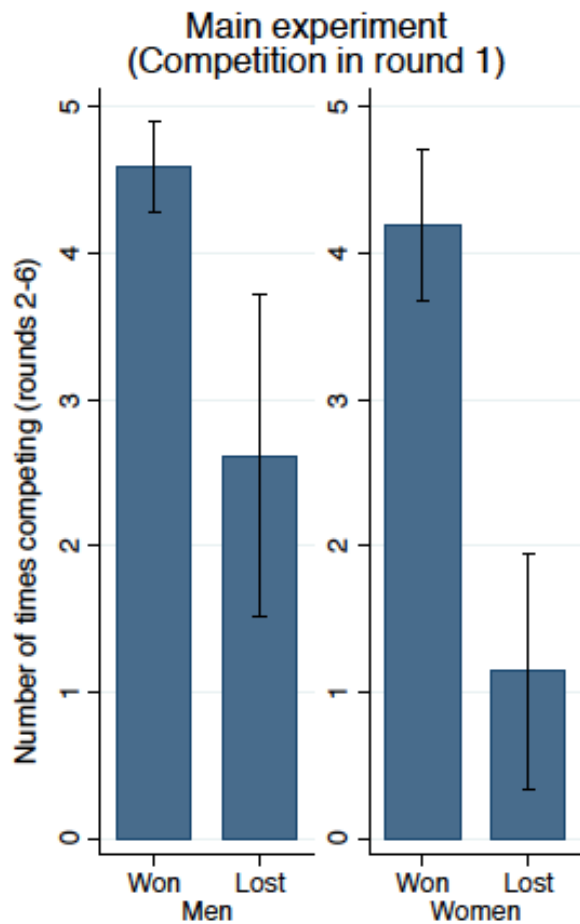
Feedback experiment



# Subjects who compete in round 1



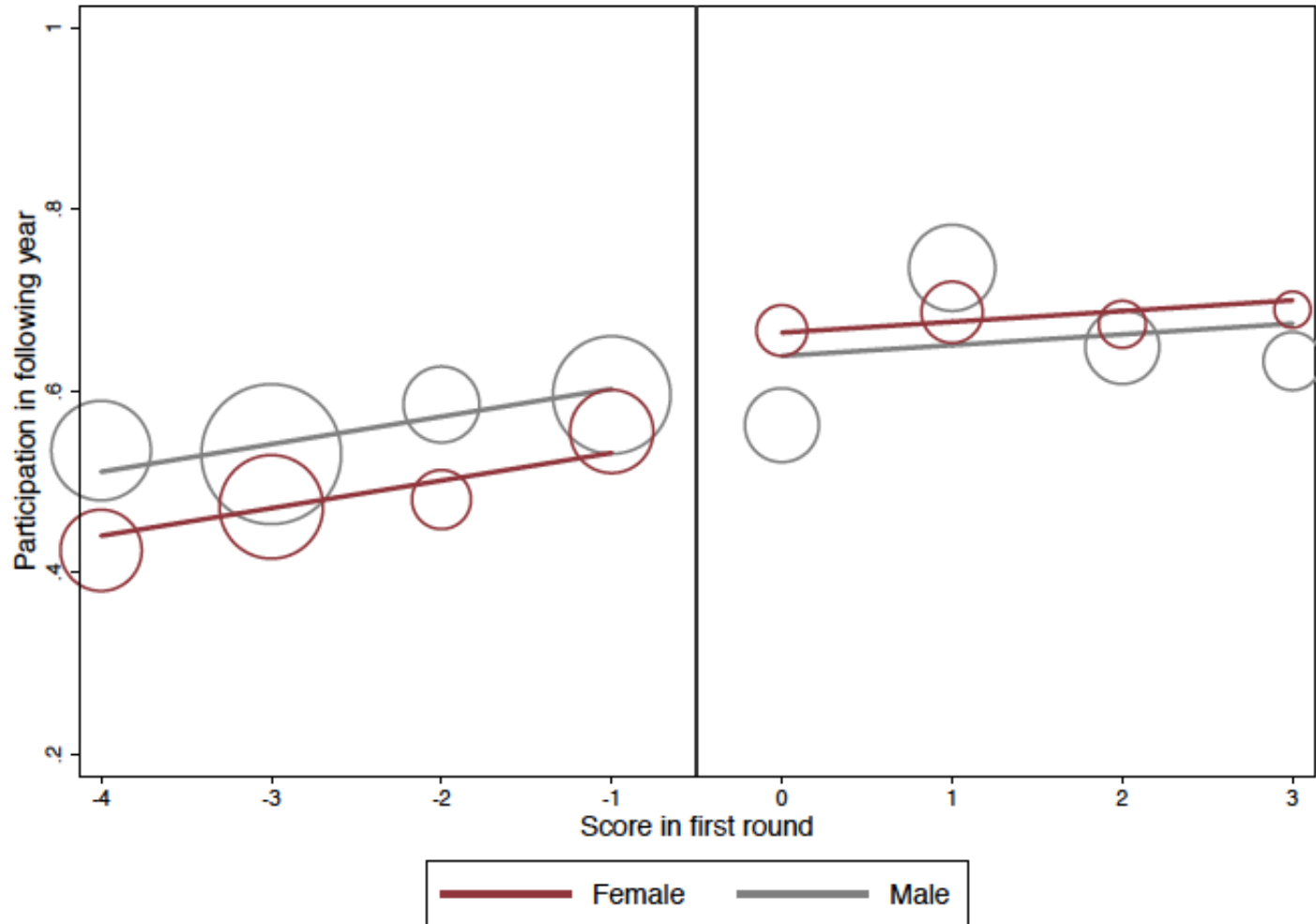
# Gender Difference in reaction to winning and losing



# Math Olympiad

- Yearly math competition to select team for International Mathematics Olympiad
- Students can compete in each year of secondary school
- Most participants from fourth and fifth year of academic track (future university students)
- Top 1000 advance to second round
- Many students who compete in year four compete again in year five
  
- Is there a gender difference in the impact of not making the cut in year four on participating again in year five?

# Gender difference in effect of not making top 1000



# Risk Experiment

- Choice between piece-rate and random payment
- Random payment: 2 points with  $P=(0.3, 0.4, 0.5, 0.6 \text{ or } 0.7)$ , 0 points otherwise
- Does gender difference in reaction to losing occur in an environment with same risks but no competitive dimension?



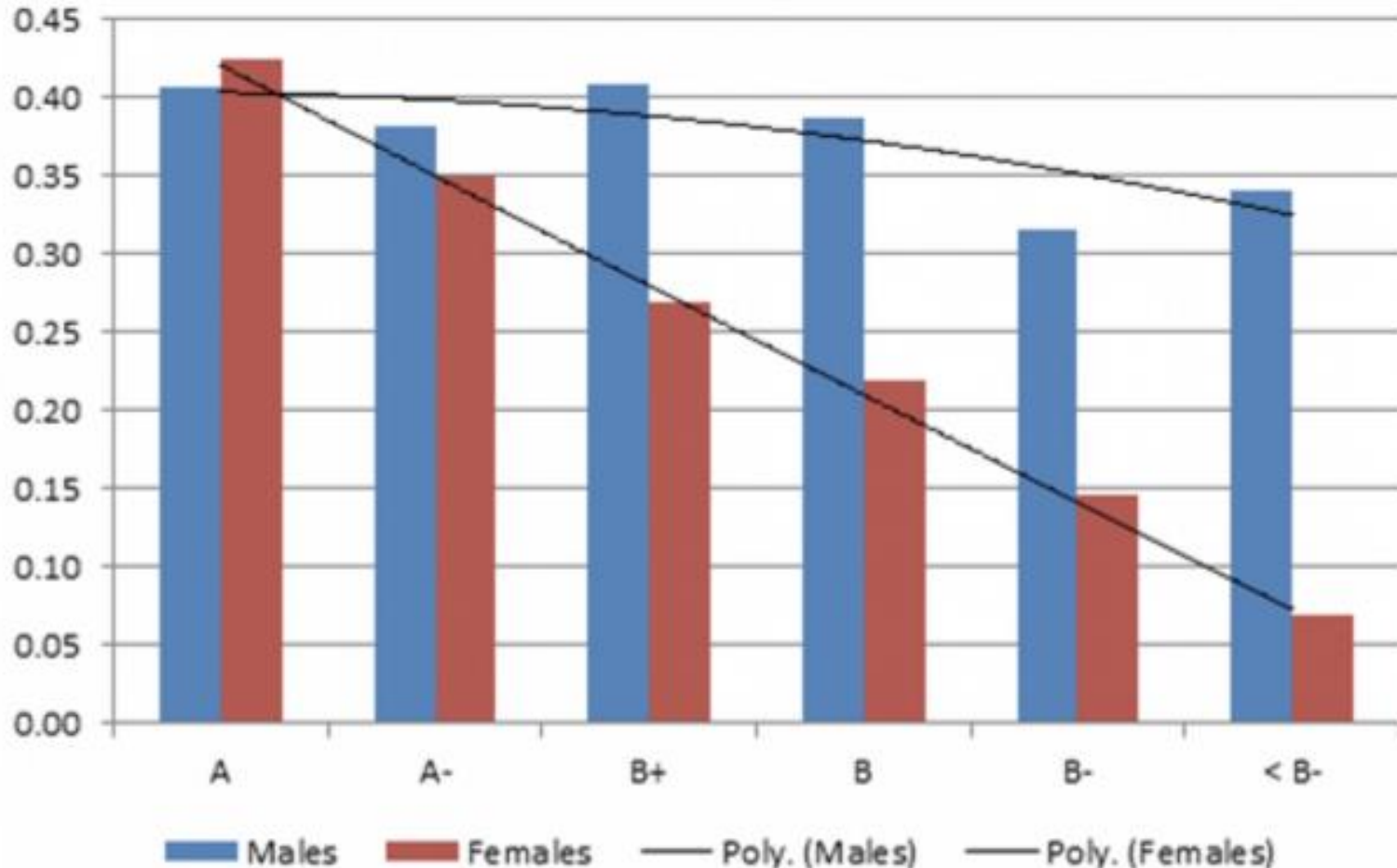
# Gender difference in the effect of losing and winning

