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Testing the importance of search frictions and matching through a randomized experiment in Jordan

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Abstract

We test the role of search and matching frictions in explaining the high unemployment of tertiary-educated youth in Jordan through a randomized experiment. Firms and job candidates were provided with a job-matching service based on educational backgrounds and psychometric assessments. Although more than 1,000 matches were made, youth rejected the opportunity of an interview in 28 percent of cases, and when a job offer was received, they rejected this offer or quickly quit the job 83 percent of the time. The results suggest voluntary unemployment in this context arises from preferences over non-wage job attributes.

JEL classification codes: O12; O15; J64; J08

Keywords: Psychometrics; Labor market matching; Reservation utility; Youth unemployment; Jordan; Randomized experiment

1 Introduction

In Jordan, recent university graduates face difficulties entering the labor market and firms that are seeking to fill entry-level positions complain that educated youth lack the appropriate interpersonal and technical skills required for the positions. In 2010, unemployment rates for men and women between the ages of 22 to 26 with a post-secondary degree were 19 percent and 47 percent, respectively. The mean duration of unemployment among this cohort was 10 months for males and 16 months for females (JLMPS 2010). The average transition period from graduating university to stable employment for youth who do not immediately find a job is 33 months (Barcucci and Mryyan, 2014). In 2011, we surveyed 2000 firms in Amman, the capital city, that were looking to hire new employees. Sixty percent of these firms said they experienced difficulty distinguishing between good and bad job candidates, and 64 percent said they experienced difficulty finding competent graduates in reasonably proximity to the firm.

Across the Middle East and North Africa, many countries face the same labor market issue for educated youth (Angel-Urdinola et al., 2010; Almeida et al., 2012). Youth unemployment across the Middle East and North Africa has been described as a "jobs shortage" and is currently a major policy issue (e.g., Reed, 2011; Sweis, 2014). But this raises the question of why the labor market does not clear. Theory offers several potential

explanations. The first is that high minimum wages exceed the marginal product of workers. However, this seems less relevant for university graduates whose wages are well above the minimum wage. A second potential explanation is offered by search and matching theory (Mortensen and Pissarides, 1994, 1999), which explains persistent unemployment as the result of high search costs which prevent firms with vacancies from connecting with qualified job candidates. In the standard model, high reservation wages lead youth to turn down job opportunities until they achieve a job match with a high enough wage. In richer versions of the model, job-seekers also consider the non-wage attributes of the job such as its difficulty and prestige, and may reject jobs even at relatively high wages if their utility from the job does not exceed a reservation utility level.

We investigate the importance of search and matching frictions through a randomized experiment testing a labor market matching service in Amman. A sample of over 1,354 unemployed recent university and community college graduates was given a comprehensive set of tests to measure their quantitative, verbal, and spatial reasoning, English and Excel proficiency, soft skills, and personality type. A total of 1,011 of this sample were then randomly assigned to a treatment group, which we attempted to match to available positions at hundreds of firms. The goals of this psychometric screening and matching process were to lower search costs and improve match quality for both job candidates and firms, and over 1,000 matches were made. However, young job candidates rejected the opportunity to even have an interview in 28 percent of cases, and when a job offer was received, graduates rejected this offer or quickly quit the job 83 percent of the time. As a result, only 9 individuals ended up in jobs that lasted longer than a month. Thus, lowering search costs through screening and matching did not result in any meaningful reduction in unemployment.

When we examine the reasons why youth turned down potential job openings, the main reason given is not that the salary is too low, but instead, recent graduates explain that the job is "unsuitable", or "not on the right career path." Educated youth appear unwilling to take on certain types of jobs. As a result, it appears that much of the educated unemployment is voluntary, with youth unwilling to work in many jobs, suggesting reservation utility derived from more factors than wages explains the high unemployment.

