Search Frictions and Self-Selection in Job Matching

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June 17, 2024

WORK IN PROGRESS - PRELIMINARY

Research Question and Roadmap

Research Question

What is the effect of costly screening procedures on self-selection into job applications and match quality?

- Motivation & Contribution
- Experimental Design, Institutional Setting & Descriptives
- Results

Motivation

- Screening tools used to acquire information about job candidates:
  - Coding tasks for a pre-doc position
  - Assessment centre for professional services job
  - Trial-shift for service jobs
- For a job applicant, screening procedures require effort and impose an opportunity cost of time, decreasing the net value of an application
- For a firm, trade-off between information gain from screening procedure vs (unknown) selection effects into applicant pool
  - Screening can be very low cost to employer (e.g. if online/automated)
- We aim to uncover the selection effects of screening procedures

Motivation: An Example

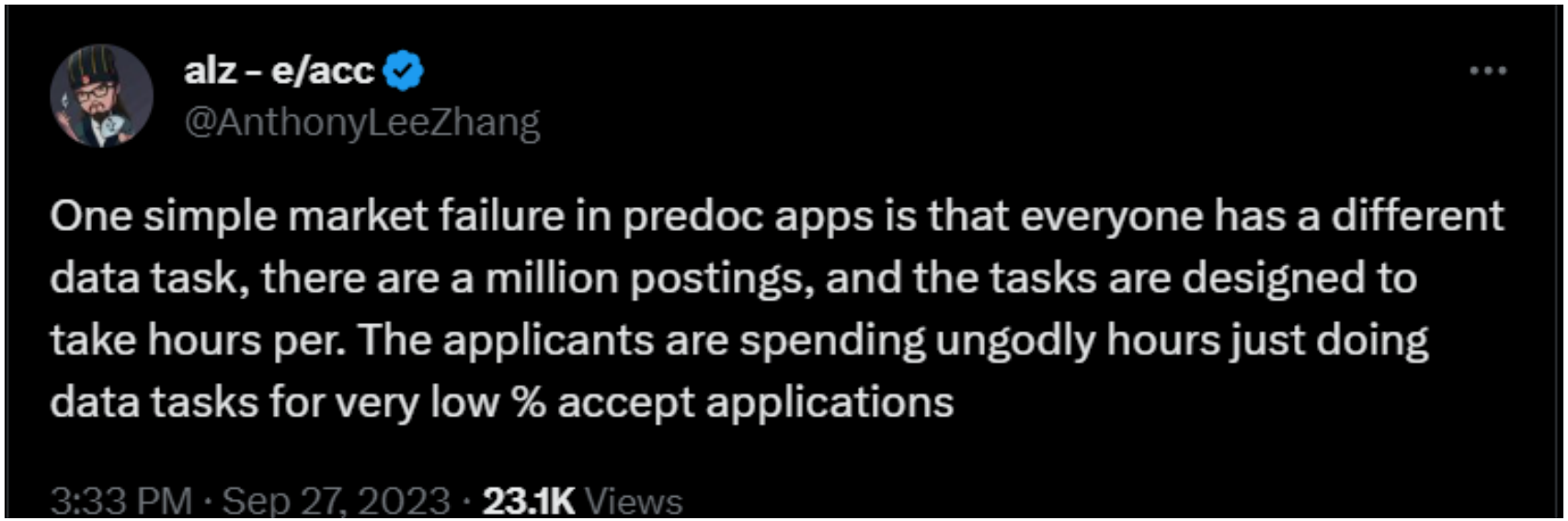

Figure: An Example from Anthony Lee Zhang (AP Chicago Booth)

Contribution to Literature

- Thick markets with low application costs lead to congestion externalities (Roth, 2018), inefficient matching (Arnosti, Johari, and Kanoria, 2021) and wasted effort (Kanoria and Saban, 2021). Online labour markets particularly susceptible to congestion.
  - Contribute by showing that the implementation of screening procedures acts as a positive friction
- Costs of applying can reduce take-up of beneficial social programmes (Bertrand et al., 2004) such as SNAP (Finkelstein & Notowidigdo, 2019). But they can also act as a screening device which deters those who are not in need of the programme (Besley & Coate, 1992; Nichols, Smolensky, & Tideman,1971; Kleven & Kopczuk, 2011)
  - Contribute by showing that screening procedures operate as an application cost in the labour market and alter self-selection behaviour
- Online labour markets are growing and account for as many as 154 million jobs (Datta et al., 2023). A literature has evolved studying information and matching (e.g. through intermediaries and social networks) in these markets (Pallais, 2014; Pallais and Sands, 2016; Pelletier & Thomas, 2018; Stanton and Thomas, 2016)
  - Contribute by studying how the implementation of employer screening can improve match quality
- Our experiment introduces an applicant screening procedure for an online job vacancy and varies the costs imposed on jobseekers to complete it
  - We vary the effort cost and opportunity cost of time required

Preview of Results

- Introducing employer screening causes large decreases in application rates, but increases in match quality
- The marginal effects of increasing the effort and opportunity costs of the screening procedure are relatively small
- Increasing the difficulty of the screening decreases application rates while increasing match quality, while increasing the opportunity cost of the application decreases application rates while decreasing the match quality
  - These effects are statistically weak and economically small
- Takeaway for design of 'optimal' screening procedures for employers: implementing a costly screening procedure is highly beneficial for the self-selection of jobseekers in the applicant pool. The design of the screening procedure is relatively less important than having one at all.