	All observations:	Chance of winning $\geq 0.5$ :
Female	-0.194* (0.112)	-0.220* (0.123)
Round 1 loser	-0.098 (0.085)	-0.122 (0.090)
Female x loser	0.011 (0.167)	0.024 (0.163)
Round 1 score	✓	✓
Probability FE	✓	✓
Observations	310	275
Individuals	62	55

# Conclusions

- Results show it is not obvious that labor market experience attenuates gender differences in willingness to compete
- Women getting more discouraged by setbacks could be partial explanation for “leaking pipeline”
- Bad luck / negative feedback early in career could be especially costly for high-performing women

# Effect of early grades



This chart shows the percentage of male and female students who received a given grade in introductory economics course who then later majored in economics. Data refer to an anonymous research institution, from a study by Harvard Professor Claudia Goldin. (Claudia Goldin/Harvard University)

# Other recent work on gender differences

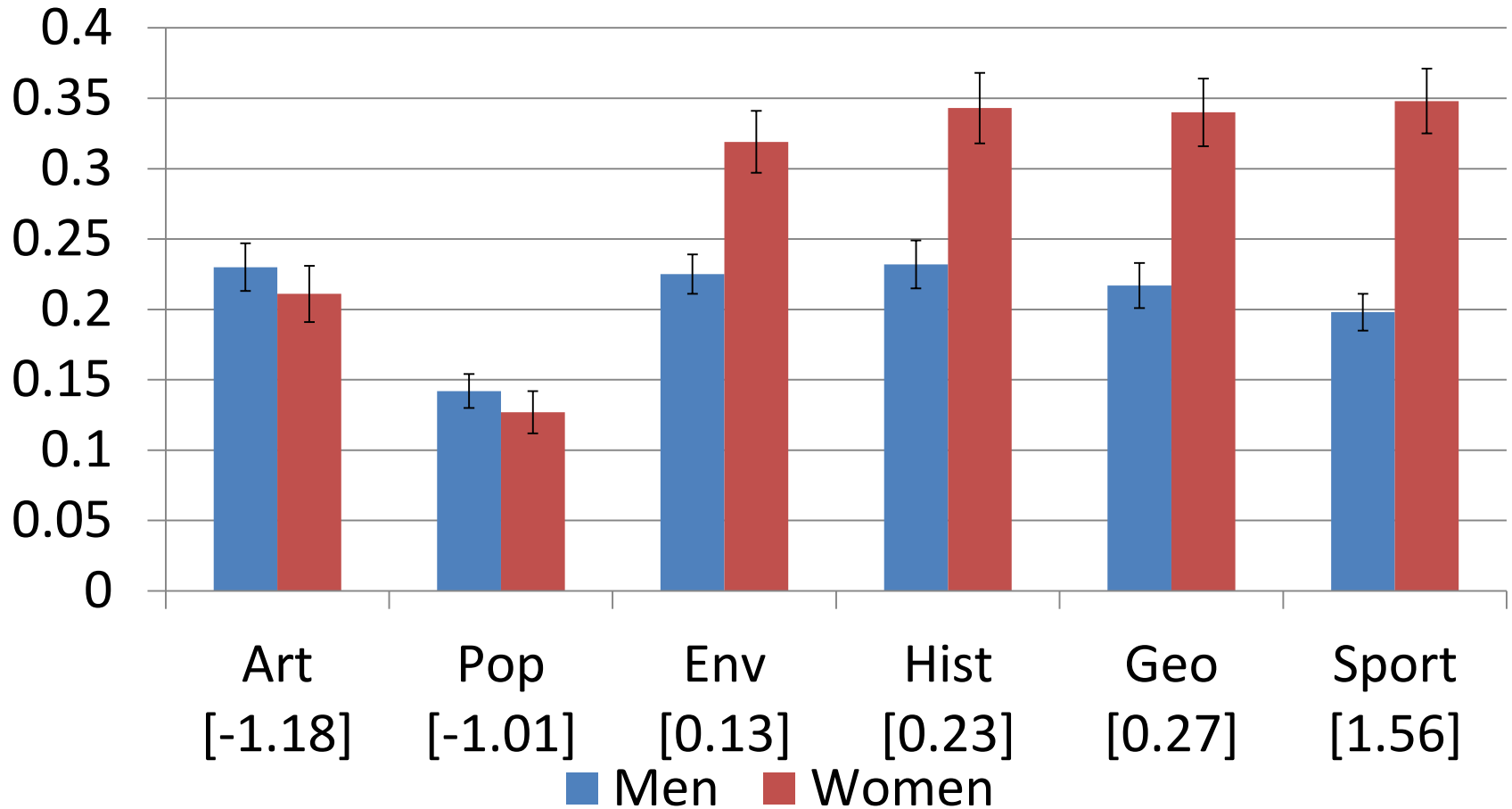
Coffman, 2014, "Evidence on Self-Stereotyping and the Contribution of Ideas"

Women not only fail to show up for competitions or challenging tasks, but they also seem to fail to contribute their ideas.

# Experimental Design

- Participants grouped in teams of two (partner of gender unknown)
- See a series of multiple-choice questions in different categories:
  - Arts and Literature
  - Entertainment and Pop Culture
  - Environmental Science
  - History
  - Geography
  - Sports and Games
- Must decide how willing they are to answer the question for the team – more willing partner submits their answer for the team
  - No possibility of discrimination

# Given right answer: How often do subjects fail to contribute the answer?



In brackets we see how “male” the category is.

# Contribution based on knowledge

At the end of the experiment: rank each category according to whether, in general, men or women know more about it:

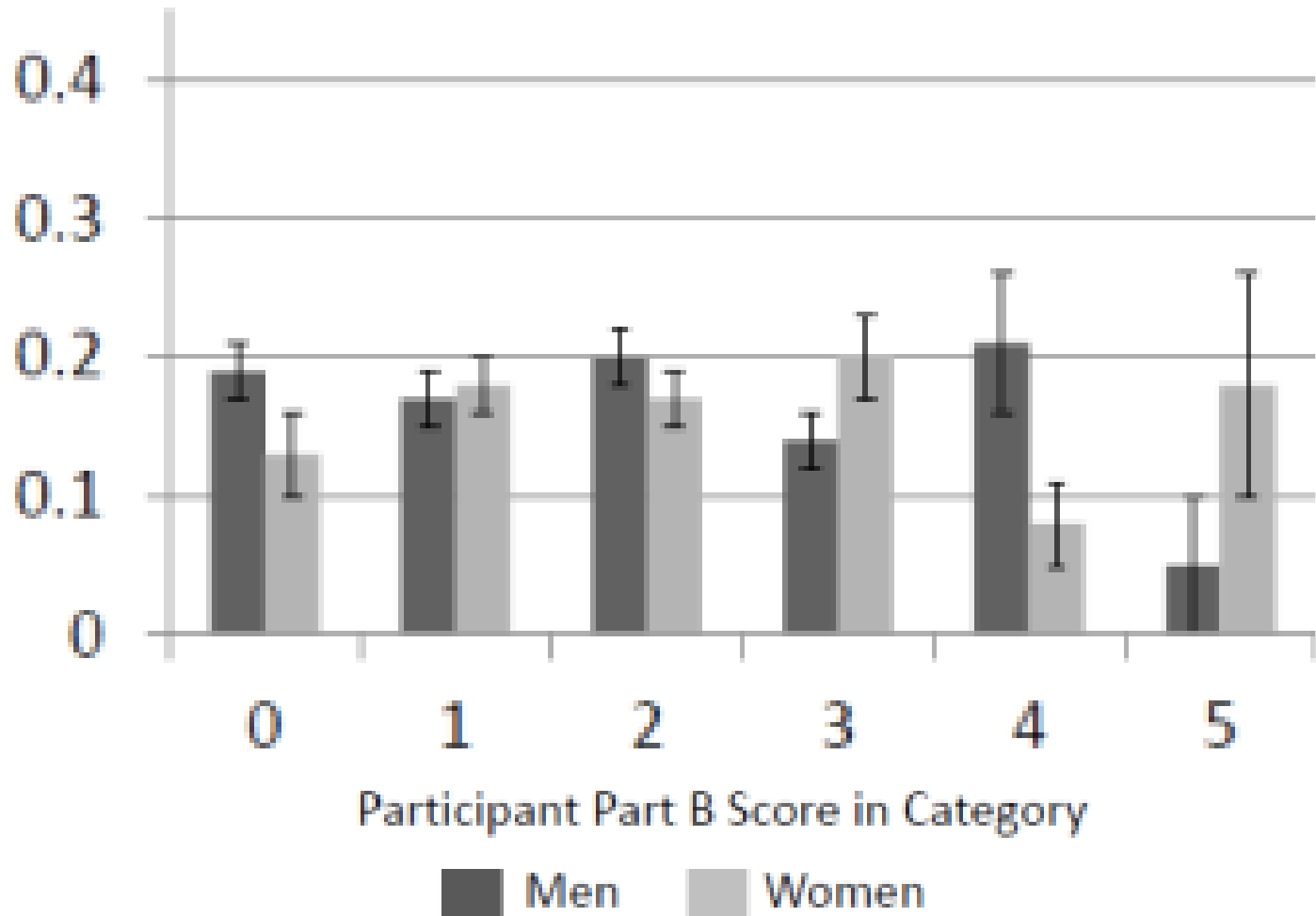
- Male typed: Environmental Science, History, Geography, Sports and Game.

Knowledge: Based on performance in a first test: 0-5.

- (while subjects do not know their performance, they in one treatment - but not the other - know if their performance in the task is higher than their counterparts. However this has no impact on behavior whatsoever. So, pool all those data.)

