An Audit Alternative: Measuring Employer Preferences and Beliefs without Deception

Judd B. Kessler, Corinne Low, and Colin D. Sullivan

July 23, 2018

What matters on the job market?

- Fundamental question in labor economics is how employers value different candidate characteristics, such as:
  - Human capital characteristics (education, field of study, experience, (e.g., Autor and Houseman [2010], Pallais [2014])
  - Gender and race (e.g., Altonji and Blank [1999])

- We need powerful tools to study these questions—obviously observational studies are insufficient

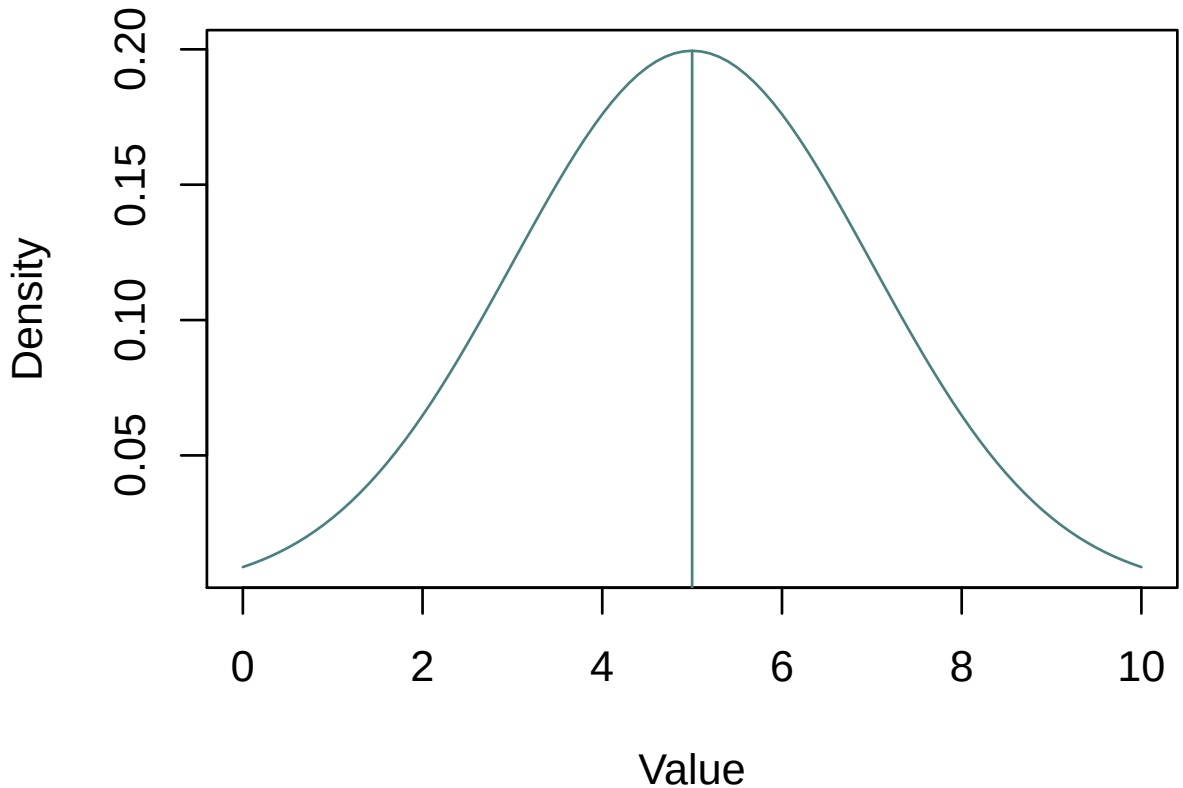
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- We need powerful tools to study these questions—obviously observational studies are insufficient
- Audit studies have been a workhorse in this literature
  - In-person (critiqued by Turner et al. [1991], Heckman and Siegelman [1992], Heckman [1998])
  - Correspondence and resume audits for discrimination (large literature launched by Bertrand and Mullainathan [2004])
  - Branched out into new areas (e.g., unemployment spells, Kroft et al. [2013], Eriksson and Rooth [2014], Nunley et al. [2017], value of for-profit-college degrees, Deming et al. [2016])
- Resume audit studies give you the difference in callback rates between groups

Callback indicates a candidate is above a threshold

- Imagine a distribution of employer i's expected productivity of candidate j with vector of characteristics X_j as in the below:

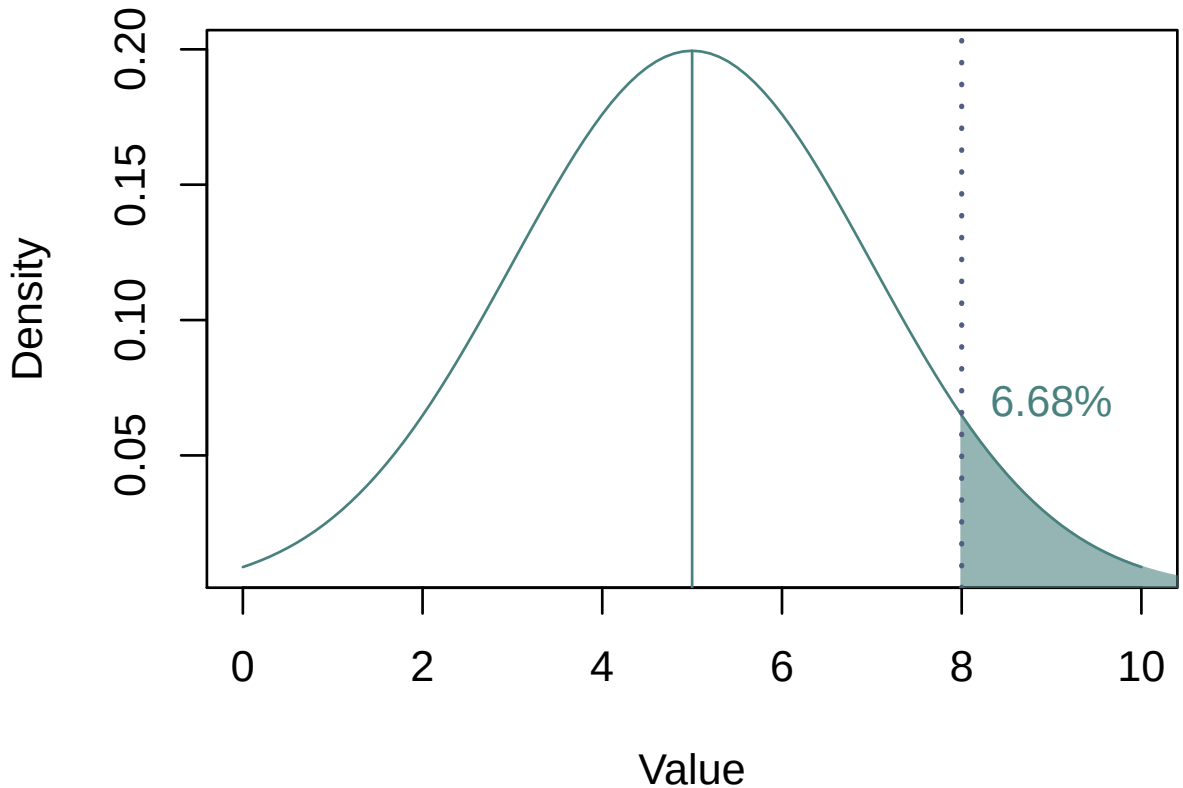
$$V_{ij} = \beta X_j + \xi_{ij},$$



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- What we observe in an audit study is an indicator for whether a candidate is called back:

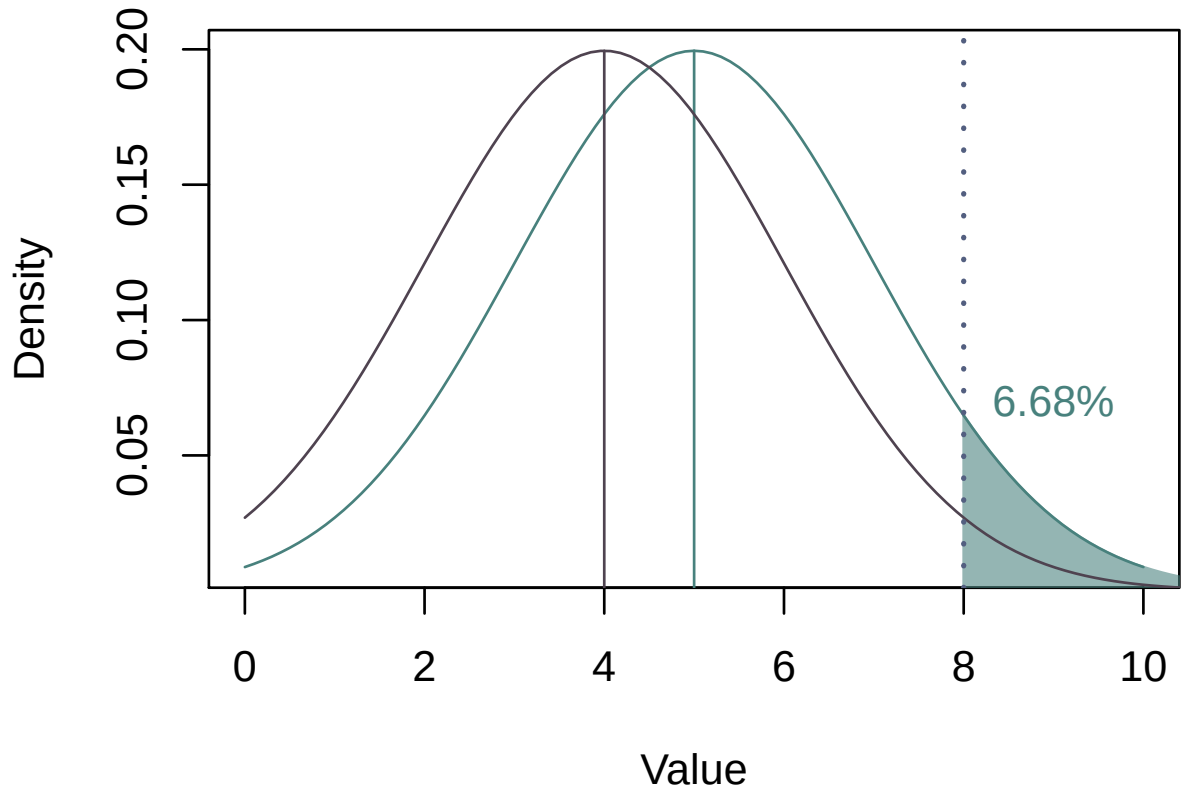
$$D_{ij} = \mathbb{1}[V_{ij} \geq V_i^*(c_i)]$$



Callback indicates a candidate is above a threshold

- We can compare callback rates of different groups. For simplicity, imagine a binary characteristic x_j:

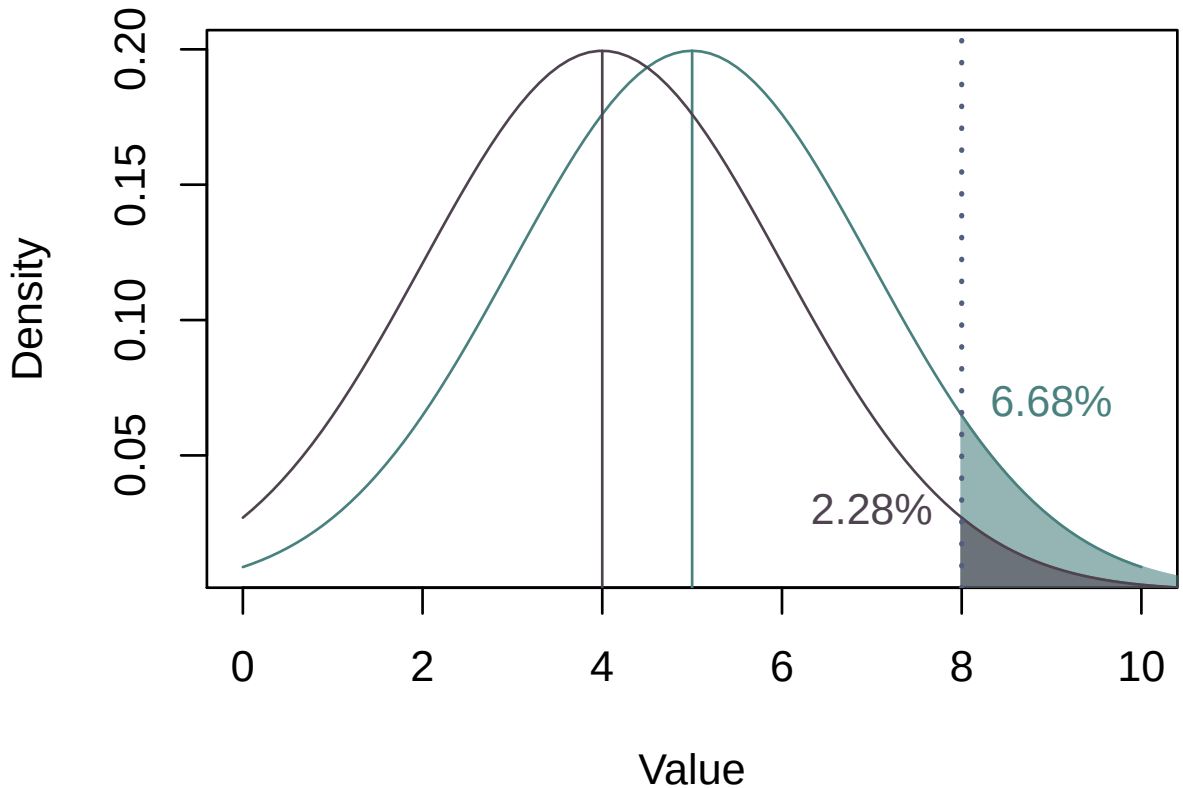
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- Resume audit studies measure the impact of x_j on callback rate by estimating α as:

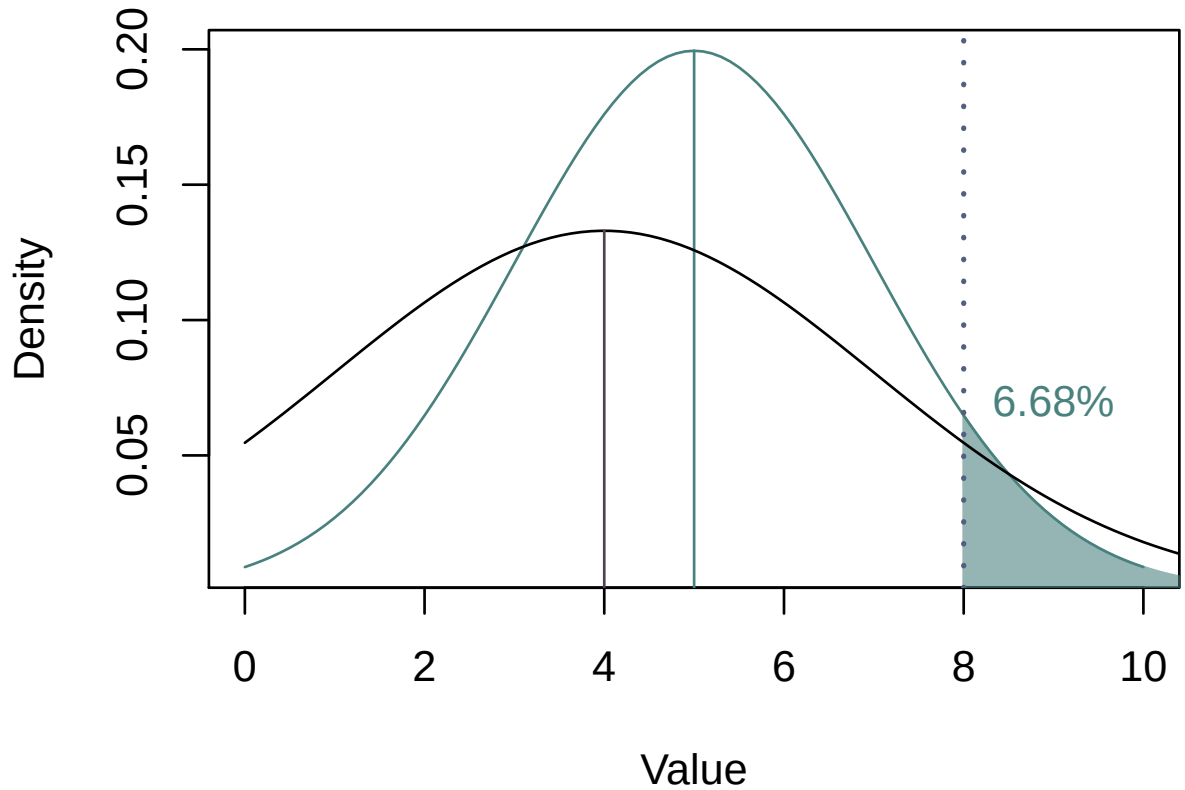
$$\alpha = E[D_{ij}|x_j = 1] - E[D_{ij}|x_j = 0]$$



