How do employers use compensation history: Evidence from a field experiment

West Coast Economic Association

July, 2019

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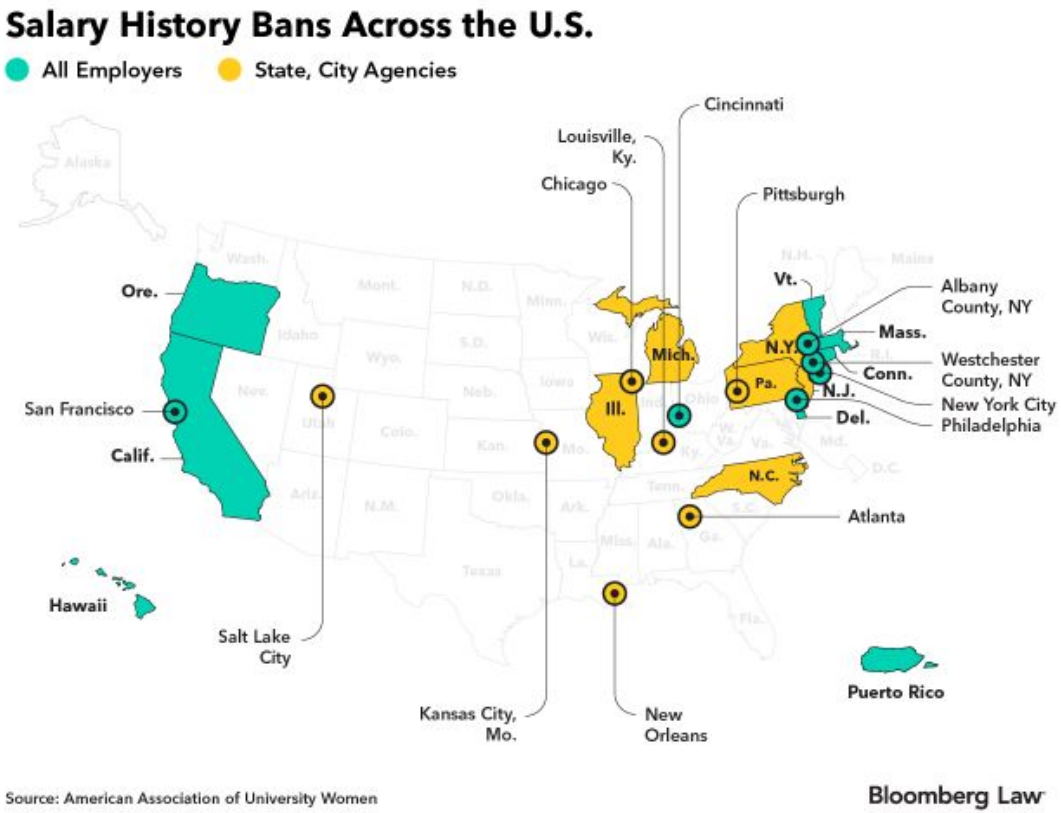
Carlson School of Management

More and more municipalities are banning employers from using past wages in hiring. . .

- Half of workers report current employer learned their wages from prior job (Hall & Krueger, 2012)
- >80% of workers report current employer learned wages prior to extending an offer (Barach & Horton survey, 2016)
- Public concern over path dependence in wages and use of this information in job screening



Congress Considers Nationwide Ban on Salary-History Questions

Bill would provide more remedies for sex-based pay discrimination

By Lisa Nagele-Piazza, J.D., SHRM-SCP
February 15, 2019

. . . Yet, business opposition to these laws is still high.

"In order to attract and retain them [educators] we need the ability to ask applicants about their salary history." - San Jose Unified School District

"It effectively eliminates an employer's ability to negotiate wage, as well as creates a new reason to sue." - The Western States Trucking Association

Research question

How does the absence of wage history information change the hiring process?

Theory

Scholarship highlights the importance and effects of signal substitution in hiring, yet mostly ignores endogenous information acquisition.

- Most empirical work on the role in information in hiring has come from audit studies and highlights the importance of signal substitution (Goldin & Rouse, 2000; Bertrand & Mullainathan, 2004; Autor & Scarborough, 2008; Dobbie et al. 2019)
- Recent work highlights the potential downside of signal substitution (Henry & Jacobs, 2007; Starr, 2017; Doleac & Hansen, 2018)
- Endogenous information acquisition has been overlooked in extant empirical work, yet has a long history in labor theory (Mortensen 1970; McCall 1970; Mortensen and Pissarides, 1999)

Research question revisited

How does the absence of wage history information change ~~the hiring process?~~

1) the extent and intensity of information acquisition by employers?
2) the attributes of the workers evaluated and ultimately hired?
3) whether employers made a hire?
4) wage bargaining?
5) the match quality, if a hire was made?

