

# The Value of Reference Letters - Experimental Evidence from South Africa

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## Abstract

Information asymmetries about workers' skills can adversely affect both match quality and equity in labor markets. Reference letters from former employers could play a role in alleviating these asymmetries, but they are rarely used in developing country settings. We conduct a series of field experiments to investigate the value and usage of standardized reference letters among young job seekers in South Africa. A resume audit study finds that including a reference letter with the application increases employer call-backs by 60%. Women, traditionally excluded from many referral networks, particularly benefit: firms pay closer attention to the content of letters sent by women and increase response rates by 89%. A second experiment, which encourages job seekers to obtain and use a reference letter, finds similar results. Men are not more likely to find jobs, but employment rates for women who have reference letters double, thus fully closing the employment gender gap in our sample after three months. We find that letters are effective because they provide accurate information about workers' skills that firms use to select applicants of higher ability, unless they deem letters to be implausibly positive. Despite these positive findings, reference letters are not widely adopted, partly because job seekers underestimate their potential value.

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§Acknowledgement: This paper greatly benefited from discussions with and comments by Rema Hanna, Lawrence Katz, Asim Khwaja and Michael Kremer. Emma Lambert-Porter, Velenkosini Matsebula, Samantha Ndiwalana and Svetlana Pimkina provided superb research assistance. This study was prepared as part of a collaboration with the World Bank Gender Innovation Lab. We thank EuropeAid for financial support. All errors and omissions are our own.

# 1 Introduction

Information asymmetries about workers' skills are prevalent in labor markets, especially in the market for low skill and entry level jobs.<sup>1</sup> In developed economies, hiring firms commonly reduce these asymmetries through reference letters from previous employers (Ioannides and Loury, 2004). In developing countries, this practice is largely absent and many firms instead hire through informal referrals, such as those from their existing work force.<sup>2</sup> This has potential adverse effects on match quality as it limits the pool of candidates (Loury, 2006) and as current employees may refer close friends or family members rather than their most qualified peers (Beaman and Magruder, 2012). In addition, informal referral systems may exacerbate inequity as they disadvantage less connected groups; in particular, they harm women who often lack access to informal referral networks (Beaman et al., 2013; Montgomery, 1991).<sup>3</sup>

There are various potential reasons why reference letters are not more widely used in many markets: former employers may not be willing to provide relevant information, hiring firms may not perceive letters to be credible or informative, and job seekers may not request them as they underestimate their value or procrastinate. To distinguish between these explanations, we conduct three experiments in cooperation with the South African Department of Labour (DoL). Specifically, we design a reference letter template and encourage young job seekers to have a former employer complete it. To test whether reference letters are valuable in principle, we first submit applications on behalf of job seekers to vacancies with and without reference letters and compare firm responses (Exp.1).<sup>4</sup> To assess whether letters are valuable in practice,

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<sup>1</sup>In these markets, job seekers often have limited work experience and lack educational degrees to signal skills. Firms are less likely to invest in costly screening as employment relationships are often short-term (Autor and Scarborough, 2008).

<sup>2</sup>In developed economies about 50% of jobs are found through informal network (Topa, 2011) compared to about 68% in South Africa (Schoer et al., 2014).

<sup>3</sup>In South Africa, many young job-seekers do not have strong connections to the labor market via employed friends and family members. Female job seekers may be at a particular disadvantage; previous research shows that women are more reliant on social networks and informal channels in the search process (Schoer and Leibbrandt, 2006) and that family networks in South Africa favor male members (Magruder, 2010).

<sup>4</sup>We are among the first to conduct an audit study with actual job seekers. This addresses the criticism that application materials designed by researchers may not be realistic or include all relevant information (Heckman, 1998).

we conduct an additional experiment in which we encourage half of job seekers to obtain a letter and subsequently follow their job search behavior and employment outcomes (Exp.2). Given the large positive effects we find, we run a third experiment that tests different explanations for why letters are not more prevalent (Exp.3). Evidence from these experiments enables us to answer three questions: i) Do reference letters have value? ii) How do they generate value? and iii) What explains their (lack of) usage?

We find that reference letters are valuable to both job seekers and hiring firms. Attaching a letter increases the probability that a firm responds to the applicant by 59% (from 4.2% to 6.5%) and the rate of interview requests by 60% (from 2.2% to 3.6%). Effect sizes are larger for women, increasing employer responses by 89% (results from Exp.1). While we do not detect significant impacts for men, female participants who obtained letters are more likely to receive job interviews and their employment rate doubles after three months, thus fully closing the gender employment gap in our sample (Exp.2). On the firm side, reference letters help to select candidates of higher ability: performing one standard deviation higher on an aptitude test increases the likelihood of an employer response by 0.6 percentage points (15%) for applications that do not include a reference letter (Exp.1). Attaching a letter increases this figure to 2.6 percentage points (63%).<sup>5</sup> These improvements in firms' screening ability apply to both male and female candidates.

How do reference letters generate value? We find that letters are informative of workers' skills: ratings from previous employers are highly correlated with aptitude scores of both male and female job seekers, even after controlling for information that can be easily inferred from the resume or school transcripts. Firms correctly use this information to update their beliefs of applicants and are more likely to respond to applications with positive letters (Exp.1). However, reference letters in which the former employer gives the highest rating in *every* category are completely ineffective, despite the fact that job seekers with these glowing reference letters perform very well in the aptitude test. This suggests that a perceived lack of credibility of the

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<sup>5</sup>Although our study was not designed to explicitly test for general equilibrium effects, theory predicts that these reductions in information asymmetries increase firm demand ([Pissarides, 1985](#)).

letter harms their employment prospects. The effect of employer ratings is more pronounced for women, indicating that firms are more uncertain about their skills and thus pay more attention to their letters' content (Exp.1).

In light of these results, one might ask why reference letters are not more prevalent and those that do exist often lack relevant information.<sup>6</sup> At baseline, 88% of job seekers say they do not have a letter because they “never asked”, often claiming they did not know they needed one. Once encouraged, 31-42% of participants succeed in obtaining a letter. This share increases substantially when we provide job seekers with information on the benefits of having a letter (Exp.3). By contrast, providing monetary incentives to obtain letters is ineffective. Underestimating potential benefits may thus explain why job seekers are not asking former employers to provide (informative) reference letters. To test why job seekers do not discover their effectiveness, we analyze actual applications submitted by participants and find that only about 20% of people who obtain a letter submit it as part of their application (Exp.2). This low usage stifles any learning about their benefits through job search. We also find that among participants in the treatment group, women are significantly more likely to use letters in their search, which explains part of the large gender difference in employment effects.

Given the low prevalence of reference letters in the South African labor market for low-skill jobs, we explore how their effectiveness may differ as letters become more common. First, we introduce a simple model of employer learning that predicts that the penalty of *not* sending a letter increases as reference letters become more prevalent. Simulation results confirm that this in turn induces more job seekers to submit a letter, improving the ability of firms to screen applicants. A second reason that the effect may differ if reference letters are more common is that an application is less distinguished by having a letter attached. We test this hypothesis by randomly varying the share of applicants for whom we submit reference letters. We find

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<sup>6</sup>Less than 2% of people in the control group use a reference letter in the job search and the majority of these letters are generic and do not provide information about skills (72%) or even the reference's contact information (44%). Interviews with firms indicate that employers know what content a letter should include, but providing this information to the market is costly and references do not directly benefit from it ([Avery et al., 1999](#)).

that increasing the number of reference letters sent to a given vacancy from one to three does not affect the letters' impact (Exp.1).

This study contributes to the literature on job referrals. Previous studies have largely focused on whether social network links can be exploited to reduce information asymmetries, showing that although workers have information on the productivity of their peers ([Pallais and Sands, 2016](#); [Burks et al., 2015](#)), they are less likely to pass on truthful information to firms unless sufficiently incentivized ([Beaman and Magruder, 2012](#)). Former employers may provide more credible information because their incentives are more aligned with the hiring firm and they can assess workers more accurately as they observed them in a professional setting ([Aamodt, 2015](#)). However, few studies have looked at the role of former employers in reducing information asymmetries. One notable exception is [Pallais \(2014\)](#), who hired people in an online labor market and finds that providing feedback increases workers' employment prospects. We contribute to this literature by investigating a more traditional labor market setting in which workers can choose both the referee and whether to reveal the information to the market after they observe it.

In addition, we contribute to the literature on how search frictions affect employment ([Mortensen and Pissarides, 1994](#)). Information asymmetries between firms and workers lead to socially sub-optimal hiring of people without work experience and an overall decrease in market efficiency ([Pallais, 2014](#); [Terviö, 2009](#)). We identify an additional market inefficiency: *after* people are hired, firms lack the incentive to provide (detailed) information about the worker's ability to the market.<sup>7</sup>

This study also adds to an extensive literature evaluating the effectiveness of active labor market policies (LAMP) (see [Card et al., 2010](#) and [Betcherman et al., 2004](#) for reviews). The evidence on ALMPs is mixed, in part because they typically include a package of interventions

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<sup>7</sup>This provides a rationale for the government to intervene and facilitate this information exchange. The South African government introduced a wage subsidy for unemployed youths in 2014 which may address the inefficiently low hiring of job seekers without work experience. The lack of information exchange between former employers and hiring firms reduces the effectiveness of this policy, especially given that many of the employment opportunities are short term.

which makes it difficult to isolate the effectiveness of specific components. In this study, we are able to isolate one component of ALMPs, namely the reduction of information asymmetries.<sup>8</sup>

Lastly, we are to our knowledge the first to experimentally test the effectiveness of reference letters, a ubiquitous selection tool in the hiring process in many developed economies.<sup>9</sup> Our results suggest that letters can also be effective in developing country contexts: they both enhance firms' screening ability and benefit job seekers. In particular, we find large employment gains for women, a group often excluded from informal referral networks. Reducing information asymmetries - through reference letters or other interventions - may thus improve equity by leveling the playing field for women in labor markets.

The remainder of this paper is structured as follows: Section 2 describes the study context and introduces a conceptual framework. Section 3 describes the study designs. Section 4 investigates the effects of reference letters on firm responses and employment. Section 5 explores how firms use reference letters in the hiring process. Section 6 discusses why reference letters are not more widely adopted and Section 7 concludes.

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<sup>8</sup>Two recent studies test the effect of reducing information frictions by a third party in the context of developing countries. In Jordan, [Groh et al., 2014](#) use results from psychometric and skill testing to match job seekers to vacancies. Test results are predictive of subsequent job market outcomes, but the intervention did not lead to changes in employment as 83% of job seekers rejected job offers or quickly quit. [Abebe et al., 2016](#) test a combination of job counseling and skill certification for job seekers in Ethiopia. While overall employment and wages are unchanged, they find a large increase in permanent employment.

<sup>9</sup>There is relatively little research on reference letters, defined as a “description or evaluation of an applicant that is completed by an observer and used as a source of information for personnel selection” ([McCarthy and Goffin, 2001](#)), despite its ubiquity in the selection process ([Aamodt, 2015](#)). Existing research focuses on the ability of reference letters to predict future performance. Most studies find that reference letters are only moderately predictive of performance, in part because employer assessments are overly positive ([McCarthy and Goffin, 2001](#)).

## 2 Background and Conceptual Framework

### 2.1 South Africa's Labor Market

The post-2008 economic slowdown coupled with the rapidly growing working-age population contributed to a persistently high unemployment rate in South Africa (26.4%), especially for youths (36.9%) ([StatsSA, 2015](#)). The gender gap among black South Africans is substantial, despite the fact that black females are on average more educated than their male counterparts ([Rospabe, 2001](#); [Shepherd, 2008](#)). One explanation is that firms appear to either underestimate or are more uncertain of the ability of female applicants.<sup>10</sup>

South Africa offers a context conducive to investigating the role of labor market information asymmetries. Most of the unemployed did not complete secondary education (55%) and have no or limited work experience (50.6%), which leaves firms with very little information to screen job applicants. In addition, the quality of education is perceived to be low in the majority of South African schools which limits the use of educational credential as signals for productivity ([van der Berg, 2007](#)). Last, in economies with mass unemployment, the employment status is less indicative of job seekers' ability ([Kroft et al., 2013](#)).

Information asymmetries affect how firms and workers are matched. In South Africa, some large firms administer aptitude tests as part of the hiring process. While these tests can increase aggregate productivity and labor demand by improving match quality ([Mortensen and Pissarides, 1994](#); [Pissarides, 1985](#)), they have not been widely adopted for several reasons: First, when faced with hundreds of applications firms still need to first decide who to test and may therefore overlook the most suitable candidates.<sup>11</sup> Second, [Autor and Scarborough \(2008\)](#)

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<sup>10</sup>[Malindi, 2016](#) finds that black females have a much higher returns to job tenure than black males, white females or white males in South Africa. This is consistent with a model in which employers initially underestimate or attach greater uncertainty to the value of productive attributes possessed by black females, but then upwardly adjust their wages once they observe their true productivity.

<sup>11</sup>Research has shown that hiring is a ‘stage specific process’: factors that affect the initial screening decisions vary from those that influence decisions at the interview stage ([Dipboye et al., 1975](#))

note that firms have fewer incentives to test candidates for jobs where investment in training is limited and employment spells are brief. Last, many small firms lack the expertise and resources to systematically test applicants.

Faced with these challenges, South African employers have increasingly turned to social networks and the existing workforce to fill vacancies.<sup>12</sup> Yet, firms face a trade-off in their choice of hiring channels (Montgomery, 1991). Under the “good match” hypothesis (Rees, 1966), current employers can help overcome the asymmetric information problem and create better employment matches as they know both the firm and the people in their network. By contrast the “limited choices” hypothesis stresses that finding employment through social networks limits the opportunities and match quality (Loury, 2006). In addition, current employees may have personal interests in referring friends that conflict with the interest of the firm (Fafchamps and Moradi, 2015; Beaman and Magruder, 2012).

A formal referral system with endorsements from former employers may thus be a more effective mechanism to reduce information asymmetries. Interviews with South African firms confirm the benefits of having former employers as references: if available, hiring managers report that they typically call them for the group of shortlisted candidates. However, focus group discussions with job seekers reveal that most do not have contactable references listed on their CV and less than 5% used a reference letter as part of the application process.<sup>13</sup>

## 2.2 Conceptual Framework

Markets differ in the extent to which references can mitigate information asymmetries. In many markets, sellers have no choice over the source of the reference and whether this infor-

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<sup>12</sup>Schoer et al., 2014 report that up to 68% of workers found employment via social networks.