Callback indicates a candidate is above a threshold

- Why might we be interested in richer information on V_{ij}?
- If the shape of the distribution depends on x_j, callback rates will not have consistent relationship across the distribution

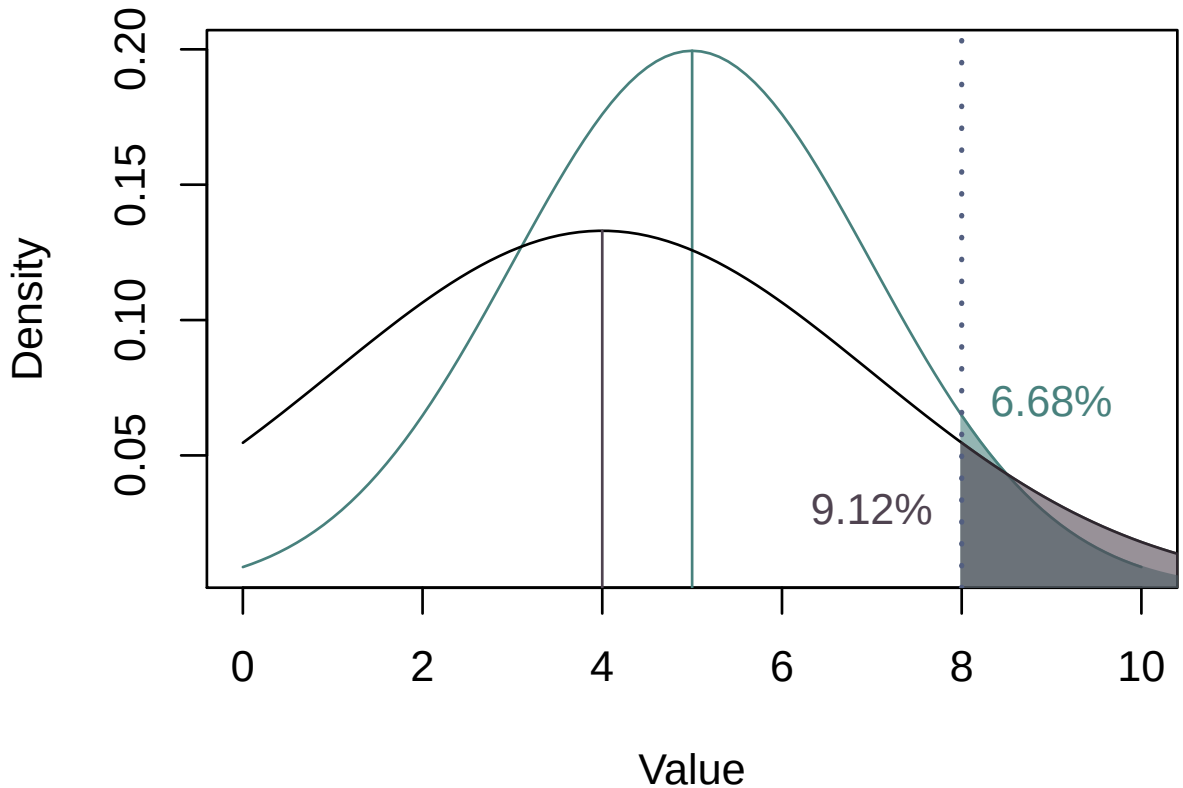
More



Callback indicates a candidate is above a threshold

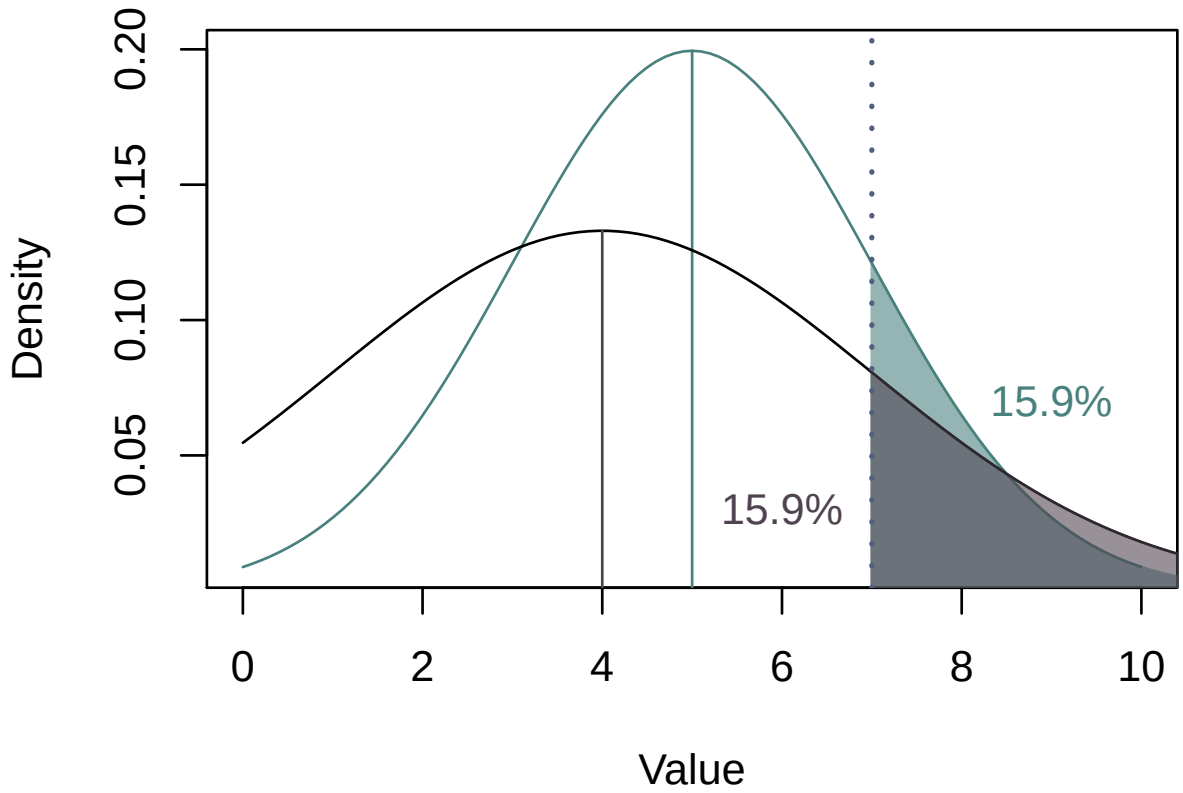
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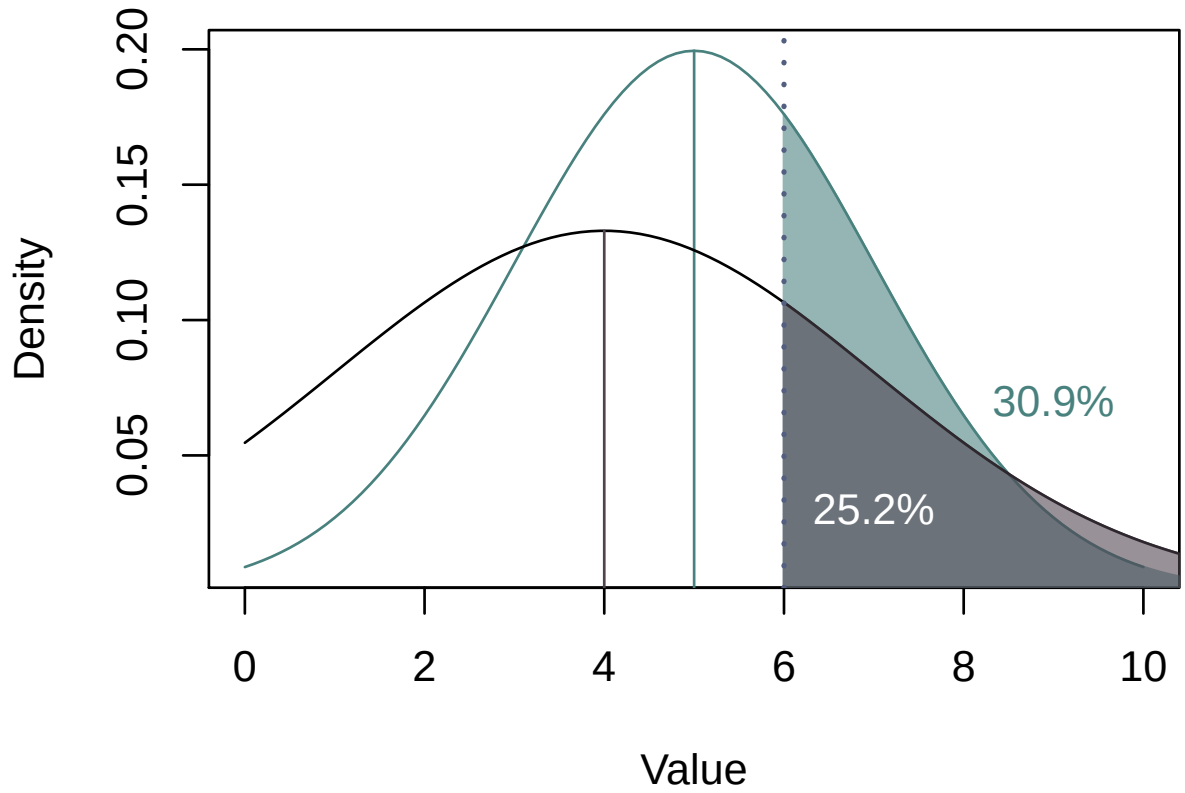
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- If you change thresholds (e.g., selective hiring to economic expansion), the sign of α can flip



