

Job Search and Hiring with Two-Sided Limited Information About Jobseekers' Skills

Eliana Carranza
World Bank

Robert Garlick
Duke University

Kate Orkin
University of Oxford

Neil Rankin
University of Stellenbosch

The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

Motivation

- ▶ Workseekers make job search decisions and firms make hiring decisions using potentially limited information about workseekers skills
- ▶ Frictions may be severe in developing countries
- ▶ Improving information about workers' skills available to firms and / or jobseekers may improve labour market outcomes
- ▶ Requires getting information to the right agents

This Paper

- ▶ Find that information frictions about workseekers skills exist on **both sides** of a labor market
- ▶ Run field experiments that separately manipulate firms' and jobseekers' information

This Paper

- ▶ Find that information frictions about workseekers skills exist on **both sides** of a labor market
 - ▶ Run field experiments that separately manipulate firms' and jobseekers' information
1. **Public information improves jobseekers' outcomes**
 - ▶ Randomize jobseekers' access to public certification they can share with firms \approx two-sided information
 - ▶ Increases employment by 17% and earnings by 34%

This Paper

- ▶ Find that information frictions about workseekers skills exist on **both sides** of a labor market
 - ▶ Run field experiments that separately manipulate firms' and jobseekers' information
1. **Public information improves jobseekers' outcomes**
 - ▶ Randomize jobseekers' access to public certification they can share with firms \approx two-sided information
 - ▶ Increases employment by 17% and earnings by 34%
 2. **Jobseekers face information frictions**
 - ▶ Information affects jobseekers' beliefs, search targeting
 - ▶ Information only to jobseekers increases earnings

This Paper

- ▶ Find that information frictions about workseekers skills exist on **both sides** of a labor market
 - ▶ Run field experiments that separately manipulate firms' and jobseekers' information
- 1. Public information improves jobseekers' outcomes**
 - ▶ Randomize jobseekers' access to public certification they can share with firms \approx two-sided information
 - ▶ Increases employment by 17% and earnings by 34%
 - 2. Jobseekers face information frictions**
 - ▶ Information affects jobseekers' beliefs, search targeting
 - ▶ Information only to jobseekers increases earnings
 - 3. Firms face information frictions**
 - ▶ Information only to jobseekers has smaller effects than public information
 - ▶ Information only to firms raises callback rates

Contribution

1. Important for **market & policy design** to address frictions
 - ▶ Interventions targeted at one side of market are not optimal
 - ▶ Intervention can be cost-effective

Contribution

1. Important for **market & policy design** to address frictions
 - ▶ Interventions targeted at one side of market are not optimal
 - ▶ Intervention can be cost-effective
2. Existing papers **cannot identify two-sided frictions**
 - ▶ Some study one side of the market
 - ▶ Firm learning (Altonji & Pierret 2001), Arcidiacono et al. 2010, Kahn & Lange 2014, MacLeod et al. 2017)
 - ▶ Referrals (Ioannides and Loury 2004, Heath 2018)
 - ▶ Jobseeker learning (Ahn et al. 2019, Altmann et al. 2018, Belot et al. 2018)
 - ▶ Some reveal information to both sides (Abebe et al. 2020, Bassi & Nansamba 2020, Abel et al. 2020, Pallais 2014)

Contribution

1. Important for **market & policy design** to address frictions
 - ▶ Interventions targeted at one side of market are not optimal
 - ▶ Intervention can be cost-effective
2. Existing papers **cannot identify two-sided frictions**
 - ▶ Some study one side of the market
 - ▶ Firm learning (Altonji & Pierret 2001), Arcidiacono et al. 2010, Kahn & Lange 2014, MacLeod et al. 2017)
 - ▶ Referrals (Ioannides and Loury 2004, Heath 2018)
 - ▶ Jobseeker learning (Ahn et al. 2019, Altmann et al. 2018, Belot et al. 2018)
 - ▶ Some reveal information to both sides (Abebe et al. 2020, Bassi & Nansamba 2020, Abel et al. 2020, Pallais 2014)
3. Complements work on the **aggregate** implications of information frictions (Jovanovic 1979, Menzio and Shi 2011) and their role in labor market dynamics in developing countries (Donovan et al. 2018)

Economic Environment

South Africa's Gauteng province

- ▶ Theory-relevant features
 - ▶ Alternative sources of information on jobseekers skills are limited
 - ▶ Firms view new hires as risky, high separation costs
 - ▶ High unemployment, especially for youths
- ▶ Features common to many settings