<sup>13</sup>Furthermore, of those that list references, many include relatives or friends – something the employers in our interviews attached little value to. While reference letters from people in non-professional networks such as former teachers or pastors is sometimes perceived as adding value, employers generally felt that references from former employers provide a much stronger and more credible signal.

mation is publicly revealed.<sup>14</sup> By contrast, job seekers typically choose referees and often observe their feedback before deciding whether to reveal it to the market.<sup>15</sup> This is an important feature which may limit how effectively referral systems can reduce information asymmetries. This section introduces a static illustrative framework for employer learning in this type of market. It will generate two important sets of results: i) it identifies conditions under which letters have value and ii) it derives predictions for how the letter affects the hiring decision and screening ability of firms.

### 2.2.1 Setup

A job-seeker has (general) ability  $a$  which determines her productivity for any firm. At the time of applying for work, the job-seeker is endowed with an application signal  $s_1 = a + e_1$ . This represents the content of a resume, including school transcripts and other easily observable applicant attributes. With probability  $\pi$  she is also endowed with a reference letter signal  $s_2 = a + e_2$  ( $c = 1$  if she does, otherwise  $c = 0$ ).<sup>16</sup> Assume that  $a \sim \text{nid}(0, 1)$ ,  $e_1 \sim \text{nid}(0, \sigma_1^2)$  and  $e_2 \sim \text{nid}(0, \sigma_2^2)$ . The job-seeker applies to a vacancy by sending application  $s_1$  to the firm and must choose whether to also attach a reference letter  $s_2$  ( $d = 1$  if she does, otherwise  $d = 0$ ).

The firm offers a fixed wage and chooses whether to hire the applicant based on available information  $\Omega$ . It will do so if the expected productivity exceeds the cost of employment  $\theta$ , i.e.  $E(a|\Omega) > \theta$ . We denote this hiring decision as  $h = 1$  if a job is offered and  $h = 0$  otherwise. Her utility depends only on whether or not she is offered a job, and there is no

<sup>14</sup>The rise of the internet facilitated the exchange of information between former and potential buyers (Avery et al., 1999). Online markets like Amazon and AirBnB provide feedback from former buyers. In online labor markets like odesk, employers are required to publicly evaluate former employers.

<sup>15</sup>Research confirms that reference letters tend to be overly positive (Aamodt et al., 1993). This ‘leniency bias’ limits the letters’ informativeness (Loher et al., 1997)

<sup>16</sup>Building on Gibbons and Katz, 1991, we assume that  $\pi$  is independent of  $a$  which limits what firms can infer about workers ability from their access to letters. (Predictions would not qualitatively change as long as there is no perfect correlation.) This assumption is supported by field work we conducted finding that some firms out of principle do not provide reference letters to former employers, citing concerns about legal reasons.

cost to applying or sending reference letters. The firm's conditional expectation is rational and common knowledge, but the hiring threshold  $\theta$  is private information.

### 2.2.2 Solution and Interpretation

Applying the perfect Bayesian equilibrium to this dynamic game of incomplete information produces a single stable solution.<sup>17</sup> Although the model outcomes cannot generally be expressed as closed-form solutions of the model parameters, we use linearization techniques to obtain such expressions. (For a formal derivation see Appendix C.)

The firm's equilibrium conditional expectation function depending on whether they receive a reference letter ( $d$ ) can be expressed as

$$E(a|s_1, s_2, d = 1) = \kappa_2 s_1 + \kappa_1 s_2 \quad (1)$$

$$E(a|s_1, s_2, d = 0) = -\psi \kappa_1 \omega + \left( \frac{1}{1 + \sigma_1^2} \kappa_1 + \kappa_2 \right) s_1 \quad (2)$$

where  $\kappa_1$  and  $\kappa_2$  capture noise in resumes ( $s_1$ ) and reference letters ( $s_2$ ), respectively.  $\omega$  is the reference variance conditional on the information in the resume and  $\psi$  is a monotonic transformation of  $P(c = 1|d = 0)$ , the number applicants who have a reference letter but choose not to attach it, expressed as a share of all those who do not attach a reference letter.

When applicants include a reference letter ( $d = 1$ ), firms form beliefs about ability using information from both the resume and reference letter, weighted according to the relative reliability of these two signals. If the application does not include a reference ( $d = 0$ ), firms form beliefs using the information in the resume. They further penalize these applicants with

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<sup>17</sup>After ruling out the possibility that no-one sends a reference letter, in which case the firm's conditional expectation for those with a reference letter would be undefined.

a downward adjustment in expected ability, conditional on the quality of the resume. The magnitude of this penalty ( $\psi\kappa_1\omega$ ) increases in the share of applicants who have access to letters, the relative reliability of the letter and the variance of the letter signal.

In equilibrium, applicants with access to letters will choose to send it if it improves the firm's perception of their ability, i.e.  $E(a|s_1, s_2, d = 1) > E(a|s_1, s_2, d = 0)$ .<sup>18</sup> This requires that the reference is sufficiently positive relative to the information in the resume:

$$d(s_1, s_2, ) = c.1 \left[ s_2 - \frac{1}{1 + \sigma_1^2} s_1 > -\frac{0.8\psi}{1 - 0.64\psi} \omega \right] \quad (3)$$

### 2.2.3 Predictions

Implicit in the model setup are two testable assumptions about the information provided by reference letters: i) letters must be informative about the applicant's ability, i.e.  $\frac{\delta E(s_2|a)}{\delta a} > 0$ , and ii) letters must contain information that is not already contained in the applicant's resume, i.e.  $\frac{\delta E(s_2|a, s_1)}{\delta a} > 0$ . Under these assumptions, the model makes the following predictions about how job seekers use letters and how firms respond to receiving letters.

1. *Hiring probability*: Firms will be more likely to hire candidates with stronger letters:  

$$\frac{\partial P(h|s_1, s_2, d=1)}{\partial s_2} > 0.$$
2. *Screening on ability*: Letters results in a closer mapping from ability to job offers:  

$$E(a|h = 1, d = 1) > E(a|h = 1, d = 0).$$
3. *Credibility*: Since the effect of reference letters depends on their relative reliability ( $\kappa_2$ ), any attribute that casts doubt over their reliability (e.g. not providing contact information or being implausibly positive) reduces their effectiveness:  $\frac{\partial^2 P(h|s_1, s_2, d=1)}{\partial s_2 \partial \kappa_2} < 0$ .

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<sup>18</sup>The share of individuals who send reference letters in equilibrium is then:  $P(d = 1) = \pi \Phi \frac{0.8\psi}{1 - 0.64\psi} \omega$  where  $\tilde{\kappa}_2$  is another reflection of the relative reliability of resumes.

4. *Variance in (prior) beliefs:*

- (a) If employers are more uncertain about ability of job seekers, then the content of reference letters matters more:  $\frac{\partial^2 P(h|s_1, s_2, d=1)}{\partial \sigma_1^2 \partial s_2} = \frac{\sigma_2^2}{(\sigma_2^2 + \sigma_1^2 \sigma_2^2 + \sigma_1^2)^2} > 0$ .
- (b) Evidence suggests that in our study context, employers are more uncertain about skills of female job seekers. The content of women's letters therefore has a larger effect on the hiring probability:  $\frac{\partial P(h|s_1, s_2, d=1, \text{female})}{\partial s_2} > \frac{\partial P(h|s_1, s_2, d=1, \text{male})}{\partial s_2}$ .

5. *Usage of letters:*

- (a) As more job seekers gain access to reference letters ( $\pi$ ), the usage will increase for two reasons: i) mechanically, more people will have access to positive letters that meet condition 3 and ii) on the margin, people with less positive letters will use it as the penalty of not sending the letter ( $\psi \kappa_1 \omega$ ) increases.<sup>19</sup>
- (b) As access to and usage of letters increase, the ability of firms to identify higher ability candidates improves:  $\frac{\partial^2 P(h)}{\partial a \delta \pi} > 0$ .

The next section describes the experiments we conduct to test these predictions. Section 4 reports results on the value of reference letters (Predictions 1 and 2). Section 5 provides evidence on the role of credibility (Prediction 3) and variance in prior beliefs (Prediction 4), as well as the two testable assumptions regarding the letters' content. Appendix D provides simulation results on how the effects of reference letters change as they become more widely adopted (Prediction 5). This framework presents a rational benchmark model, which assumes that job seekers have correct beliefs about the value of reference letters. We revisit this assumption in Section 6.

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<sup>19</sup>A variation of this prediction is known as the Full Disclosure Theorem: if certification of types is costless, then there is full disclosure of information (Grossman and Hart, 1980; Milgrom, 1981).

### 3 Study Design

This section first describes the sampling and the process of eliciting reference letters common to all three experiments. We then describe each of the experimental designs in detail.

#### 3.1 Study Sample

Our target population are unemployed youths between the ages of 18 and 34.<sup>20</sup> We limit our study sample to African unemployed job seekers who have some form of previous work experience (as our interventions tests reference letter from previous employers), have not completed university-level tertiary education and live within traveling distance from our four implementing labor centers in the Gauteng and Limpopo province.<sup>21</sup>

Job seekers who meet these criteria were randomly selected from the Employment Services South Africa (ESSA) data base. We further stratify the sample by gender to facilitate subgroup analysis. In the recruitment call, surveyors explain that the job seeker is invited to participate in an employment service study at the local labor center on a specified day. In return, they receive a stipend of 30 Rand (2 USD) to cover travel cost. Across all experiments, 67% of the successfully contacted unemployed individuals agreed to participate.<sup>22</sup>

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<sup>20</sup>Table A.4 provides summary statistics for job seekers in our sample: 50.2% are female and the average age is 27.3 years. The average level of education is 12.1 years and 67% have completed secondary school (matric). 7% of participants are married and they have on average one child. 11.4% receive unemployment insurance and the average participant spends 14 hours per week searching for work.

<sup>21</sup>We worked with the following centers: Krugersdorp, Sandton and Soweto in the Gauteng Province and Polokwane in Limpopo.

<sup>22</sup>Using the limited demographic information provided in ESSA, we find that age and gender are not correlated with the decision to participate. By contrast, every year of additional education increases the probability of participation by 1.6 percentage points (p-value: 0.063). Of those that agree to participate, 63.5% showed up at the labor center on the specified day. None of the socioeconomic variables predict whether participants fail to show up at the agreed time and day.

### 3.2 Obtaining Reference Letters

We conducted more than 30 interviews with employers who frequently mentioned the importance of contactable references in the screening process. When asked what information they collect from references, employers listed both non-cognitive skills like motivation, reliability and work ethic as well as cognitive skills like numeracy and literacy. They are also interested in the nature of the relationship between the referee and job seeker and why the employment relationship ended. Based on this feedback, we designed a reference letter template that employers can easily fill out. (Figure A.1 shows the template. For examples of completed reference letters see Figure A.2.)

The study employs an encouragement design implemented in cooperation with the Department of Labour (DoL). A baseline survey is administered through an in-person interview at the labor center, followed by an aptitude test that evaluates basic math and literacy skills.<sup>23</sup> Next, participants assigned to the treatment group have a brief individual meeting explaining the benefit of obtaining a reference letter and instructions how to use it in the job search. This is followed by a discussion of the job seekers' work history and identification of potential referees. We provide job seekers with several hard copies of the template and instructions on how to return the completed letter to us. After one week, participants receive a text message reminding them to obtain and return the reference letter.

31% of encouraged job seekers returned the completed letter. In surveys after five weeks, 42% of people claim to have obtained a letter. Table A.1 investigates which characteristics are correlated with the probability of obtaining a letter. Age is the only statistically significant predictor of receiving a letter; however, there are likely unobservable variables correlated with the propensity to obtain a letter.<sup>24</sup>

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<sup>23</sup>The test takes about 20 minutes and was designed by the researchers. It closely follows standard entry level tests used in the hiring process by large employers in South Africa. Figure A.4 shows that results are approximately normally distributed with a mean (median) joint numeracy and literacy score of 61% (63%). For sample questions see Figure A.3.

<sup>24</sup>Older job seekers are significantly more likely to have the letter completed, whereas the coefficients of

Table A.2 provides summary statistics of the reference letter content, converting employer ratings into numeric values (0=below average, 1=average, 2=good, 3=very good). Overall, ratings tend to be positive: on a scale from 0 to 6, the average aggregate hard and soft skill rating is 4.9; 11% have a perfect score of 6. We find that hard skills are slightly less positively rated than soft skills (2.3 vs. 2.6 on a 3 point scale; Figure A.6 shows the distribution of scores). While for most categories women receive slightly more positive ratings, only one gender difference is significant at the 10% level (Team Ability) and one at the 5% level (How highly recommended). As an important caveat, we do not verify the authenticity of the reference letters. In Section 5, we will explore whether the letter provides truthful information.

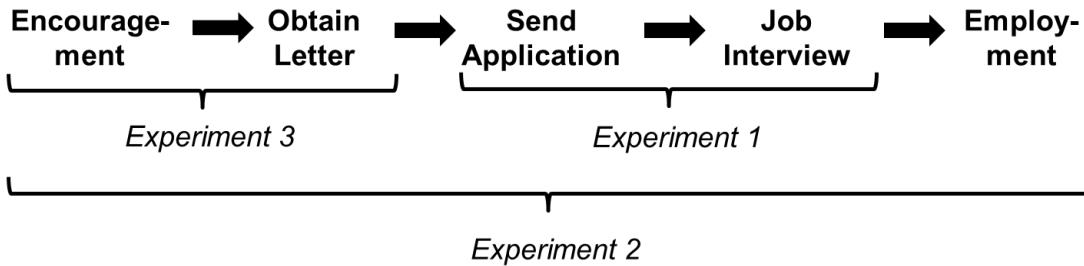
### 3.3 Experimental Designs

Figure 1 describes how our intervention may affect employment and summarizes our experimental designs. In Experiment 1, we submit applications on behalf of job seekers to vacancies from online job sites and test if employers are more likely to respond if a reference letter is attached. This provides a “test case” whether reference letters have the potential to be valuable. Experiment 2 explores the effect of reference letters on job search behavior and estimates employment effects *after* people adjusted their search strategy. Experiment 3 tests different forms of encouragement to investigate why only a small share of people obtain reference letters in equilibrium.

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both education and gender are small in magnitude and not statistically significant (Table A.1, Column 1). We find that neither people who are more actively searching nor those who perform better on the aptitude test are more likely to obtain a letter (2,3). The time since last employment is uncorrelated (5) and the employment spell in the last job is negatively correlated (4), although the latter relationship loses significance when we control for all characteristics simultaneously (7). People who were fired in the last job are less likely to obtain a letter than those that left voluntarily, but these differences are not statistically significant (6).