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A new approach: Incentivized Resume Rating (IRR)

- Much richer information by being able to directly measure preferences
  - Parallel to buy / no-buy versus tracing demand curve (e.g., BDM)

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- How to do it in the hiring domain with incentives?
  - Employers rate **hypothetical resumes** with randomly assigned characteristics
  - They are matched with **real job seekers** according to their reported preferences
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- Similar-in-spirit to design applied to dating markets in Low [2017]
- This offers the control of a laboratory experiment with the "stakes" of a field experiment
  - Independently randomize many characteristics
  - Get continuous measures of employer preferences
  - Have each employer rate multiple resumes
- Experimental paradigm is very flexible, and can be used to measure many different traits with different pools of employers and candidates

We study employer preferences for college students

- Traditionally hard to investigate preferences of "elite" employers because they do not accept cold resumes
- How they value human capital investments
  - College students spend three months a year outside of school; we explore the impact of their HC accumulation in those months
  - Investigate impact of quality (e.g., more prestigious internship) and quantity (e.g., an additional experience) of summer employment
  - Can compare these to impact of GPA, which we treat as a numeraire
- How they respond to demographics
  - On-campus recruiters may have different race and gender preferences than firms traditionally targeted in resume audit studies
  - We measure—for the first time—employers' beliefs about demographic groups' likelihood of job acceptance

Sample resume of graduating senior

Nathan Stewart

[redacted]

EDUCATION

University of Pennsylvania, College of Arts and Sciences — **Philadelphia, PA**
BA in Economics — **Expected May 2017**
Cumulative GPA: 3.82/4.00

WORK EXPERIENCE

Bank of America Merrill Lynch, New York, NY
Investment Banking Summer Analyst - Healthcare Finance — **June - August 2016**

- Advised hospitals and healthcare systems on strategic financing options, new project initiatives, and M&A opportunities
- Prepared client pitchbooks and presentation materials for investor roadshows
- Conducted due diligence and filed reports on 103 deals (41% of group's total deals) as part of an SEC initiative (MCDC)

P.F. Chang's, Mclean, VA
Server — **June - August 2015**

- Memorized entire menu and completed server training in five days
- Worked diligently under stressful conditions to deliver high quality service to customers
- Communicated and worked with servers, hosts, and bar staff to operate restaurant smoothly and uphold P.F. Chang's core values and principles

LEADERSHIP EXPERIENCE

MUSE - Undergraduate Marketing Club, Philadelphia, PA
Executive Board Member — **2013-2015**

- Assisted in organizing speaker conferences, alumni panels, and networking sessions, with past

Incentivized Resume Rating: our design

- We partner with University of Pennsylvania Career Services
  - Collect hundreds of real Penn resumes to cull components
  - Use real Penn seniors interested in being matched as candidate pool
- Career Services offers employers the opportunity to try a new pilot tool designed by Wharton professors
  - Framed and marketed as a way to help employers find candidates
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- Career Services offers employers the opportunity to try a new pilot tool designed by Wharton professors
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  - Only participation incentive is to be matched with Penn seniors
- Employers rate 40 resumes (median employer takes 28 minutes)
  - Choose majors to view: Humanities/Social Sciences or Science/Math
  - Rate candidates on: "desirability" and "likelihood of acceptance"
- We use ML to match each employer to 10 real seniors based on their preferences (i.e., no deception) and email their resumes
- We repeat the experiment at University of Pittsburgh to show differences based on subject pool

Instructions Sample Recruitment Email

Rating on two dimensions

MRY and Evolution

Prospect Forum, Philadelphia, PA
Executive VP **2013-2015**

- Launched early stage entrepreneurial venture with peers to improve the career search process for college students
- Connected students with Philadelphia-based companies that match their interests and worked to expand to other Ivies

SKILLS

Public speaking, marketing, writing, fundraising, data analysis, PowerPoint, Excel

How interested would you be in hiring **Nathan Stewart**?

Not interested 1	2	3	4	5	6	7	8	9	**Very interested** 10
○	○	○	○	○	○	○	○	○	○

How likely do you think **Nathan Stewart** would be to accept a job with your organization?

Not likely 1	2	3	4	5	6	7	8	9	**Very likely** 10
○	○	○	○	○	○	○	○	○	○



Next

Resume creation and variables

Component	Randomization
GPA	Drawn from $U(2.90, 4.00)$
Major	Drawn from a list of Penn majors
First job	Pr(**Top Internship**) $= \frac{1}{2}$
Second job	Pr(**Second Internship**) $= \frac{13}{40}$, Pr(**Work for Money**) $= \frac{13}{40}$, Pr(Blank)$= \frac{14}{40}$
Leadership	Two items drawn independently
Skills	Pr(**Technical skills**)=0.25

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Component	Randomization
Name	Pr(**Not White Male**)=67.2%, Gender (50% Male, 50% Female), Race drawn from U.S. distribution (65.7% White, 16.8% Hispanic, 12.6% Black, 4.9% Asian)

Regression specification

- Recall expected employer productivity, $V_{ij} = \beta X_j + \xi_{ij}$
- Mean value in OLS (averaged over the space we created):

$$V_{ij} = \beta_0 + \beta_1 \, GPA + \beta_2 \, TopInt + \beta_3 \, SecondInt + \beta_4 \, WFM + \beta_5 \, TechSkills + \beta_6 \, NotWhiteMale + \alpha_i + \gamma_j + \xi_{ij}$$

where α_i are rater fixed effects and γ_j includes leadership and major fixed effects

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  where α_i are rater fixed effects and γ_j includes leadership and major fixed effects

- Will also run quantile specifications to estimate marginal effects at 25th, 50th, 75th, 90th, and 95th percentiles
- Will first present results on the first rating: "How interested would you be in hiring [name]"?

OLS results

	All
GPA	2.195***
	(0.129)
Top Internship	0.902***
	(0.0806)
Second Internship	0.463***
	(0.0947)
Work for Money	0.149
	(0.0913)
Technical Skills	-0.0680
	(0.0900)
Not White Male	-0.117
	(0.0842)
Observations	2880
F-test p-value for Majors	< 0.001
F-test p-value for Leadership	0.0649