Context: Online labor market

Who?
77% of jobs are posted by a business
80% of jobs have 1-10 full time employees
50% have revenue over $100k/year
90% have revenue under $5M/year

What?
Remote Tasks: computer programming, graphic design, data entry, research, and writing

Where?
Top Employers: US, UK, France, Germany, Israel
Top Employees: US, Philippines, Russia, Bangladesh, UK

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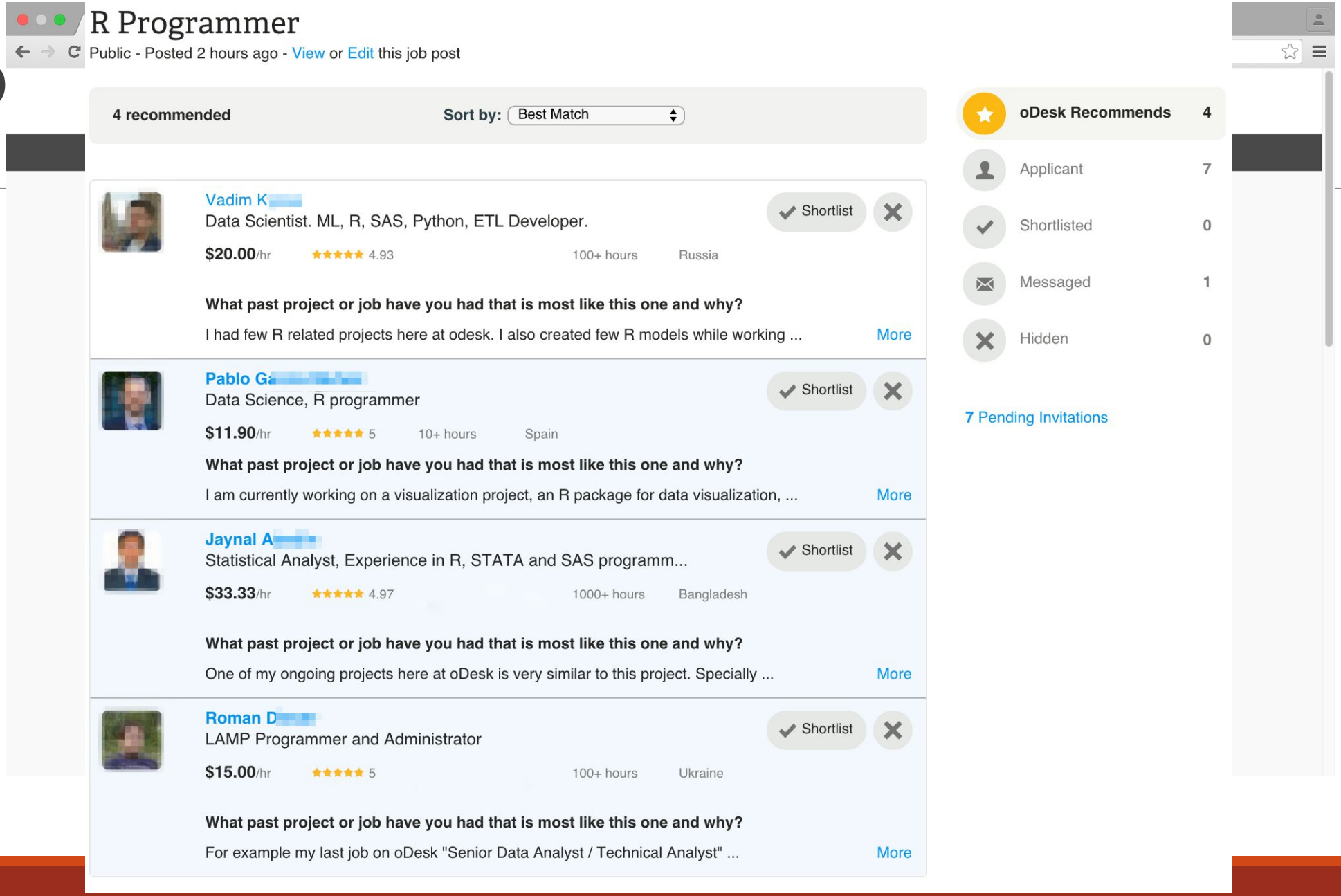
R Programmer
Public - Posted 2 hours ago - View or Edit this job post
4 recommended
Sort by: Best Match
Vadim K
Data Scientist. ML, R, SAS, Python, ETL Developer.
$20.00/hr 4.93 100+ hours Russia
What past project or job have you had that is most like this one and why?
I had few R related projects here at odesk. I also created few R models while working ... More
Pablo G
Data Science, R programmer
$11.90/hr 5 10+ hours Spain
What past project or job have you had that is most like this one and why?
I am currently working on a visualization project, an R package for data visualization, ... More
Jaynal A
Statistical Analyst, Experience in R, STATA and SAS programm...
$33.33/hr 4.97 1000+ hours Bangladesh
What past project or job have you had that is most like this one and why?
One of my ongoing projects here at oDesk is very similar to this project. Specially ... More
Roman D
LAMP Programmer and Administrator
$15.00/hr 5 100+ hours Ukraine
What past project or job have you had that is most like this one and why?
For example my last job on oDesk "Senior Data Analyst / Technical Analyst" ... More
Shortlist
oDesk Recommends 4
Applicant 7
Shortlisted 0
Messaged 1
Hidden 0
7 Pending Invitations

R Programmer

Public - Posted 2 hours ago - View or Edit this job post

4 recommended Sort by: Best Match

Vadim K
Data Scientist. ML, R, SAS, Python, ETL Developer.
Shortlist
$20.00/hr ★★★★★ 4.93 100+ hours Russia

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oDesk Recommends 4
Applicant 7
Shortlisted 0
Messaged 1
Hidden 0

7 Pending Invitations

Detailed Applicant History.