# Given right answer: How often do subjects fail to contribute the answer?

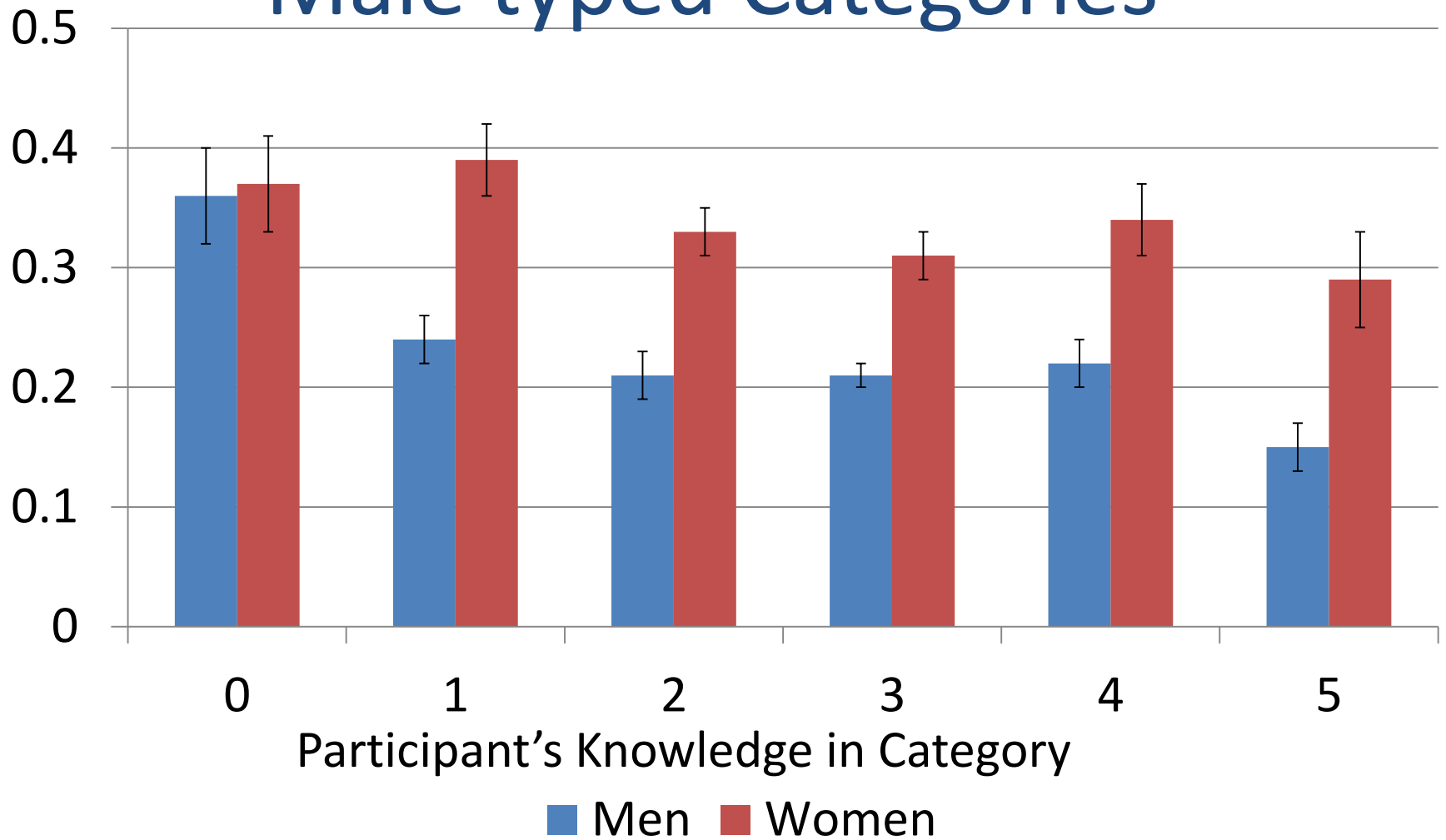
## Female-Typed Categories





# Given right answer: How often do subjects fail to contribute the answer?

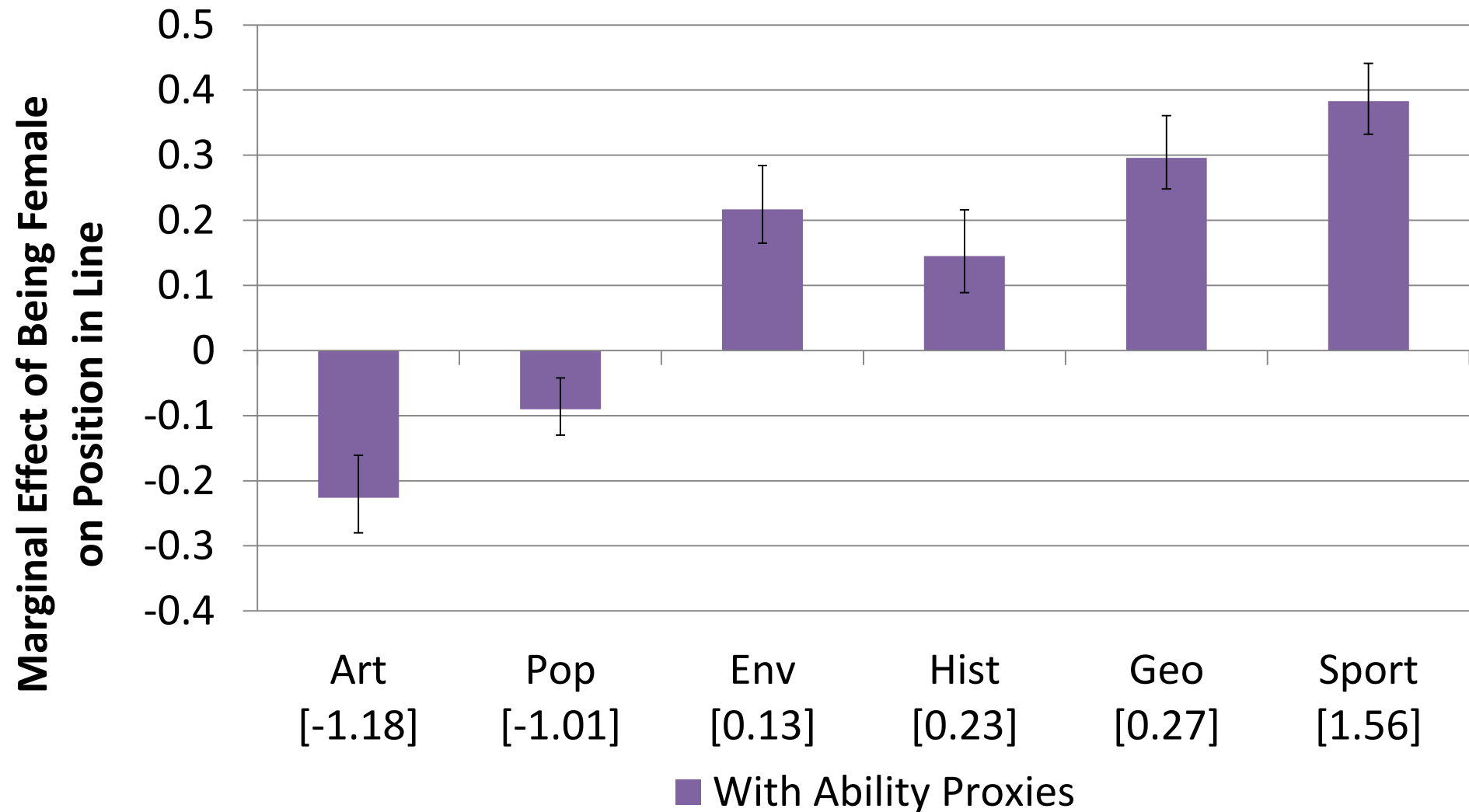
## Male typed Categories



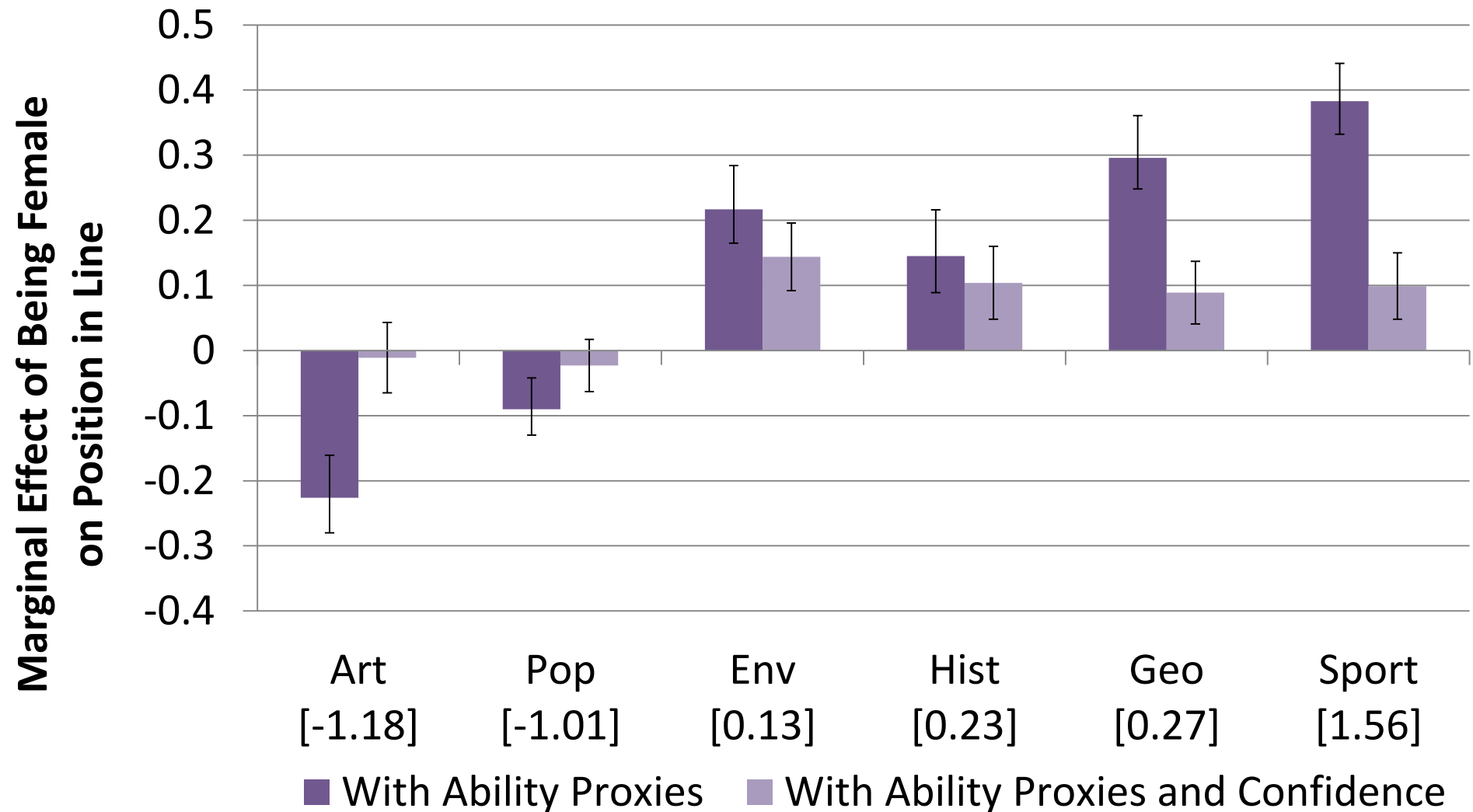
# What else accounts for differences?

- Why do decisions depend on gender stereotype associated with category?
- Beliefs seem to be the key
  - After Part 1, they ask participants to guess whether they had highest Part 1 score in group
  - Incentivized
  - No feedback about own or partner's performance at this stage, no information on partner's gender

# Beliefs Explain a Large Part of Willingness to Contribute – But Not All



# Beliefs Explain a Large Part of Willingness to Contribute – But Not All



# Consequences for Group Performance

- Groups have a harder time capitalizing on women's knowledge in male-typed categories ...  
*Even* when there is no discrimination
  - It's not that groups aren't listening to these answers
  - It's that individuals aren't contributing them
  - This is true even for experts!
- These patterns are driven largely by differences in self-confidence
- Negative implications for group performance: missed opportunities are costly

# Gender Differences in belief updating

Gender differences in overconfidence:

- Niederle and Vesterlund (2007) and follow up literature

Are they driven by gender differences in

- Priors
- Updating
- Demand for Information?

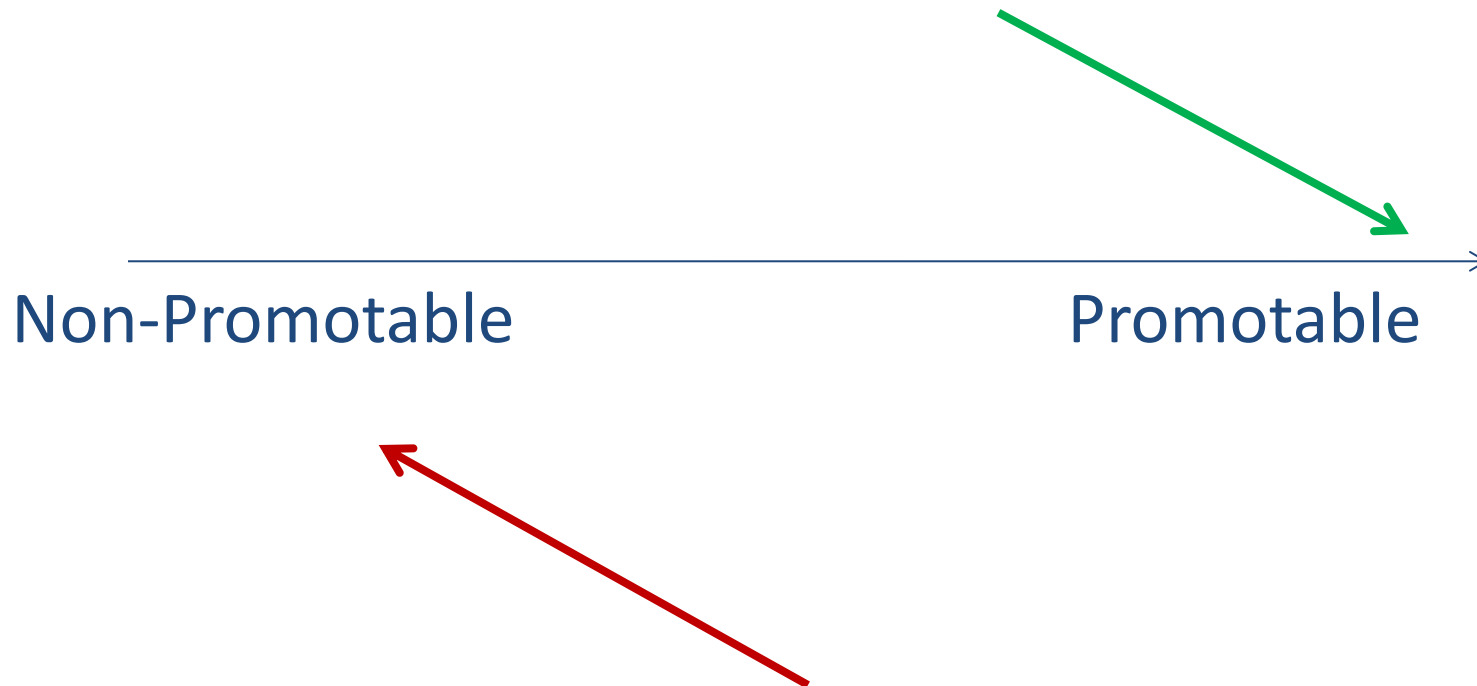
# Behavioral differences

Women less likely to compete/negotiate/lean in...