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

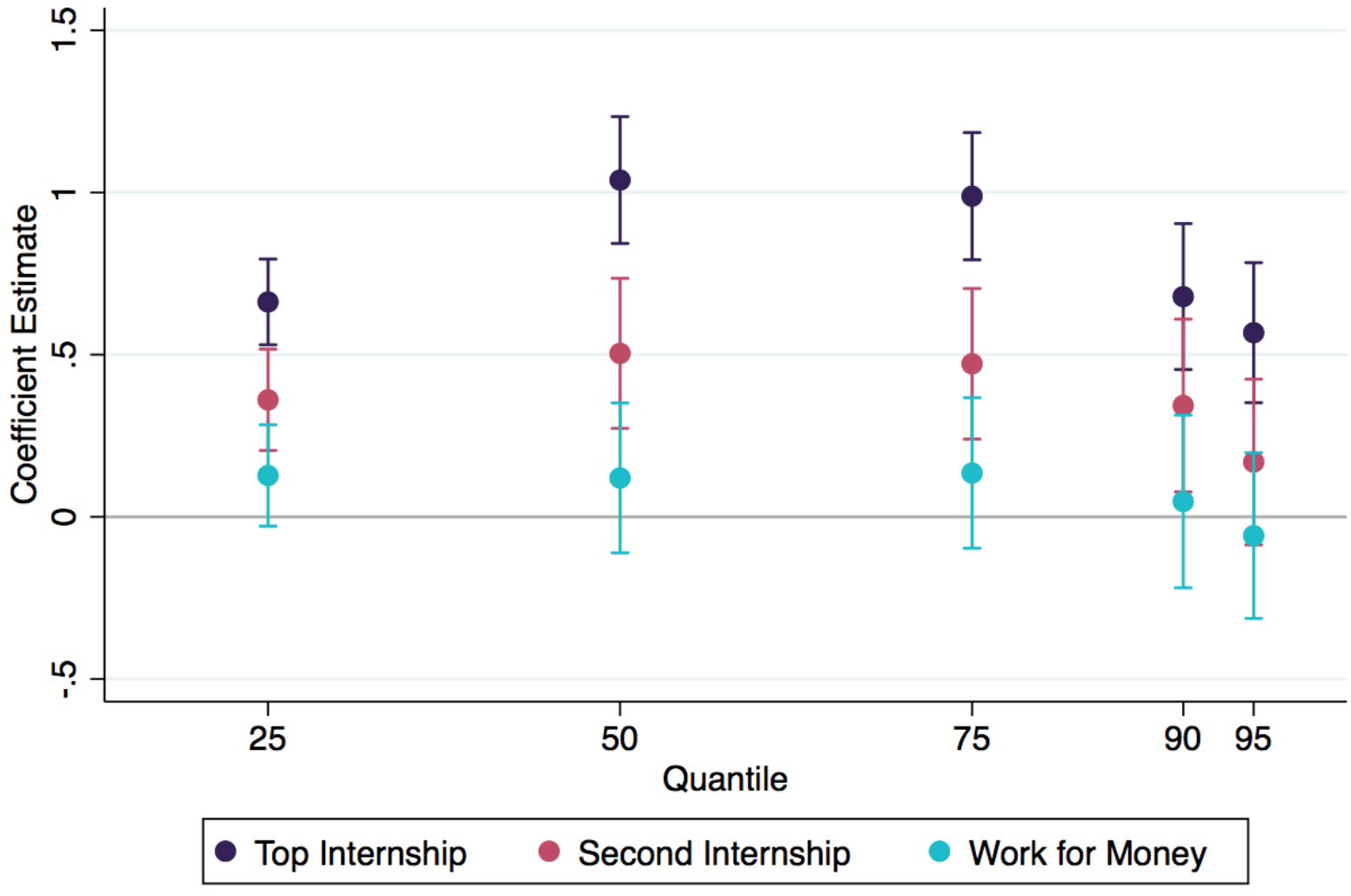
OLS results

	All	Humanities & Social Sciences	Science & Math
GPA	2.195***	2.300***	1.852***
	(0.129)	(0.153)	(0.243)
Top Internship	0.902***	1.039***	0.530***
	(0.0806)	(0.0944)	(0.173)
Second Internship	0.463***	0.514***	0.291
	(0.0947)	(0.114)	(0.187)
Work for Money	0.149	0.114	0.319*
	(0.0913)	(0.109)	(0.185)
Technical Skills	-0.0680	-0.0492	-0.171
	(0.0900)	(0.106)	(0.186)
Not White Male	-0.117	-0.0110	-0.399**
	(0.0842)	(0.0998)	(0.188)
Observations	2880	2040	840
F-test p-value for Majors	< 0.001	0.0036	< 0.001
F-test p-value for Leadership	0.0649	0.0246	< 0.001

Standard errors in parentheses

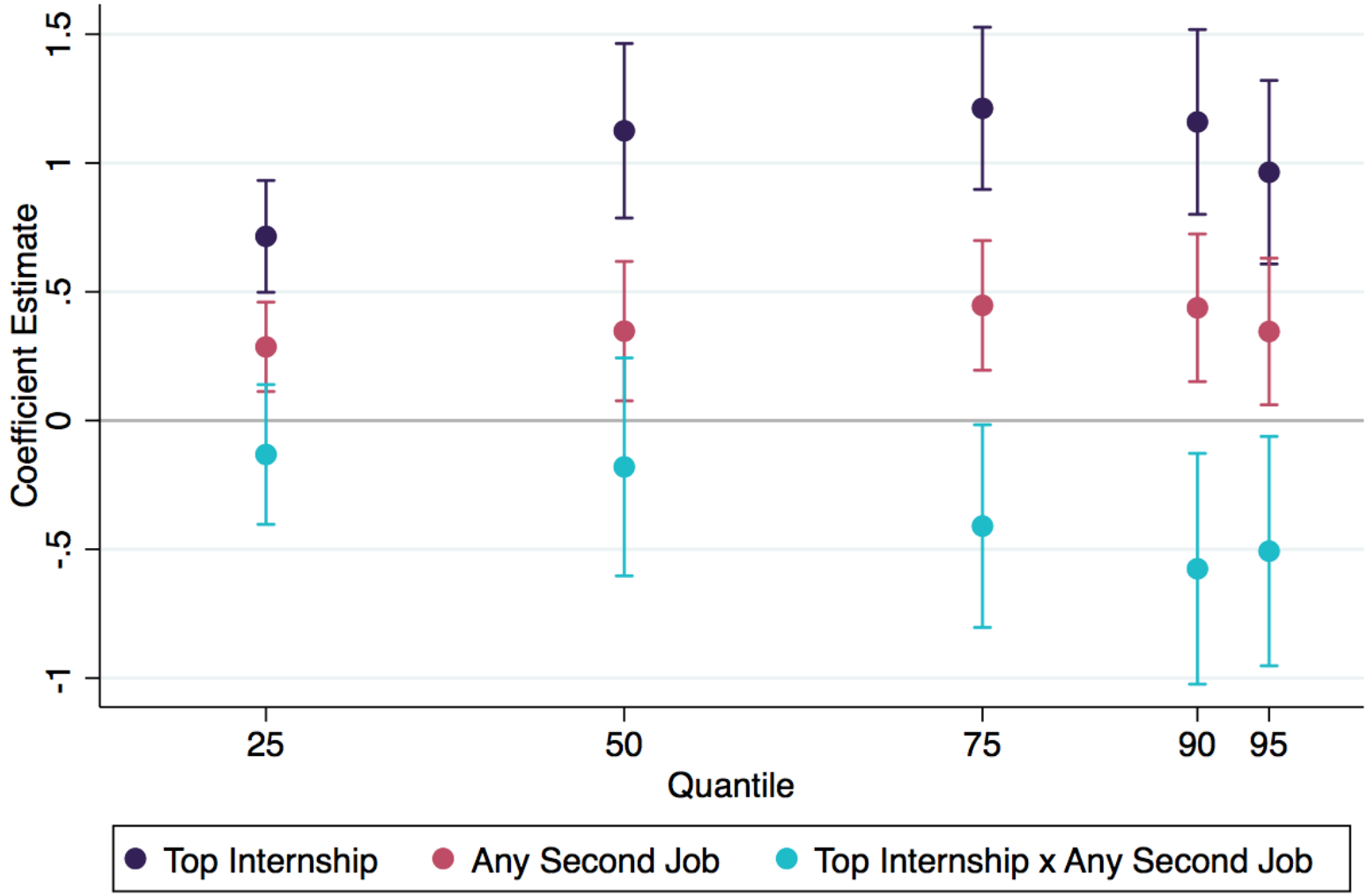
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Valuation of summer work experience



Bars indicate 95% Confidence Intervals.