Figure 1: Experimental Design Overview



### 3.3.1 Experiment 1: Employers’ Response to Reference Letters

To test the effect of the letter on employer demand, we employ a within-subject randomization design: we encourage 441 job seekers across three labor centers (Soweto, Sandton, Krugersdorp) to obtain a reference letter using the protocol described above; for the 31% of participants who return it to us, we send out applications with and without the reference letter.<sup>25</sup> This has the advantage that we can control for individual specific factors that determine employer responses and thus estimate the effect of reference letters more precisely.

Figure 2 summarizes the randomization design. We search the four most popular South African job websites to identify vacancies for entry positions from one of the following sectors: administration, call center, cleaner, driver, retail, security and unskilled. The vacancies are randomly assigned to vacancy slot 1 through 6. Next, we select four of the job seekers who returned the letter and have previous work experience in a related sector. We create email addresses for each participant and send out six applications following the pattern described in Figure 2. For example, for Participant A we send four applications with the CV (and any additional supporting documents the job seeker provides) and two applications for which we attach the reference letter as an additional document. Importantly, we are invisible to the employer in the entire application process.

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<sup>25</sup>Selection at the encouragement stage may affect the generalizability of results. However, using within-subject randomization ensures that results are internally valid.

Figure 2: Experiment 1: Randomization Design

		Vacancy					
		1	2	3	4	5	6
Participant	A	CV + Ref Letter	CV	CV	CV	CV	CV + Ref Letter
	B	CV	CV + Ref Letter	CV	CV	CV	CV + Ref Letter
	C	CV	CV	CV + Ref Letter	CV	CV	CV + Ref Letter
	D	CV	CV	CV	CV + Ref Letter	CV	CV

Vacancies 1 through 4 offer a straightforward test of the effect of reference letters as we can compare employer responses between applications with and without the attached letter (e.g. compare cell A1 to cell A2, A3 and A4). For vacancy 5 we only send CVs. This provides us with a test for displacement effects at the interview stage, i.e. whether being in an application pool with somebody with a reference letter reduces the chances of getting an employer response. To test for this, we can compare employer responses in cell A5 to A2, A3, and A4. Vacancy 6 receives three applications with reference letters. Comparing application A1 and A6 allows us to test whether employers respond to reference letters differently once they present a higher proportion of the applicant pool.

We submitted a total of 2,050 applications for 102 job seekers between June 2015 and April 2016.<sup>26</sup> We regularly checked for firm responses and forwarded these to the job seekers.<sup>27</sup>

### 3.3.2 Experiment 2: Job Search and Employment Effects

While Experiment 1 cleanly identifies the effect of including a reference letter in applications, it does not allow us to test whether people search differently once they obtain a letter. South African job seekers use a mix of search strategies beyond online vacancies ([Schoer et al.](#),

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<sup>26</sup>A total of 117 letters were returned to us, of which 15 letters were either illegible or these job seekers did not have work experience in a relevant sector. We included vacancy 6 starting in January 2016.

<sup>27</sup>One possible concern is that employers may contact job seekers directly via phone. From talking to participants this did not happen frequently. While it may lead us to underestimate the overall response rate there is little reason to believe that the choice of how employer communicate with job seekers is correlated with the treatment assignment.

2014) and employment effects are more meaningful if they are measured *after* people adjusted both search intensity and search channels. We therefore conduct a second experiment with a separate sample in which half of the job seekers receive the encouragement treatment described in Section 3.2.

A total of 1,267 participants are part of this sample and were initially surveyed between September 2015 and February 2016. Participants are invited to come to the labor center on a certain date, randomly assigned to be either control or treatment days. The same calling script is used for the control and treatment group to ensure that there is no differential selection. The share of invited participants who show up are very similar (64.2% reference letter, 63% control group, p-value of test of equal coefficient: 0.55). Table A.4 suggests that the randomization was successful.<sup>28</sup>

To track job search activities and employment outcomes over time, we conduct phone surveys five weeks and three months after the treatment.<sup>29</sup> One potential shortcoming of any survey data is that it is self-reported. We therefore complement the survey data with an observed measure of job search. Specifically, study participants are notified about a vacancy and are asked to submit their full application via email in case they are interested.<sup>30</sup>

### 3.3.3 Experiment 3: Barriers to Obtaining Letters

Results discussed in more detail below suggest that reference letters substantially increase the probability of receiving an employer response. This raises the question of why only about 2%

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<sup>28</sup>Of the 19 characteristics reported, only two differences are significant at the 10 percent level. When we control for all characteristics in a regression, none of the variables is significant and we can reject that variables are jointly significant (p-value: 0.72, results not reported).

<sup>29</sup>Table A.5 shows that attrition rate increases from about 6% in wave 1 to 17% in wave 2, likely due to survey fatigue and participants switching phone numbers. Attrition is clearly not random: younger and less educated participants are more likely to attrite, but importantly rates do not differ between treatment and control group.

<sup>30</sup>Participants were informed about a vacancy in a specific sector. Among those with work experience in multiple sectors, we randomly chose for which sector we notify them. For job seekers for whom we do not have information on previous sectors, we send a general notification about a vacancy. Sectoral shares were balanced by treatment status. Applications were submitted to actual vacancies after the end of the last survey wave so that it would not confound employment estimates.

of job seekers in the control group use reference letters in their job search. Experiment 3 tests different barriers to obtaining reference letters.

During follow up surveys, a significant share of participants could not provide us with a reason why they have not tried to obtain the letter or cited reasons like “No Time” or that they do not need it. This may be a sign of procrastination or that job seekers do not believe they would benefit from a letter. We design two interventions to test these hypotheses: i) provide job seekers with information on the effectiveness of letters and ii) compensate participants with 100 Rand (about half a daily wage) in cell phone airtime if they obtain a letter.<sup>31</sup>

A group of 498 job seekers, previously encouraged to obtain a letter, receives a follow-up text message to their cell phone and (if provided) email address reminding them of how to return the completed letter to us. Participants were randomized into four groups.<sup>32</sup> The control group received only this reminder. The other three groups received one of the following additional messages:

- *“Research suggests reference letters almost double chances of getting a job interview.”*  
(Information)
- *“To compensate your costs, you get 100 Rand airtime after sending us the completed letter.”* (Compensation)
- *“Research suggests reference letters almost double chances of getting a job interview. To compensate your costs, you get 100 Rand airtime after sending us the completed letter.”*  
(Information + Compensation)

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<sup>31</sup> Job seekers were compensated with airtime rather than money for logistical reasons. Participants could provide any time for the airtime top up and could choose among all major cellphone carriers. As participants frequently top up cell phone airtime, we expect that they value it similar to receiving 100 Rand in cash.

<sup>32</sup> Comparing observable characteristics between the treatment and control group suggests that randomization was successful (Table A.6).

## 4 Do Reference Letters Have Value?

### 4.1 Empirical Strategy

This section tests the effect of the reference letter on firm demand using data from Experiment 1. We use two measures of employer response: i) a narrow measure of interest that captures interview requests and ii) a broader measure of interest that captures either an interview request or a different employer response (most commonly, firms asked questions, requested specific documents, or provided more information about the job and asked if job seekers were still interested). Throughout the analysis we will report results for both outcomes.

To estimate the effect of the reference letter, we estimate the following model:

$$y_{is} = \beta Ref_i + \lambda_s + \mu_k + e_s \quad (4)$$

Outcome  $y_{is}$  is a binary variable measuring whether employers respond to application  $i$  of person  $s$ .  $Ref_i$  is an indicator variable for whether a reference letter was included with application  $i$ .  $\lambda_s$  and  $\mu_k$  capture individual and sector fixed effects, respectively. The error term  $e_s$  is clustered at the individual level. The coefficient of interest  $\beta$  captures the causal effect of the reference letters.

### 4.2 Employer Responses

Table 1 reports results from Specification 4. Column 1 to 4 report effects using the broad measure of interest as an outcome and Column 5 to 8 report effects on interview requests. The preferred specification controls for both sector and individual fixed effects (Column 3, 7). On a control mean of 4.15 percent, the reference letter increases the chance of getting any employer response by 2.44 percentage points (59%) (3) and on getting an interview request

by 1.44 percentage points (60%) on a control mean of 2.4 percent (7). The former effect is significant at the 5% level, the latter is not significant at conventional levels (p-value: 0.11).<sup>33</sup> Treatment coefficients for both outcomes are substantially larger for women, although the difference across gender is not statistically significant (4, 8).<sup>34</sup>

Do employers respond differently if they receive multiple applications with reference letters? We estimate Specification 4 including an interaction term between the reference letter variable and an indicator variable for vacancy 6, which received three applications with letters. The coefficient on the interaction term is very close to zero indicating that the effect does not differ if the employer receives more than one letter (Table A.7, Column 2, 5). These results suggest that it is not the novelty of seeing a reference letter that is driving the positive employer response.<sup>35</sup>

Next, we test if there is a negative effect from being in the applicant pool with a job seeker who submits a reference letter. We include a dummy for pure control applications (sent to vacancy 5) in Specification 4. Coefficients in Table A.7 are small in magnitude and not statistically significant suggesting that there is no displacement (3, 6). However, these coefficients are estimated relatively imprecisely and we can only rule out with 95% confidence that the displacement effect is larger than 1.2 percentage points.

### 4.3 Screening Ability

The starting premise of the paper is that information asymmetries inhibit firms to identify the most suitable candidates. Following the model in Section 2.2, we assume that there is an

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<sup>33</sup>Table A.8 reports results of Specification 4 estimated separately for each of the seven sectors. There is some evidence that effects are larger in sectors that require fewer cognitive skills (e.g. cleaner, retail, unskilled). However, the evidence is inconclusive given the relatively small number of applications sent to each sector.

<sup>34</sup>Within the sample of women, we find significant effects for the interest outcome (at the 1% level) and interview outcome (at the 5% level). Treatment coefficients in the sample of men are not significant.

<sup>35</sup>However, the exact interpretation remains inconclusive as seeing multiple letters that use the same template may increase its credibility. It further allows employers to compare letters and calibrate the ratings.

ability parameter  $a$ , imperfectly observed by the firm at the time of the application.<sup>36</sup> As a proxy for productivity, we employ standardized results of the aptitude test administered as part of the baseline survey.

To test whether the letters enable firms to identify applicants of high ability (Prediction 2) we estimate the following model:

$$y_{is} = \beta Ref_i + \gamma a_s + \delta Ref_i * a_s + \mu_k + e_s \quad (5)$$

Coefficient  $\gamma$  captures whether employers select higher ability applicants when only the CV is attached and  $\gamma + \delta$  is the effect when the letter is attached. Results are presented in Table 2. It is noteworthy that coefficients  $\gamma$  are small in magnitude and not significant suggesting that without the reference letter, firms are ineffective in selecting the more productive applicants.  $\delta$  is positive indicating that reference letters enable firms to identify applicants of higher ability (despite not seeing the aptitude score). The coefficients are significant at the 5% level and large in magnitude. A one standard deviation higher performance in the aptitude test increases the probability of receiving an employer response and interview request by 2 percentage points (47%) and 1.3 percentage points (54%), respectively (Column 1, 3). Put differently, in control applications the chance of receiving an employer response for job seekers at the 90th ability percentile is 1.8 percentage points (35%) higher compared to those at the 10th percentile. Once the reference letter is included this figure increases to 6.3 percentage points (123%). These improvements in firms' screening ability does not differ by the gender of the job seeker (2, 4).

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<sup>36</sup>This parameter captures the part of productivity that is transferable across firms rather than firm specific match quality.

## 4.4 Employment Effects

To test whether reference letters are increasing firm responses and employment when used by job seekers, we use data from Experiment 2 and estimate the following model:

$$y_{ij} = \beta T_i + \gamma X_i + \delta y_{ij}^{bs} + \lambda_j + e_i \quad (6)$$

The dependent variable  $y_{ij}$  is measured for individual  $i$  residing in location  $j$ . We focus on three key outcomes: number of applications submitted and job interviews in the last four weeks and employment status. In order to increase precision we control for the baseline value  $y_{ij}^{bs}$  of outcomes. To account for differences in firm demand across space, we control for location fixed effects  $\lambda_j$ . Robust standard errors are computed at the individual level. Results from the audit study (Table 1) suggest that the effect of reference letters may differ by gender. We therefore also estimate specification 6 separately for women and men.

Columns 1 to 3 in Table 3 report intent to treat (ITT) effects after three months. Columns 4 to 6 reports local average treatment effects (LATE) estimated with 2SLS, using the random encouragement assignment to instrument for the take-up of reference letters.<sup>37</sup> Results in the pooled sample are inconclusive (Panel A): coefficients on both the number of applications submitted and on employment outcomes are sizable - LATE estimates range between 20% and 30% of the control mean - but not statistically significant.

Panel B and C show that there is important treatment effect heterogeneity by gender: after three months, women in the treatment group submit more applications and are significantly more likely to receive interviews and find employment. Employment effects are large in magnitude: 5.7 percentage points for ITT estimates (3) and 11.7 p.p. for LATE estimates (6),

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<sup>37</sup>The first stage equation is  $Ref_i = \gamma T + \beta X + e_i$  with  $T_i$  as the randomly assigned encouragement treatment. Local average treatment effects for the group of compliers. ITT and LATE estimates are both interesting from a policy perspective. ITT estimates show what effect we can expect from scaling-up programs as this measure accounts for the fact that some job-seekers will fail to take advantage of the service. LATE estimates, by contrast, provide information about the actual effect of a program for the compliers (Angrist and Imbens 1994).

effectively doubling employment rates for the group of compliers. Coefficients for men are close to zero and insignificant. We can reject that employment coefficients for women and men are equal at the 10 percent level. While estimates are relatively imprecise, these results suggest that reference letters have the potential to improve employment outcomes.<sup>38</sup>

Results in this section provide support for model Prediction 1 and 2. Next, we explore the mechanism underlying these large and significant effects of reference letters.

## 5 How Do Firms Use Reference Letters?

### 5.1 Are letters informative?

This section tests the two key assumptions necessary for reference letters to be effective: they must be informative of applicants' skills and provide information that cannot easily be inferred from other application documents. We test these assumptions by comparing subjective employer ratings to an objective assessment. Specifically, we regress results from the aptitude test we administer on employer ratings in numeracy and literacy. Table 4 shows that employer ratings and test results are highly correlated for both literacy (1) and numeracy (4). This implies that the average letter contains information about the applicant's skills. Next, we explore how the correlation changes when we control for additional covariates (age, education, gender) and school grades in English and math, respectively. While the magnitude of the coefficients decreases they stay highly significant suggesting that the letter contains information that employers cannot easily infer from the resume (2, 5).<sup>39</sup> Results do not differ by gender, ruling out that treatment effects are larger for women because their reference letters are more informative (3, 6).