Experimental Setting: An Online Labour Market

- A 'natural field' experiment - our experimental participants are in their natural environment and do not know they are being observed
- Online matching platform called Prolific:
  - MTurk alternative with higher levels of oversight/regulation.
    - And better data quality Eyal, David, Andrew, Zak, and Ekaterina (2021)
  - Entrants are vetted before entry and removed from the website if failing to meet standards for quality (e.g. complaints made from other side of market)

Experimental Design

- Online posting for a study on 'work history and preferences'
  - Implemented via Qualtrics
  - We collect baseline individual demographics
  - We implement a Raven's test to measure ability
  - We collect info on work history and preferences
- At the end, invitation to apply for a future job (data-entry)
- Cost of applying is randomised
  - Separation between effort and opportunity costs of application
- Invite all applicants to complete the gig, measuring ability/match quality

Experimental Design: Flowchart

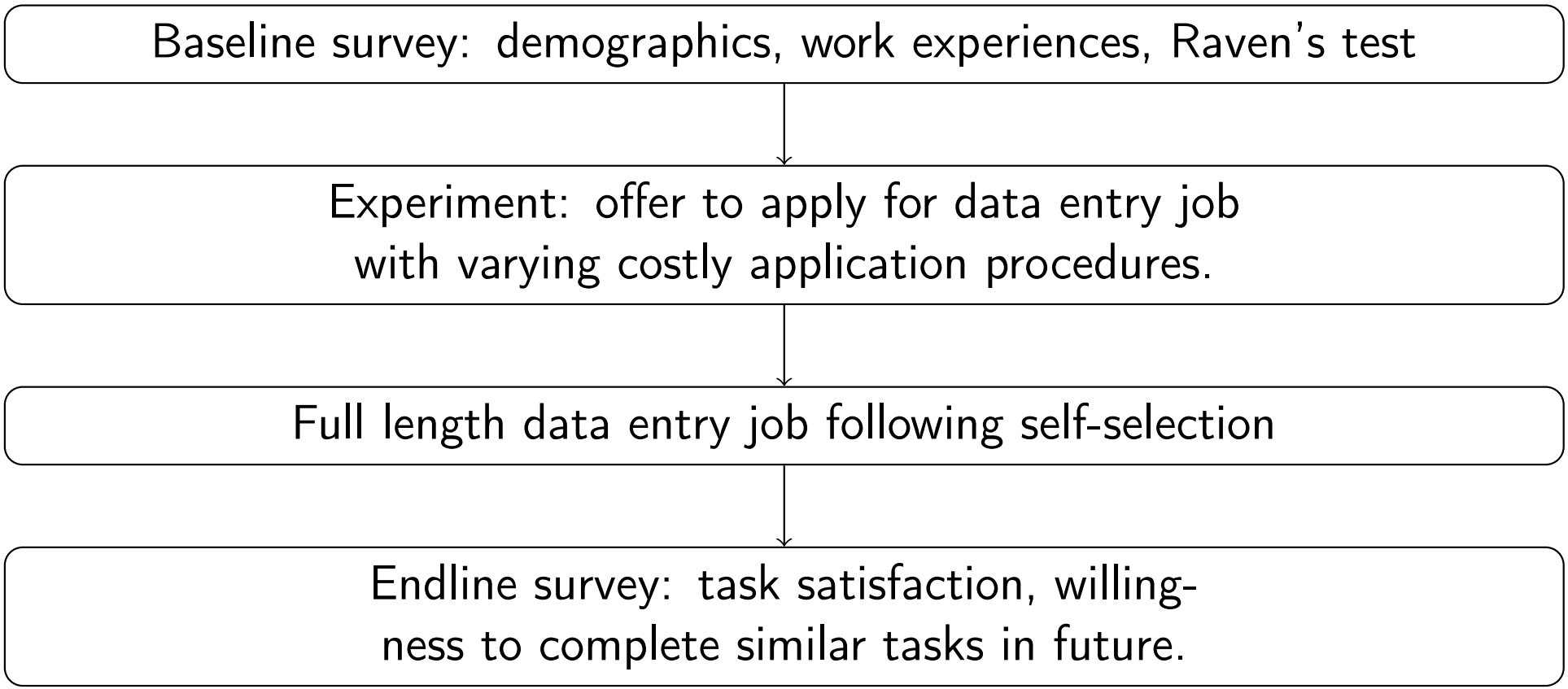

Figure: Sequence Data Collection and Experiment

Experimental Design: Identification

- To identify the effects of opportunity costs in applications:
  - Hold constant the task effort
  - Vary time needed to complete application task
- To identify the effects of effort costs in applications:
  - Hold constant the task time
  - Vary the difficulty of the task
- Task variation: watching video (easy) vs trial-run data digitisation (difficult)
- Time variation: 1 minute, 3 minutes or 5 minutes.
- The full-length job ("gig") we recruit for takes 20 minutes

Experimental Design: 'The Gig'

- Entering the names of municipalities and the local workforce statistics
  - Has some portability outside of experimental environment

CUADRO 40

Población de 12 años y más por situación en la fuerza de trabajo y sexo según municipios y parroquias