Profile Overview

Control Employer

I have 3+ years experience working with data.
ETL Developer: SQL, SAS DI, Talend, Oracle DB, GreenPlum DB, PostgrSql, Hadoop, Hive, Pig.
…t: R, SAS, Python, Machine Learning, D3.js, Spark.

I have 4+ years previous experience on developing web applications using PHP, JavaScript, AJAX.
Databases: MySQL, Postgresql.
Frameworks: JQuery, Code Igniter.
CMS: MODx, Wordpress.

Recent Work History & Feedback

Newest first

Ongoing R script development (JSON etc)

Job in progress

$150.00 earned
Fixed Price
Feb 2015 - Present

Lead data scientist

Job in progress

21 hours
$17.00 /hr
$357.25 earned
Dec 2014 - Present

R script to count wins/draws/losses from chess db

★★★★★ **5.00**
$50.00 earned
Fixed Price
Feb 2015

Help with using R and RStudio

"Good job."

★★★★★ **5.00**
1 hour
$18.00 /hr
$12.00 earned
Feb 2015

Experimental design.

PAST WAGES AVAILABLE

CONTROL EMPLOYER

Job Title: Lead data scientist

Contract Type: Hourly

Hourly Wage: $17.00

Total: $451.34

Time: December 2014 - present

PAST WAGES **NOT** AVAILABLE

TREATMENT EMPLOYER

Job Title: Lead data scientist

Contract Type: Hourly

Total: $451.34

Time: December 2014 – present

Experimental Details

The treatment level was the employer.

Treated employers could no longer observe recent hourly wage (measure of marginal productivity)

Ran on oDesk.com during September 2014

5,922 unique employers

- 2,948 assigned to control posted 4,661 job openings
- 2,974 assigned to treatment posted 4,815 job openings

Randomization was effective and the samples were well-balanced with respect to pre-randomization employer characteristics.

Balance

Balance Table of Employer, Job Posting, and Applicant Characteristics

	Control mean: $\bar{X}_{CTL}$	Treatment mean: $\bar{X}_{TRT}$	Difference In Means	p-value	
Employer Attributes					
Prior Job Postings	23.49 (0.90)	23.98 (0.95)	0.49 (1.31)	0.71	
Prior Billed Jobs	10.71 (0.43)	11.29 (0.46)	0.58 (0.63)	0.35	
Prior Spend by Employers	5643.10 (312.83)	6053.35 (328.90)	410.25 (453.99)	0.37	
Num Prior Contractors	10.84 (0.46)	11.73 (0.65)	0.89 (0.80)	0.27	
Avg Feedback Score of Employer	4.81 (0.01)	4.79 (0.01)	-0.03 (0.02)	0.09	*
Num of Reviews of Employer	8.05 (0.40)	8.84 (0.59)	0.79 (0.71)	0.27	
Job Posting Attributes					
Number non-invited Applicants	33.62 (0.80)	33.44 (0.74)	-0.18 (1.09)	0.87	
Avg Best Match Score	0.36 (0.00)	0.36 (0.00)	0.00 (0.00)	0.41	
Avg Bid	12.76 (0.17)	12.60 (0.17)	-0.16 (0.24)	0.52	
Prefered Experiance in Hours	33.69 (2.43)	34.25 (2.37)	0.56 (3.40)	0.87	
Estimated Job Duration in Weeks	17.19 (0.39)	16.93 (0.39)	-0.26 (0.55)	0.63	
Applicant Attributes					
Tenure in Days	868.58 (1.98)	866.48 (2.75)	-2.10 (3.39)	0.53	
Hours Worked to Date	1206.39 (8.32)	1199.51 (11.51)	-6.87 (14.20)	0.63	
Num Past Jobs Worked	33.51 (0.19)	33.72 (0.28)	0.21 (0.34)	0.53	
Past Hourly Earnings	9815.27 (87.68)	9707.77 (121.50)	-107.50 (149.83)	0.47	
Past Fixed Wage Earnings	2035.82 (17.94)	2028.27 (25.69)	-7.55 (31.33)	0.81	
Num Prior Employers	25.74 (0.13)	25.94 (0.19)	0.19 (0.24)	0.41	
Wage Bid	11.01 (0.07)	10.96 (0.10)	-0.05 (0.12)	0.66	
Profile Wage	10.71 (0.06)	10.66 (0.08)	-0.05 (0.10)	0.61	
Min Hr. Wage (6 months)	6.95 (0.04)	6.91 (0.06)	-0.04 (0.07)	0.56	
Avg Hr. Wage (6 months)	8.48 (0.05)	8.44 (0.07)	-0.04 (0.09)	0.65	
Max Hr. Wage (6 months)	10.58 (0.06)	10.55 (0.09)	-0.02 (0.11)	0.84	

Notes: This table reports means and standard errors across experimental groups of employer, job posting, and applicant characteristics. The Top Panel reports characteristics of employers allocated to treatment and control. The middle panel reports characteristics of job postings by treatment and control groups for the first job posted after allocation to the experiment for each employer. The bottom panel reports characteristics of employers at the time they were allocated to treatment or control groups. The bottom and top 1% by average historical wage were dropped. Reported p-values are the for two-sided t-tests of the null hypothesis of no difference in means across groups. In the bottom panel, standard errors are clustered at the employer level. Significance indicators: $p \leq 0.10 : *$, $p \leq 0.05 : **$ and $p \leq .01 : ***$.