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<sup>38</sup>Table A.10 reports results after five weeks. Results are smaller and insignificant, possibly because the follow up period is too short as many participants report that it takes them longer to obtain a reference letter.

<sup>39</sup>Groh et al. (2016) employ a similar test on a sample of unemployed youths in Jordan and find that results from psychometric and skill tests have predictive power for subsequent employment, even after controlling for easily observable worker characteristics. Abebe et al. (2016) find that the job search workshop improves firms' ability to identify applicants' whose observable characteristics predict higher performance in aptitude tests.

Results confirm that referee ratings contain additional information, at least for skills captured in the aptitude test. Arguably, it would even be more difficult for firms to learn about other skills from the CV, especially non-cognitive skills like reliability or work ethics (Aamodt, 2015).

## 5.2 Does the Reference Letter Content Matter?

The model predicts that those with *better* reference letters are more likely to receive job offers (Prediction 1). An alternative channel is that the mere ability to obtain a reference letter and use it correctly in the job search is the relevant signal for firms. We can test for whether employer responses depend on the content of the letter, by estimating:

$$y_{is} = \mu_k + \lambda_s + \beta Ref_i + \gamma score_s + \delta Ref_i * score_s + e_s \quad (7)$$

Coefficient  $\gamma$  captures the counterfactual, i.e. the effect of the referee rating (*score*) when it is not revealed to employers, indicating whether job seekers that are in higher demand receive more positive reference letters. We find that the coefficient is close to 0 (Table 5). Coefficient  $\delta$  measures the (additional) effect of the referee rating once the letter is revealed to the firm. The score is positive but not significant for both outcomes (1, 5). Looking at the relationship between referee ratings and employer responses graphically shows a non-linear relationship: ratings and employer responses are positively correlated, but we observe a sharp discontinuity for letters with perfect scores (Figure A.7). We therefore estimate specification 7 and control for applications with perfect scores (3, 7). The coefficient on the rating increases and turns significant: a one standard deviation higher rating increases employer responses (interviews) by 41% (71%). The coefficient on the all positive dummy interacted with the reference letter is negative and large in magnitude, but only significant (at the 1% level) for the interview outcome (3, 7). A letter with a perfect score has a 7 percentage points lower chance of receiving an interview compared to what is predicted by the rating (7).

The content of the letter matters much more for female applicants: positive ratings have a larger positive impact and letters with perfect ratings have a more negative effect across both outcomes (2, 4, 6, 8). This finding is consistent with the starting premise that firms are more uncertain about applications from women and thus use letters more for updating beliefs about female job seekers (Prediction 4b).<sup>40</sup>

The discontinuity in employer responses at high scores raises the question of whether firms are correct in inferring that these applicants are of lower ability. Figure A.5 shows that these job seekers are in fact the group that performs *best* in the aptitude test.<sup>41</sup> In line with Prediction 3 of the theoretical model, this suggests that employers ignore the reference letter signal if it is perceived to be implausibly positive and thus deemed non-credible. After all, it is unclear why the firm did not continue to hire these job seekers if they are “very good” at every skill.<sup>42</sup>

These findings provide empirical support for studies that explore the role of credibility of signals. Clark and Martorell (2011) conclude that in addition to providing relevant information, signals must be verifiable in order to be of value.<sup>43</sup> Avery and Meyer (2011) echo this argument and observe that there is no universal standard for the assessment procedure, nor databases on the history of past recommendations. This induces evaluators to be biased thus reducing their usefulness in the hiring process (Avery and Meyer, 2011).

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<sup>40</sup>These results are consistent with earlier work showing that reducing information asymmetries leads to a larger belief updating among employers for members of disadvantaged groups (Agrawal et al., 2013; Lang and Manove, 2011).

<sup>41</sup>Writing implausibly good reference letters presents a form of inadvertent signal jamming. Results (not reported) confirm that the effect of reference letters on firms’ ability to pick higher ability applicants is *increased* when we estimate Specification 5 without these positive letters.

<sup>42</sup>A uniform rating may also indicate that the referee did not take the time to carefully consider each category. However, we do not find that the effect of these uniform assessments differs for letters that include more detailed comments on skill categories, suggesting that the negative effect is not due to a perceived lack of effort of the referee.

<sup>43</sup>They speculate that the low return to a high school degree they find may be because diploma information is difficult to verify, partly because schools are under no legal obligation to cooperate with employer requests Clark and Martorell, 2014.

## 6 Why are Reference Letters Not More Widely Used?

The previous section showed that both job seekers and firms benefit from reference letters: they increase workers' chances of receiving callbacks and help employers to pick job seekers of higher ability. This raises the question of why the market is in a near pooling equilibrium in which reference letters are almost completely absent. The previous analysis rules out two of the most obvious explanations, confirming that reference letters contain additional information and, despite being sent by job seekers, employers use them to update beliefs. This section explores additional explanations on the part of previous employer, hiring firms and job seekers.

### 6.1 The Role of Previous Employers, Hiring Firms and Job Seekers

#### 6.1.1 Previous Employers

We ask job seekers to bring all their application documents to the initial meeting at the labor center. We find that among job seekers with previous work experience, only about 4% have a reference letter from a former employer. When probed, 86.4% of job seekers report that they "Did not ask", while only 3.1% report that they asked but the employer refused (Table 6). It is however possible that many job seekers did not ask because they correctly predict that employers would not be willing to write a letter. We can exploit results from our encouragement design to test this hypothesis. Five weeks after the treatment, 56% of job seekers report that they have tried to obtain a letter. Of this group, 73.6% succeeded. Among those that tried, only 4.1% report that they failed to obtain a letter because the employer refused.

#### 6.1.2 Hiring Firm

Results in Section 4 indicate that firms believe letters (unless they are implausibly positive), use them to update beliefs of job seekers, and benefit as it enables them to select people of

higher ability. Interviews with hiring managers further shows that they recognize that job seekers do not have any bargaining power to request letters. Firms therefore do not require applicants to submit letters.

### 6.1.3 Job Seeker

Why do job seekers not request reference letters from employers? This section reports results from Experiment 3 in which we test the relative importance of the cost and perceived benefits of obtaining letters. We estimate the following specification:

$$y_{ij} = \beta T_i + \gamma X_i + \lambda_j + e_i \quad (8)$$

The outcome  $y_{ij}$  is a binary measure of whether individual  $i$  residing in location  $j$  returned the reference letter. We report estimates with and without controlling for covariate vector  $X_i$ . To account for differences across space, we control for location fixed effects  $\lambda_j$ . Robust standard errors are computed at the individual level.

Pooling the information and compensation treatment groups, we find a statistically significant increase in the share of people who obtain a letter of 7.6 percentage points (p.p.) (Table 7, Column 2). This is a sizable effect given the control mean of 18.9 percent. Next, we estimate the effect of each treatment arm separately. The effect of the information treatment is 12.6 p.p. and statistically significant (column 4). By contrast, the effect of monetary incentive is much smaller (2 p.p.) and statistically indistinguishable from 0.<sup>44</sup> We can reject that treatment effects are identical at the five percent significance level. Interestingly, the effect of providing

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<sup>44</sup>Interpreting the small and non-significant effect of the monetary incentive on obtaining letter is not straightforward. Given that participants were compensated in airtime and only after returning the letter, this treatment does not provide a test of liquidity constraints. Instead, the treatment provides a short-term benefit of exerting effort and may thus address procrastinating behavior. There are various potential reasons for why this intervention did not have an effect: the amount may have been too small, the monetary incentive may have crowded out job seekers' intrinsic motivation (Frey and Jegen, 2001) or participants may have regarded the payout to be too far in the future.

both information and a monetary incentive (6.6 p.p.) is smaller in magnitude than providing information alone, although we cannot reject that coefficients are identical (p-value: 0.278). The effect of providing information does not differ by gender.<sup>45</sup>

## 6.2 Why do Job Seekers Underestimate Benefits of Letters?

The previous section finds that providing information on the benefits of letters has a large effect on the behavior of job seekers suggesting that erroneous beliefs is one of the reasons why the market is in a pooling equilibrium. This is puzzling as standard learning models predict that job seekers should learn about the returns to having a letter. This section explores why these beliefs can be sustained by investigating how job seekers use letters and by comparing how our reference template differs from existing letters.

### 6.2.1 Low Usage of Letters

We first explore results on the usage of the letter from Experiment 2. Participants were informed about an open vacancy and asked to submit their application material if interested. We estimate the following specification:

$$y_{ij} = \beta T_i + \gamma X_i + \lambda_j + e_i \quad (9)$$

using two outcome measures: i) a dummy capturing whether a job seeker  $i$  residing in location  $j$  submits an application and ii) a dummy measuring whether they submit a reference letter as part of the application.  $T_i$  captures whether participants were assigned to the treatment group that received the encouragement to obtain a letter.

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<sup>45</sup>Results (not reported) show that the effects are larger for men (insignificant), which is unsurprising given that we provided information on the effectiveness of letters across gender. Men may thus have received an overly optimistic view of reference letters, whereas women may still underestimate the letters' value.

Table 8 shows that participants in the treatment group are not more likely to submit applications (1). Next, we investigate the application documents of those that send an application. Unsurprisingly, the share who submits a reference letter is significantly larger in the reference letter group (3). In the control group only 1.1% submit a letter confirming that reference letters are almost completely absent in the labor market we investigate. This share increases in the treatment group: 8% of all participants (or 18.2% of those who obtained a letter) submit it as part of the application (3). While this difference is statistically significant, this figure is far below the share of job seekers who report in the survey to have successfully obtained a letter (44%) and use it in the job search (37%).<sup>46</sup>

We observe a large differences in the usage of reference letter across gender: women are much more likely than men to attach it as part of the application (4, 5). This can in part explain the large difference in employment effects across gender we find in Experiment 2.

Results suggest that low usage of the reference letters stifles the feedback that job seekers receive about reference letters from the market. The resulting failure to learn is further compounded by the overall low level of search activity among job seekers. Results in Section 4 show that the letter reduces the number of applications needed to obtain an employer response from 25 to 15 and an interview request from 40 to 28. However, at baseline the average job seeker only submits about 4 applications per month.

### **6.2.2 Existing Reference Letters Are Less Informative**

A second reason why job seekers may underestimate the potential benefit of reference letters is that the type of letter in circulation at the time of the baseline is in fact of lower value. Our model predicts that the effectiveness depends on the noisiness of the reference letter relative to the resume. Reviewing a total of 30 reference letters collected from job seekers in our sample

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<sup>46</sup>One reason is that we asked job seekers to submit material via email and some participants may not have had access to scanners. A larger share of job seekers may indeed use the letter in conventional job search channels.

at the time of baseline provides strong support for this hypothesis: the majority of letters lack information on the workers' position (48% include this information), responsibilities (38%), skills (28%) duration of employment (48%), and reason for termination of employment (18%). In addition, only 48% of letters are signed and 56% provide contact information. If job seekers experiment with reference letters that are both less informative and credible, they may incorrectly infer that all letters are ineffective.

In-depth interviews with a sample of 28 hiring firms provide further support for this explanation. 73% of hiring managers report that our reference letter template is more effective than other reference letters they receive. The most frequently cited reasons are that the template provides information on specific skills (55%) and that it is more clearly structured (32%).<sup>47</sup> Asked for reasons that make the template *less* effective than other letters, managers point to the lack of a firm letter head or stamp (45%) and that letters are too positive (14%). This corroborates our experimental findings documenting the importance of credibility and suggests that modifications in the design of the letter may further increase its effectiveness.

## 7 Conclusion

The internet has drastically reduced information asymmetries across many markets: online labor market require firms to provide public evaluations of employees' performance and offer workers to take tests to certify their skills. Services like LinkedIn offer an easy way to communicate credentials, work experience and even endorsements from former coworkers and employers. These professional network sites also identify common connections than can serve as informal references. Yet, large parts of the global labor force is working in markets that have not been affected by these changes.

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<sup>47</sup>In addition, the rubric form offers *less ambiguous* presentation of the assessment than a reference letter in paragraph form. This may particularly benefit women as previous research documents that candidates who are perceived to be similar by the predominantly male hiring managers receive more favorable evaluations (Cardy and Dobbins, 1986).

Our study investigates the role of information asymmetries in one such market: the low-skill sector in South Africa. We document that information asymmetries are prevalent in this market and employers struggle to identify high ability job seekers. We find that a simple intervention - encouraging job seekers to obtain a standardized reference letter from a former employer - can lead to substantial improvements in firms' ability to select job seekers of higher ability from the large pool of applicants. Especially women, who are excluded from many informal referral networks in South Africa, benefit from reference letters. This demonstrates that reducing information asymmetries can improve equity on labor markets.

While our study looks at the effects of reference letter in a static framework, reducing information asymmetries may also have dynamic effects. Similar to many other low-income countries, South Africa suffers from low quality of education, which limits the use of educational credentials to screen job seekers. This has adverse dynamic effects: if a high school degree loses its signaling value, youths may be less motivated to study or graduate. Likewise, if workers are employed on temporary contracts and their job performance is not revealed to the market, returns to exerting effort are lower. Our results suggest that reference letters have the potential to provide a powerful incentive to workers. Reducing information asymmetries may therefore have positive effects on productivity beyond the diminishment of frictions in the matching process explored in this study. Yet, not having a reference letter may also pose a barrier for new labor market entrants as letters enhance firms' ability to screen applicants with job experience relative to entrants.<sup>48</sup> This could lead to inefficiently low hiring of people without work experience ([Pallais, 2014](#)). Quantifying these dynamic effects remains the work of future research.

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<sup>48</sup>The severity of this barrier depends partly on whether firms are able to distinguish people with and without work experience. If firms do not observe the employment history, they will apply a uniform penalty to applicants without reference letters. By contrast, the penalty is smaller for new labor market entrants if firms can identify applicant types, e.g. from information on the resume.