MUNICIPIOS Y PARROQUIAS	TOTAL			POBLACION EN LA FUERZA DE TRABAJO				POBLACION INACTIVA		NO DECLARADO
				OCUPADA		DESOCUPADA				
	TOTAL	VARONES	HEMBRAS	VARONES	HEMBRAS	VARONES	HEMBRAS	VARONES	HEMBRAS	
ESTADO...APURE	179.925	93.403	86.522	51.860	15.510	7.528	2.897	32.276	66.590	3.264
MUNICIPIO AUTONOMO ACHAGUAS. . .	26.025	13.615	12.410	6.928	1.525	1.036	322	5.423	10.386	405
MUNICIPIO AUTONOMO ACHAGUAS. . .	12.639	6.400	6.239	3.424	1.047	545	210	2.285	4.878	250
MUNICIPIO FORANEO APURITO. . . .	2.571	1.359	1.212	553	111	118	30	664	1.047	48
MUNICIPIO FORANEO EL YAGUAL. . .	2.531	1.362	1.169	458	62	100	12	795	1.089	15
MUNICIPIO FORANEO GUACHARA . . .	1.941	1.053	888	227	76	105	24	717	786	6
MUNICIPIO FORANEO MUCURITAS. . .	2.607	1.354	1.253	637	150	150	43	540	1.037	50
MUNICIPIO FORANEO QUESERAS DEL MEDIO	3.736	2.087	1.649	1.629	79	18	3	422	1.549	36
MUNICIPIO AUTONOMO BIRUACA . . .	15.975	8.225	7.750	4.978	1.457	462	251	2.592	5.856	379
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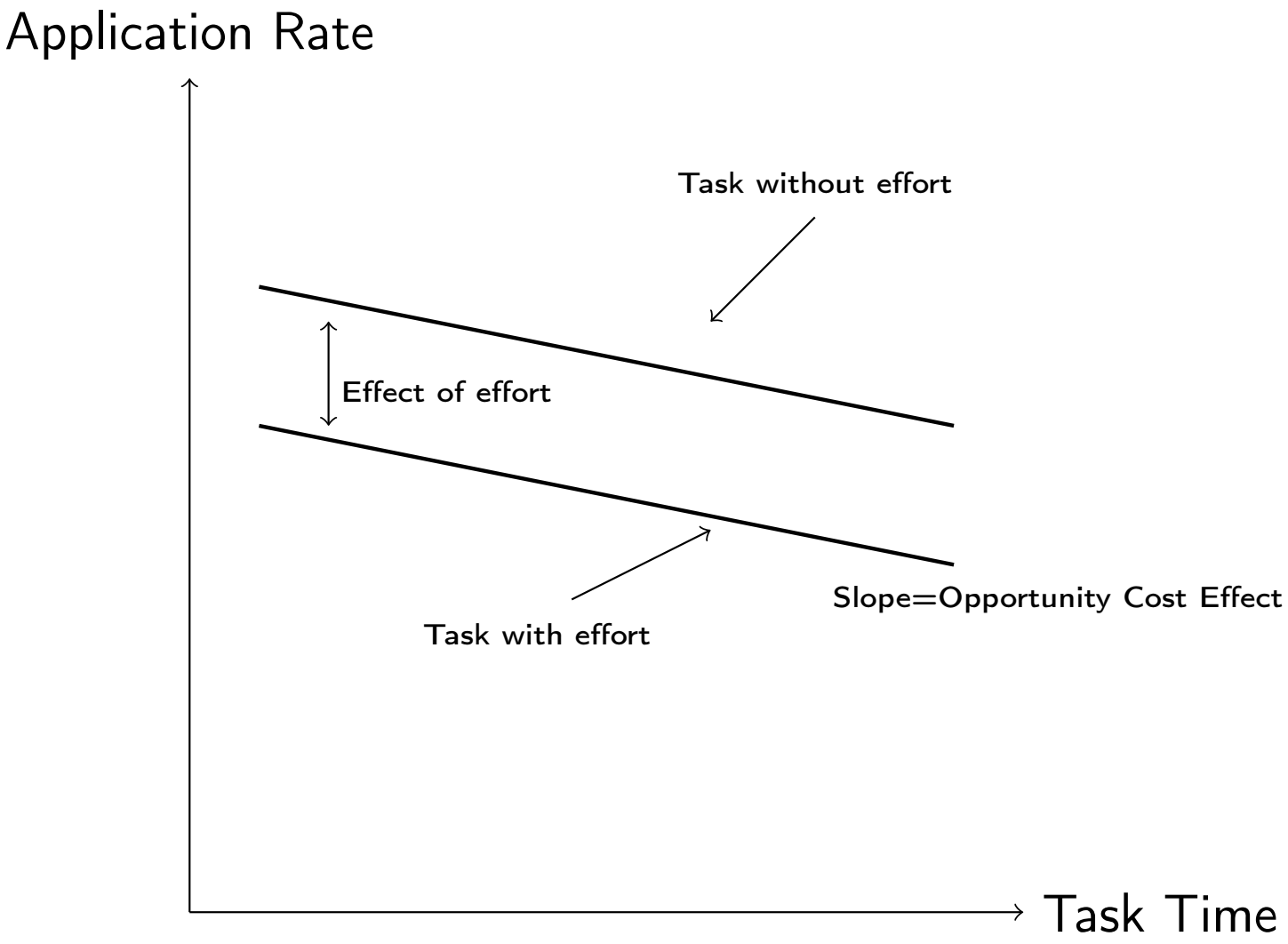
Location	Workforce (All)	Workforce (Men)	Workforce (Women)	Employed (Men)	Employed (Women)	Unemployed (Men)	Unemployed (Women)