Sampling & Measurement

- ▶ Recruit active young job searchers through partnership with social enterprise
- ▶ Computerized baseline survey after assessments
- ▶ Phone surveys after 3-5 months
- ▶ Measure
 - ▶ Beliefs about skills, returns to search, earnings
 - ▶ Job search & certificate use
 - ▶ Labour market outcomes
- ▶ 96% response rate, balanced across all treatments

Sample

- ▶ 6,891 active jobseekers; 99% Black African, 62% female, and on average 24 years old
- ▶ High school education, but little more
- ▶ 70% have some work experience, only 9% have had a long term job

Sample

- ▶ 6,891 active jobseekers; 99% Black African, 62% female, and on average 24 years old
- ▶ High school education, but little more
- ▶ 70% have some work experience, only 9% have had a long term job
- ▶ Employed are mostly in **entry-level wage work**
 - ▶ Wage work 8x more common than self-employment
 - ▶ \$94 PPP mean weekly earnings for the employed
 - ▶ Median tenure 2 months

Sample

- ▶ 6,891 active jobseekers; 99% Black African, 62% female, and on average 24 years old
- ▶ High school education, but little more
- ▶ 70% have some work experience, only 9% have had a long term job
- ▶ Employed are mostly in **entry-level wage work**
 - ▶ Wage work 8x more common than self-employment
 - ▶ \$94 PPP mean weekly earnings for the employed
 - ▶ Median tenure 2 months
- ▶ **Actively searching**, including through formal channels
 - ▶ 97% searched in past week, mean time of 17 hours, mean cost of \$40 PPP
 - ▶ 38% of jobs obtained from formal applications

Public Certification

- ▶ **Gives candidates information** about their assessment results and **allows them to share** the results with prospective employers
- ▶ Group briefing by psychologist
- ▶ Different to universal two-sided information provision as not using a certificate is unlikely to send a signal

REPORT ON CANDIDATE COMPETENCIES

name.. surname..
 ID No. id..

This report provides information on assessments conducted by Harambee Youth Employment Accelerator (harambee.co.za), a South African organisation that connects employers looking for entry-level talent to young, high-potential work-seekers with a matric or equivalent. Harambee has conducted more than 1 million assessments and placed candidates with over 250 top companies in retail, hospitality, financial services and other sectors. Assessments are designed by psychologists and predict candidates' productivity and success in the workplace. This report was designed and funded in collaboration with the World Bank. You can find more information about this report, the assessments and contact details at www.assessmentreport.info. «name» was assessed at Harambee on 13 September, 2016.

«name» completed assessments on English Communication (listening, reading, comprehension), Numeracy, and Concept Formation:

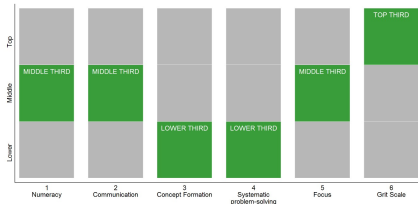
1. The Numeracy tests measure candidates' ability to apply numerical concepts at a National Qualifications Framework (NQF) level, such as working with fractions, ratios, money, percentages and units, and performing calculations with time and area. This score is an average of two numeracy tests the candidate completed.
2. The Communication test measures a candidate's grasp of the English language through listening, reading and comprehension. It assesses at an NQF level, for example measuring the ability to recognise and recall literal and non-literal text.
3. The Concept Formation Test is a non-verbal measure that evaluates candidates' ability to understand and solve problems. Those with high scores are generally able to solve complex problems, while lower scores indicate an ability to solve less complex problems.

«name» also completed tasks and questionnaires to assess their soft skills:

4. The Planning Ability Test measures how candidates plan their actions in multi-step problems. Candidates with high scores generally plan one or more steps ahead in solving complex problems.
5. The Focus Test assesses a candidate's ability to distinguish relevant from irrelevant information in potentially confusing environments. Candidates with high scores are generally able to focus on tasks in distracting surroundings, while candidates with lower scores are more easily distracted by irrelevant information.
6. The Grit Scale measures whether candidates show determination when working on challenging problems. Those with high scores generally spend more time working on challenging problems, while those with low scores choose to pursue different problems.

«name»'s results have been compared to a large benchmark group of young (age 18-34) South Africans assessed by Harambee. All candidates have a matric certificate and are from socially disadvantaged backgrounds. The benchmark group is 5,000 for cognitive skills and 400 for soft skills.