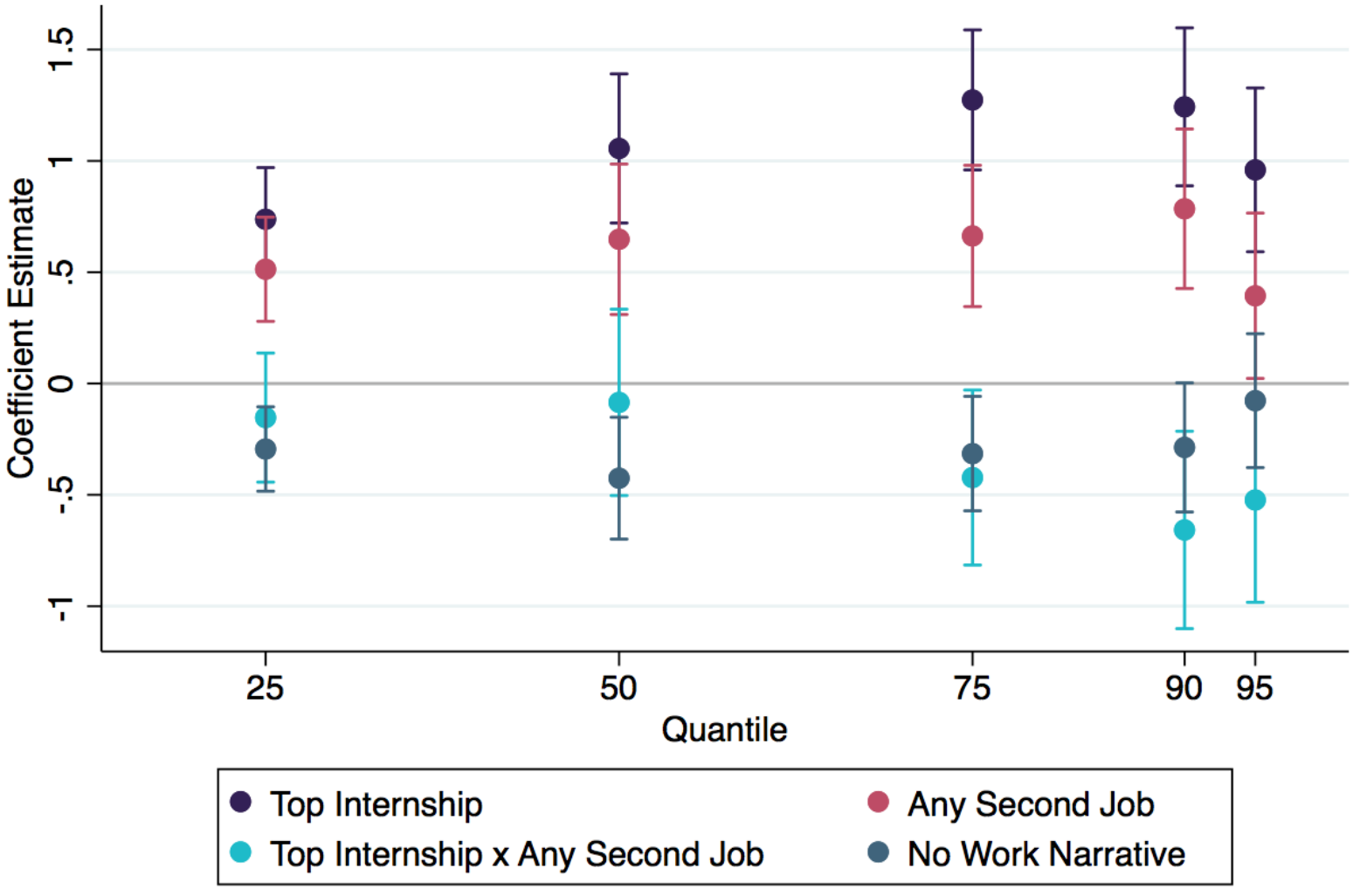
Interactions between work experience



Bars indicate 95% Confidence Intervals.

Top Internship x Second Internship | Top Internship x Work for Money

Work experience narrative?



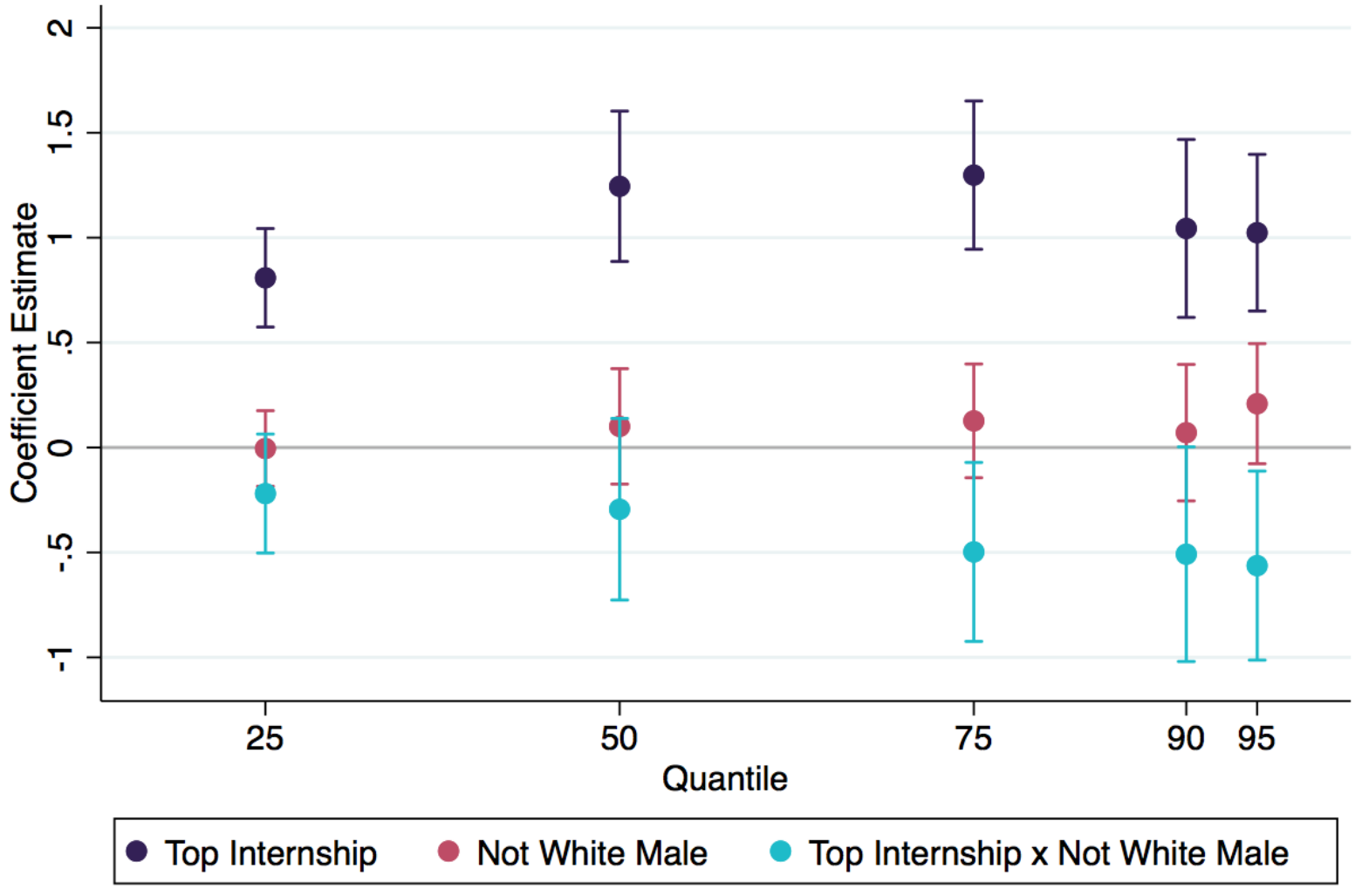
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Human capital matters, what about demographics?

- Have shown that firms value summer work experience
  - Both quality and quantity important—effects differ by quantile
  - Constraints students face in needing to earn money from summer work might be materially important
  - Interactions between different components, can be more closely examined with this design