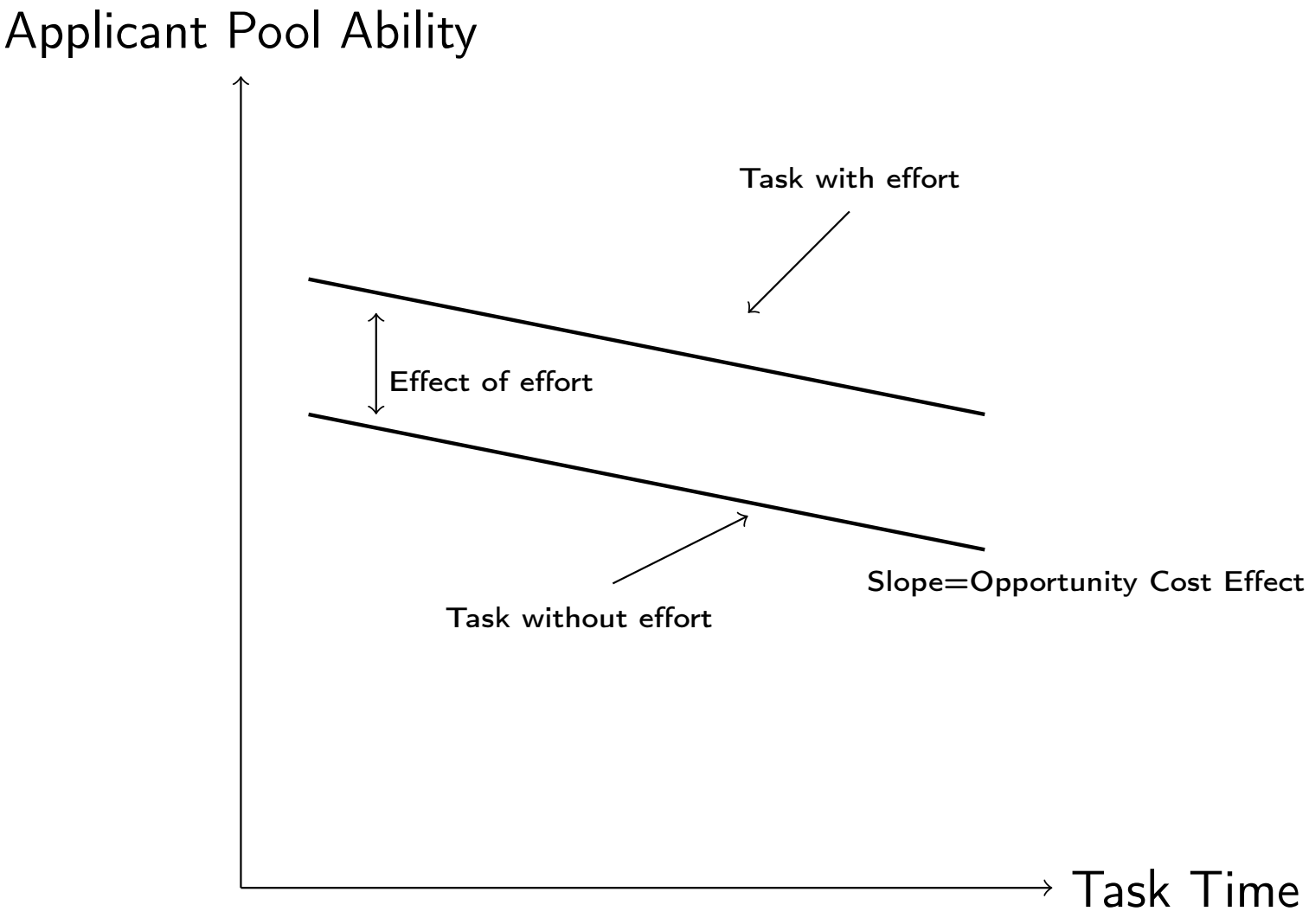
Add Row

Figure: The Task

Identification Intuition



Identification Intuition



Experimental Setting: Our Sample

- We invite 3,470 individuals to apply for a short term 'gig' job
- Stratified sample to balance gender
- Only invited English-speaking workers located in US
- Median age is 35 and 58% hold a university degree
- 80% are employed outside of Prolific, of which 38% are looking for work in addition to their main job

