Job Search and Hiring

with Limited Information about Workseekers' Skills

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Presented by: Sai Zhang

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Outline

Introduction

Motivation

- *limited information* for **workseekers** in the labor market

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  - *interaction with other frictions* : high search cost and migration cost

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What	Who	Where
information treatment on workseekers' skills	*both* firms and disadvantaged workseekers	a developing country with inefficient labor markets

Roadmap

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information treatment on workseekers' skills

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- standardized *non-specialist* skill assessments

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- *firms*: how many certified applicants?

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	shareable	**no report**
	seeker + / eqbm +	0

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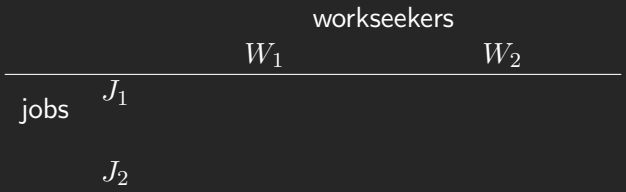
- **GE** implications: dynamic learning (Conlon et al., 2018; Donovan et al., 2018; Gonzalez and Shi, 2010)
- **policy** implications: the effectiveness of skill assessment certificates

  comparing with referrals (Beaman, Keleher, et al., 2018; Beaman and Magruder, 2012; Chandrasekhar et al., 2020) and performance evaluations (Abel et al., 2020; Pallais, 2014)

Context

Conceptual Framework



Conceptual Framework

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		W_1	W_2
jobs	J_1	$P_{1,1}$	$P_{2,1}$
	J_2	$P_{1,2}$	$P_{2,2}$

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A2 differential matching: 1-1 and 2-2 easy and optimal

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- higher C: labor force nonparticipation
- *unbalanced* $P_{i,j}$: unemployment

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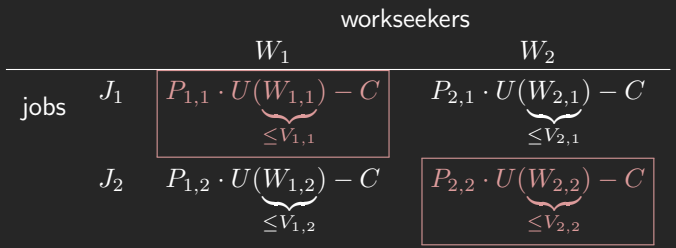

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prediction

- lower wages conditional on employment, lower employment
- costly screening technology cannot fully mitigate this inefficiency

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- legal wage floor and differentiated hiring channels worsen the inefficiency

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- **vertical** differentiation:

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prediction

- **horizontal** differentiation: lower wages and employment for all types
- **vertical** differentiation: *underprice* efficient types, *overprice* inefficient types

The Real World: Urban South Africa

- substantial information frictions
- costly mismatches for firms
- reservation and minumum wages exist
- high unemployment rate (28% for the working-age population, even higher for young workseekers)

Data

Sampling and Data Collection

- *Sample* : 6891 active young workseekers
  lack of university education, work experience and access to referral networks
- *Assessments* : in **6** domains *(communication, concept formation, focus, grit, numeracy, planning)*
  already used by some large firms and agencies
- *Surveys* : labor market outcomes, job search, beliefs about their skills and the labor market
  baseline: after assessments, before the results being revealed
  endline (6609 obs, 96%): 3 to 4 months after treatment

Sample Characteristics

	baseline	
variable	mean	std. dev
age	23.6	3.3
male	0.382	0.486
university degree / diploma	0.167	0.373
any other post-secondary qualification	0.212	0.409
completed secondary education only	0.610	0.488
employed	0.378	0.485
ever worked	0.704	0.457
earnings	565	740
search in the week before	0.968	0.175

A *positively* selected sample: comparing to Quarterly Labour Force Survey (conditional on location, age, education, gender and race)

- similarly employed but *less paid*
- *more* likely to *search*

Assessments: Multidimensionality

	concept formation	grit	numeracy	control	*flexibility*
communication	0.337	0.127	0.386	0.237	0.126
concept formation		0.108	0.489	0.174	0.098
grit			0.162	0.507	0.334
numeracy				0.212	0.107
control					0.173

	concept formation	grit	numeracy	focus	*planning*
communication	0.346	0.088	0.393	0.171	0.258
concept formation		0.094	0.519	0.225	0.292
grit			0.128	0.049	0.106
numeracy				0.162	0.325
focus					0.181

The assessments *horizontally differentiate* candidates in multiple dimensions

Assessment: Self Evaluation

	baseline	
variable	mean	std. dev
correct about all results	0.082	0.274
incorrect about all results	*0.290*	0.454
overconfident about all results	*0.219*	0.413
underconfident about all results	0.010	0.100