# Behavioral differences

Women less likely to compete/negotiate/lean in...





# Breaking the Glass Ceiling with “No”: Gender Differences in Declining Requests for Non-Promotable Tasks

Babcock, Recalde, Vesterlund & Weingart

- Experimental Design
  - Participants paired in groups of three
  - Have 2 minutes to decide whether to invest
  - Round ends when someone invests
  - \$1 if no investment; \$1.25 if you invest; \$2 if someone else invests
  - 10 rounds, random rematching,
  - Mixed gender sessions (share 0.33-0.53)

# Equilibria

- If no cost of waiting, decision made in last second.
- Reduces to simultaneous move game
- Let  $p_i$  denote probability  $i$  invests
- Equilibria
  - Pure strategy asymmetric Nash equilibria:  $p_i = 1, p_{-i} = 0$
  - Mixed strategy asymmetric equilibria:  $p_i = 0, p_{-i} = 0.4$
  - Mixed strategy symmetric equilibrium:  $p_i = 0.232,$   
 $i = \{1, 2, 3\}$
- Probability of group investment: 100%, 64%, or 54%

Round: 1

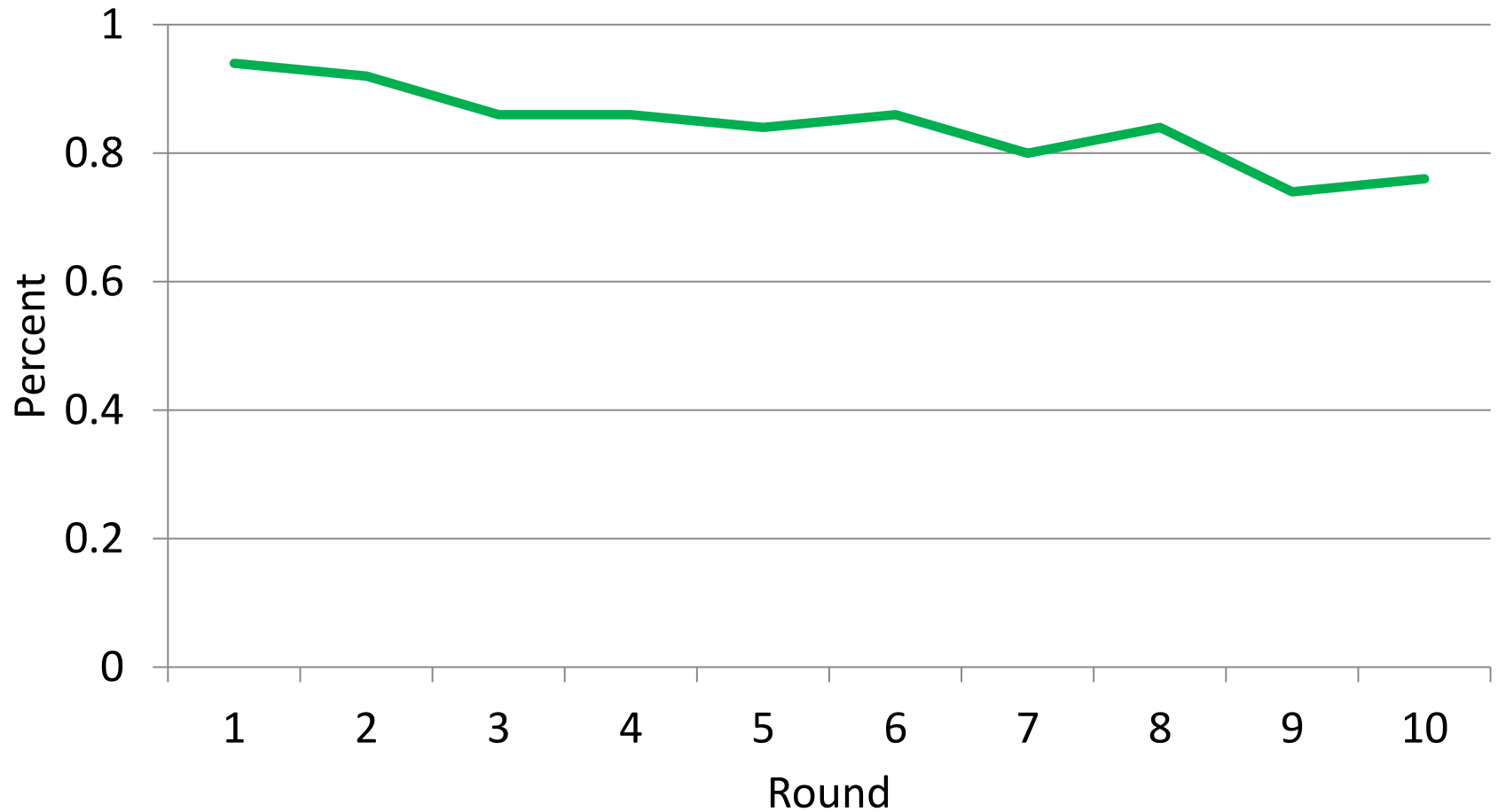
## Decision Stage

Click here if you want to invest.

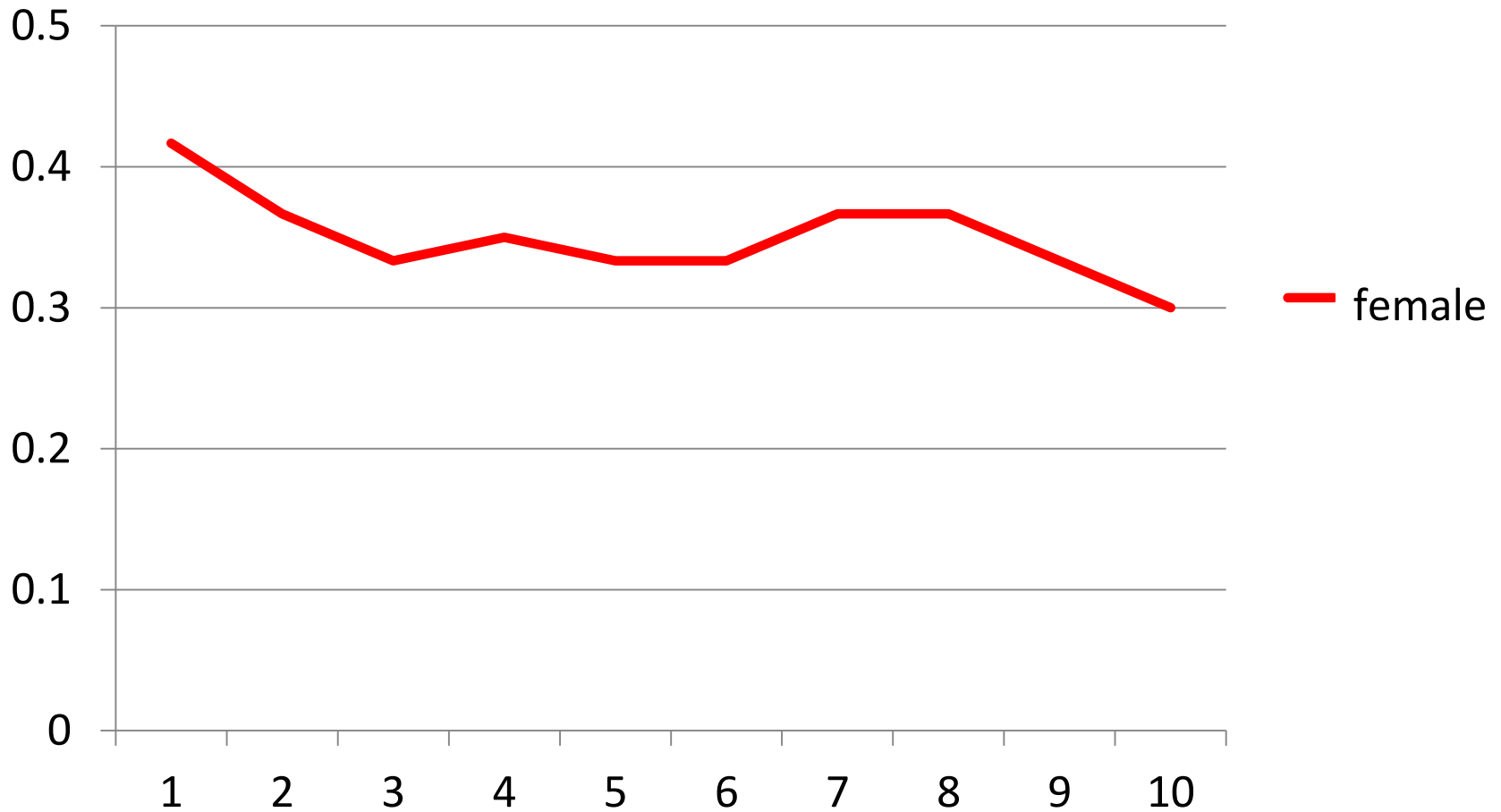


You have 120 seconds to decide whether you want to invest. If no member of your group invests then you will each make \$1. If a member of your group invests then that member will make \$1.25, and the other two group members will each make \$2.00.