This research builds on several strands of empirical literature. Most of the existing work has focused on interventions designed to affect the search component of search and matching theory. In developed countries, job search assistance and counseling of the unemployed is a common active labor market policy designed to get unemployment benefit recipients to begin working again. Typically this involves monitoring their job search efforts, providing basic search skills such as helping with C.V.s and interview techniques, and providing information about job openings. A number of evaluations of these programs have found positive effects on employment outcomes, including Blundell et al. (2004) in the U.K., Behaghel et al. (2014) in France, and the meta-analysis of Card et al. (2010), although displacement of other job seekers may occur (Crepon et al. 2013). In some cases, the policies may just cause a substitution from the unmonitored, informal search activities to the monitored, more formal search activities, with no resulting change in employment outcomes (van den Berg and van der Klaauw, 2006).

There is a much smaller literature examining such policies in developing countries. A couple of recent studies suggest the potential of reductions in search costs for job-seekers to increase employment. Jensen (2012) finds that providing information

about jobs in the business process outsourcing sector and interview skills to young women in India increases their employment. Franklin (2014) finds transport subsidies that enable workers in Ethiopia to travel to an area where new jobs are posted has positive effects on the employment of those receiving the subsidies. In contrast, Beam (2014) finds no impact of information and job fairs on getting Filipino workers into overseas jobs. The one study which also attempts to lower search costs for employers is Beam et al. (2014), who provide information about international migration opportunities to Filipino workers and also set up a jobs website for recruiters to recruit these job seekers. They find this leads to individuals taking more steps towards employment abroad, but it has no ultimate impact on international migration.

A third strand of the literature uses the o-Desk online labor market for several experiments. Pallais (2014) shows that revealing more information about the ability of inexperienced workers through detailed public feedback improves their subsequent employment outcomes. Agrawal et al. (2013) finds that verified work experience improves the likelihood of being hired, especially for individuals from developing countries. Taken together, these two studies are consistent with some of the ideas underlying our work – that young workers have difficulty signaling their quality and that this may particularly be the case for individuals with qualifications from developing countries. Horton (2013) uses this platform to test the impact of using a computerized matching algorithm to supply employers with matches for their openings, finding that this improves their rate of filling technical jobs, but it has no impact on their fill rates for non-technical jobs. These online experiments have the advantage of allowing detailed examination of each step of the search process but are typically for short-term work and different types of firms than most labor markets.

Our work builds on this existing literature through combining several aspects and explicitly attempting to reduce matching frictions. It reduces search costs for both job-seekers and employers, validates the skills of the job-seekers, and attempts to improve match quality. Our results suggest that this match quality depends heavily on graduates' preferences over non-wage job characteristics and that simply reducing the general costs of search does not spur more employment when graduates remain resistant to considering any job outside of a narrow range.

The remainder of the paper is structured as follows. Section 2 briefly outlines different theories of why the labor market doesn't clear and their implications for our experiment. Section 3 discusses our experiment, which uses psychometric testing to match workers and firms. Section 4 discusses possible reasons for our results, and Section 5 concludes.

2 Why is the educated youth labor market so distorted? Theories of prolonged unemployment of the educated

High levels of unemployment for educated workers in the Middle East has been the subject of a number of policy reports (e.g., World Bank, 2013), with a large number of factors identified as potential explanations. These include shrinking government sectors combined with a range of regulatory and market failures that inhibit private firms from growing and inflexible labor regulations that raise the cost of hiring workers. These factors can affect the position of the labor demand curve, reducing the number of workers that firms are willing to hire at any given wage. However, they are less able to explain

why labor markets do not respond through movements along the labor demand curve, with wages falling to a point where labor supply equals labor demand. We consider three possible explanations for this: high minimum wages, high reservation wages, or high reservation utility.

A first potential explanation is high minimum wages which exceed the marginal product of labor of workers and which prevent wages falling to a level which will equate the supply and demand of labor. In previous work with female community college graduates in Jordan, we found some evidence for this channel, with the majority of those contracted with a wage subsidy receiving exactly the minimum wage and losing these jobs when the subsidy ended (Groh et al., 2013). But this explanation seems less relevant for university graduates whose wages are above this level. Indeed, in the experiments which follow, employed graduates are earning on average 1.8 times the minimum wage, with very few earning exactly the minimum wage.