A *multidimensional ordinal* evaluation:

- It's the *ranking* that matters
- *accurate beliefs* depends on observing the population distribution

Experiments and Results

An Overview

	report		**no report**
	shareable	*non-shareable*	
No. certified applicants	seeker $+$ / eqbm $+$		0
	seeker $+$  / eqbm $+$	seeker $+$ / eqbm ~ 0	

Intervention 1: Shareable Credible Assessments

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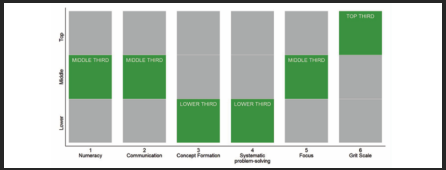
No. certified applicants	?		0
	?	?	

T1 email version, and 20+ colorered high-quality paper copies



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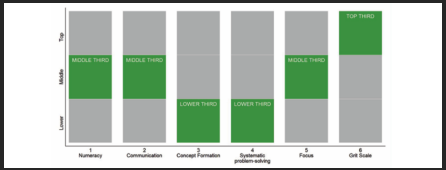

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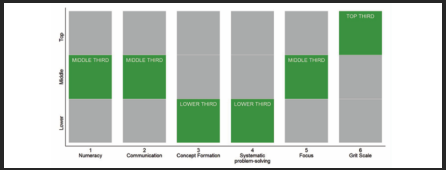

- assessments are carefully explained
- encouraged to be used for job application

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	?	?	
N	**2247**		**2274**

Both T and C groups received job searching counseling and tips, a CV template, interview tips

Intervention 1: Shareable Credible Assessments

T1 email version, and 20+ colorered high-quality paper copies **with credibility**

	report		no report
	shareable	*non-shareable*	
No. certified applicants	?		0
	?	?	
N	**2247**		**2274**

Both T and C groups received job searching counseling and tips, a CV template, interview tips

Intervention 1: Estimation

$$Y_{id} = \mathbf{T}_d \cdot \Delta + \mathbf{X}_{id} \cdot \Gamma + S_d + \epsilon_{id}$$

where

- Y_{id} : outcome for workseeker i assessed on date d
- $\mathbf{T}_d$: treatment assignments
- $\mathbf{X}_{id}$: prespecified baseline covariates (some unbalanced variables don't affect results)
- S_d : block fixed effects (days of treatment randomly assigned within blocks)
- ϵ_{id} : robust standard errors clustered at assessment date level

Intervention 1: Treatment Effects

	Employed	Hours	Earnings	Hourly wage	Written contract
treatment	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
mean outcome	0.309	8.848	159.291	9.840	0.120
mean outcome | employed		28.847	518.291	32.283	0.392

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mean outcome | employed		28.847	518.291	32.283	0.392

A decomposition:

$$\begin{aligned}&\mathbb{E}\left[\text{Earn} \mid \text{Treat}=1\right]-\mathbb{E}\left[\text{Earn} \mid \text{Treat}=0\right] \qquad \text{ATE}\\ =&\underbrace{\left(\mathbb{E}\left[\text{Earn} \mid \text{Treat}=1, \text{Work}=1\right]-\mathbb{E}\left[\text{Earn} \mid \text{Treat}=0, \text{Work}=1\right]\right)}\cdot\underbrace{\Pr\left[\text{Work}=1 \mid \text{Treat}=1\right]}\\ &+\underbrace{\mathbb{E}\left[\text{Earn} \mid \text{Treat}=0, \text{Work}=1\right]}\cdot\underbrace{\left(\Pr\left[\text{Work}=1 \mid \text{Treat}=1\right]-\Pr\left[\text{Work}=1 \mid \text{Treat}=0\right]\right)}\end{aligned}$$

Intervention 1: Treatment Effects

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A decomposition:

$$\mathbb{E}\left[\text{Earn} \mid \text{Treat}=1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat}=0\right] \quad \text{ATE}$$

$$= \underbrace{\left(\mathbb{E}\left[\text{Earn} \mid \text{Treat}=1, \text{Work}=1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat}=0, \text{Work}=1\right]\right)}_{\text{ATE for earnings | employed}} \cdot \underbrace{\Pr\left[\text{Work}=1 \mid \text{Treat}=1\right]}_{\text{Treated employment rate}} \quad \text{IM}$$

$$+ \underbrace{\mathbb{E}\left[\text{Earn} \mid \text{Treat}=0, \text{Work}=1\right]}_{} \cdot \underbrace{\left(\Pr\left[\text{Work}=1 \mid \text{Treat}=1\right] - \Pr\left[\text{Work}=1 \mid \text{Treat}=0\right]\right)}_{}$$