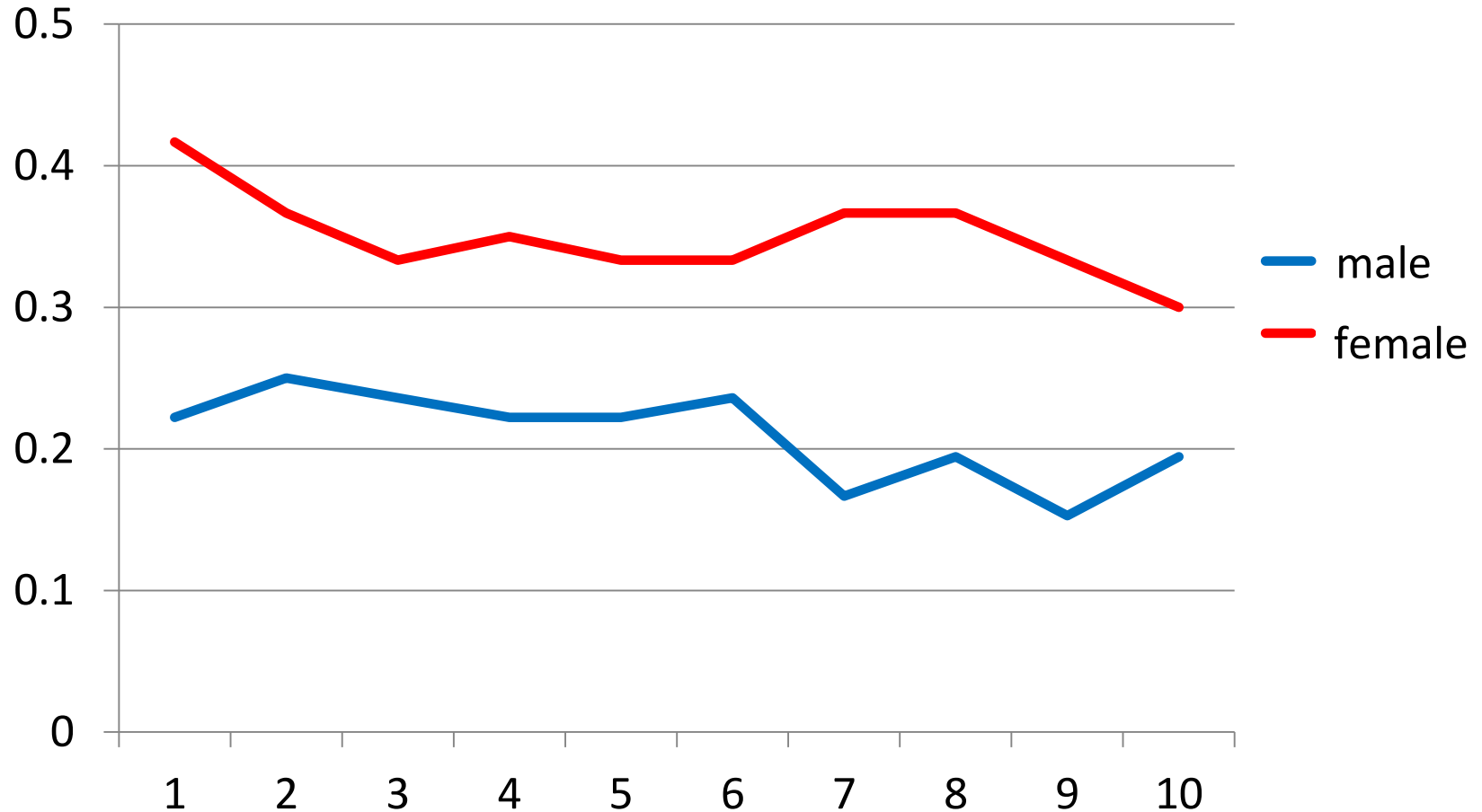
# Probability group invests



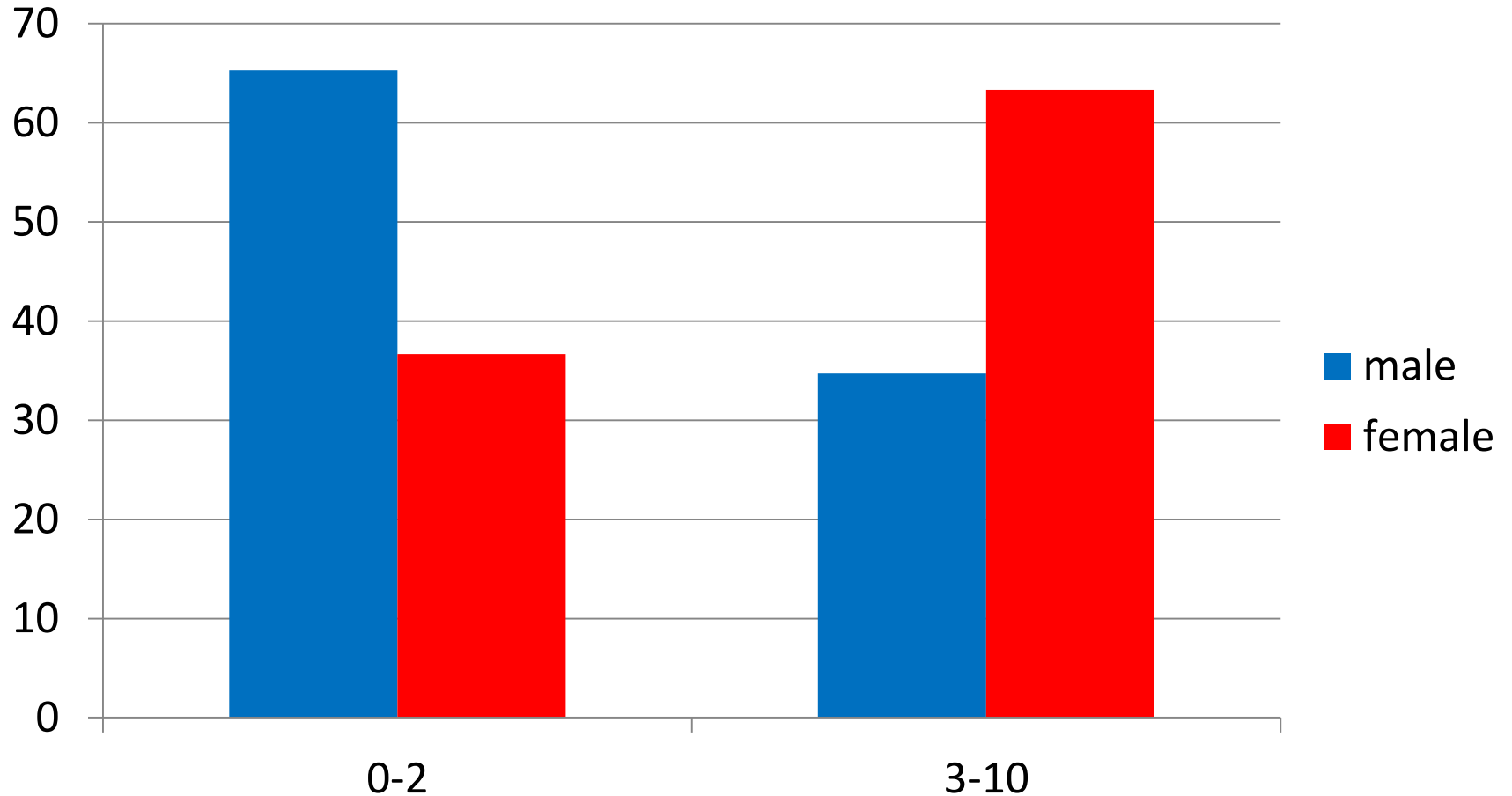
# Who volunteers?