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Hiring funnel and summary statistics

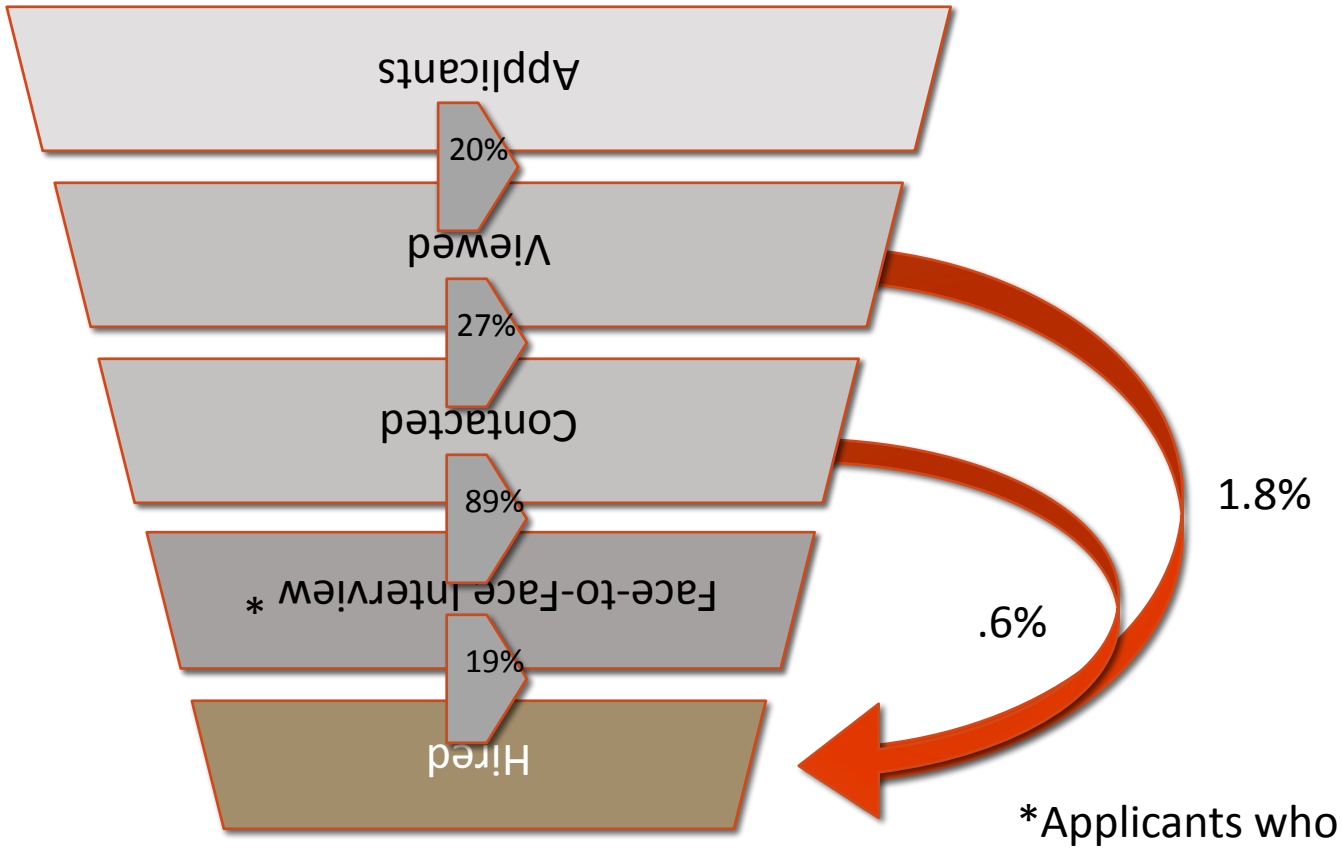
33.69 /Job

6.67 /Job

1.79 /Job

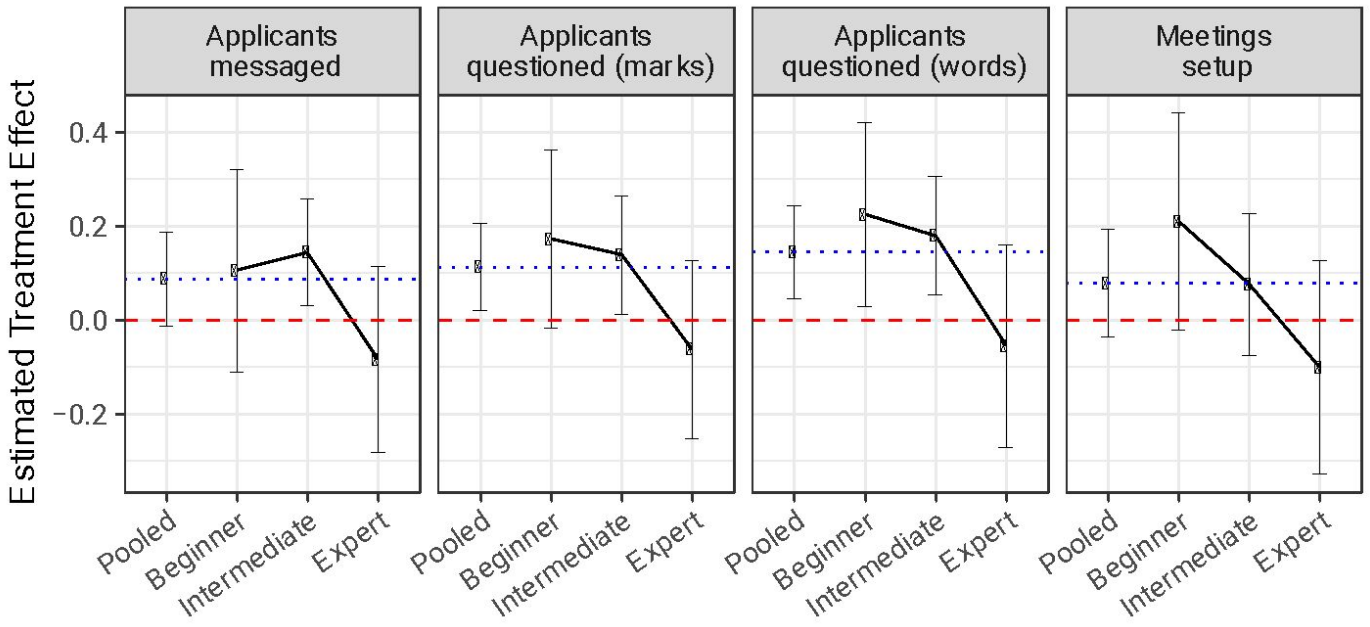
1.59 /Job

0.43 /Job



*Applicants who are questioned or asked for skype ID

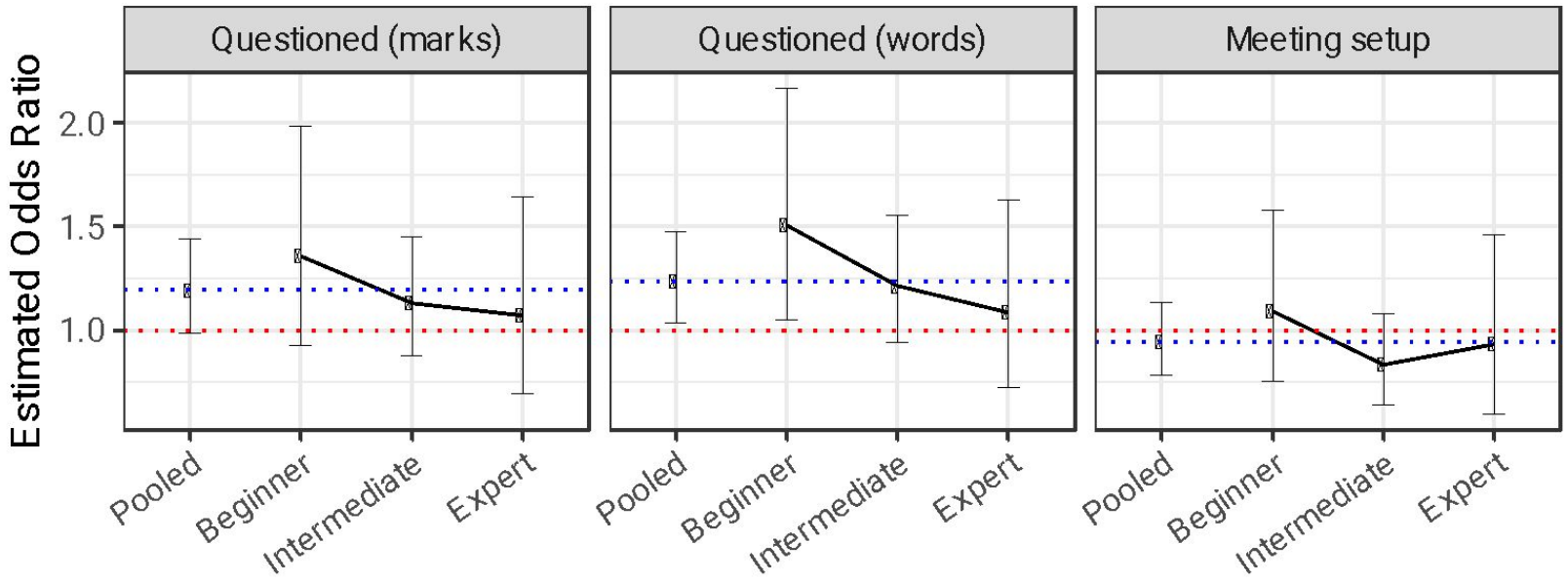
Hiding past wages increases employer information acquisition …



- **Treated employers called-back 8.9% more applicants.**
- **Asked 12.1% more applicants questions.**
- **Invited 8.2% more applicants to face-to-face interviews.**

- Results from job-posting level poison model, controlling for category, prior jobs billed, employer prior spend, number of applications to job, number of recommended applications, average bid, indicator if job requires special skills.