Intervention 1: Treatment Effects

	Employed	Hours	Earnings	Hourly wage	Written contract
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A decomposition:

$$\mathbb{E}\left[\text{Earn} \mid \text{Treat}=1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat}=0\right] \quad \text{ATE}$$

$$= \underbrace{\left(\mathbb{E}\left[\text{Earn} \mid \text{Treat}=1, \text{Work}=1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat}=0, \text{Work}=1\right]\right)}_{\text{ATE for earnings | employed}} \cdot \underbrace{\Pr\left[\text{Work}=1 \mid \text{Treat}=1\right]}_{\text{Treated employment rate}} \quad \text{IM}$$

$$+ \underbrace{\mathbb{E}\left[\text{Earn} \mid \text{Treat}=0, \text{Work}=1\right]}_{\text{Control earnings | employed}} \cdot \underbrace{\left(\Pr\left[\text{Work}=1 \mid \text{Treat}=1\right] - \Pr\left[\text{Work}=1 \mid \text{Treat}=0\right]\right)}_{\text{ATE for employment}} \quad \text{EM}$$

Intervention 1: Treatment Effect Decomposition

$$\text{ATE} = (\text{ATE for earnings} \mid \text{employed}) \cdot (\text{Treated employment rate}) \quad \text{IM}$$
$$(\text{Control earnings} \mid \text{employed}) \cdot (\text{ATE for employment}) \quad \text{EM}$$

	Employed	Hours	Earnings	Hourly wage	Written contract
total effect	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
mean outcome	0.309				

Intervention 1: Treatment Effect Decomposition

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	Employed	Hours	Earnings	Hourly wage	Written contract
total effect	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
mean outcome	0.309				
extensive margin		0.188^{***}	0.269^{***}	0.141^{***}	0.020^{***}

EM : ATE on **employment**, priced at the mean earnings in the **control group**

Intervention 1: Treatment Effect Decomposition

$$\text{ATE} = (\text{ATE for earnings} \mid \text{employed}) \cdot (\text{Treated employment rate}) \quad \text{IM}$$
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	Employed	Hours	Earnings	Hourly wage	Written contract
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EM : ATE on **employment**, priced at the mean earnings in the **control group**

IM : ATE on **wage** conditional on employment

$$\mathbb{E}\left[\text{Earn} \mid \text{Treat} = 1, \text{Work} = 1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat} = 0, \text{Work} = 1\right]$$

not identified.

Intervention 1: Treatment Effect Decomposition

$$\text{ATE} = (\text{ATE for earnings} \mid \text{employed}) \cdot (\text{Treated employment rate}) \quad \text{IM}$$
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	Employed	Hours	Earnings	Hourly wage	Written contract
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not identified. But **IM=ATE-EM** $\rightarrow$ Delta method

Intervention 1: Treatment Effect Decomposition

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	Employed	Hours	Earnings	Hourly wage	Written contract
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mean outcome	0.309				
extensive margin		0.188^{***}	0.269^{***}	0.141^{***}	0.020^{***}
intensive margin		0.013	0.069^{*}	0.056^{**}	-0.000

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$$\mathbb{E}\left[\text{Earn} \mid \text{Treat} = 1, \text{Work} = 1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat} = 0, \text{Work} = 1\right]$$

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	Employed	Hours	Earnings	Hourly wage	Written contract
total effect	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
mean outcome	0.309				
extensive margin		0.188^{***}	0.269^{***}	0.141^{***}	0.020^{***}
intensive margin		0.013	0.069^{*}	0.056^{**}	-0.000
treatment effect | employed		0.037	0.194^{*}	0.158^{**}	-0.001

EM : ATE on **employment**, priced at the mean earnings in the **control group**

IM : ATE on **wage** conditional on employment

$$\mathbb{E}\left[\text{Earn} \mid \text{Treat} = 1, \text{Work} = 1\right] - \mathbb{E}\left[\text{Earn} \mid \text{Treat} = 0, \text{Work} = 1\right]$$

not identified. But **IM=ATE-EM** $\rightarrow$ Delta method

Intervention 1: Treatment Effect Decomposition

		workseekers W_1	workseekers W_2
jobs	J_1	$P_{1,1} \cdot U(\underbrace{W_{1,1}}_{\leq V_{1,1}}) - C$	$P_{2,1} \cdot U(\underbrace{W_{2,1}}_{\leq V_{2,1}}) - C$
	J_2	$P_{1,2} \cdot U(\underbrace{W_{1,2}}_{\leq V_{1,2}}) - C$	$P_{2,2} \cdot U(\underbrace{W_{2,2}}_{\leq V_{2,2}}) - C$