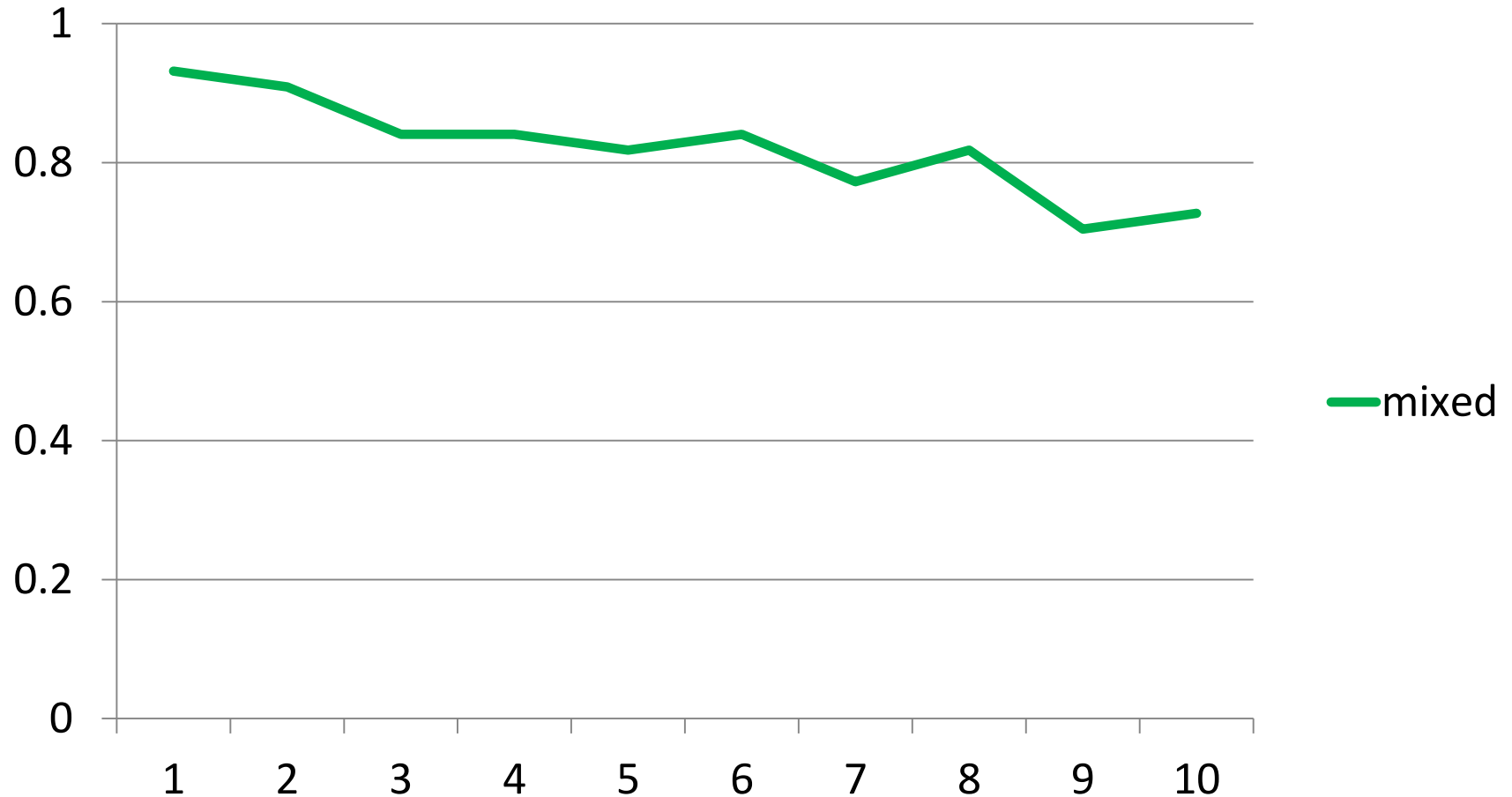
# Who volunteers?