A second explanation is offered by the search and matching theory of Diamond (2011), Mortensen (2011) and Pissarides (2011). The reason for persistent unemployment in this model is that costly search frictions make it difficult for jobless workers to match with firms with vacancies. These search frictions can be larger for youth, who do not have previous job experience to signal their quality. Moreover, they may be particularly large in many developing countries in which employers are less confident with the signal obtained from grades and university than is the case in developed economies, and in which youth may be less likely to undertake internships or receive work experience while studying.[1] As a result, many workers and firms rely on a system of connections known by its name in Arabic, *wasta,* to fill job openings (Barnett et al., 2013), limiting the set of possible matches. Improvements in search and matching technology then offer the potential to lower unemployment through filling existing vacancies and through inducing firms to create more vacancies as their hiring costs fall.

In the standard matching model (e.g., Mortensen and Pissarides, 1994), workers decide whether or not to accept a job offer by comparing the wage of the job to their reservation wage, which is determined by the value of leisure and the expected gains from future search (being matched to a job in the future with higher wages). Over 75 percent of unemployed Jordanians live with their parents and a large proportion of educated, unemployed Jordanians are from the wealthiest families (Iqbal and Razzaz 2008). As a result of living with their parents until marriage, recent graduates have minimal expenses and so may be able to afford to set a high reservation wage, waiting long periods until they receive a high wage offer. High unemployment would then result from high reservation wages.

Whilst much of the search literature has focused on a reservation wage, it has long been recognized that other attributes of the job may also matter for match quality. An early example is Blau (1991), who considers hours of work as well as the wage. Rogerson et al. (2005, p. 962) note that "although we refer to w as the wage, more generally it could capture some measure of the desirability of the job, depending on benefits, location, prestige, etc." The result is that instead of a reservation wage, job-seekers have a reservation utility level, accepting only job offers in which their utility from the job exceeds a particular level (see, e.g., Sullivan and To, 2011 for a formal derivation). As a consequence, workers may reject jobs even at relatively high wages if they consider the non-wage attributes of the jobs to be particularly undesirable.

In particular, in the context of Jordan and the Middle East, we hypothesize that non-wage attributes such as the prestige or status of the job may be important, with graduates believing it brings shame to their families if they are working in a job for which they believe they are over-qualified. This may interact with gender norms, which restrict the set of jobs considered suitable for women to work in. The result may then be that graduates are voluntarily unemployed, refusing available job openings while they wait for a job of the appropriate job type.

These theories have different implications for the appropriate policy action to reduce the unemployment of educated youth. If the problem is minimum wages, then introducing a lower minimum wage for young workers can be a solution. If the problem is high reservation wages as high search costs and difficulty matching workers with firms means it takes workers time to find a job offering the right wage, then the policy response should be efforts to lower these search costs and develop signaling mechanisms and matching services. Conversely, if unemployment is voluntary due to high reservation utility in terms of non-wage job attributes, the policy response is less clear since this can reflect a structural mismatch between the types of jobs graduates are willing to work in and the types of jobs firms are looking to fill.[2]

3 A randomized experiment to match workers and firms

Our experiment consists of an employment pilot designed to manually match firms and job candidates based on survey data and psychometric assessments. The aim is to reduce search costs and other matching frictions and thereby increase the employment rates of educated unemployed youth.

3.1 The sample and randomization process

The study involved matching unemployed graduates with firms looking to potentially hire workers. This required us to put together separate samples of job candidates and firms.