When we observe higher wages:

Intervention 1: Treatment Effect Decomposition

		workseekers W_1	workseekers W_2
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	J_2	$P_{1,2} \cdot U(\underbrace{W_{1,2}}_{\leq V_{1,2}}) - C$	$P_{2,2} \cdot U(\underbrace{W_{2,2}}_{\leq V_{2,2}}) - C$

When we observe higher wages:

- optimal matching is easier: $P_{i,i} \uparrow$

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When we observe higher wages:

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- *latent* output of optimal matches is higher: $V_{i,i} \uparrow$

Intervention 1: Treatment Effect Decomposition

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	J_2	$P_{1,2} \cdot U(\underbrace{W_{1,2}}_{\leq V_{1,2}}) - C$	$P_{2,2} \cdot U(\underbrace{W_{2,2}}_{\leq V_{2,2}}) - C$

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does $V_{i,i}$ really increase?

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	J_2	$P_{1,2} \cdot U(\underbrace{W_{1,2}}_{\leq V_{1,2}}) - C$	$P_{2,2} \cdot U(\underbrace{W_{2,2}}_{\leq V_{2,2}}) - C$

	Employed
treatment effect	0.052 ± 0.024
control	0.309

When we observe higher wages:

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Intervention 1: Treatment Effect Decomposition

		workseekers W_1	workseekers W_2
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	J_2	$P_{1,2} \cdot U(\underbrace{W_{1,2}}_{\leq V_{1,2}}) - C$	$P_{2,2} \cdot U(\underbrace{W_{2,2}}_{\leq V_{2,2}}) - C$

	Employed
treatment effect	0.052 ± 0.024
control	0.309
marginally employed	0.361 ± 0.024

When we observe higher wages:

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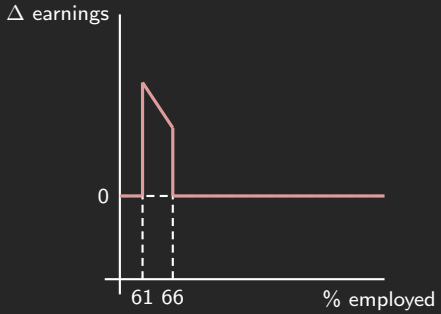
does $V_{i,i}$ really increase?

	Employed
treatment effect	0.052 ± 0.024
control	0.309
treated outcome	$[0.337, 0.385]$



Intervention 1: Treatment Effect Decomposition

		workseekers W_1	workseekers W_2
jobs	J_1	$P_{1,1} \cdot U(\underbrace{W_{1,1}}_{\leq V_{1,1}}) - C$	$P_{2,1} \cdot U(\underbrace{W_{2,1}}_{\leq V_{2,1}}) - C$
	J_2	$P_{1,2} \cdot U(\underbrace{W_{1,2}}_{\leq V_{1,2}}) - C$	$P_{2,2} \cdot U(\underbrace{W_{2,2}}_{\leq V_{2,2}}) - C$

When we observe higher wages:

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control	0.309
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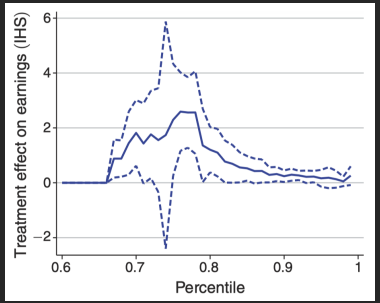
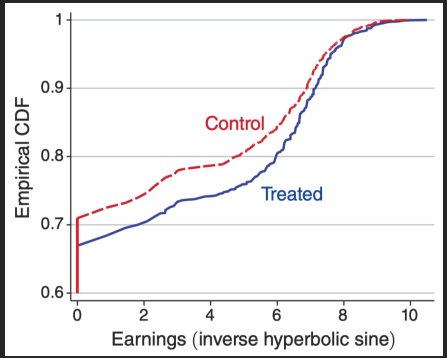
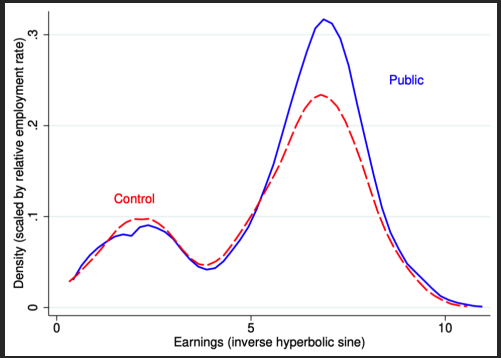


Intervention 1: Treatment Effect Decomposition

Does $V_{i,i}$ really increase? Another piece of evidence:





Intervention 1: Behavioral and Belief Changes of Workseekers

	accurate belief	$>$ median self-esteem	targeted search	used report	applications w. report	interviews w. report	offers w. report	expected offers
public	0.158^{***}	0.002	0.051^{***}	0.699^{***}	1.682^{***}	0.432^{***}	0.112^{***}	0.106^{***}
	(0.008)	(0.013)	(0.010)	(0.013)	(0.040)	(0.023)	(0.011)	(0.019)
mean (C)	0.389	0.553	0.155	0.000	0.000	0.000	0.000	4.198

- assessments *correct* beliefs

Intervention 1: Behavioral and Belief Changes of Workseekers

	accurate belief	$>$ median self-esteem	targeted search	used report	applications w. report	interviews w. report	offers w. report	expected offers
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- assessments *correct* beliefs
- assessments are used for job searching

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mean (C)	0.389	0.553	0.155	0.000	0.000	0.000	0.000	4.198

- assessments *correct* beliefs
- assessments are used for job searching
- assessments improve employment

Intervention 1: Some Subtle Changes Are Happening

	any search	search hours	search cost	No. applications
public	-0.020	-0.036	-0.094	0.019
	(0.014)	(0.048)	(0.080)	(0.042)
mean (C)	0.389	0.553	0.155	0.000

Potentially,

- certification changes *how* workseekers search
- certification-induced changes may be *temporary*, hence not captured by the baseline survey

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	any search	search hours	search cost	No. applications
public	-0.020	-0.036	-0.094	0.019
	(0.014)	(0.048)	(0.080)	(0.042)
mean (C)	0.389	0.553	0.155	0.000

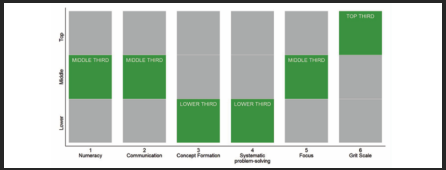
Potentially,

- certification changes *how* workseekers search
- certification-induced changes may be *temporary*, hence not captured by the baseline survey

Intervention 2: *Private* Certification

	report		no report
	shareable	*non-shareable*	
No. certified applicants	?	?	0

T1 email version, and 20+ colorered high-quality paper copies **with credibility**

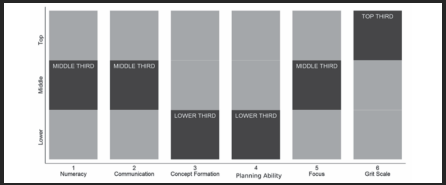


- assessments are carefully explained
- encouraged to be used for job application

Intervention 2: *Private* Certification

	report		no report
	shareable	*non-shareable*	
No. certified applicants	?	?	0

T2 NO email version, and 1 black-and-white low-quality paper copies **without credibility**




REPORT ON CANDIDATE COMPETENCIES
-Personal Copy-

- assessments are still carefully explained
- NOT encouraged to be used for job application

Intervention 2: *Private* Certification

T1 NO email version, and 1 black-and-white low-quality paper copies **without credibility**

	report		**no report**
	shareable	*non-shareable*	
No. certified applicants	?	?	0
N	*2247*	*2114*	**2274**

Intervention 2: Behavioral and Belief Changes of Workseekers

	accurate belief	$>$ median self-esteem	targeted search	used report	applications w. report	interviews w. report	offers w. report	expected offers
public	0.158^{***}	0.002	0.051^{***}	0.699^{***}	1.682^{***}	0.432^{***}	0.112^{***}	0.106^{***}
	(0.008)	(0.013)	(0.010)	(0.013)	(0.040)	(0.023)	(0.011)	(0.019)
private	0.123^{***}	-0.002	0.047^{***}	0.290^{***}	0.572^{***}	0.144^{***}	0.036^{***}	0.054^{***}
	(0.008)	(0.015)	(0.010)	(0.012)	(0.033)	(0.017)	(0.008)	(0.023)
$p_{\text{public=private}}$	0.000^{***}	0.812	0.701	0.000^{***}	0.000^{***}	0.000^{***}	0.000^{***}	0.025^{**}
mean (C)	0.389	0.553	0.155	0.000	0.000	0.000	0.000	4.198