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# Tables

Table 1: Effect of Reference Letter on Call Back

	y=Employer Response: Interest				y=Employer Response: Interview			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reference Letter	0.0254** (0.0102)	0.0251** (0.0102)	0.0244** (0.0107)	0.0105 (0.0162)	0.0154* (0.0087)	0.0147* (0.0087)	0.0144 (0.0091)	0.0037 (0.0115)
Female				-0.0107 (0.0141)				-0.0037 (0.0085)
Female x Letter				0.0268 (0.0211)				0.0203 (0.0163)
Sector F.E.	N	Y	Y	Y	N	Y	Y	Y
Individual F.E.	N	N	Y	N	N	N	Y	N
<i>R</i> <sup>2</sup>	0.003	0.01	0.078	0.009	0.002	0.016	0.057	0.010
N	2050	2050	2050	2050	2050	2050	2050	2050
Control mean	0.0415	0.0415	0.0415	0.0415	0.0240	0.0240	0.0240	0.0240

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors (reported in parentheses) are clustered at the applicant level. Results report OLS estimates. Dependent variables are binary measures of employer response: interview requests (Col. 4-6) and either interview request or a different employer response expressing interest in the job applicant (Col 1-3). Sector fixed effects are included for the six sectors for which we send applications.

Table 2: Effect of Reference Letter on Screening Productive Applicants

	Y=Interest		Y=Interview	
	(1)	(2)	(3)	(4)
Reference Letter	0.02575** (0.010)	0.00838 (0.016)	0.01555* (0.009)	0.00522 (0.012)
Aptitude (z-score)	0.00618 (0.005)	0.00801 (0.009)	0.00062 (0.003)	0.00047 (0.004)
Ref Let x Aptitude (z-score)	0.01999** (0.008)	0.01574 (0.011)	0.01305** (0.006)	0.01230 (0.008)
Ref Let x Female		0.03166 (0.022)		0.02078 (0.018)
Ref Let x Female x Aptitude (z-score)		-0.00271 (0.011)		-0.00807 (0.015)
<i>R</i> <sup>2</sup>	0.003	0.008	0.002	0.004
N	2050	2050	2050	2050
Control mean	0.0415	0.0415	0.0240	0.0240

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors (reported in parentheses) are clustered at the applicant level. Results report OLS estimates controlling for sector fixed effects. *Aptitude* is measuring the standardized English and Math score. For readability reasons, we suppressed coefficients for *Female* and *Female x Aptitude*. These coefficients are small in magnitude and insignificant.

Table 3: Effect of Reference Letter on Employment (3 months)

	Intent to Treat Effects			Local Average Treatment Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Application	Interview	Employment	Application	Interview	Employment
<b>Panel A: POOLED</b>						
Reference Letter	0.660 (0.426)	0.072 (0.046)	0.020 (0.022)	1.336 (0.857)	0.147 (0.092)	0.037 (0.046)
$R^2$	0.222	0.051	0.015	0.222	0.046	0.008
N	997	996	1033	997	996	1033
Control Mean	3.975	0.675	0.130	3.975	0.675	0.130
<b>Panel B: FEMALE</b>						
Reference Letter	1.051 (0.702)	0.130** (0.059)	0.057* (0.032)	2.249 (1.522)	0.280** (0.125)	0.117* (0.068)
$R^2$	0.267	0.063	0.029	0.242	0.050	0.001
N	501	506	528	501	506	528
Control Mean	3.842	0.534	0.117	3.842	0.534	0.117
<b>Panel C: MALE</b>						
Reference Letter	0.118 (0.431)	0.014 (0.071)	-0.015 (0.032)	0.553 (0.868)	0.027 (0.135)	-0.032 (0.062)
$R^2$	0.282	0.042	0.021	0.232	0.041	0.020
N	491	492	510	491	492	510
Control Mean	4.130	0.862	0.157	4.130	0.862	0.157
p-value: $\beta_{fem} = \beta_{male}$	0.368	0.241	0.090			

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Results presented in Column 1-3 are intent to treat estimates. Results in Column 4-6 are treatment on the treated estimates, using the encouragement assignment as an instrument for take-up. All regressions control for covariates. Panel A reports estimates from Specification 6 for the full sample. *Application* and *Interviews* measures the number of applications submitted and job interviews in the last four weeks, respectively. The number of applications and interviews are winsorized at the 1% level to account for outliers. Employment is an indicator variable denoting if people are in paid employment or self-employed. Panel B and C estimate results separately for women and men.

Table 4: Are Numeracy and Literacy Employer Ratings Correlated with Aptitude?

	Literacy: Reference Letter (z-score)			Numeracy: Reference Letter (z-score)		
	(1)	(2)	(3)	(4)	(5)	(6)
Literacy: Aptitude (z-score)	0.3645*** (0.0935)	0.2274** (0.1026)	0.2458** (0.1185)			
Female x Literacy Apt (z-score)			-0.04907 (0.2066)			
Numeracy: Aptitude (z-score)				0.3001*** (0.0885)	0.2627*** (0.0966)	0.25585* (0.1381)
Female x Numeracy Apt (z-score)						0.01548 (0.1788)
Covariate	N	Y	Y	N	Y	Y
School Grade	N	Y	Y	N	Y	Y
R <sup>2</sup>	0.136	0.232	0.232	0.093	0.116	0.116
N	116	116	116	114	114	114

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The dependent variable is the standardized value of the numeric employer rating (0=below average, 3=very good). *Literacy* and *Numeracy* measure the standardized performance in the aptitude test. Control variables include age, gender and education. School grade is measuring the grade (in %) participants achieved in the last math and English class, respectively.

Table 5: Effect of Referee Rating on Call Back

	Y=Interest				Y=Interview			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Reference Letter	0.0371 (0.0561)	-0.0014 (0.0605)	0.0441 (0.0544)	-0.0033 (0.0584)	0.0447 (0.0469)	0.0268 (0.0519)	0.0531 (0.0454)	0.0156 (0.0502)
Referee Rating (z-score)	-0.0006 (0.0057)	0.0101 (0.0084)	-0.0030 (0.0056)	0.0083 (0.0065)	0.0014 (0.0040)	0.0044 (0.0057)	0.0007 (0.0045)	0.0060 (0.0060)
Letter x Rating (z-score)	0.0077 (0.0086)	-0.0120 (0.0127)	0.0167* (0.0089)	-0.0065 (0.0117)	0.0057 (0.0080)	0.0002 (0.0084)	0.0169* (0.0092)	0.0009 (0.0091)
Letter x Rating x Female		0.0396** (0.0184)		0.0558*** (0.0188)		0.0089 (0.0140)		0.0368** (0.0162)
All positive			0.0164 (0.0266)	0.0211 (0.0766)			0.0048 (0.0140)	-0.0288** (0.0131)
Letter x All positive			-0.0584 (0.0353)	-0.0708 (0.0809)			-0.0731*** (0.0248)	0.0016 (0.0183)
Letter x All positive x Female				-0.0213 (0.0897)				-0.1265*** (0.0358)
R <sup>2</sup>	0.014	0.016	0.015	0.019	0.014	0.015	0.017	0.021
N	2050	2050	2050	2050	2050	2050	2050	2050
Control content	Y	Y	Y	Y	Y	Y	Y	Y
Control mean	0.0415	0.0415	0.0415	0.0415	0.0240	0.0240	0.0240	0.0240

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors (reported in parentheses) are clustered at the applicant level. *Total Score* measures the average employer rating converted to numeric values (out of 6). *All positive* is a indicator variable for whether employers give a perfect rating. We estimate with model with all interaction terms but suppress coefficients for readability reasons. All columns control for other content revealed in the reference letter - for detailed results see Table A.9. We include dummy variables for five reference letters that did not include a rating.

Table 6: Reasons for Low Prevalence of Reference Letters

	N	Mean
<i>Why do you not have a letter? (Baseline)</i>		
I did not ask	936	0.864
Employer refused	936	0.031
It was not requested	936	0.016
Other	936	0.089
<i>Did you try to obtain a letter? (After encouragement)</i>		
Yes	618	0.56
<i>If No, Why did you not try?</i>		
Travel Cost / Distance	618	0.052
Firm Unavailable / Relocated	618	0.038
No Time	618	0.037
Bad Terms wit Employer	618	0.019
No Need for it	618	0.013
Other	618	0.281
<i>Did you Succeed? (If participant tried)</i>		
Yes	360	0.736
<i>If No, Why Not?</i>		
Firm relocated / unavailable	360	0.078
Waiting to hear back	360	0.053
Firm Refused	360	0.041
Other	360	0.087

Note: Results report responses at different points in time. The first panel asks why participants do not have letters at the time of the baseline. The second panel reports follow up survey responses in the treatment group that was encouraged to obtain a letter. The third panel limits responses to participants that tried to obtain a letter.

Table 7: Take up Experiment

	(1)	(2)	(3)	(4)
Pooled Treatment	0.070*	0.076**		
	(0.0382)	(0.0382)		
Information		0.115**	0.126**	
		(0.0513)	(0.0511)	
Money		0.008	0.020	
		(0.0418)	(0.0422)	
Information + Money		0.067	0.066	
		(0.0492)	(0.0500)	
$R^2$	0.135	0.152	0.141	0.159
N	499	496	499	496
Control Mean	0.189	0.189	0.189	0.189
Control Variables	N	Y	N	Y
p-value: $\beta_{Inf} = \beta_{Mon}$			0.033	0.038
p-value: $\beta_{Inf} = \beta_{Mon+Inf}$			0.378	0.278
p-value: $\beta_{Mon} = \beta_{Mon+Inf}$			0.211	0.354

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Column 1 and 2 pool Information, Money and Information+Money groups. The control group received message reminding them of how to return the letter.

Table 8: Application Material Submitted

	Y=Submit Application		Y=Attach Reference Letter		
	(1)	(2)	(3)	(4)	(5)
Reference Letter	-0.001 (0.022)	-0.023 (0.033)	0.069** (0.029)	0.007 (0.030)	-0.000 (0.006)
Female	0.011 (0.023)	-0.017 (0.032)	0.038 (0.029)	-0.018 (0.021)	-0.003 (0.004)
Ref Let x Female		0.047 (0.045)		0.113* (0.058)	0.021** (0.010)
$R^2$	0.006	0.017	0.072	0.091	0.014
N	1141	1141	184	184	1141
Control Mean	0.163	0.163	0.011	0.011	0.002
Sample	full	full	application	application	full

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors (reported in parentheses) are clustered at the applicant level. Outcomes are binary measures of whether job seekers submit an application (1-2) and whether they attach a reference letter (3-5). Column 3 and 4 restrict the sample to job seekers who submit an application.

# Appendix

## A Tables

Table A.1: Selection: Who returns Reference Letters?

<i>Dep var: 1=return letter</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	demogr	search	aptitude	job spell	unemp spell	job termination	
Education (yr)	0.01820 (0.0215)	0.01911 (0.0220)	0.01221 (0.0232)	0.01484 (0.0217)	0.01765 (0.0215)	0.00884 (0.0228)	0.00568 (0.0248)
Age (yr)	0.01277** (0.0050)	0.01272** (0.0050)	0.01292** (0.0051)	0.01767*** (0.0059)	0.01268** (0.0052)	0.01370*** (0.0051)	0.01765*** (0.0059)
1=Female	-0.00344 (0.0435)	-0.00411 (0.0437)	-0.00686 (0.0436)	-0.01303 (0.0441)	-0.00345 (0.0437)	-0.00856 (0.0442)	-0.01830 (0.0447)
Nr Applications (4 weeks)		0.00161 (0.0075)					0.00214 (0.0076)
Aptitude Score (%)			0.00070 (0.0012)				0.00039 (0.0013)
Last job spell (yr)				-0.02174* (0.0120)			-0.01762 (0.0122)
Time since last job (yr)					0.00175 (0.0029)		0.00144 (0.0028)
Job termination: contract end						0.03234 (0.0508)	0.03983 (0.0512)
Job termination: fired						-0.08013 (0.0855)	-0.04502 (0.0874)
Job termination: voluntary						0.08781 (0.0852)	0.08085 (0.0875)
<i>R</i> <sup>2</sup>	0.027	0.028	0.027	0.035	0.028	0.033	0.038
N	437	435	436	437	437	437	434
Dep Var mean	0.308	0.308	0.308	0.308	0.308	0.308	0.308

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

The table explores factors correlated with whether job seekers return a completed letter. *Aptitude Score* measures the average numeracy and literacy score of an aptitude test. *Last job spell* captures the number of years the job seeker stayed in her last job.

The *Job termination* variable capture the reason of termination stated by employers on the reference letter.

Table A.2: Content of Reference Letter by Gender

	N	mean	Gender		
			Female	Male	p-value
Total Score	119	4.933	5.04	4.821	.134
Hard Skill Score	119	2.307	2.362	2.25	.211
Soft Skill	120	2.625	2.677	2.571	.151
All Positive	119	0.109	0.131	0.086	0.434
TeamAbility	117	2.692	2.77	2.607	.058
WorkEthics	120	2.675	2.742	2.603	.162
Reliability	118	2.568	2.597	2.536	.568
Agreeability	118	2.61	2.645	2.571	.448
Interpersonalskills	119	2.597	2.639	2.552	.408
Literacy Ref	117	2.462	2.5	2.421	.487
Numeracy Ref	115	2.174	2.22	2.125	.48
ComputerLiteracy	109	1.917	2.052	1.765	.104
LearningAbility	118	2.576	2.574	2.579	.961
Task1	70	2.5	2.5	2.5	1
Task2	60	2.433	2.452	2.414	.807
Comments (any)	120	.458	.452	.466	.88
Comments (nr)	120	1.842	1.984	1.69	.606
How Recommend (0=reserve.,2=highly)	104	1.558	1.691	1.408	.012
Confidence Assessing (0=low, 2=high)	112	1.67	1.717	1.615	.278
Termination: Voluntary	107	.224	.263	.18	.304
Termination: Contract Ended	107	.645	.632	.66	.762
Termination: Retrenchment	107	.112	.088	.14	.403
Termination: Fired	107	.019	.018	.02	.927
Signed	115	.974	.967	.981	.63
Phone listed	115	.957	.934	.981	.205
Email listed	115	.496	.492	.5	.931

Notes: The table results details from the completed reference letters. Ratings are converted to numeric values (0=below average, 3=very good). Columns on the right provide summary statics separately for women and men and report p-values of a test of equal means.