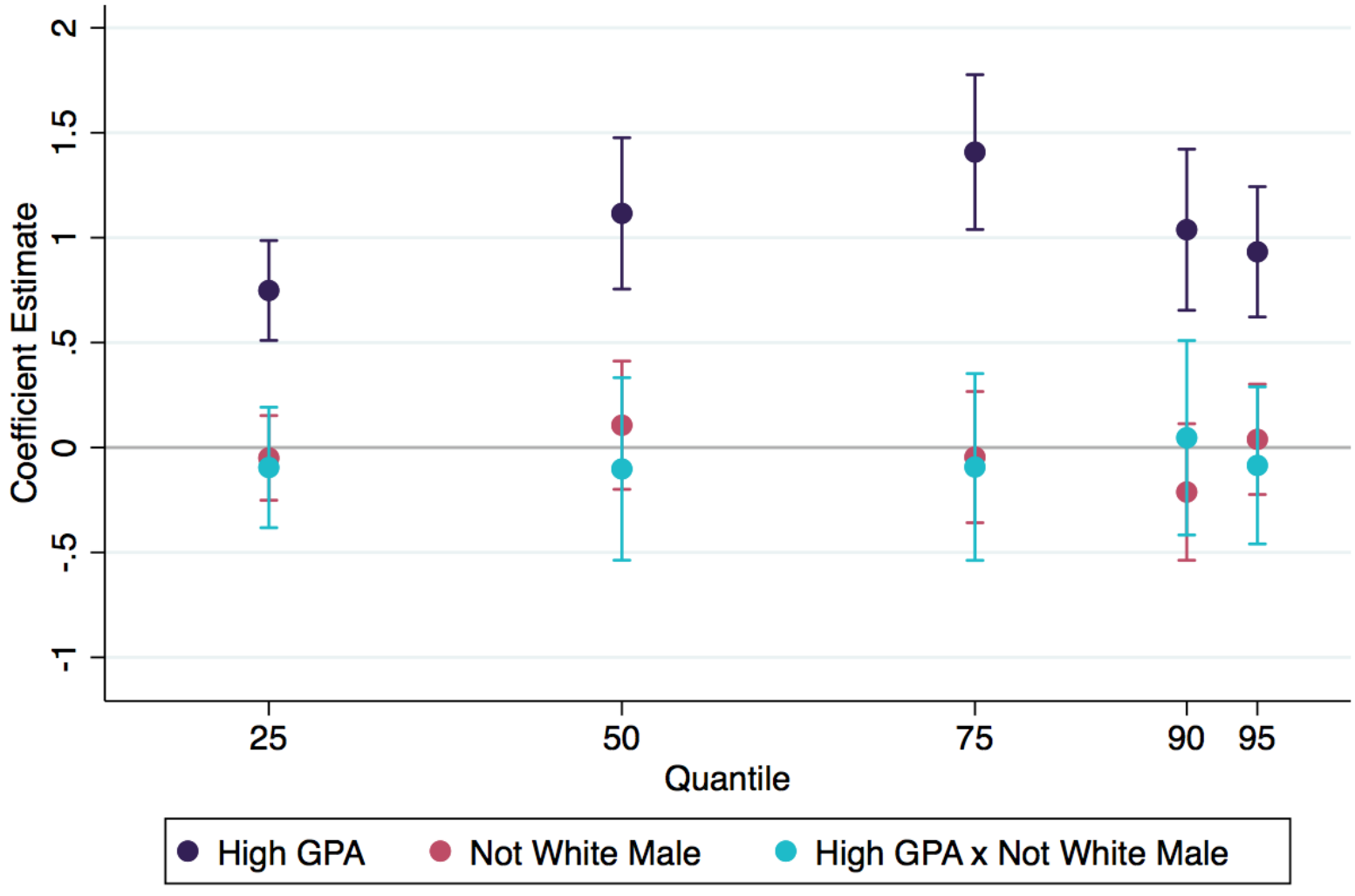
- Have also shown that firms recruiting in STEM are less interested in female/minority candidates
  - Will now examine impact of demographic characteristics more closely
  - In Bertrand and Mullainathan [2004], not only did resumes with black names receive fewer callbacks, there was also a lower return to quality improvements

Top Internship less valuable for women and minorities



Bars indicate 95% Confidence Intervals.

Effect absent for GPA



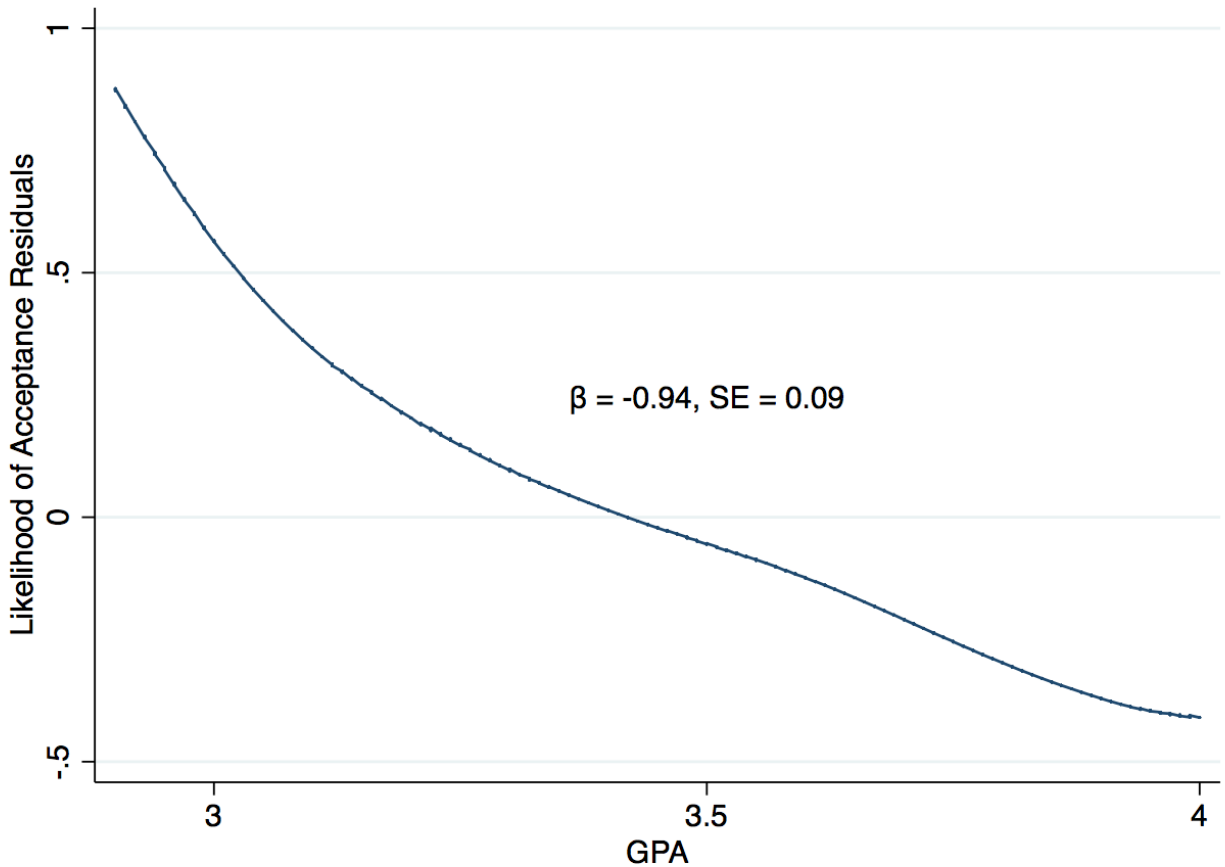
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Second measure: likelihood of acceptance

- Recall question: "How likely do you think [name] would be to accept a job with your organization?"
  - This is correlated positively with desirability rating
  - Holding desirability constant, negatively correlated with "objective" quality

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Firms believe women and minorities are less likely to accept

	All
GPA	0.734***
	(0.120)
Top Internship	0.666***
	(0.0763)
Second Internship	0.393***
	(0.0910)
Work for Money	0.200**
	(0.0895)
Technical Skills	-0.105
	(0.0862)
Not White Male	-0.197**
	(0.0805)
Observations	2880

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

More

Firms believe women and minorities are less likely to accept

	All	Desirability < 5	Desirability ≥ 5
GPA	0.734***	-0.341**	-0.133
	(0.120)	(0.140)	(0.144)
Top Internship	0.666***	0.435***	0.0632
	(0.0763)	(0.0910)	(0.0880)
Second Internship	0.393***	0.293***	0.194*
	(0.0910)	(0.105)	(0.104)
Work for Money	0.200**	0.0895	0.136
	(0.0895)	(0.0991)	(0.106)
Technical Skills	-0.105	0.00508	-0.119
	(0.0862)	(0.0982)	(0.0962)
Not White Male	-0.197**	-0.0664	-0.208**
	(0.0805)	(0.0913)	(0.0919)
Observations	2880	1367	1513

Standard errors in parentheses

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More

Why does this matter?