Intervention 2: Behavioral and Belief Changes of Workseekers

	accurate belief	$>$ median self-esteem	targeted search	used report	applications w. report	interviews w. report	offers w. report	expected offers
public	0.158^{***}	0.002	0.051^{***}	0.699^{***}	1.682^{***}	0.432^{***}	0.112^{***}	0.106^{***}
	(0.008)	(0.013)	(0.010)	(0.013)	(0.040)	(0.023)	(0.011)	(0.019)
private	0.123^{***}	-0.002	0.047^{***}	0.290^{***}	0.572^{***}	0.144^{***}	0.036^{***}	0.054^{***}
	(0.008)	(0.015)	(0.010)	(0.012)	(0.033)	(0.017)	(0.008)	(0.023)
$p_{\text{public=private}}$	0.000^{***}	0.812	0.701	0.000^{***}	0.000^{***}	0.000^{***}	0.000^{***}	0.025^{**}
mean (C)	0.389	0.553	0.155	0.000	0.000	0.000	0.000	4.198

Intervention 2: Behavioral and Belief Changes of Workseekers

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	(0.008)	(0.013)	(0.010)	(0.013)	(0.040)	(0.023)	(0.011)	(0.019)
private	0.123^{***}	-0.002	0.047^{***}	0.290^{***}	0.572^{***}	0.144^{***}	0.036^{***}	0.054^{***}
	(0.008)	(0.015)	(0.010)	(0.012)	(0.033)	(0.017)	(0.008)	(0.023)
$p_{\text{public=private}}$	0.000^{***}	$\boxed{0.812}$	$\boxed{0.701}$	0.000^{***}	0.000^{***}	0.000^{***}	0.000^{***}	0.025^{**}
mean (C)	0.389	0.553	0.155	0.000	0.000	0.000	0.000	4.198

Intervention 2: What About The Subtle Changes?

	any search	search hours	search cost	No. applications
public	−0.020	−0.036	−0.094	0.019
	(0.014)	(0.048)	(0.080)	(0.042)
private	−0.006	−0.036	−0.033	0.037
	(0.014)	(0.049)	(0.088)	(0.038)
$p_{\text{public=private}}$	1.000	1.000	1.000	1.000
mean (C)	0.389	0.553	0.155	0.000

Intervention 2: Treatment Effects

	Employed	Hours	Earnings	Hourly wage	Written contract
Total effect					
public	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
Extensive margin					
public		0.188^{***}	0.269^{***}	0.141^{***}	0.020^{***}
Intensive margin					
public		0.013	0.069^{*}	0.056^{**}	-0.000
Treatment effect | employed					
public		0.037	0.194^{*}	0.158^{**}	-0.001

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public	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
private	0.011	0.066	0.162^{**}	0.094^{**}	0.017^{*}
public $\neq$ private	0.002^{***}	0.011^{**}	0.028^{**}	0.030^{**}	0.769
Extensive margin					
public		0.188^{***}	0.269^{***}	0.141^{***}	0.020^{***}
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Extensive margin					
public		0.188^{***}	0.269^{***}	0.141^{***}	0.020^{***}
private		0.041	0.058	0.030	0.004
public $\neq$ private		0.001^{***}	0.001^{***}	0.001^{***}	0.001^{***}
Intensive margin					
public		0.013	0.069^{*}	0.056^{**}	-0.000
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public		0.013	0.069^{*}	0.056^{**}	-0.000
private		0.025	0.103^{***}	0.064^{***}	0.013^{*}
public $\neq$ private		0.529	0.380	0.791	0.102
Treatment effect | employed					
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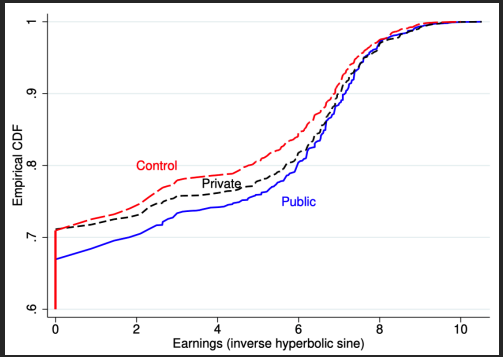
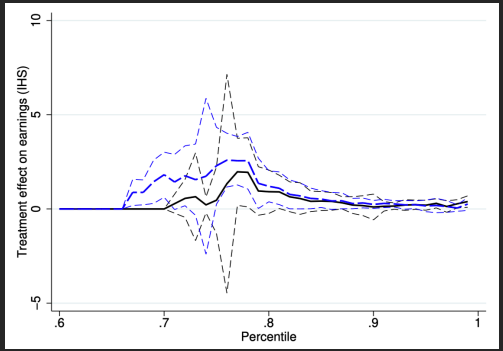
private		0.025	0.103^{***}	0.064^{***}	0.013^{*}
Treatment effect | employed					
public		0.037	0.194^{*}	0.158^{**}	-0.001
private		0.083	0.339^{***}	0.209^{**}	0.041^{*}
public $\neq$ private		0.440	0.234	0.585	0.078^{*}

Intervention 2: Treatment Effect Decomposition





Intensive margins matter *more* for the private treatment.