**Table A.3: Correlation**

	TeamAbility	Interpersonal	WorkEthics	Reliability	Agreeability	Numeracy	Literacy	Computer	Learning
Team Ability	1.000								
Interpersonal	0.410***	1.000							
WorkEthics	<b>0.550***</b>	0.406***	1.000						
Reliability	0.437***	0.331***	0.416***	1.000					
Agreeability	<b>0.523***</b>	<b>0.499***</b>	0.431***	<b>0.520***</b>	1.000				
Numeracy	0.276***	<b>0.169*</b>	0.189**	0.372***	0.348***	1.000			
Literacy	0.308***	0.348***	0.318***	0.290***	0.381***	<b>0.516***</b>	1.000		
Computer Lit.	<b>0.150</b>	0.321***	<b>0.079</b>	<b>0.134</b>	<b>0.230*</b>	0.272***	0.344***	1.000	
Learning Ability	0.255***	0.355***	0.412***	0.301***	0.416***	0.338***	0.385***	0.187***	1.000

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The table reports correlation coefficients of employer ratings, converted to numeric values (0=below average, 3=very good). The five correlation coefficients with the largest (lowest) correlation coefficients are marked blue (red).

**Table A.4: Balance Test: Reference Letter vs Control Group**

	Full Sample		Control		Reference Let		pvalue
	N	mean	N	mean	N	mean	
1=Female	1267	.502	566	.516	701	.491	.373
Age in yrs	1267	27.33	566	27.07	701	27.55	.042
Education (years)	1262	12.16	561	12.08	701	12.23	.395
1=married	1267	.069	566	.055	701	.081	.06
Nr of Children	1179	1.026	525	1.021	654	1.031	.878
1=moved to Johannesburg	1267	.744	566	.753	701	.738	.539
Zulu	1267	.273	566	.281	701	.267	.575
Xhosa	1267	.084	566	.083	701	.086	.871
Venda	1267	.056	566	.049	701	.061	.356
1=ever had job	1267	1	566	1	701	1	.
1=ever selfemployed	1267	.193	566	.187	701	.197	.667
Currently receiving UIF	1267	.114	566	.102	701	.124	.225
Reservation wage (ZAR/month)	1259	3381	559	3251	700	3484	.079
Fair Wage (ZAR/month)	1265	6108	565	5930	700	6251	.143
Hours search (week)	1226	14.35	544	14.13	682	14.52	.768
Interview requests (month)	1041	.671	472	.593	569	.735	.127
Plan for job search	1132	2.972	471	2.958	661	2.982	.71
Total search cost (ZAR/month)	1107	169.01	458	168.434	649	169.416	.93
Likelihood find job	1129	2.06	471	2.038	658	2.076	.421

Notes: The table reports summary statistics for the full sample as well as separately for the control and the treatment group. The last column reports p-values of a test of equal means of the control and treatment group. Results (not reported) show that we can reject joint significance of control variables in explaining treatment status (p-value: 0.72). Likelihood find job measures perceived chances to find employment in next month (0=very unlikely, 4=very likely).

Table A.5: Attrition (Experiment 2)

	Wave 1		Wave 2	
	(1)	(2)	(3)	(4)
Reference Letter	-0.010 (0.014)	-0.005 (0.014)	-0.019 (0.021)	-0.017 (0.021)
Education (yrs)		-0.009*** (0.001)		-0.009*** (0.002)
Age (yrs)		-0.003** (0.002)		-0.005** (0.003)
1=Female		-0.006 (0.014)		-0.013 (0.021)
Control Variables	N	Y	N	Y
$R^2$	0.000	0.024	0.001	0.016
N	1246	1241	1246	1241
Control Mean	0.068	0.068	0.182	0.182

Notes: Standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

The dependent variable is an indicator variable for whether people attrited in wave 1 and 2 of the follow up survey.

Table A.6: Balance Test: Take-Up Experiment

	Pooled		Control Mean	Information		Money		Inform+Money	
	N	Mean		Mean	p-value	Mean	p-value	Mean	p-value
Age in yrs	496	26.85	27.12	27.25	.813	26.28	.134	26.73	.475
1=Female	498	.506	.508	.524	.796	.483	.697	.508	.998
Married	498	.056	.047	.056	.733	.052	.862	.069	.444
Nr of Children	498	.998	.977	1.089	.372	1.026	.711	.908	.57
Education (years)	497	11.95	11.76	12	.098	11.97	.188	12.07	.031
1=Migrant	498	.795	.781	.823	.412	.802	.695	.777	.934
1=Ever self-employed	498	.205	.227	.234	.891	.198	.591	.162	.188
Currently receiving UIF	498	.143	.109	.129	.632	.164	.22	.169	.166
Reservation wage	496	3121	2949	3299	.214	3547	.091	2738	.37
Hours search (week)	487	13.8	11.98	12.94	.555	18.08	.004	12.75	.618
Total search cost (month)	455	165.1	164	173	.71	167	.904	155	.677
Likelihood find job (month)	459	2.07	2.04	2.02	.791	2.08	.73	2.14	.283

Note: The table reports summary statistics for the pooled sample, control group and three treatment groups. P-values report results of a test of equal means of the control group and respective treatment group. Likelihood to find job converts reports responses converted to numeric values (0=very unlikely, 4=very likely).

Table A.7: Multiple Reference Letter and Displacement

	Y=Interest			Y=Interview		
	(1)	(2)	(3)	(4)	(5)	(6)
Reference Letter	0.02429** (0.0110)	0.02364** (0.0117)	0.02305** (0.0114)	0.01437 (0.0090)	0.01404 (0.0099)	0.01334 (0.0094)
Reference Letter x Multiple		0.0044 (0.0305)			0.0023 (0.0254)	
Control Group - Pure			-0.00827 (0.0127)			-0.00689 (0.0103)
$R^2$	0.080	0.080	0.080	0.058	0.058	0.058
N	2050	2050	2050	2050	2050	2050
Control mean	0.0415	0.0415	0.0415	0.024	0.024	0.024

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors clustered at applicant level.

Coefficients report results of Specification 4. Column 2 and 4 include an interaction term between the reference letter indicator and an indicator of the vacancy that receive three reference letters. Column 3 and 5 includes a dummy for applications sent to a vacancy that does not receive any reference letters.

Table A.8: Employer Response Effects by Sector

	Admin	Callcentre	Cleaner	Driver	Retail	Security	Unskilled
<b>Y=Interest</b>							
Reference Letter	0.0115 (0.0299)	-0.0107 (0.0320)	0.0455 (0.0289)	-0.0069 (0.0149)	0.0664* (0.0335)	-0.0152 (0.0087)	0.0620 (0.0432)
$R^2$	0.142	0.087	0.047	0.072	0.070	0.019	0.128
N	429	378	272	195	380	164	232
Control Mean	0.0556	0.0599	0.0385	0.0357	0.0352	0.0159	0.0227
<b>Y=Interview</b>							
Reference Letter	0.0021 (0.0163)	-0.0110 (0.0285)	0.0428 (0.0278)	-0.0069 (0.0149)	0.0556** (0.0258)	-0.0081 (0.0079)	0.0089 (0.0216)
$R^2$	0.087	0.088	0.037	0.072	0.063	0.025	0.104
N	429	378	272	195	380	164	232
Control Mean	0.0154	0.0493	0.0240	0.0357	0.0176	0.0079	0.0114

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Results presented from Specification 4 estimated separately by sector.

Table A.9: Effect of Reference Letter Content on Call Back

	Y=Interest					Y=Interview				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Reference Letter	-0.0488 (0.0477)	-0.0342 (0.0512)	-0.0242 (0.0532)	-0.0152 (0.0541)	0.0082 (0.0672)	-0.0666 (0.0425)	-0.0591 (0.0456)	-0.0432 (0.0446)	-0.0427 (0.0463)	-0.0142 (0.0516)
Total Score	-0.0037 (0.0068)	-0.0062 (0.0065)	-0.0028 (0.0066)	0.0000 (0.0068)	-0.0049 (0.0069)	-0.0002 (0.0049)	-0.0027 (0.0057)	-0.0001 (0.0049)	0.0030 (0.0044)	0.0002 (0.0053)
Ref Let x Total Score	0.0123 (0.0099)	0.0241** (0.0102)	0.0182* (0.0101)	0.0107 (0.0109)	0.0203* (0.0110)	0.0160* (0.0087)	0.0220** (0.0099)	0.0208** (0.0102)	0.0145 (0.0097)	0.0204* (0.0113)
Nr of Comments	0.0015 (0.0020)				0.0010 (0.0024)	0.0002 (0.0014)				-0.0004 (0.0017)
Nr of Comments x Ref Let	0.0059* (0.0035)				0.0057 (0.0045)	0.0037 (0.0035)				0.0022 (0.0036)
Confidence (0=low, 2=high)		0.0145 (0.0138)			0.0144 (0.0140)		0.0116 (0.0083)			0.0097 (0.0084)
Confidence x Ref Let	-0.0337 (0.0206)				-0.0389* (0.0211)		-0.0160 (0.0170)			-0.0165 (0.0174)
How recommend (2=high)		-0.0058 (0.0100)			-0.0014 (0.0122)			-0.0086 (0.0066)		-0.0071 (0.0078)
How recommend x Ref Let		-0.0244 (0.0194)			-0.0084 (0.0247)			-0.0236 (0.0199)		-0.0191 (0.0218)
Termination: Contract			0.0207** (0.0095)	0.0209** (0.0096)					0.0052 (0.0069)	0.0049 (0.0074)
Termin.: Contract x Ref Let			-0.0153 (0.0205)	-0.0225 (0.0208)					-0.0076 (0.0194)	-0.0131 (0.0184)
Termin.: Retrenchment			0.0155 (0.0182)	0.0136 (0.0188)					0.0265* (0.0138)	0.0229 (0.0144)
Termin.: Retrench. x Ref Let			-0.0011 (0.0329)	-0.0006 (0.0379)					-0.0124 (0.0256)	-0.0185 (0.0288)
Termin.: Fired			0.0498 (0.0808)	0.0505 (0.0772)					0.0709 (0.0872)	0.0650 (0.0845)
Termin.: Fired x Ref Let			-0.0997 (0.0893)	-0.0908 (0.0848)					-0.0834 (0.0901)	-0.0881 (0.0892)
N	1919	1919	1919	1919	1919	1919	1919	1919	1919	1919
Control mean	0.042	0.042	0.042	0.042	0.042	0.024	0.024	0.024	0.024	0.024

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors clustered at applicant level. Nr of Comments measures the number of comments that are provided by employers in the skill section of the template. Confidence measures how confident employers report to be in assessing the job seeker. How recommend captures how highly referees

Table A.10: Short-run Effect of Reference Letter on Employment (5 weeks)

	Intent to Treat Effects			Local Average Treatment Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
	Application	Interview	Employment	Application	Interview	Employment
<b>Panel A: POOLED</b>						
Reference Letter	0.462 (0.382)	-0.037 (0.045)	0.014 (0.016)	1.153 (0.945)	-0.093 (0.112)	0.037 (0.040)
$R^2$	0.289	0.062	0.007	0.296	0.055	0.005
N	1120	1122	1162	1120	1122	1162
Control Mean	4.683	0.365	0.076	4.683	0.365	0.076
<b>Panel B: FEMALE</b>						
Reference Letter	-0.112 (0.542)	-0.031 (0.062)	-0.005 (0.022)	-0.312 (1.462)	-0.083 (0.164)	-0.012 (0.059)
$R^2$	0.393	0.068	0.014	0.344	0.063	0.012
N	564	565	589	564	565	589
Control Mean	4.748	0.356	0.073	4.748	0.356	0.073
<b>Panel C: MALE</b>						
Reference Letter	0.791 (0.498)	-0.052 (0.065)	0.036 (0.023)	2.286* (1.235)	-0.124 (0.155)	0.086 (0.055)
$R^2$	0.307	0.065	0.013	0.263	0.053	0.002
N	546	556	573	546	556	573
Control Mean	4.683	0.374	0.078	4.683	0.374	0.078

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Results presented in Column 1-3 are intent to treat estimates. Results in Column 4-6 are treatment on the treated estimates, using the encouragement assignment as an instrument for take-up. Panel A reports estimates from Specification 6 for the full sample. *Application* and *Interviews* measures the nr of applications submitted and job interviews in the last four weeks, respectively. The number of applications and interviews are winsorized at the 1% level to account for outliers. Employment is an indicator variable measuring if people are in paid employment or self-employed. Panel A and B estimate results separately for women and men.

## B Figures

Figure A.1: Reference Letter Template

<b>Subject:</b> Reference for _____ <small>(Name)</small>		_____ <small>(Address of Firm)</small>			
To Whom it May Concern:					
My name is _____ . I am the _____ of _____. <small>(Name) (Position) (Firm / Business Name)</small>					
Our firm is _____. <small>(Describe what firm is doing)</small>					
I have known _____ for _____. He/She has worked for our firm as a _____ for _____. <small>(Name) (Time Known) (Position) (Time Worked)</small>					
From _____ interactions I feel _____ to accurately judge his attitude and skills. <small>(daily/weekly/monthly) (very confident / confident / somewhat confident)</small>					
<b>Attitude</b>	<b>Rating</b>				<b>Comment</b>
<b>Team ability:</b> Ability to work under supervisor and in a team.	Very good	Good	Average	Below Average	Cannot rate
<b>Interpersonal skills:</b> Friendliness and communication with customers/ coworkers	Very good	Good	Average	Below Average	Cannot rate
<b>Work Ethics:</b> Willingness and ability to work hard.	Very good	Good	Average	Below Average	Cannot rate
<b>Reliability:</b> Show up on time and not mismanage funds / equipment	Very good	Good	Average	Below Average	Cannot rate
<b>ADDITIONAL COMMENT on Attitude:</b> _____					
<b>Skill</b>	<b>Rating</b>				<b>Comment</b>
<b>Numeracy:</b> Math skills necessary for this job.	Very good	Good	Average	Below Average	Cannot rate
<b>Literacy:</b> Reading / Writing skills needed for this job.	Very good	Good	Average	Below Average	Cannot rate
<b>Computer literacy:</b> Use of Windows, Word, Excel, Internet, etc.	Very good	Good	Average	Below Average	Cannot rate
<b>Task 1:</b> <small>(Describe Task)</small>	Very good	Good	Average	Below Average	Cannot rate
<b>Task 2:</b> <small>(Describe Task)</small>	Very good	Good	Average	Below Average	Cannot rate
<b>ADDITIONAL COMMENT on Skills:</b> _____					
Our employment relationship ended because _____ <small>(Reason for end of employment)</small>					
I would _____ <small>(highly recommend / recommend / recommend with reservations)</small>	_____ <small>(Name)</small>				
If you have any questions do not hesitate to contact me via phone _____ AND/OR email _____					
Sincerely, _____ Signature					
_____ Date					