The *experimental job candidate sample* consists of 1,354 recent graduates of either community college or university in Jordan who participated in the program between December 2011 and November 2012. We obtained this sample through advertising the program (called Jordan NOW 2.0) in local newspapers, radio stations, cafes, and Facebook, along with a telephone campaign to recent graduates from 14 universities and community colleges in and around Amman. Youth were told this program would be free to participate in and that it had the goal of helping match them to jobs. Eligibility was restricted to Jordanians who had graduated from community college or university since May 2009. In the first four months, the program was restricted to females only before also being opened up to males.

Candidates signed up and completed a screening process (described below) on a rolling basis throughout 2012. We then stratified by gender and screening batches (110 strata) and randomly assigned three-quarters of the candidates within each strata to a treatment group that would be attempted to be matched to jobs and one-quarter to a control group that would not. This continued until Dec 2, 2012, resulting in 343 individuals being assigned to the control group and 1,011 to the treatment group. In order to avoid John Henry and Hawthorne effects, job candidates were not informed as to which group they were assigned.[3]

The World Bank does not currently have an IRB board or requirement for IRB approval. Instead, studies go through a review process when seeking funding, where ethical concerns can be mentioned by the reviewers alongside any other comments they have on the technical or policy limits of the research. This design was clearly laid out in these research proposals, and no concerns on ethical matters were raised. Given that we faced limits on the number of vacancies available in which to match candidates, randomization provided a fair way of deciding who would be attempted to be matched to these vacancies.

Table 1 summarizes some basic characteristics of the job candidates by treatment status. The average participant is 23.5 years old and graduated three-quarters of a year before participating in our program. Females accounted for 59 percent, 81 percent are university graduates and 19 percent community college graduates. The most common majors are accounting and business, engineering, and computing and information technology. The last column shows randomization has succeeded in generating balance on background characteristics, on the tawjihi score (the end of high school exam), and on the different test measures to be described below. The only variable which shows imbalance is whether they are a university versus a community college graduate. A chi-squared test of joint orthogonality of all the variables in Table 1 has a p-value of 0.622, so we cannot reject the null that treatment assignment is unrelated to observable characteristics.

The *firm sample* consists of a primary, experimental sample and a secondary, booster sample. The experimental sample consists of 2,279 small and medium firms who were selected via a listing survey that screened firms according to whether they planned on hiring a worker in the next six months and whether they would consider young workers and

Table 1 Summary statistics on job candidates

	Control mean	Control SD	Treat mean	Treat SD	P-value
Male	0.43	0.50	0.40	0.49	0.120
Age	23.6	2.3	23.5	2.0	0.377
Years since Graduation	0.73	0.91	0.75	1.03	0.496
University	0.84	0.37	0.80	0.40	0.021
Ever Worked	0.60	0.49	0.65	0.48	0.211
Single	0.91	0.29	0.93	0.26	0.197
Tawjihi Score	72.3	11.7	73.0	11.1	0.636
Accounting or Business	0.33	0.47	0.36	0.48	0.406
Engineering	0.10	0.31	0.10	0.30	0.791
Computing or IT	0.13	0.34	0.10	0.31	0.597
Ability Score	0.01	1.30	−0.04	1.31	0.469
Soft Skills Score	−0.26	2.21	−0.15	2.37	0.696
Excel Test	62.6	21.8	63.3	21.9	0.571
English Test	56.1	19.4	57.2	20.1	0.730
Analytical Personality	6.78	2.84	6.80	2.94	0.995
Emotional Personality	3.49	3.16	3.68	3.34	0.321
Extroverted Personality	3.73	2.84	3.57	2.80	0.363
Opportunistic Personality	4.90	3.69	4.97	3.72	0.773
Dependable Personality	4.27	2.66	4.43	2.58	0.290
Sample Size	343		1011		

Note: P-value is for a test of no difference in means by treatment group after controlling for randomization strata.
A chi-squared test of joint orthogonality has a p-value of 0.622.
Source: Baseline survey of candidates applying for matching service.

female workers for these positions. Appendix 1 describes in more detail this listing process. Firms of this size typically do not have human resource departments and have less experience hiring workers than large companies. As such, we might expect search and matching costs to be higher for such firms. Indeed, in our survey of these firms, 60 percent say they have difficulty distinguishing between good and bad candidates.