«name» scored in the «tercile_num» THIRD of candidates assessed by Harambee for Numeracy, «tercile_lit» THIRD for Communication, «tercile_cft» THIRD for Concept Formation, «tercile_tpb» THIRD for Planning Ability, «tercile_trp» THIRD for Focus and «tercile_grit» THIRD for the Grit Scale.



REPORT ON CANDIDATE COMPETENCIES

name.. surname..

ID No. id..

This report provides information on assessments conducted by Harambee Youth Employment Accelerator (harambee.co.za), a South African organisation that connects employers looking for entry-level talent to young, high-potential work-seekers with a matric or equivalent. Harambee has conducted more than 1 million assessments and placed candidates with over 250 top companies in retail, hospitality, financial services and other sectors. Assessments are designed by psychologists and predict candidates' productivity and success in the workplace. This report was designed and funded in collaboration with the World Bank. You can find more information about this report, the assessments and contact details at www.assessmentreport.info. «name» was assessed at Harambee on 13 September, 2016.

«name» completed assessments on English Communication (listening, reading, comprehension), Numeracy, and Concept Formation:

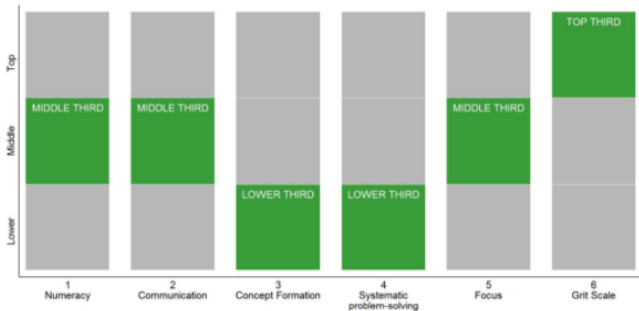
1. The Numeracy tests measure candidates' ability to apply numerical concepts at a National Qualifications Framework (NQF) level, such as working with fractions, ratios, money, percentages and units, and performing calculations with time and area. This score is an average of two numeracy tests the candidate completed.
2. The Communication test measures a candidate's grasp of the English language through listening, reading and comprehension. It assesses at an NQF level, for example measuring the ability to recognise and recall literal and non-literal text.
3. The Concept Formation Test is a non-verbal measure that evaluates candidates' ability to understand and solve problems. Those with high scores are generally able to solve complex problems, while lower scores indicate an ability to solve less complex problems.

«name» also completed tasks and questionnaires to assess their soft skills:

4. The Planning Ability Test measures how candidates plan their actions in multi-step problems. Candidates with high scores generally plan one or more steps ahead in solving complex problems.
5. The Focus Test assesses a candidate's ability to distinguish relevant from irrelevant information in potentially confusing environments. Candidates with high scores are generally able to focus on tasks in distracting surroundings, while candidates with lower scores are more easily distracted by irrelevant information.
6. The Grit Scale measures whether candidates show determination when working on challenging problems. Those with high scores generally spend more time working on challenging problems, while those with low scores choose to pursue different problems.

«name»'s results have been compared to a large benchmark group of young (age 18-34) South Africans assessed by Harambee. All candidates have a matric certificate and are from socially disadvantaged backgrounds. The benchmark group is 5,000 for cognitive skills and 400 for soft skills.

«name» scored in the «tercile_num» THIRD of candidates assessed by Harambee for Numeracy, «tercile_lit» THIRD for Communication, «tercile_cfb» THIRD for Concept Formation, «tercile_tob» THIRD for Planning Ability, «tercile_troop» THIRD for Focus and «tercile_grit» THIRD for the Grit Scale.



DISCLAIMER: This is a confidential assessment report for use by the person specified above. The information in the report should only be disclosed on a "need to know basis" with the prior understanding of the candidate. Assessment results are not infallible and may not be entirely accurate. Best practice indicates that any organisation's career management decisions should depend on factors in addition to these assessment results. Harambee cannot accept responsibility for decisions made based on the information contained in this report and cannot be held liable for the consequences of those decisions.