Figure A.2: Reference Letter Template - Examples

Subject: Reference for _____ (Name)			
(Address of Firm)			
To Whom It May Concern:			
My name is _____ I am the _____ of _____. (Name) (Position) (Firm/Business Name)			
Our firm is _____ (Business Description)			
I have known _____ for _____ He/She has worked for our firm as a _____ for _____ years. (Name) (Time Known) (Position) (Time Worked)			
From _____ interactions I feel _____ to accurately judge his attitude and skills. (days/weekly/monthly) (very confident / confident / somewhat confident)			
Attitude	Rating	Comment	
Team ability: Ability to work under supervisor and in a team.	Very good Good Average Below Average Cannot rate	Worked in a larger team	
Interpersonal skills: Friendliness and communication with customers/ co-workers	Very good Good Average Below Average Cannot rate	With co-workers	
Work Ethics: Willingness and ability to work hard.	Very good Good Average Below Average Cannot rate		
Reliability: Show up on time and not mismanage funds / equipment	Very good Good Average Below Average Cannot rate		
Agreeability: responds well to instructions/ is able to adapt	Very good Good Average Below Average Cannot rate		
ADDITIONAL COMMENT on Attitude:			
Skill	Rating	Comment	
Numeracy: Math skills necessary for this job.	Very good Good Average Below Average Cannot rate		
Literacy: English proficiency: Reading / Writing skills needed for this job	Very good Good Average Below Average Cannot rate		
Computer literacy: Use of Windows, Word, Excel, internet, etc.	Very good Good Average Below Average Cannot rate		
Learning ability: Able to pick up new skills quickly	Very good Good Average Below Average Cannot rate		
Task 1: Collects products account Sorts products clearly	Very good Good Average Below Average Cannot rate		
Task 2: (Describe Task)	Very good Good Average Below Average Cannot rate		
ADDITIONAL COMMENT on Skills:			
Our employment relationship ended because _____ (Reason for end of employment)			
I would _____ recommend (Regd. recommend / recommended / recommended with reservations)			
If you have any questions do not hesitate to contact me via phone _____ AND/OR email _____			
Sincerely,  _____ Signature Date 22/5/15			
Subject: Reference for _____ (Name)			
(Address of Firm)			
To Whom It May Concern:			
My name is _____ I am the _____ of _____. (Name) (Position) (Firm/Business Name)			
Our firm is _____ (Business Description)			
I have known _____ for _____ He/She has worked for our firm as a _____ for _____ years. (Name) (Time Known) (Position) (Time Worked)			
From _____ interactions I feel _____ to accurately judge his attitude and skills. (days/weekly/monthly) (very confident / confident / somewhat confident)			
Attitude	Rating	Comment	
Team ability: Ability to work under supervisor and in a team.	Very good Good Average Below Average Cannot rate	He was able to share his ideas with his co-workers	
Interpersonal skills: Friendliness and communication with customers/ co-workers	Very good Good Average Below Average Cannot rate	He showed his deformation from the day he was employed	
Work Ethics: Willingness and ability to work hard.	Very good Good Average Below Average Cannot rate	He worked for 6 months then he got promoted	
Reliability: Show up on time and not mismanage funds / equipment	Very good Good Average Below Average Cannot rate	He was always punctual and never afford any hazing	
Agreeability: responds well to instructions/ is able to adapt	Very good Good Average Below Average Cannot rate	He can work independently	
ADDITIONAL COMMENT on Attitude:			
Skill	Rating	Comment	
Numeracy: Math skills necessary for this job.	Very good Good Average Below Average Cannot rate	Average	
Literacy: English proficiency: Reading / Writing skills needed for this job	Very good Good Average Below Average Cannot rate	Good	
Computer literacy: Use of Windows, Word, Excel, Internet, etc.	Very good Good Average Below Average Cannot rate	Below Average	
Learning ability: Able to pick up new skills quickly	Very good Good Average Below Average Cannot rate	Very Good	
Task 1: (Describe Task) Cleaning	Very good Good Average Below Average Cannot rate	Good	
Task 2: (Describe Task) Stock Control	Very good Good Average Below Average Cannot rate	Good	
ADDITIONAL COMMENT on Skills: He can work under pressure without supervision.			
Our employment relationship ended because _____ (Reason for end of employment)			
I would _____ recommend (Regd. recommend / recommended / recommended with reservations)			
If you have any questions do not hesitate to contact me via phone _____ AND/OR email _____			
Sincerely,  _____ Signature Date 26 May 2015			

Figure A.3: Aptitude Test - Sample Questions

**MATH**

$25 + 8 =$

$0.58 + 1.29 =$

$11.39 - 3.18 =$

$25 \div 5 =$

$3 + (2 \times 5) =$

What is larger  $1/4$  or  $1/3$ ?

Three quarters of  $100 =$

Which of these means  $8/10$ :    a) 80    b) 78    c) 0.8    d) 0.08

30% of R100

How many meters in a kilometre?

The time is 8:10. What time will it be in 1 hours and 40 mins?

The distance to work is 50km and I am halfway there, how much longer do I still have to travel to get to work?

At the bake sale, you sold biscuits for R2 each. You earned R32. How many biscuits did you sell?

Thandeka works from 8am to 11am. Every hour, she sells 6 books. How many books does she sell in a day?

**ENGLISH**

**Please fill in the correct word:**

Alicia, \_\_\_\_\_ the windows please. It's too hot in here.

- A. opens
- B open
- C opened
- D will opened

Maria \_\_\_\_\_ never late for work.

- A. am
- B. are
- C. were
- D. is

**Please read the paragraph and answer the questions:**

Tomorrow, you will need to pick up the fish from the harbour. Be there in the morning before it gets too hot and the fish will go bad. You can tell the fisher that the secretary will make a bank transfer tomorrow. Please bring the fish directly to the restaurant so that the chef can use it for lunch customers.

Why do you need to pick up the fish early?

Who fill make the payment?

- A) the fisher
- B) you
- C) the secretary
- D) the chef

Where are you supposed to drop off the fish?

Figure A.4: Aptitude Distribution

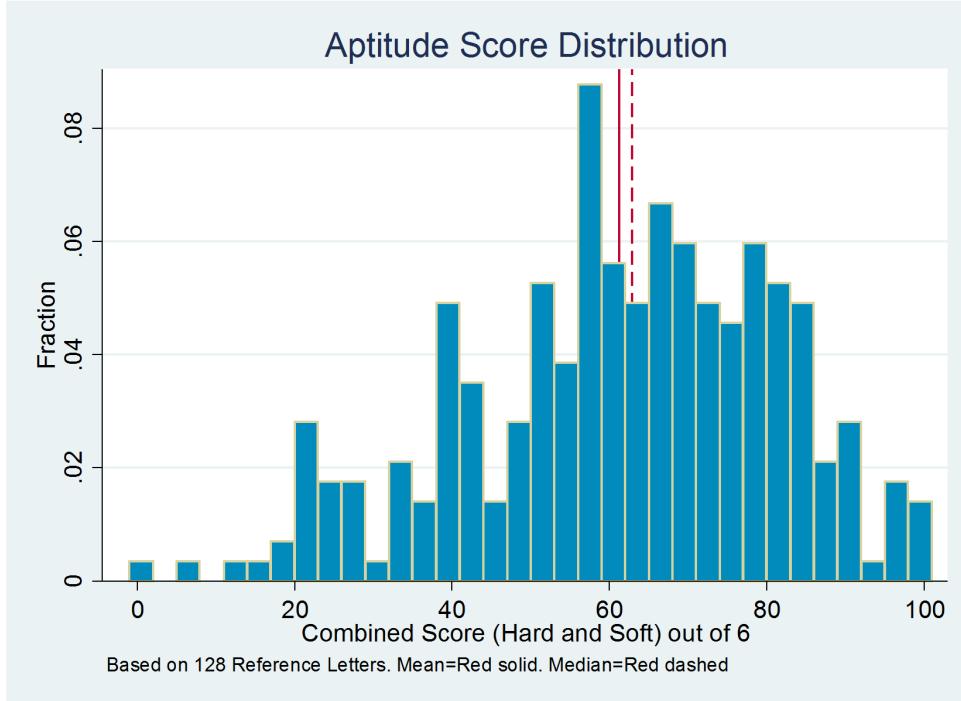


Figure A.5: Correlation between Employer Rating and Aptitude

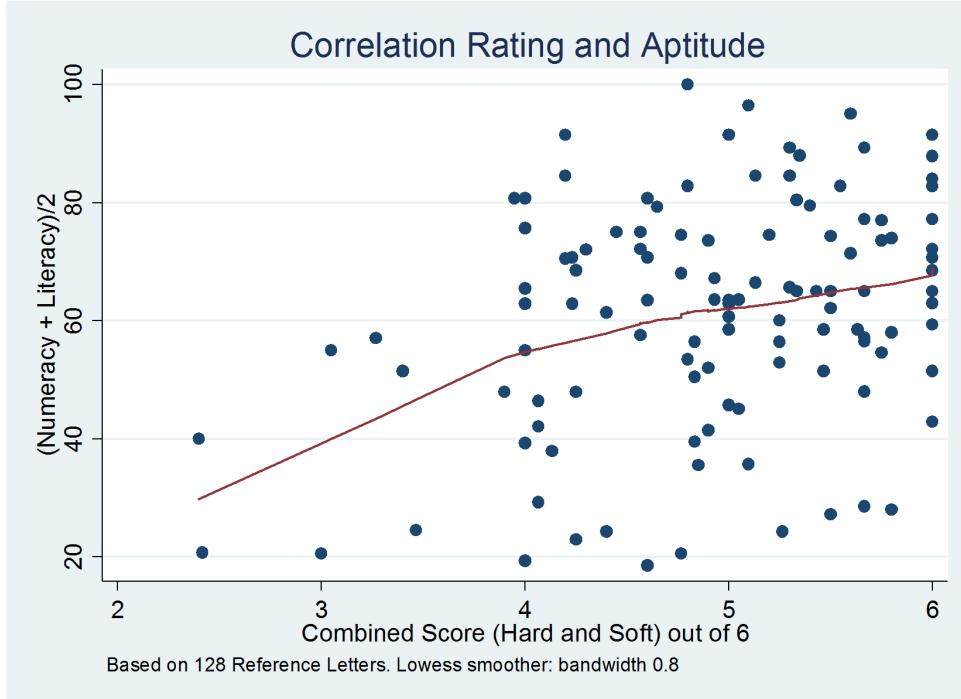
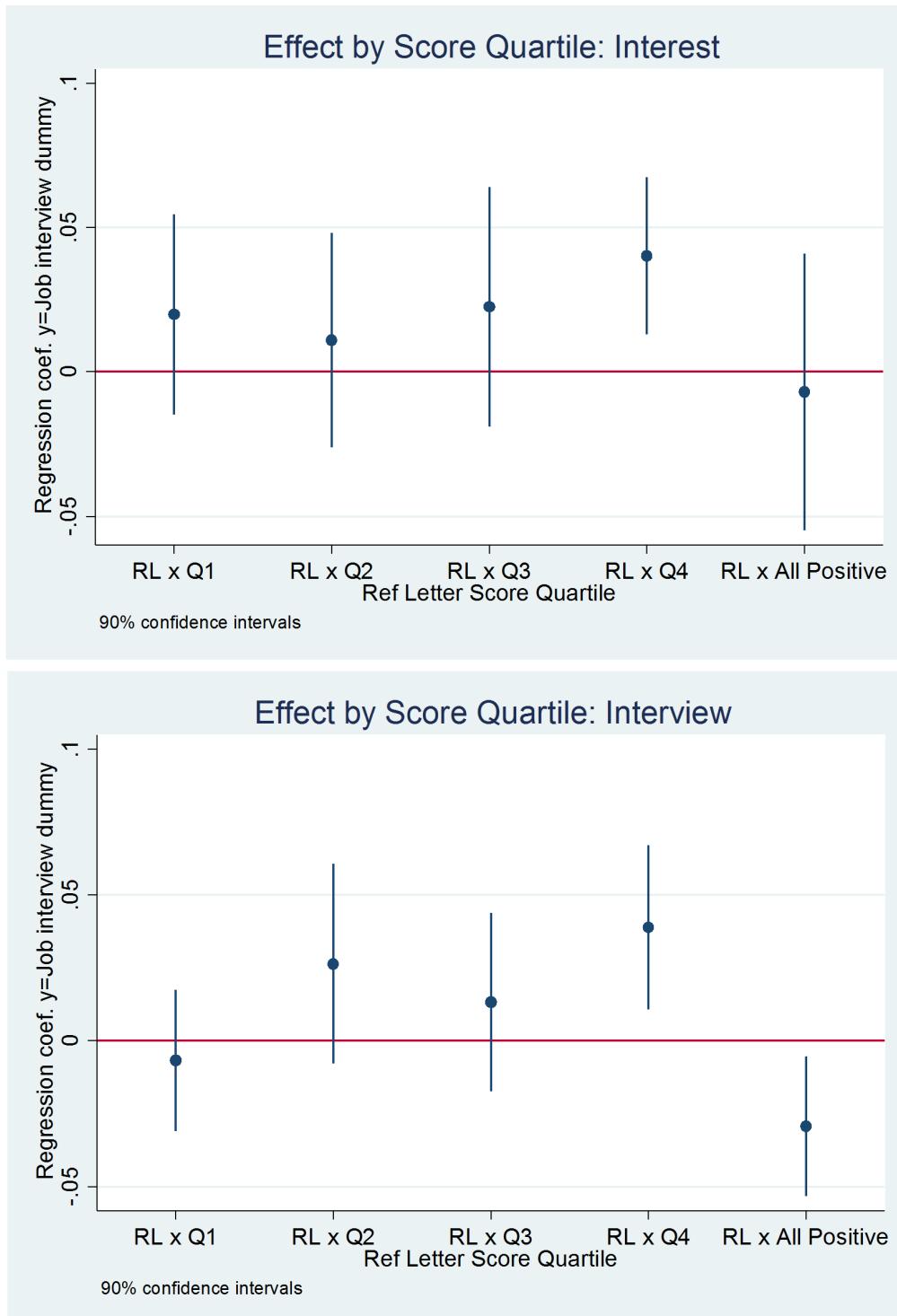


Figure A.6: Distribution of Reference Letter Scores



Figure A.7: Quartile Regression



## C Model

The firm's conditional expectation function is

$$E(a|s_1, s_2, d) = \beta_{00} + \beta_{01}d + \beta_{10}s_1 + \beta_{11}s_1d + \beta_{21}s_2$$