We stratified these firms by sector (commercial or industrial), whether or not the firm had recently hired a worker, whether or not the firm had previously hired a female fresh graduate, and by the number of female employees in the firm (0, 1 to 10, 10 or more). Within these 24 strata, we then randomly assigned half the firms to treatment, which would be attempted to be matched to job candidates, and half to control, which would not. This gave a treatment group of 1,137 firms and a control group of 1,142 firms, with a mean size of 17 workers and a mean annual hiring rate of 1.6 workers per firm (Appendix 1). After no hires occurred in a first phase, the control group was also offered the treatment, and a secondary booster sample of 175 larger firms that were potentially interested in hiring workers through the program was added. Appendix 1 details how these were chosen. These larger firms would typically be viewed as more prestigious by graduates.

Table 2 provides the sector breakdown of these firms, and Table 3 a description of the positions they were trying to fill. Among the SMEs, the most common industries were retail, other services, manufacturing of textiles, food, and chemicals, IT, and marketing. Among the larger firms, IT, education, and other services were the most common. These employers were seeking a wide range of jobs, with the most common positions being administrative assistants, sales staff, accountants, marketing positions, and web development and IT.

Table 2 Firm sector distribution by firm sample

	Control	Treat	Booster sample
Retail	420	407	0
Other	286	263	7
Other Services	97	75	27
Electronics Manufacturing	21	53	0
Wholesale	56	49	11
Textile Manufacturing	26	45	1
Food Manufacturing	40	42	0
Chemical Manufacturing	48	36	0
IT	22	34	35
Marketing/Advertising	23	29	14
Construction	25	24	7
Health	17	19	2
Hotel Restaurant	23	16	1
Financial	14	12	9
Agriculture	8	12	0
Education	9	8	25
Entertainment	2	8	0
Transport	5	5	2
Total	1142	1137	141

Source: listing data on firms participating in matching project.

Table 3 All positions available for matching workers with firms

Position available	# of firms with listed position	Position available	# of firms with listed position
Administrative Assistant	23		
Sales	23	Artist	1
Accounting	18	Bank Teller	1
Marketing	18	Business Development	1
Telemarketing	10	Civil Engineer	1
Web Development	10	Consultant	1
Information Technology	8	Credit Officer	1
Admin Assistant	7	Data entry	1
Customer Service	7	Designer	1
Sales – Indoor	7	Editor	1
Sales – Outdoor	7	Engineer – Civil	1
Data Entry	5	Engineer – Electrical	1
Graphic design	4	Event Coordinator	1
Human Resources	4	Human Resources	1
Software Development	4	Hostess	1
Engineer	3	Housekeeping	1
Management Information Systems	3	Indoor Sales	1
Outdoor sales	3	Insurance Agent	1
Cashier	2	Interior Design	1
Computer Engineer	2	Museum Guide	1
Engineer – Computer	2	Public Relations	1
Engineer – Industrial	2	Social Media	1
Mechanical Engineer	2	Technical Writer	1
Accounting	1	Trainer	1

Source: administrative data from matching project.

3.2 The intervention

The intervention was designed in collaboration with Marwan Al-Zoubi, a professor in psychology at the University of Jordan specializing in organizational behavior and work psychology. It was implemented by Business Development Center (BDC), a leading training services firm in Jordan that is well-known for its soft skills training and job placement program known as Maharat.

3.2.1 Testing job candidates

The first step in the intervention consisted of testing job candidates. Job candidates came to the BDC offices and were given a series of tests that lasted four hours. This consisted of two hours of computerized tests to measure quantitative, verbal, and spatial reasoning, proficiency in English and Excel, and personality type, and two hours of live, interactive sessions to measure soft skills. The tests included the following:

1. *Mental Reasoning:* a timed test consisting of 45 questions, equally divided between verbal, quantitative, and spatial reasoning. We form a principal component to aggregate scores from these categories into a single ability index.