Skill Measurement

- ▶ Assess
 - ▶ Numeracy
 - ▶ Communication, verbal & written
 - ▶ “Concept formation”
 - ▶ Grit (*Duckworth et al., 2007*)
 - ▶ Focus (*Stroop, 1935*)
 - ▶ Planning (*Burks et al., 2009; 2015*)
- ▶ Reports are likely to **horizontally differentiate jobseekers**
 - ▶ Scores are weakly correlated
 - ▶ 1% have all bottom terciles
 - ▶ 2% have all top terciles
 - ▶ 76% have any bottom terciles
 - ▶ 88% have any top terciles
 - ▶ 64% of candidates have both top and bottom terciles
- ▶ **Candidates have inaccurate beliefs** about their own types

Experimental Design & Estimation

- ▶ Randomly assign jobseekers to
 - ▶ **Public skill certification**
 - ▶ Control: no feedback on assessment results
- ▶ Randomize by assessment date
- ▶ Prespecify estimation, inference, variable definitions
- ▶ Cluster standard errors at treatment assignment unit (day of arrival at assessment centre)
- ▶ All results are robust to a p value correction to control false discovery rate

Certificate Improves Employment, Earnings

	(1) Employed	(2) Hours ^c	(3) Earnings ^c	(4) Hourly wage ^c	(5) Written contract
Treatment	0.052 (0.012)	0.201 (0.052)	0.338 (0.074)	0.197 (0.040)	0.020 (0.010)
Mean outcome	0.309	8.85	159.3	9.84	0.120
Mean outcome employed		28.85	518.3	32.28	0.392
# observations	6607	6598	6589	6574	6575
# clusters	84	84	84	84	84

Standard errors shown in parentheses, clustering by treatment date. Mean outcome is for the control group. All outcomes use a 7-day recall period. Outcomes with ^c use an IHS transformation.

Match Quality & Magnitudes

- ▶ Patterns are consistent with an **improvement in match quality**
 - ▶ Hourly wages increase
 - ▶ Treatment increases earnings by increasing employment *and* earnings conditional on employment
- ▶ Effects are **economically significant**
 - ▶ Employment effect is 3x larger than for ALMPs in Card et al. (2018)
 - ▶ Weekly earnings gain = 17% of weekly adult poverty line
- ▶ Intervention is **cost-effective**: Average earnings gain is 2.3 times the average variable cost of assessment and certification

Which Side Faces Frictions?

- ▶ Skill certification might operate through
 - ▶ Better information for jobseekers changing search
 - ▶ Better information for firms changing job & wage offers
 - ▶ Mechanisms not based on skill information
- ▶ Distinction matters for policy & market design
- ▶ We use additional experiments to separately manipulate information available
 1. To jobseekers
 2. To firms

Jobseekers Face Frictions

1. Public certification shifts **beliefs and search targeting**
 - ▶ Perceived skills are closer to measured skills
 - ▶ Candidates are more likely to search for jobs that they think value skills they score highly on
 - ▶ No persistent increase in other search effort measures
2. An intervention which **gives information only to workseekers**. Randomly assign jobseekers to
 - ▶ Control: no feedback on assessment results
 - ▶ **Private skill certification**
 - ▶ Give jobseekers their assessment results
 - ▶ Without help sharing results with firms
 - ▶ Group briefing by psychologist

REPORT ON CANDIDATE COMPETENCIES

-Personal Copy-

This report contains results from the assessments you took at Harambee in Phase 1 and Phase 2. These results can help you learn about some of your strengths and weaknesses and inform your job search.

You completed assessments on English Communication (listening, reading and comprehension) and Numeracy today in Phase 2. In Phase 1, you completed a Concept Formation assessment which asked you to identify patterns.

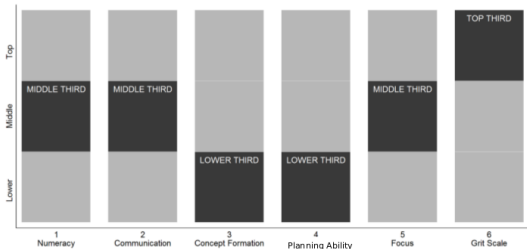
1. The Numeracy tests measure various maths abilities. Your score is the average of the two maths tests you did today at Harambee.
2. The Communication test measures English language ability through listening, reading and comprehension.
3. The Concept Formation test measures the ability to understand and solve problems. Candidates with high scores can generally solve complex problems, while lower scores show an ability to solve less complex problems.

You also did some games and questionnaires to measure your soft skills:

4. The Planning Ability Test measures how you plan your actions in multi-step problems. Candidates with high scores generally plan one or more steps ahead in solving complex problems.
5. The Focus Test looks at your ability to pick out which information is important in confusing environments. Candidates with high scores are able to focus on tasks in distracting situations.
6. The Grit Scale measures candidates' determination when working on difficult problems. Candidates with high scores spend more time working on the problems rather than choosing to pursue different problems.