Results: Effects of Employer Screening

- Screening procedures significantly improve matching efficiency

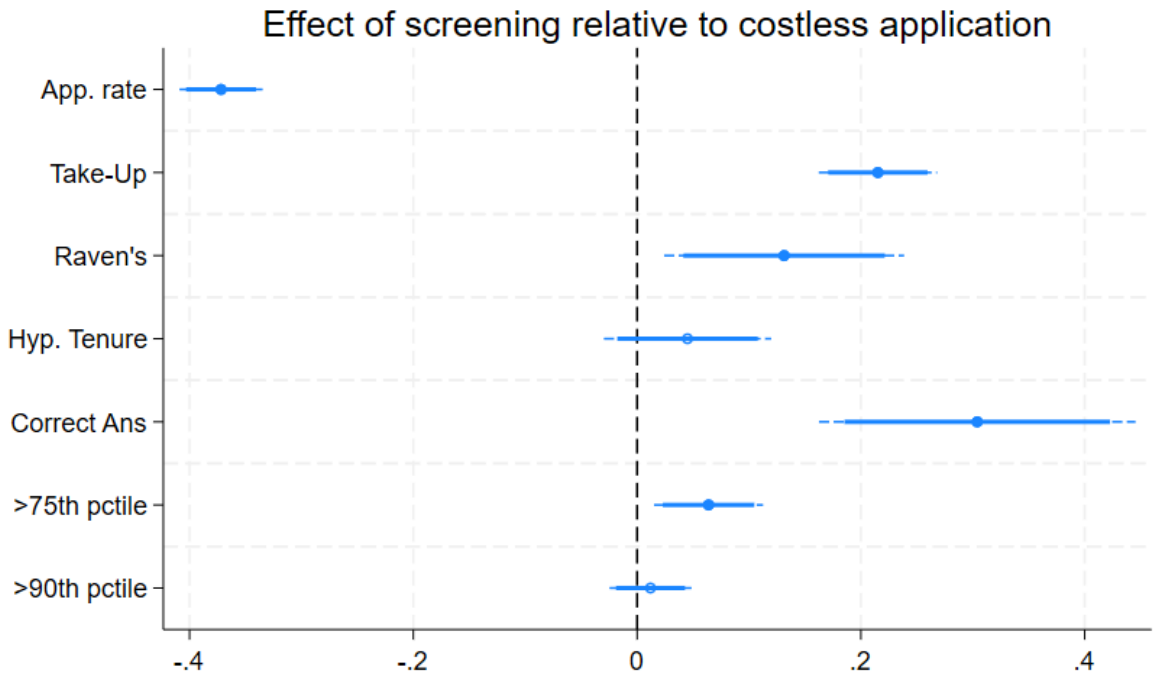


Figure: Grouped Effects of Employer Screening

Notes: The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity.

Results: Effort and Opportunity Costs of Screening

- Application rates are lower as the screening difficulty increases and as the opportunity cost of time increases
- Real performance in job is higher when the screening task difficulty increases, and when the opportunity cost of time decreases
- Average ability and top-end ability (measured by Raven's Score) is higher when the screening task difficulty increases, with ambiguous effects from opportunity cost of time
- Take-up of job offers is higher for the more difficult task and increases with opportunity cost of application time

Results: Application Rates

- Reducing application rates without sacrificing match quality is an improvement to the search and match process
- Less wasted effort on both sides

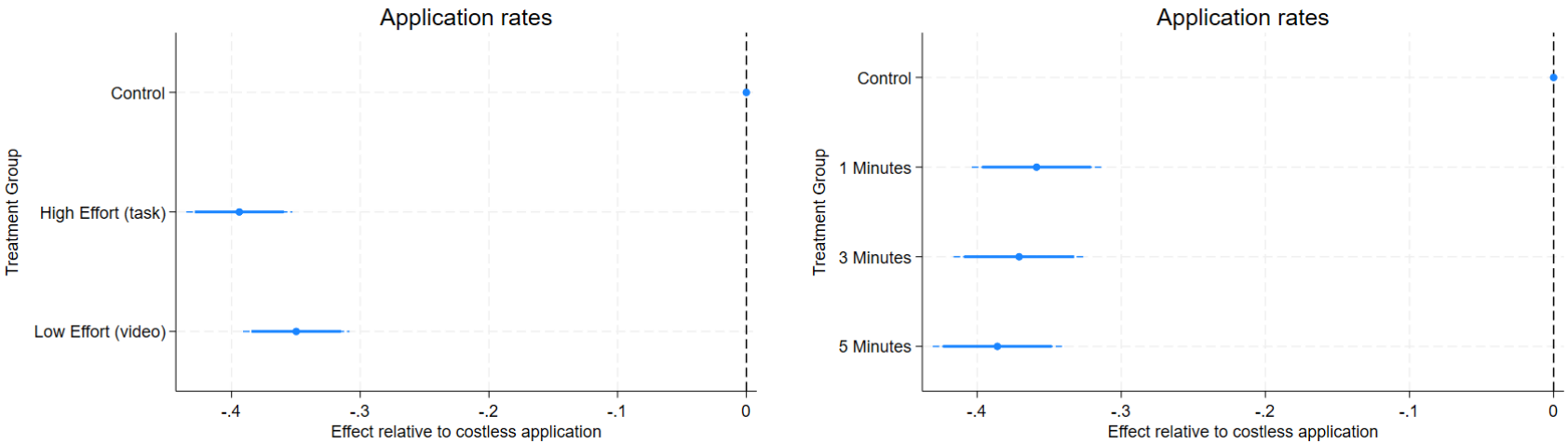


Figure: Application Rates

Notes: The sample size is 3,470. The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity. Control mean: 0.821

Results: Take-Up

- Take-up of job offers not a given in online (Pallais, 2014; Pallais and Sands, 2016) or offline (Burks, Cowgill, Hoffman, and Housman, 2015) labour markets