Since the firm's expectations are rational and common knowledge, the job-seeker's decision to send a reference letter is

$$d(s_1, s_2, d) = c.1(E(a|s_1, d = 0) < E(a|s_1, s_2, d = 1))$$

Under the additional linearity assumption this becomes

$$d(s_1, s_2, ) = c.1(\beta_{01} + \beta_{11}s_1 + \beta_{21}s_2 > 0) = c.1(s_2 > -\frac{\beta_{01}}{\beta_{21}} - \frac{\beta_{11}}{\beta_{21}}s_1)$$

If the candidate sends a reference letter, then the employer observes  $s_1$  and  $s_2$  but no additional information about  $a$  is conveyed by the fact that the letter was sent. The linear coefficients of  $E(a|s_1, s_2, d = 1)$  can therefore be calculated as regression coefficients. The linear regression coefficients for

$$E(a|s_1, s_2, d = 1) = (\beta_{00} + \beta_{01}) + (\beta_{10} + \beta_{11})s_1 + \beta_{21}s_2$$

can be calculated via the Frisch-Waugh-Lovell theorem as

$$\beta_{10} + \beta_{11} = \frac{\sigma_2^2}{\sigma_2^2 + \sigma_1^2\sigma_2^2 + \sigma_1^2}$$

$$\beta_{21} = \frac{\sigma_1^2}{\sigma_2^2 + \sigma_1^2\sigma_2^2 + \sigma_1^2}$$

$$\beta_{00} + \beta_{01} = 0$$

so that

$$E(a|s_1, s_2, d=1) = \frac{\sigma_2^2}{\sigma_2^2 + \sigma_1^2\sigma_2^2 + \sigma_1^2}s_1 + \frac{\sigma_1^2}{\sigma_2^2 + \sigma_1^2\sigma_2^2 + \sigma_1^2}s_2$$

However, when no reference letter is sent the employer should use this information to update their expectation about the value of  $s_2$ . By the law of iterated conditional expectations:

$$E(a|s_1, d) = E(E(a|s_1, s_2, d)|s_1, d) = \beta_{00} + \beta_{01}d + \beta_{10}s_1 + \beta_{11}s_1d + \beta_{21}dE(s_2|s_1, d)$$

The expected value of  $s_2$  given the observed value of  $s_1$  and the fact that no reference letter was sent is

$$E(s_2|s_1, d=0) = P(c=0|d=0)E(s_2|s_1, c=0) + P(c=1|d=0)E(s_2|s_1, s_2 < -\frac{\beta_{01}}{\beta_{21}} - \frac{\beta_{11}}{\beta_{21}}s_1)$$

Define  $\psi \equiv P(c=1|d=0)$ ,  $\kappa_1 \equiv \frac{\sigma_1^2}{\sigma_2^2 + \sigma_1^2\sigma_2^2 + \sigma_1^2}$ ,  $\kappa_2 \equiv \frac{\sigma_2^2}{\sigma_2^2 + \sigma_1^2\sigma_2^2 + \sigma_1^2}$ , and  $\omega = \sqrt{(1+\sigma_2^2)(1-\rho^2)}$ .

Then

$$E(s_2|s_1, d=0) = \frac{1-\psi}{1+\sigma_1^2}s_1 + \frac{\psi}{1+\sigma_1^2}s_1 - \psi\sqrt{(1+\sigma_2^2)(1-\rho^2)} \frac{\phi\left(\frac{-\frac{\beta_{01}}{\beta_{21}} - \frac{\beta_{11}}{\beta_{21}}s_1 - \frac{1}{1+\sigma_1^2}s_1}{\sqrt{(1+\sigma_2^2)(1-\rho^2)}}\right)}{\Phi\left(\frac{-\frac{\beta_{01}}{\beta_{21}} - \frac{\beta_{11}}{\beta_{21}}s_1 - \frac{1}{1+\sigma_1^2}s_1}{\sqrt{(1+\sigma_2^2)(1-\rho^2)}}\right)}$$

$$\cong -\psi(0.64\frac{\beta_{01}}{\beta_{21}} + 0.8\sqrt{(1+\sigma_2^2)(1-\rho^2)} + (\frac{1-0.64\psi}{1+\sigma_1^2} - 0.64\psi\frac{\beta_{11}}{\beta_{21}})s_1)$$

When the job-seeker chooses not to send the letter the employer has to replace the observed value of  $s_2$  with its conditional expectation  $E(s_2|s_1, d=0)$

$$E(a|s_1, d=0) = (\beta_{00} + \beta_{01}) + (\beta_{10} + \beta_{11})s_1 + \beta_{21}E(s_2|s_1, d=0)$$

$$\cong -0.64\beta_{01}\psi - 0.8\beta_{21}\psi\sqrt{(1+\sigma_2^2)(1-\rho^2)} + \left(\frac{1-0.64\psi}{1+\sigma_1^2}\beta_{21} - 0.64\psi\beta_{11} + (\beta_{10} + \beta_{11})\right)s_1$$

So the coefficients of

$$E(a|s_1, d=0) = \beta_{00} + \beta_{10}s_1$$

$$\beta_{00} = -\frac{0.8\psi}{1-0.64\psi}\kappa_1$$

$$\beta_{10} = \frac{1}{1+\sigma_1^2}\kappa_1 + \kappa_2$$

Then

$$\beta_{01} = \frac{0.8\psi}{1 - 0.64\psi} \kappa_1$$

$$\beta_{11} = -\frac{1}{1 + \sigma_1^2} \kappa_1$$

$$\beta_{21} = \kappa_1$$

The perfect Bayesian equilibrium (PBE)<sup>49</sup> for this dynamic game of incomplete information is then that the job-seeker's decision to send the letter can be expressed as

$$d(s_1, s_2, ) = c.1 \left[ s_2 - 1/(1 + \sigma_1^2) s_1 > -\frac{0.8\psi}{1 - 0.64\psi} \omega \right]$$

while the firm's hiring decision will be

$$E(a|s_1, s_2, d) = 1. \left[ \frac{0.8\psi}{1 - 0.64\psi} \kappa_1 \omega + -\frac{0.8\psi}{1 - 0.64\psi} \kappa_1 \omega d + (\frac{1}{1 + \sigma_1^2} \kappa_1 + \kappa_2) s_1 - (\frac{1}{1 + \sigma_1^2} \kappa_1) s_1 d + \kappa_1 s_2 d > \theta \right]$$

The share of applicants  $\pi$  who use of the reference letter in equilibrium ( $P(c = 1)$ ) is

$$P(d(s_1, s_2, ) = 1) = \pi.P(s_2 - \frac{1}{1 + \sigma_1^2} s_1 > -\frac{0.8\psi}{1 - 0.64\psi} \omega)$$

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<sup>49</sup>A PBE is a strategy profile and belief system that are sequentially rational and consistent. In our context, employers know the decision problem of the job seeker, who in turn knows that the hiring firm has this information. Neither firm nor job seeker can benefit by deviating from their strategy.

## D Simulation: How do effects change as letters become widely adopted?

Section 4 finds that increasing the number of letters from one to three does not change their effectiveness. However, this still presents a relatively small share of the applicant pool as employers report to typically receive about 50 applications per vacancy. While the experiment cannot create substantive variation in the share of applications submitted with reference letters, we can employ our conceptual framework (Section 2.2) to investigate how effects may change as reference letters become more widely adopted.

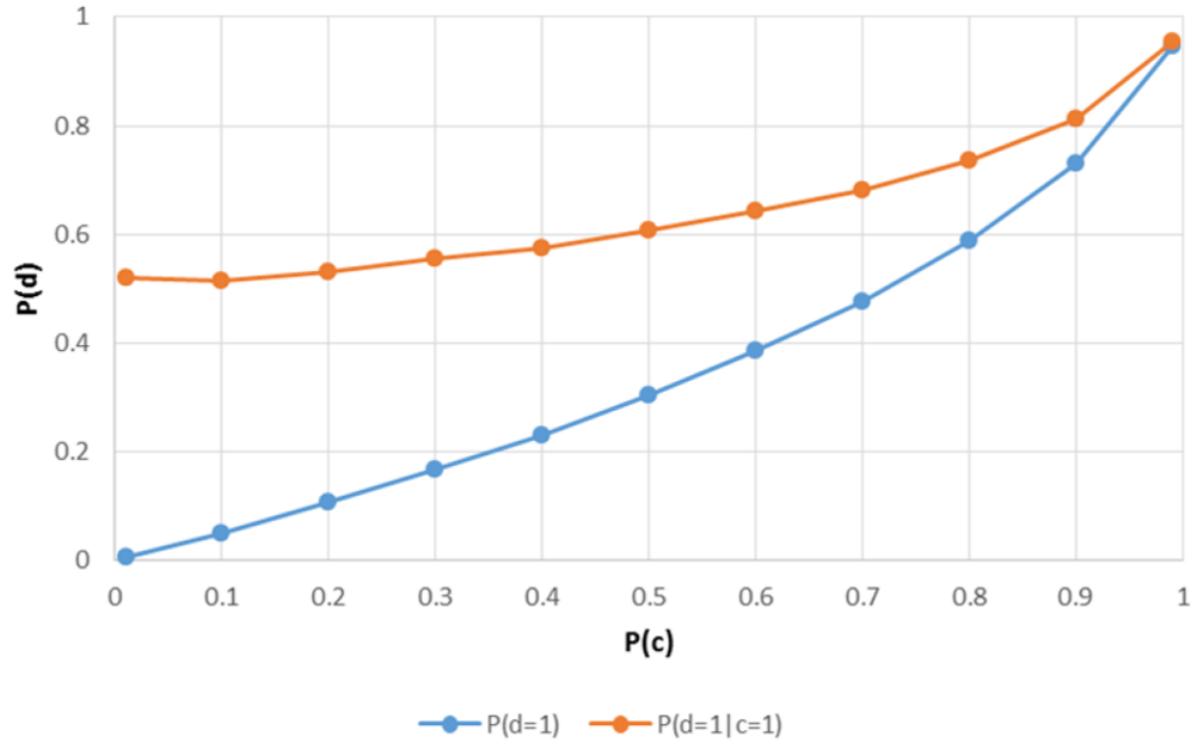
Simulation results presented in Figure A.8 illustrate the relationship between the share with access to letters ( $c$ ) and the share using it in the job search ( $d$ ). The share using the letter increases for two reasons: first, more high ability people with positive letters gain access and, second, the share using the letter conditional on having access to it  $P(d = 1|c = 1)$  increases. One corollary is that the ability of the marginal job seeker using the letter decreases as more get access (results not shown). The intuition behind these results is that in an equilibrium with very few reference letters, the information employers can infer about the applicant's ability from not receiving a letter is limited. Workers who receive a negative letter can hide in the larger pool of job seekers without access to letters and will thus only accrue a small penalty, i.e. firms only slightly adjust their beliefs about ability downward.

Figure A.9 depicts how the firms' screening ability changes as more people get access to letters. Two effects emerge: the overall share of people hired  $P(h = 1)$  increases suggesting that the letter has positive net employment effects and the average ability of the hired person  $E(a|h = 1)$  increases.<sup>50</sup> Combined, these results suggest that the unraveling of the market (i.e.  $P(c = 1) \rightarrow 1$ ) is desirable from a market efficiency perspective as it maximizes the information available to firms to identify the most able candidates.

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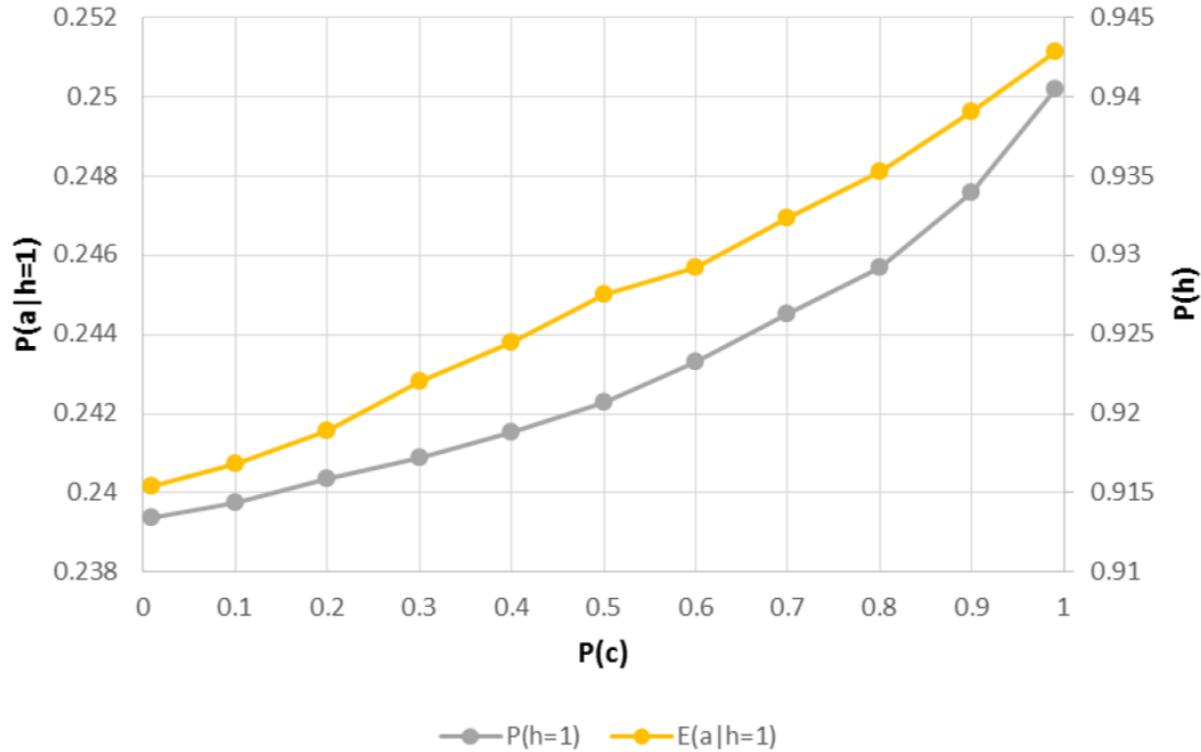
<sup>50</sup>Pissarides, 1985 concludes that labor demand can change very rapidly as firms make hiring decision based on the *perceived* cost and benefits of future matches.

Figure A.8: Simulation: Reference Letter Access and Usage



Note: The graph shows simulation results of the relationship between access to the letter ( $c$ ) and using it ( $d$ )

Figure A.9: Simulation: Hiring and Ability



Note: The graph shows simulation results of the probability of hiring ( $h$ ) and the expected ability ( $a$ ) of hires.