...and [to some extent] intensity of employer information acquisition.



- **Message-threads from treated employer where 1.2 times as likely to ask a question,**
- **But no more likely to set up an interview.**

- Results from messaged applicant level logit model, controlling for category, prior jobs billed, employer prior spend, number of applications to job, number of recommended applications, applicant's bid, applicant's tenure, applicant's experience, and applicant's prior feedback.

Characteristics of messaged applicants do not differ . . .

	Control	Treatment	Difference	% Change
Characteristics of called-back (i.e., messaged) applicants				
	N = 6,530	N = 6,725		
Bid amount	12.85 (0.33)	12.40 (0.29)	-0.46 (0.44)	-3.55
Profile wage rate	12.86 (0.30)	12.36 (0.26)	-0.50 (0.40)	-3.86
Avg 6-month wage	11.09 (0.29)	10.56 (0.25)	-0.53 (0.38)	-4.78
Min 6-month wage	8.93 (0.24)	8.53 (0.21)	-0.40 (0.32)	-4.51
Max 6-month wage	14.11 (0.40)	13.36 (0.31)	-0.76 (0.50)	-5.37
Previous hours worked	1107.33 (46.57)	1072.50 (36.68)	-34.84 (59.28)	-3.15
Prior billed jobs	27.62 (0.93)	26.73 (0.79)	-0.90 (1.22)	-3.24
Avg Feedback	4.70 (0.01)	4.71 (0.01)	0.00 (0.01)	0.08

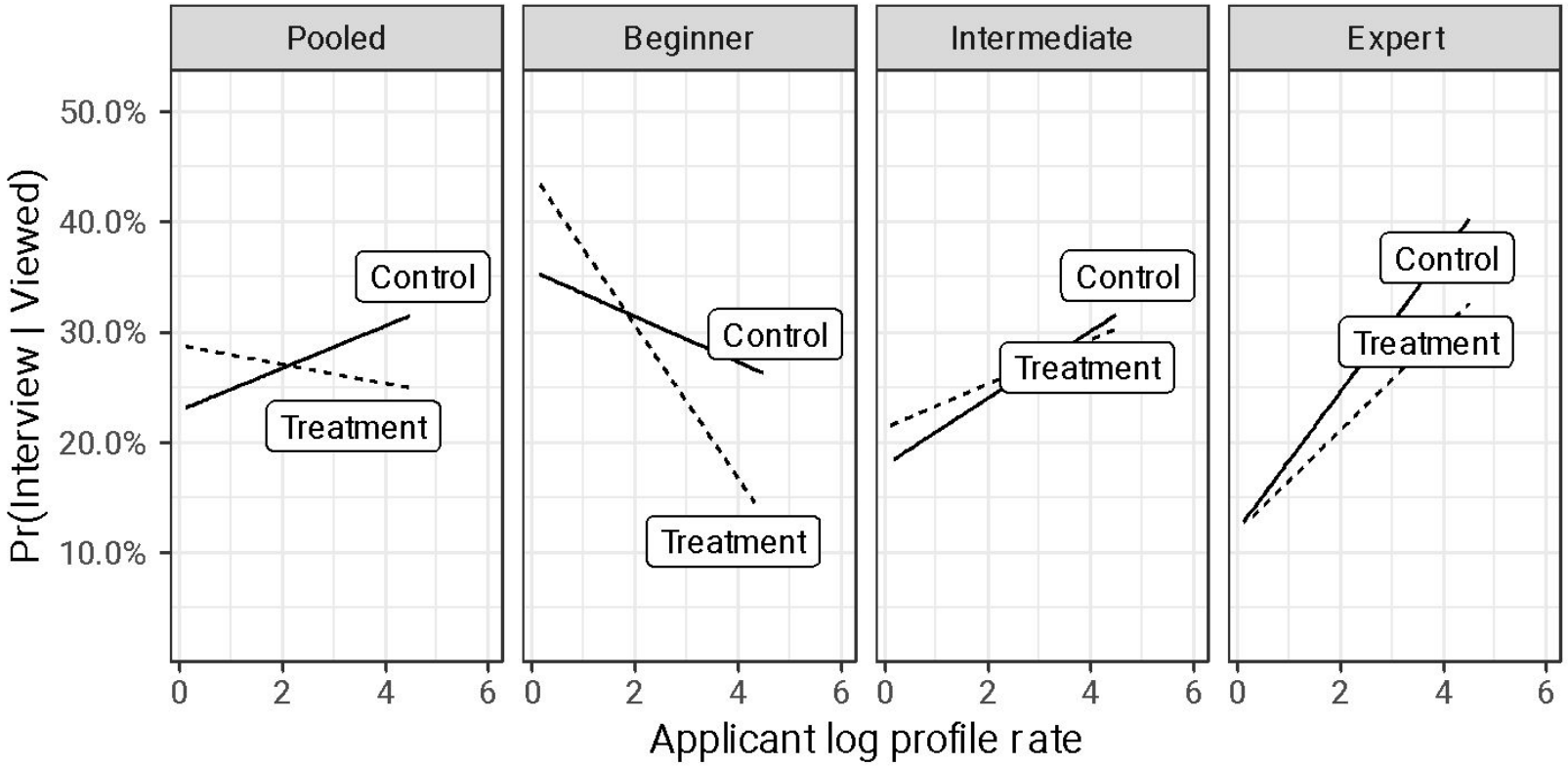
Notes: This table reports means errors across experimental groups. Next to each mean, standard errors are reported in parentheses. The "% Change" column is the percentage change in the treatment, relative to the control. Significance stars are calculated using p-values for a two-sided t-tests of the null hypothesis of no difference in means across groups. Significance indicators: $p \leq 0.05 : *$, $.p \leq 0.01 : **$ and $p \leq .001 : ***$.