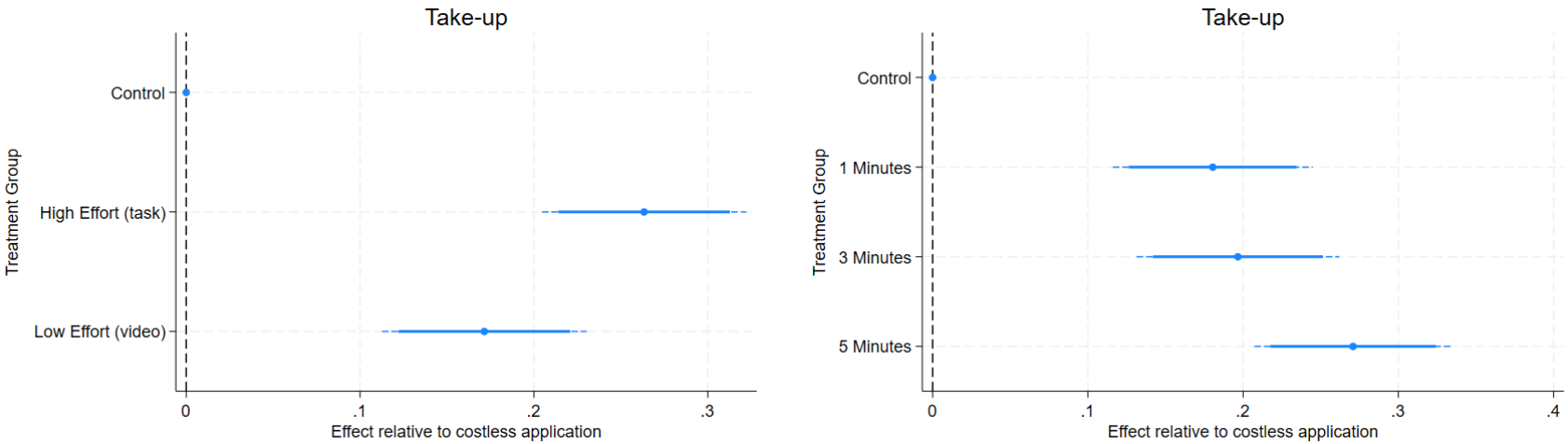


Figure: Take-Up Rates

Notes: The sample size is 1,754. The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity. Control mean: 0.41

Results: Real Performance (Ability)

- Performance in the job is the ultimate outcome of interest for employers Real Performance Alternatives

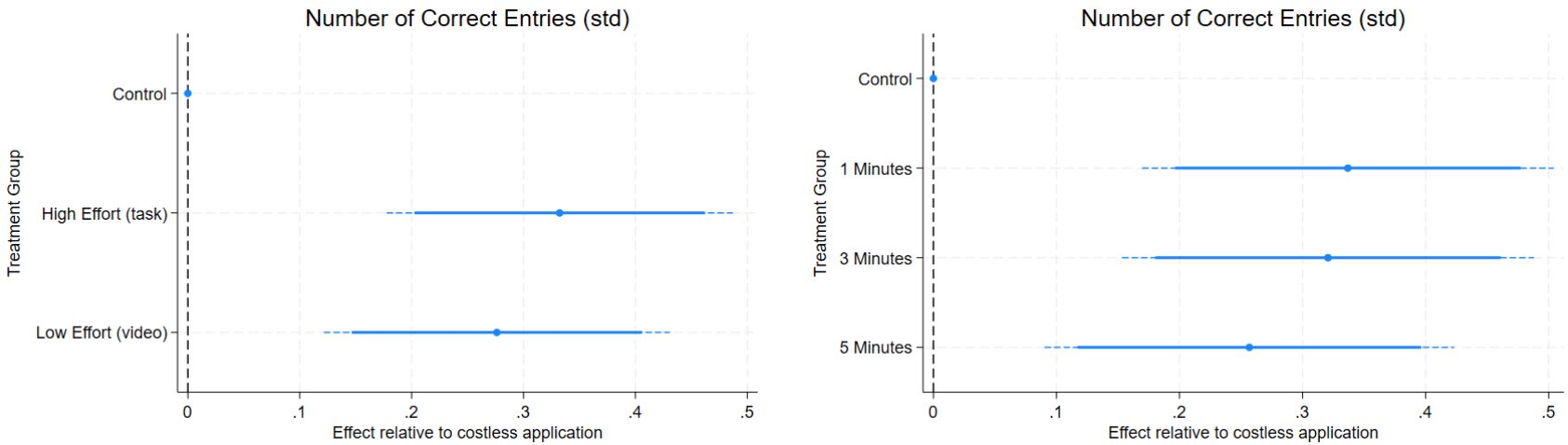


Figure: Job Performance

Notes: The sample size is 1,164. The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity. Control mean: 0

Results: Raven's Scores (Ability)