Intervention 1 and 2: Summary

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- assessments correct workseekers' self-evalution
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  no significant changes in targeting and search effort

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Intervention 3: Direct Information Provision to Firms

T3 randomly use 1 or 3 real certified resumes, randomly applying for vacancies

	report		**no report**
	shareable	*non-shareable*	
No. certified applicants	?	?	0

Intervention 3: Experiment Procedure

Workseeker

Jobs

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Workseeker

- invite 2220 *assessed* candidates for CVs
- 717 submissions

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Randomization:

Total	Group	Assessed	#applications/vacancy	ideal%	actual%
3992=998×4	(1)	Yes	1	1/8	12%
	(2)	No	1	3/8	37%
	(3)	Yes	3	3/8	38%
	(4)	No	3	1/8	13%

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Randomization: whether firms get credible information, do they get *overloaded*

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Intervention 3: Estimation on Application Level

$$Y_{rv} = \underbrace{\text{Certificate}_{rv}}_{=\mathbf{1}(\text{public})} \cdot \beta_1 + \text{Certificate}_{rv} \cdot \underbrace{\text{HighIntensity}_{v}}_{=\mathbf{1}(\text{3 applications})} \cdot \beta_2 + \mathbf{V}_v + \mathbf{X}_r \cdot \Gamma + \mathbf{E}_{rv} + \epsilon_{rv}$$

- $\mathbf{V}_v$ vacancy FEs, $\mathbf{X}_v$ resume covariates, $\mathbf{E}_{rv}$ email address FEs

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- $\mathbf{V}_v$ vacancy FEs, $\mathbf{X}_v$ resume covariates, $\mathbf{E}_{rv}$ email address FEs

	Any repsonse		Interview invitation	
	(1)	(2)	(3)	(4)
β_1	0.015 (0.009)	0.016 (0.009)	0.009 (0.004)	0.010 (0.006)
β_2	-0.027 (0.013)	-0.028 (0.014)	-0.016 (0.009)	-0.017 (0.010)
mean (C)	0.130		0.087	
FEs and controls	No	Yes	No	Yes

Intervention 3: Estimation on Vacancy Level

$$Y_v = \underbrace{\text{HighIntensity}_v}_{=\mathbf{1}(\text{3 applications})} \cdot \alpha + \eta_v$$

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	Repsonse		Interview invitation	
	mean	$= \mathbf{1}(\# > 0)$	mean	$= \mathbf{1}(\# > 0)$
α	0.023 (0.020)	0.042 (0.026)	-0.001 (0.016)	0.021 (0.021)
mean (C)	0.134	0.187	0.090	0.117

Summary of Intervention 1-3

So far:

- assessments correct workseekers' self-evalution
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- *tentatively*, diminishing marginal returns of aggregate certificate use

Firms and workseekers *both* learn from the assessment treatment

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A information channel
B signalling channel
C behavioral anomalies

Supporting Result 1: Assessment Results Matter

Placebo group (N=254): assessed, reported, certified, *without assessment results*

	market index	employed	hours	earnings	hourly wage	written contract
Public	0.120^{***}	0.052^{***}	0.201^{***}	0.337^{***}	0.197^{***}	0.020^{**}
Placebo						

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Placebo	0.027	0.020	0.040	0.068	0.053	0.005
	(0.043)	(0.028)	(0.075)	(0.185)	(0.129)	(0.021)
$p_{\text{public=placebo}}$	**		**			

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Infer *WTP* : 69 firms, a standard Decker-DeGroot-Marschak mechanism, on a talent-pool database with the assessment results

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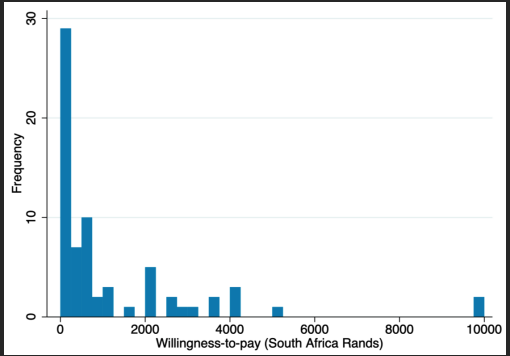

Supporting Result 2: Horizontal vs Vertical

		workseekers W_1	workseekers W_2
jobs	J_1	$V_{1,1}$	$V_{2,1}$
	J_2	$V_{1,2}$	$V_{2,2}$