Bargain Hunting

Treatment induced bargain hunting.

- In ‘beginner’ and ‘intermediate’ tiers call-back probability shifts towards lower wage applicants.
- In the ‘expert’ tier we simply see less messaging of most expensive applicants.

Probability of call-back on applicant profile wage rate



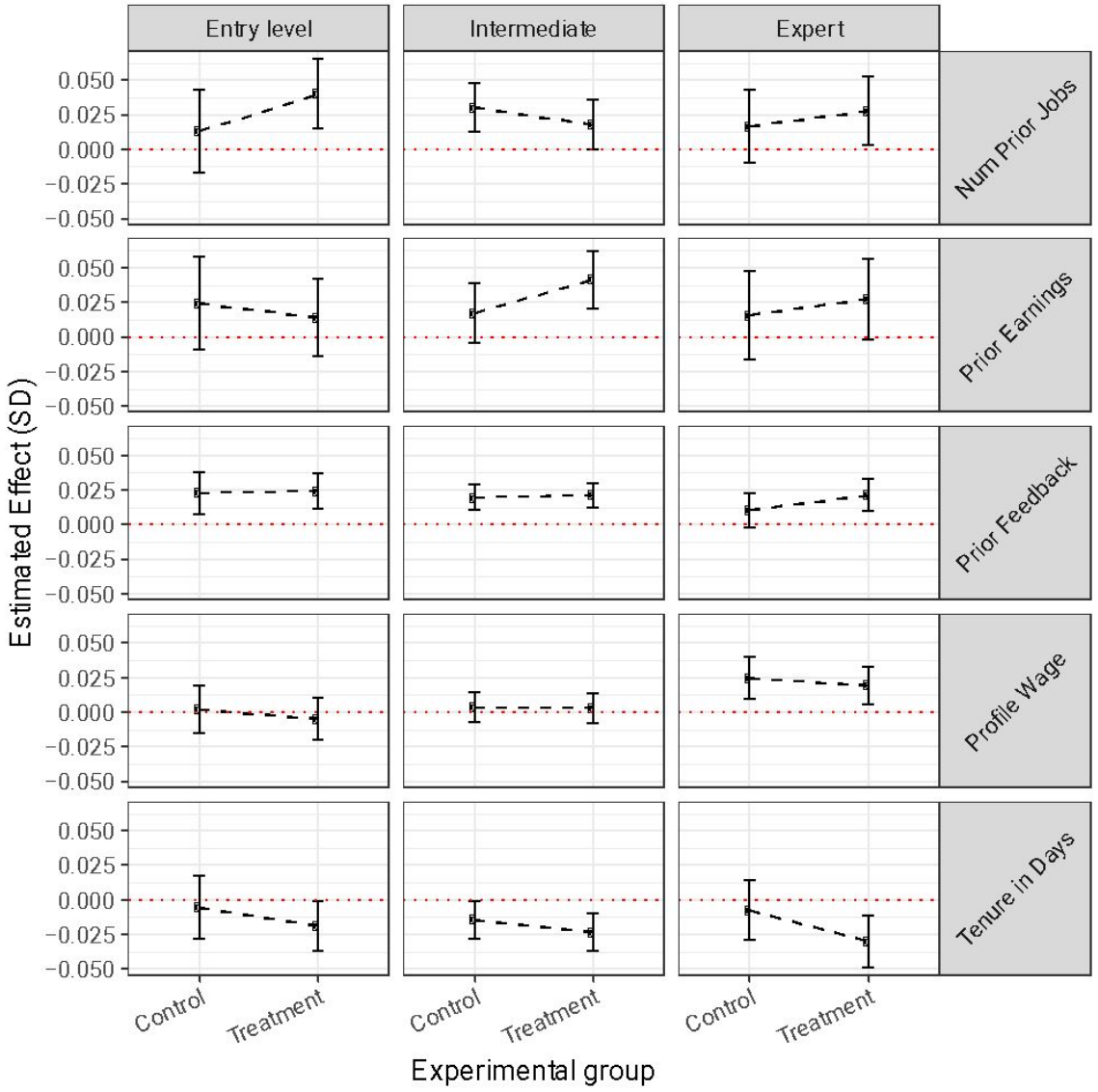
Signal Substitution

Employers value prior jobs, prior earnings, and prior feedback.

Employers do not place high value on profile wage rate.

Across all analyzed ‘signals 'but tenure there does not seem to be any significant shift in weighting of signals.