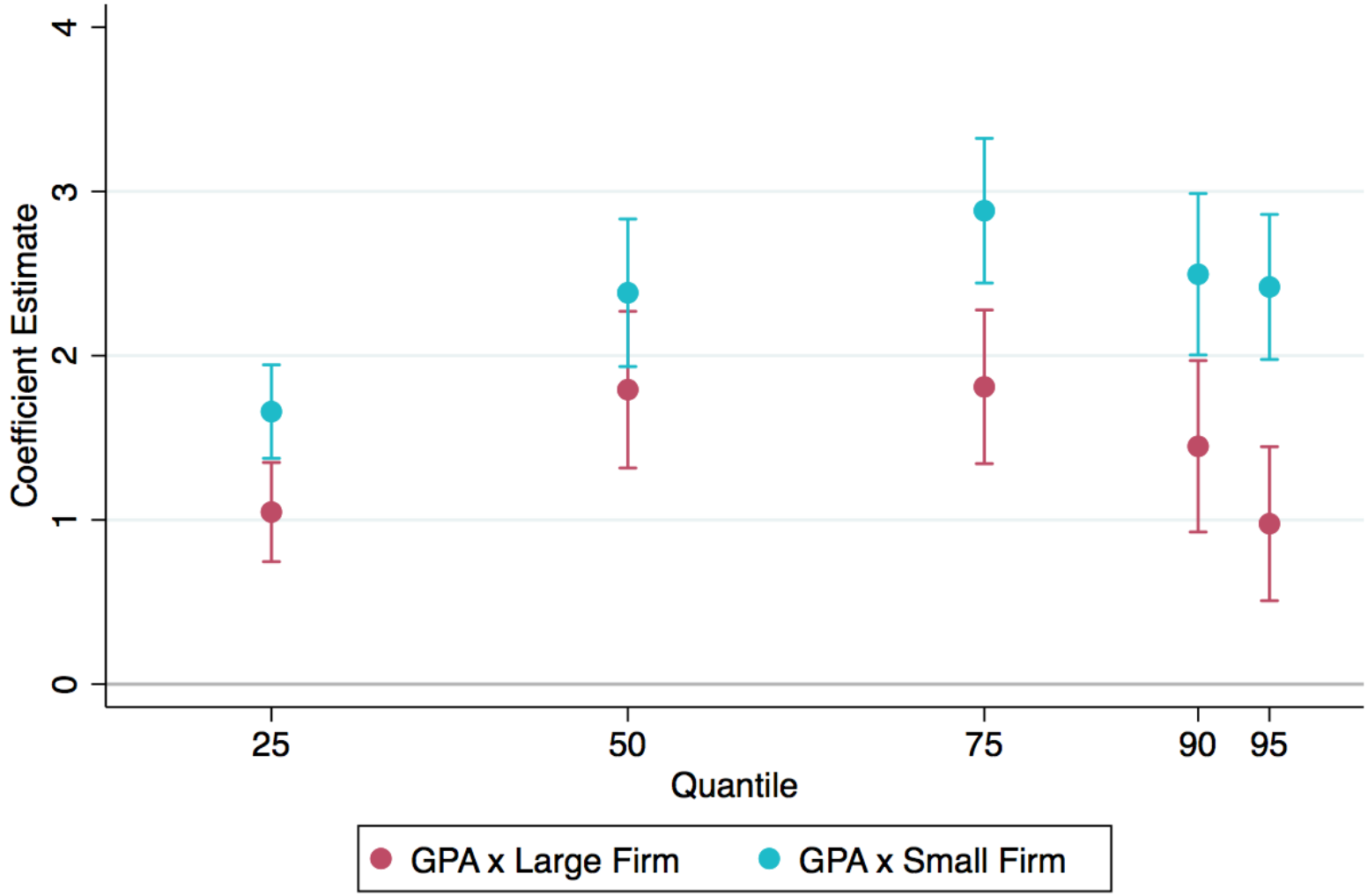
- Imagine the firm incurs costs to interview or recruit candidates (e.g., time/effort, limited slots)
- Could produce (or exacerbate) lower callback rates for under-represented groups
- Callback differences may reflect more than expected productivity
  - Essentially an omitted variable bias problem
  - But not solved with randomization, since appeal of trait and impact on likelihood of acceptance assigned simultaneously
  - Anything the firm finds appealing might also change their chance of "getting" candidate

Incentivized Resume Rating: future research opportunities

- IRR can be used to answer a wide array of human capital questions
- Can identify different dimensions of preferences
- Setup costs are substantial, but marginal costs of running are lower (we will gladly share our technology)
- Can be used outside of college setting
- Deployment with multiple groups possible for comparison

Conclusion

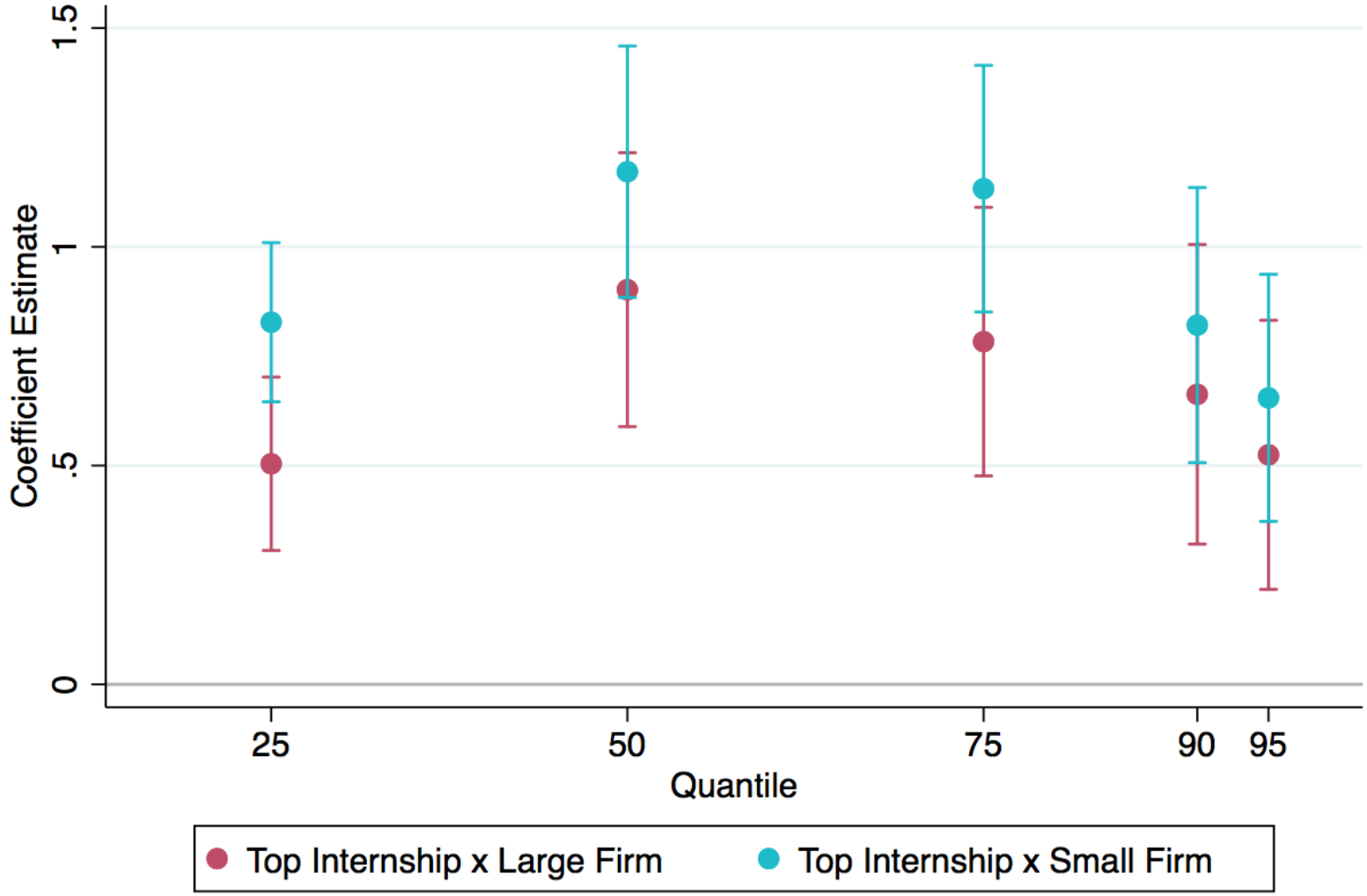
Firm Size & GPA



Bars indicate 95% Confidence Intervals.

Firm Prestige & GPA

Firm Size & Top Internship



Bars indicate 95% Confidence Intervals.

Firm Prestige & Top Internship

Results at Pitt directionally similar

	Penn	Pitt
GPA	2.195***	0.263**
	(0.129)	(0.113)
Top Internship	0.902***	0.222***
	(0.0806)	(0.0741)
Second Internship	0.463***	0.212**
	(0.0947)	(0.0844)
Work for Money	0.149	0.154*
	(0.0913)	(0.0807)
Technical Skills	-0.0680	0.107
	(0.0900)	(0.0768)
Not White Male	-0.117	0.00297
	(0.0842)	(0.0710)
Observations	2880	3440
F-test p-value for Majors	< 0.001	< 0.001
F-test p-value for Leadership	0.0649	0.937

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Summary

- In this paper, we introduce a new experimental paradigm, Incentivized Resume Rating, for measuring employers' preferences over candidate characteristics
- The key advantage is ability to elicit the full distribution of employer preferences
  - Estimate value of characteristics at different levels of selectivity
  - Independent randomization of many characteristics allows for analysis of conditional marginal effects
- Other benefits
  - Can access employers who don't respond to cold resumes
  - Can measure multiple dimensions driving employer callbacks
- We deploy IRR to investigate
  - Preferences of recruiters at elite colleges for student human capital investments
  - Impact of demographic characteristics, beyond current literature