- **horizontal** differentiation:

$$V_{i,i} > V_{i,j}, V_{j,j} > V_{j,i}$$

- **vertical** differentiation:

$$V_{i,\cdot} > V_{j,\cdot}$$

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no skill-level heterogeneity

	(1)	(2)	(3)
Public	0.052^{***}	0.052^{***}	0.053^{***}
× TmB	0.019		
× PC1(Scores)		0.004	
× w. Scores			-0.007

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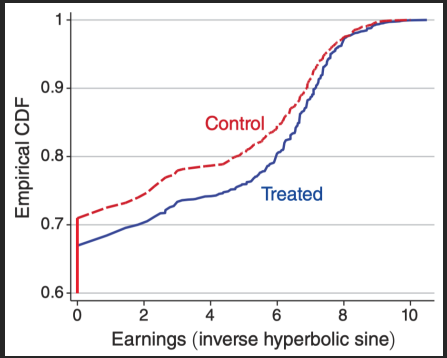
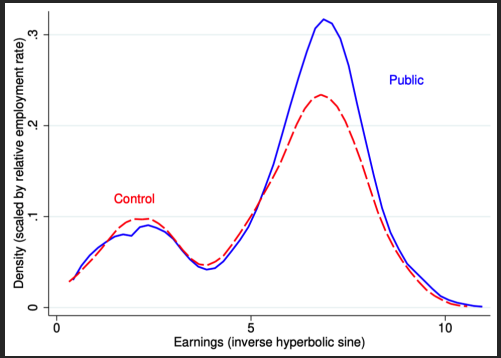
dispersion of wages | employed doesn't increase

- standard deviation: $+0.03$ $(p = 0.87)$
- interquartile range: $+0.65$ $(p = 0.57)$
- interdecile range: $+0.42$ $(p = 0.41)$

Supporting Result 2: Horizontal vs Vertical





Supporting Result 2: Horizontal vs Vertical

- The 6 assessments are *weakly correlated*

	concept formation	grit	numeracy	focus	*planning*
communication	0.346	0.088	0.393	0.171	0.258
concept formation		0.094	0.519	0.225	0.292
grit			0.128	0.049	0.106
numeracy				0.162	0.325
focus					0.181

Supporting Result 2: Horizontal vs Vertical

- The 6 assessments are *weakly correlated*
- workseekers with different skills respond differently to the treatment
  - high skilled workseekers more likely to *use certificates*
  - low skilled workseekers more likely to engage in *search targeting*

Supporting Result 2: Horizontal vs Vertical

- The 6 assessments are *weakly correlated*
- workseekers with different skills respond differently to the treatment
  - high skilled workseekers more likely to *use certificates*
  - low skilled workseekers more likely to engage in *search targeting*
- firms' relative demand for different skills is heterogeneous

in top tecile	education	ranked first	ranked last	median rank
communication	secondary	0.119	0.015	3
concept formation	secondary	0.075	0.030	4
focus	secondary	0.328	0.060	3
grit	secondary	0.134	0.045	4
numeracy	secondary	0.060	0.090	2
planning	secondary	0.194	0.000	4
none	1-year post-secondary	0.000	0.761	7

Supporting Result 3: Certification Mitigates Limited Information

	(1)	(2)	(3)
Public	0.051^{***}	0.052^{***}	0.051^{***}
$\times$ post-secondary education	-0.028		
	(0.028)		
$\times$ employed at baseline		-0.043	
		(0.032)	
$\times \hat{\Pr}(\text{Employed at endline} \mid \mathbf{X})^1$			-0.076^{***}
			(0.028)

estimated with baseline variables, following Abadie et al. (2018)

Discussion

About This Paper

Pros

- a *complete* study
- intuitive framework
- thoughtful experiment design
- valuable insights and discussion

Debatables

- some questionable results
- lack of a rigorous model
- *debugging*-ish story-telling
- and ...

My Thoughts: Workseekers

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- *Bargaining* power of workseekers and information revelation
- The network aspect: diffusion of the feedback workseekers get from using certificates

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- $V_{i,j} \uparrow \overset{?}{\Rightarrow} W_{i,j} \uparrow$: firms' power of wage setting (monopsony, oligopsony, joint hiring)
- What is happening here?

	Any repsonse	Interview invitation
β_1	0.016 (0.009)	0.010 (0.006)
β_2	-0.028 (0.014)	-0.017 (0.010)
α	0.042 (0.026)	0.021 (0.021)

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behavioral anomalies	?	attention (✗)	others (?)

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$$\text{cardinal} \rightarrow \text{ordinal} \rightarrow \text{threshold-ish} \rightarrow \text{signal}$$

hiring managers get more careful in later stages (less candidates), but it might be too late

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  simultaneous to sequential

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- On empirical strategy
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Thank you!