Applicant characteristics on probability of call-back



. . . but hiding past waged increased hire-rate and shifted hiring toward cheaper applicants

	Control	Treatment	Difference	% Change
Job opening outcomes				
Hire made?	0.40 (0.01)	0.43 (0.01)	0.03 (0.01)**	7.23
Characteristics of hired applicants				
	N = 1,520	N = 1,744		
Bid amount	11.77 (0.35)	10.53 (0.47)	-1.25 (0.58)**	-10.59
Profile wage rate	12.05 (0.34)	11.03 (0.48)	-1.02 (0.59)*	-8.47
Avg 6-month wage	10.33 (0.38)	9.00 (0.43)	-1.33 (0.57)**	-12.87
Min 6-month wage	8.36 (0.34)	7.10 (0.38)	-1.26 (0.51)**	-15.08
Max 6-month wage	13.11 (0.49)	11.71 (0.55)	-1.39 (0.74)*	-10.64
Previous hours worked	1140.67 (57.99)	1252.57 (85.72)	111.90 (103.49)	9.81
Prior billed jobs	35.90 (1.75)	34.33 (1.50)	-1.58 (2.30)	-4.39
Avg Feedback	4.72 (0.01)	4.71 (0.02)	-0.01 (0.02)	-0.20

Notes: This table reports means errors across experimental groups. Next to each mean, standard errors are reported in parentheses. The "% Change" column is the percentage change in the treatment, relative to the control. Significance stars are calculated using p-values for a two-sided t-tests of the null hypothesis of no difference in means across groups. Significance indicators: $p \leq 0.05 : *$, $.p \leq 0.01 : **$ and $p \leq .001 : ***$.

Hiding past wages shifts bargaining power towards [lower wage] applicants . . .

Effect of the treatment on the existence and outcomes of hired worker wage bargaining

	Dependent variable:		
	AnyBargaining	WageToBidRatio	
	(1)	(2)	(3)
Wage history hidden, WageHistHid	−0.005	0.089**	0.281**
	(0.016)	(0.043)	(0.122)
Applicant profile rate in logs (LPR)			0.008
			(0.034)
WageHistHid × LPR			−0.093*
			(0.054)
Constant	0.108***	0.836***	0.818***
	(0.012)	(0.029)	(0.083)
Observations	1,424	150	150

Notes: This table reports regressions where the outcomes are measures of bargaining. In Column (1), the outcome is whether any wage bargaining occurred. The sample is restricted to employers that made a single hire. In Columns (2) and (3), the outcome is the ratio of the realized wage to the initial wage bid. The sample for these two regressions are only those hires for which some bargaining ocurred. Heteroskedastic robust standard errors are reported. The top and bottom 5% of wage-to-bid ratios are dropped. Significance indicators: $p \leq 0.05 : *$, $p \leq 0.01 : **$ and $p \leq .001 : ***$..

- **Treated employers are no more likely to bargain over wages**
- **But when they do, the ratio of applicant's wage to the applicant's initial bid is 9% higher.**

. . . but has no measurable effect on employer outcomes

Effect of the treatment on employer's subjective measures of contract outcomes

	Dependent variable:					
	Feedback Left	log(Hours Billed)	Public Feedback (SD)	Private Feedback (SD)	Bonus Given	Rehired
	(1)	(2)	(3)	(4)	(5)	(6)
Wage history hidden	−0.002	−0.010	0.007	0.098	2.019	−0.003
	(0.021)	(0.077)	(0.067)	(0.061)	(4.909)	(0.015)
Constant	0.746***	2.603***	0.083	0.405***	−5.079	0.112
	(0.105)	(0.377)	(0.191)	(0.040)	(8.081)	(0.076)
Employer-level covariates	Yes	Yes	Yes	Yes	Yes	Yes
Assignment-level covariates	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,851	1,851	1,002	1,143	1,672	1,848

Notes: This table reports regressions where the outcome is a measure of the employer's subjective evaluation of the contract. The sample is restricted to fill job op where feedback was left. In Column (1) the outcome is an indicator if the employer left any public feedback. In Column (2) the outcome is the log of the number o billed on the job. In Column (3) the outcome is the z-score of public feedback score left by the employer on the employee's performance. In Column (4) the outc the z-score of the private feedback score left by the employer on the employee's preformace. In Column (5) the outcome is an indicator if the employer left the w bonus. In Column (6) the outcome is an indicator if the employer rehired the worker for a later job. Covariates included are category indicators, the number of pri the employer filled, and the number of prior jobs the employer and worker completed together, and total job billings. Significance indicators: $p \leq 0.05 : *$, $.p \leq 0.01 :$ $p \leq .001 : * * *$.

Winners & Losers among applicants

Notes: This figure shows the relationship between an applicants expected value from submitting a bid, and the treatment by the applicant's profile wage. The level of observation is the bid. Models all include an applicant level fixed effect. Heteroskedasticity-robust 95% confidence intervals are displayed.

Contributions

Employers use past wages as a screening shortcut for learning about productivity

- Information contained in salary history is a substitute for more/ more intense screening of applicants.

Banning past wages will increase search/ screening costs for employers but. . .

- Will lead to the hiring of more lower cost applicants
- Will lead to savings on wages
- Will shift bargaining power to applicants, and specifically lower wage applicants.

No evidence of worse job outcomes or undo burden on employers.
Evidence of these policies helping exactly who they are intended to help.

Thank you!

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