# Who volunteers?

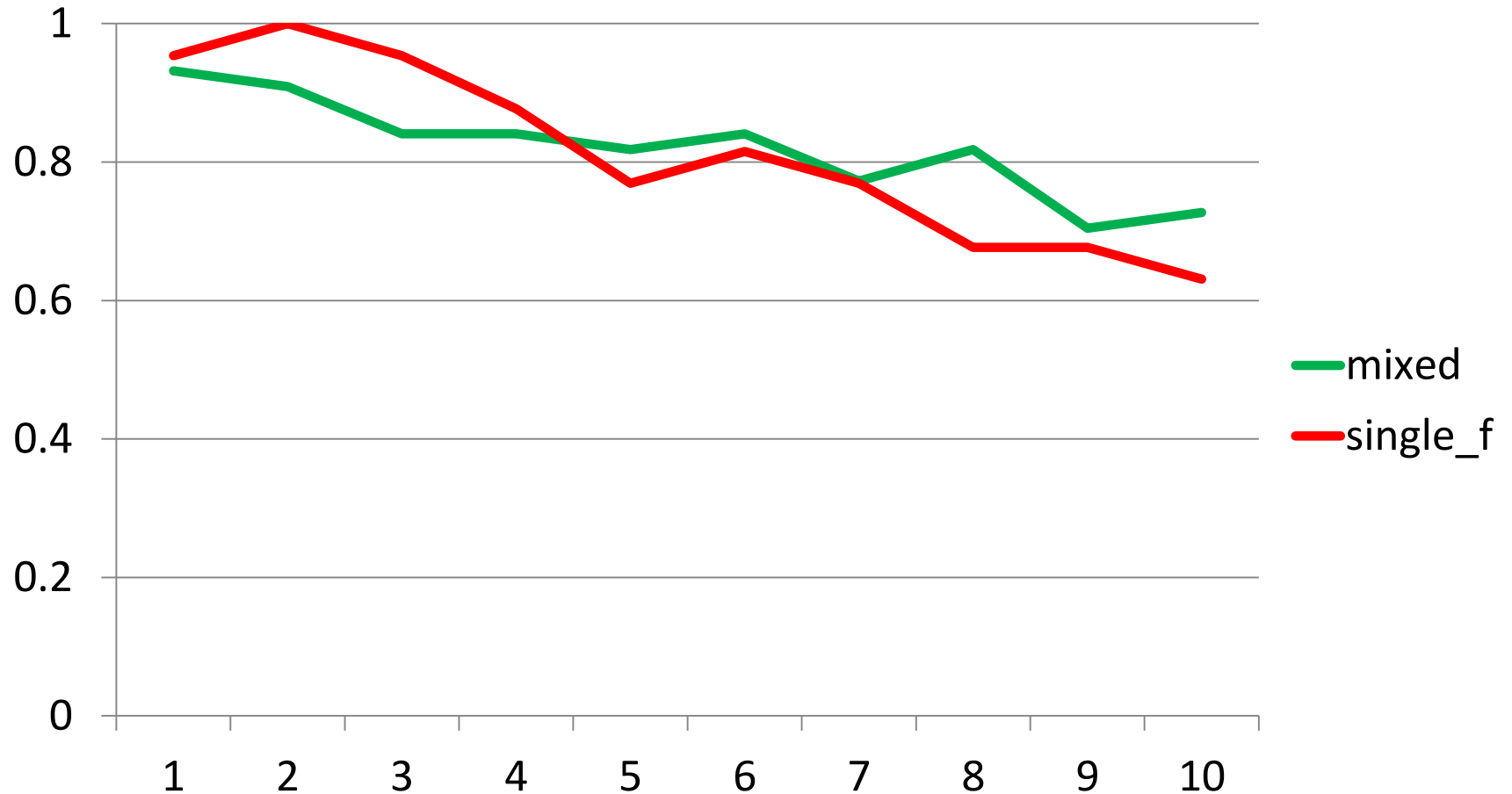


# Single sex sessions

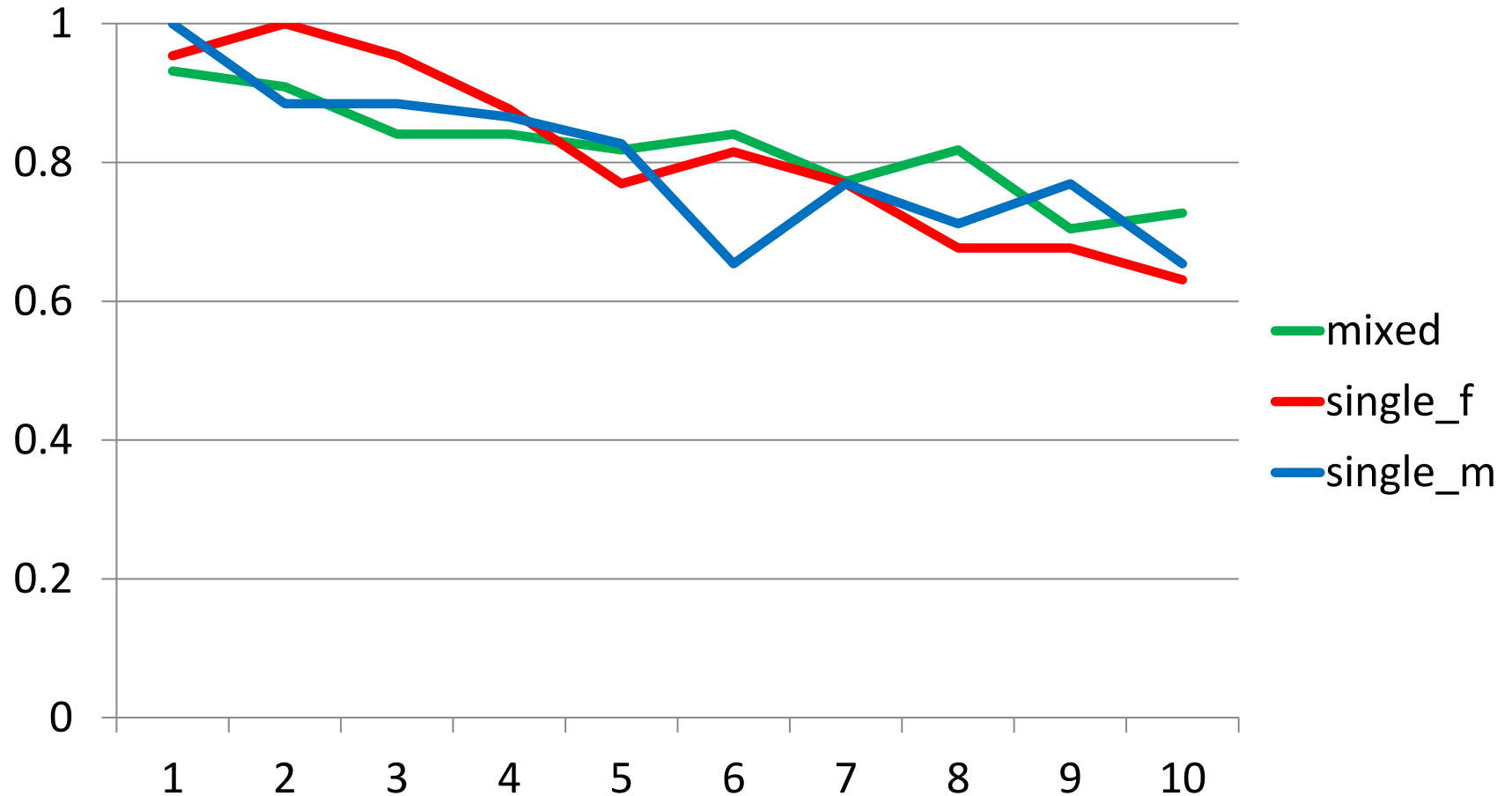




# Who volunteers?



# Who volunteers?



# Propensity to receive requests (demand)

- If you benefit from getting a task done (\$2 vs. \$1) – who would you ask?
- Photo-Ask Treatment
  - 4 people per group
    - 3 people can invest
    - 1 person unable to invest, asks one of the three to invest
  - Elicit requests using strategy method

Round: 1

## Group Information Stage

The three other members of your group are shown below.  
If you are selected to be the red player for this round, who would you like to ask to invest?  
( mark your preferred option )



Round: 1

## Group Information Stage

The three other members of your group are shown below.  
If you are selected to be the red player for this round, who would you like to ask to invest?  
( mark your preferred option )



The red player asked  
you to invest.



Round: 1

## Group Information Stage

The three other members of your group are shown below.  
If you are selected to be the red player for this round, who would you like to ask to invest?  
( mark your preferred option )



The red player asked this group member to invest.



Round: 1

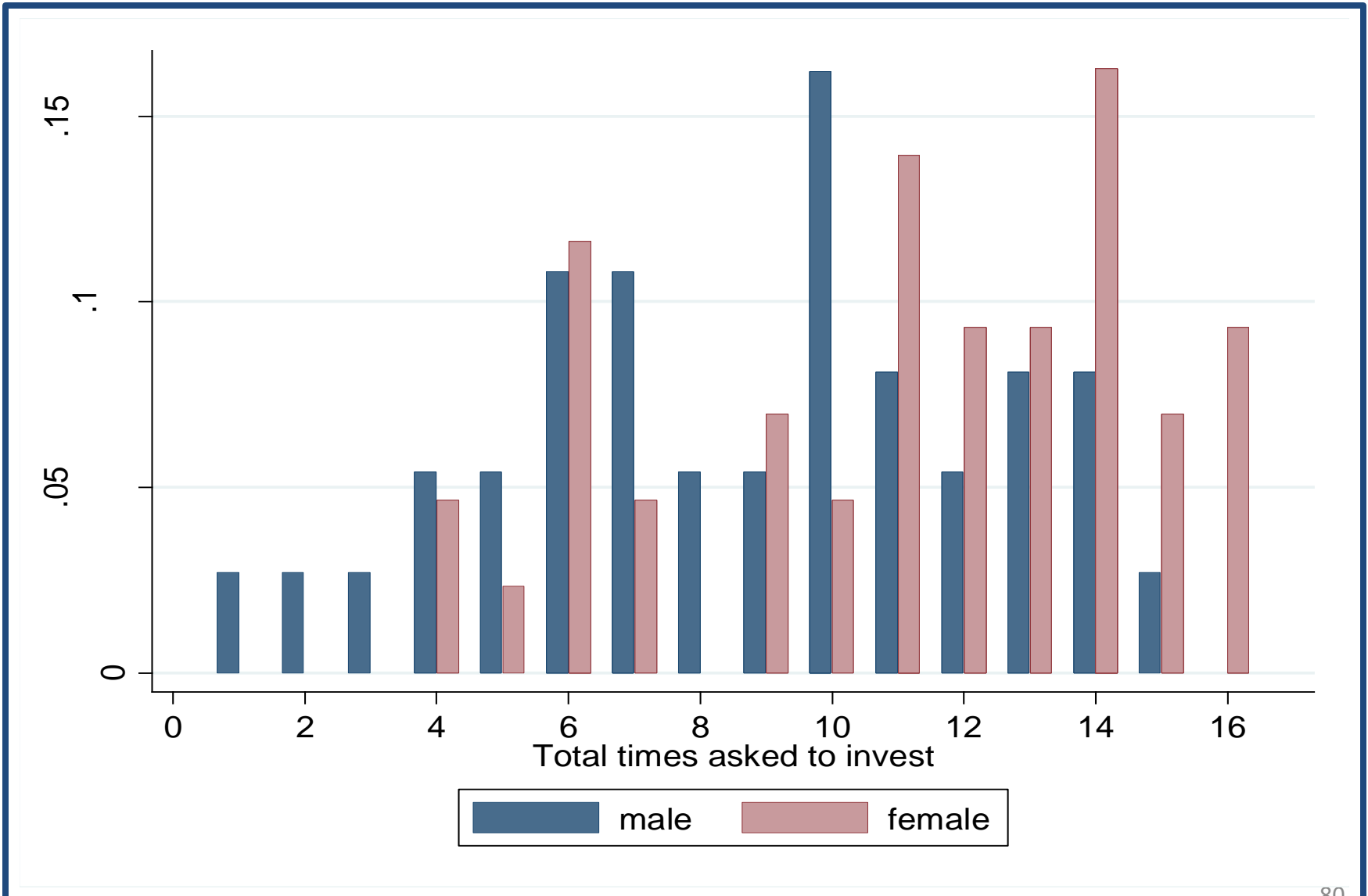
## Group Information Stage

The three other members of your group are shown below.  
If you are selected to be the red player for this round, who would you like to ask to invest?  
( mark your preferred option )



The red player asked this group member to invest.







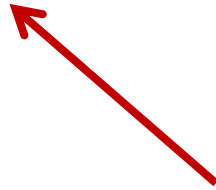
# Asking

Is it better to ask a woman?

When asked to invest, person invests:

- Women: 76 %
- Men: 51%

# Conclusion



Women more likely to volunteer,  
to be asked, and to accept requests



# Conclusion

- Gender differences in economic outcomes
- The role of gender differences in behavioral traits:
  - Competition
  - Seeking challenging tasks
  - Volunteering
- Changes in institution can affect outcomes
- More recent literature: role of discrimination?