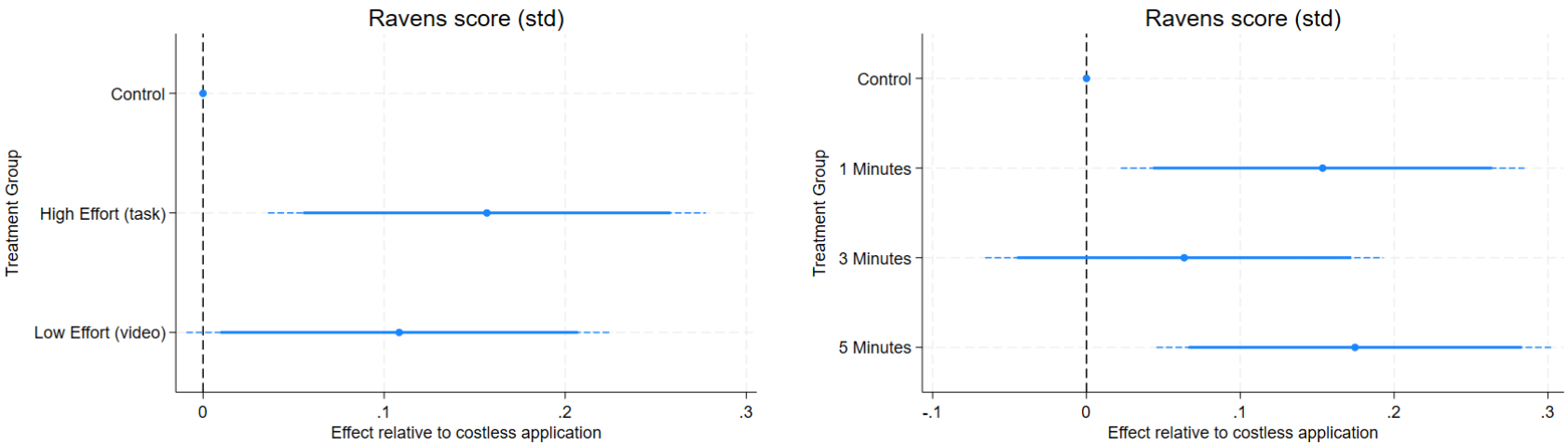


Figure: Worker Ability

Notes: The sample size is 1,754. The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity. Control mean: 0

Results: Top-end Ability

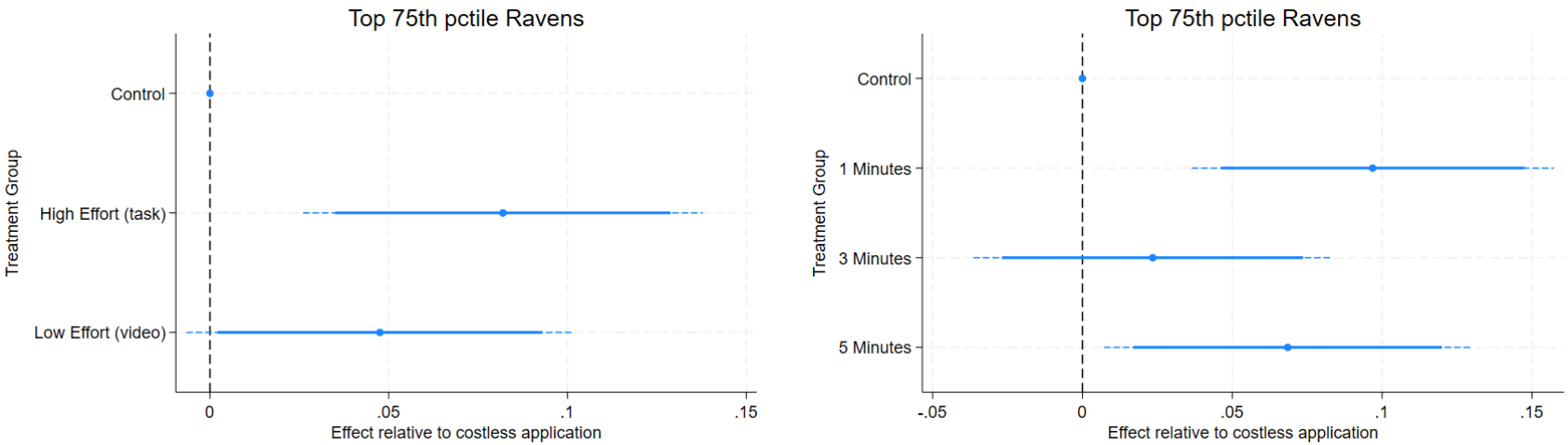


Figure: Top end Worker Ability

Notes: The sample size is 1,754. The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity. Control mean: 0.27