Your results have been compared to a large group of young South African job seekers who have a matric certificate, are from socially disadvantaged backgrounds and have been assessed by Harambee.

You scored in the MIDDLE THIRD of candidates assessed by Harambee for Numeracy, MIDDLE THIRD for Communication, LOWER THIRD for Concept Formation, LOWER THIRD for Planning Ability, MIDDLE THIRD for Focus and TOP THIRD for the Grit Scale.



Jobseekers Face Frictions

Private certification shifts beliefs, search targeting (not shown)

Private certification increases earnings and wages

	(1) Employed	(2) Hours ^c	(3) Earnings ^c	(4) Hourly wage ^c	(5) Written contract
Private certification	0.011 (0.012)	0.066 (0.048)	0.162 (0.078)	0.095 (0.046)	0.017 (0.009)
Mean outcome	0.309	8.848	159.291	9.840	0.120
# observations	6607	6598	6589	6574	6575
# clusters	84	84	84	84	84

Standard errors in parentheses, clustering by treatment date. Mean outcome is for the control group. All outcomes use a 7-day recall period. Outcomes with ^c use an IHS transformation.

Firms Face Frictions

- Public and private certificates have similar effects on beliefs, search targeting. **Public certificate has larger effects on labor market outcomes**

	(1) Employed	(2) Hours ^c	(3) Earnings ^c	(4) Hourly wage ^c	(5) Written contract
Public certification	0.052 (0.012)	0.201 (0.052)	0.338 (0.074)	0.197 (0.040)	0.020 (0.010)
Private certification	0.011 (0.012)	0.066 (0.048)	0.162 (0.078)	0.095 (0.046)	0.017 (0.009)
p: public = private	0.002	0.011	0.028	0.030	0.769
Mean outcome	0.309	8.848	159.291	9.840	0.120
# observations	6607	6598	6589	6574	6575
# clusters	84	84	84	84	84

Standard errors in parentheses, clustering by treatment date. Mean outcome is for the control group. All outcomes use a 7-day recall period. Outcomes with ^c use an IHS transformation.

Firms Face Frictions

1. Public and private certificates have similar effects on beliefs, search targeting. **Public certificate has larger effects on labor market outcomes**
2. Revealing **information only to firms** increases callbacks
 - ▶ **Submit real jobseeker resumes to vacancies**
 - ▶ Randomize which resumes have public skill certificates
 - ▶ Callbacks come to us, are relayed to jobseekers

Firms Face Frictions

1. Public and private certificates have similar effects on beliefs, search targeting. **Public certificate has larger effects on labor market outcomes**
2. Revealing **information only to firms** increases callbacks
 - ▶ **Submit real jobseeker resumes to vacancies**
 - ▶ Randomize which resumes have public skill certificates
 - ▶ Callbacks come to us, are relayed to jobseekers
 - ▶ Treatment increases callback rate by 1.6 pp and interview rate by 1 pp $\approx 11\%$ of mean

Additional Results in the Paper

1. Assessment results matter, not just being assessed
2. There is evidence consistent with horizontal rather than vertical differentiation
3. Treatment effects on employment are higher for candidates without existing signals and with a lower latent probability of employment

Summary

- ▶ Two-sided skill certification substantially raises employment & earnings
- ▶ Evidence of both jobseeker- and firm-side information frictions

Test for	Method	Result
Frictions on either side of the market	Public certification	Higher employment & earnings, shifted beliefs, targeting
Jobseeker-side frictions	Private certification	Smaller shifts in earnings, beliefs, search
Firm-side frictions	Audit study	Slightly higher callbacks

Policy Implications & Future Research

- ▶ Skills signalling could be a focus of government policy
- ▶ Scope for market based provision
- ▶ Productive areas for future research may include
 - ▶ Market design for market-based provision
 - ▶ Interactions between frictions on different sides of the market

Thank you

- ▶ **Partners:** Harambee, the World Bank & JPAL Africa
- ▶ **Funders:** PEDL, National Science Foundation, W. E. Upjohn Institute for Employment Research, & the Global Challenges Research Fund Accelerating Adolescent Achievement Hub
- ▶ **RAs:** Wim Louw, Wendy Trott, Shelby Carvalho, Allegra Cockburn, Goodwill Mpofo, Emmanuel Bakirdjian and Nilmini Herath in South Africa and Lukas Hensel, Svetlana Pimkina, Laurel Wheeler, Gabriel Cunha and Rachel Sayers at our institutions.