Results: Top-end Ability

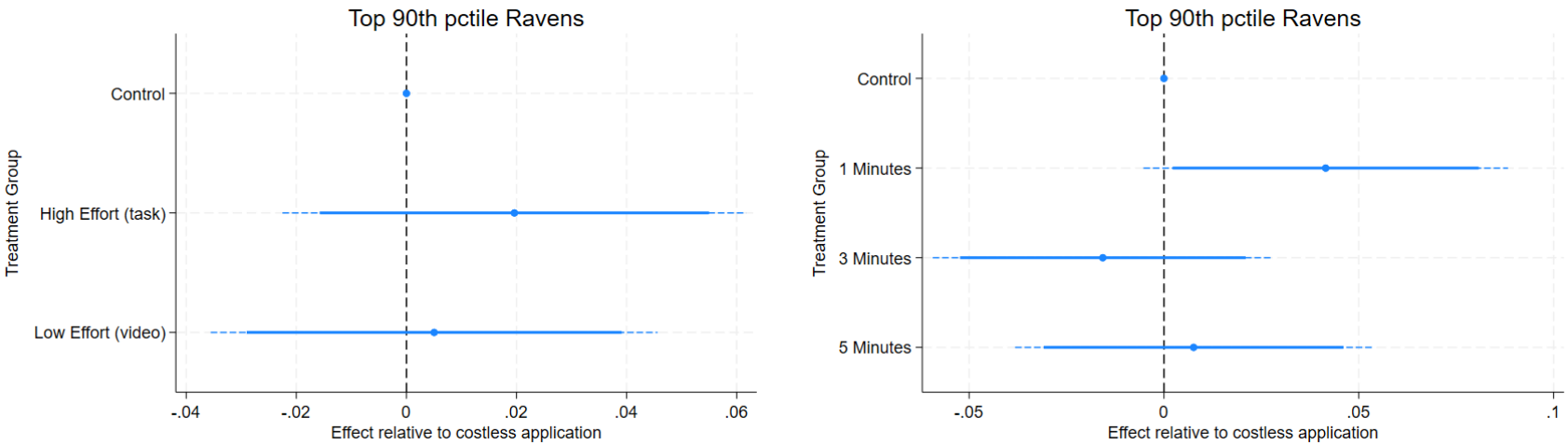


Figure: Top end Worker Ability

Notes: The sample size is 1,754. The specification includes a control for gender and fixed-effects for the experiment wave. The solid bar gives the 90% confidence interval while the dashes extend this to the 95% confidence interval. Standard errors are robust to heteroskedasticity. Control mean: 0.13

Selection on Self-Selection or Selection on Observables?

	Worker Ability				
	(1)	(2)	(3)	(4)	(5)
Pooled Treatment	0.131**				
	(0.05)				
Degree Holder		0.091			
		(0.10)			
Data Entry Experience			0.201**		
			(0.10)		
Grad Degree Holder				0.123	
				(0.13)	
Data Expert					0.118
					(0.16)
p-values:					
$\beta = \beta_{sel}$:		0.73	0.53	0.95	0.93
DV Control Mean:	0.000	0.000	0.000	0.000	0.000
Sample:	Full	Control	Control	Control	Control
N	1754	441	441	441	441

Table: Regression Results: Selection vs Selection on Observables

Notes: Robust standard errors are reported in parentheses. Worker ability is measured using the Raven's Progressive Matrices test score, normalised to have mean zero and standard deviation one among the control group of applicants. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Jobseeker Learning Mechanism

- Is this all self-selection?
  - It looks like some effects come from learning

	Application Rate	Offer Acceptance	Worker Ability	Task Performance
	(1)	(2)	(3)	(4)
Pooled Treatment	-0.345***	0.186***	0.042	0.211**
	(0.02)	(0.03)	(0.07)	(0.09)
Pooled Treatment * Inexperienced	-0.085**	0.088	0.263**	0.261*
	(0.04)	(0.06)	(0.12)	(0.15)
p-values:				
$\beta_{\text{pooled exp}} + \beta_{\text{pooled}} = 0$:	0.00	0.00	0.00	0.00
DV Control Mean:	0.821	0.410	0.000	0.000
N	3470	1754	1754	1164

Table: Regression Results: Jobseeker Learning

Conclusion

- We aim to uncover the effect of costly screening procedures on self-selection into job applications and match quality
- We run an experiment hiring people for a real short-term 'gig' job and find evidence that imposing employer screening improves match quality and decreases congestion
- The effort and opportunity costs of the screening requirement matter, but less than the 'fixed cost' of having any screening

Alternative Measures of Real Performance

	Correct Answers (std.)		Total Entries (std.)		Correct Entries w Lenience (std.)	
High Effort (task)	0.325***		0.341***		0.271***	
	(0.08)		(0.07)		(0.07)	
Low Effort (video)	0.270***		0.183*		0.175*	
	(0.08)		(0.07)		(0.08)	
1 Minutes		0.329***		0.257**		0.206*
		(0.08)		(0.08)		(0.08)
3 Minutes		0.314***		0.236**		0.221**
		(0.08)		(0.08)		(0.08)
5 Minutes		0.251**		0.289***		0.241**
		(0.08)		(0.08)		(0.08)
N	1164	1164	1164	1164	1164	1164

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table: Regression Results: Different measures of performance

Notes: All outcomes standardised to mean zero standard deviation of one.

Balance

	Control b/se	1 Min Task b/se	3 Min Task b/se	5 Min Task b/se	1 Min Vid b/se	3 Min Vid b/se	5 Min Vid b/se
Male	0.002	-0.009	0.009	-0.012	0.000	-0.003	0.012
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Employed	-0.030	0.018	-0.008	-0.013	0.028	0.040**	-0.037*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Non-White	-0.017	-0.007	0.035*	-0.007	0.011	0.004	-0.020
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age	-0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Degree Holder	-0.006	0.013	-0.012	0.009	0.026*	-0.021	-0.008
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Risk Aversion	-0.016*	-0.005	-0.004	0.004	0.015*	-0.003	0.009
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Patience	0.001	0.013*	-0.003	0.001	-0.009	-0.006	0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N	3421	3421	3421	3421	3421	3421	3421

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table: Balance Test

Notes: Some observations are missing in cases where job applicants chose "Prefer Not to Say" such as for their age or employment status.