2. *English Proficiency:* a timed test consisting of 15 vocabulary and grammar questions, 15 reading comprehension questions, and 20 listening based questions. The scores are then normalized to a score out of 100 based on comparisons to the performance of University of Jordan students on the same test prior to the launch of the pilot.
3. *Excel Proficiency:* a timed test which measures the participants' ability to write text in cells, add and delete rows and columns, sum variables, and calculate the mean of a group of scores. The score is calculated based on the participants' ability to complete 17 Excel tasks correctly, and the score is then normalized to a score out of 100 based on comparisons to the performance of University of Jordan students on the same test prior to the launch of the project.
4. *Soft Skills:* soft skills were measured by three interactive exercises. The first was based on a group exercise in which five to eight participants were put in a group and tasked to redesign a failing amusement park in Jordan. They were each given a pre-defined role and evaluated on how they work in groups. The second exercise was a role-playing game designed to test the participant under pressure. The participant plays the role of a customer service associate, and the evaluator plays the role of an angry customer who had purchased a computer that broke down. The participant's goal is to calm the customer and come up with a solution within the framework of the company's rules. The final assessment was a skills-based interview where the soft skills specialist asks questions to elicit examples of leadership, teamwork and overcoming obstacles. We form a principal component analysis of scores in the 10 soft skill categories to form a single soft skills index.
5. *Jackson Five-Factor personality traits:* personality traits were measured through a series of 300 questions assessing the following five characteristics and their sub-characteristics: analytics (complexity, breadth of interest, innovation, tolerance), extraversion (sociability, social confidence, energy level), emotions (anxiety, cooperativeness, empathy), opportunism (social astuteness, risk taking), and dependability (organization, traditional values, and responsibility) (Paunonen and Douglas 1996).[4] We calculated the personality traits as the mean of their sub-characteristics, and we normalized the five factor personality traits for ease of interpretation. In preparation of the launch of this pilot, Marwan Al-Zoubi translated the Jackson Personality Inventory Revised into Arabic and validated the Arabic version through a sample of students at University of Jordan (Al-Zoubi M: Developing the differential norms for Janckson Personality Test using a large Jordanian Employee Sample, forthcoming).

In addition to these test measures, we also collected basic information that would be typically included on a C.V., such as previous work experience, college or university, and field of study. At the end of the assessment, all participants were given a seven-page report of their results detailing their scores on each component of the assessment, their relative rank on this component, and a summary paragraph describing what the score meant.

3.2.2 Matching job candidates with firms

The second step involved using this information collected on candidates to match them with firms that may potentially want to hire them. The matching process proceeded as follows:

i) BDC staff called the firms in our sample and explained the concept of psychometric testing and its use for job matching, giving examples of how the tested concepts could help them better find a good fit for different types of jobs. For example, extroversion is likely to be important for sales positions, and organizational personality types for administrative positions, while some positions may require analytic ability, and others depend more on English ability. They then asked the firm manager or HR manager what their current needs for workers were, whether they currently had or would soon have any open positions, and what kind of traits they were looking for in each position.
ii) BDC staff would then filter our job candidate database for the top three to five candidates that would be considered a good fit for the position. Marwan Al-Zoubi prepared an instruction manual in Arabic which helped in this process, giving examples of the types of personality and ability characteristics that would be ideal for different positions.
iii) These staff would then call these candidates and explain the job description and likely salary range, the location of the job, and check the candidate was interested in being considered for this position. If they were not interested, a replacement match would be drawn from the next best fit in the database.
iv) The firm would then be sent a list of the three to five job candidates matched to the position, along with the resumes of these candidates, and a description of why these candidates would be a good fit for the job. Steps ii) through iv) normally took 2 to 3 business days from the initial discussion with the firm in step i).
v) Firms would then contact the job candidates they were interested in to arrange an interview, and following this interview, potentially make a job offer. BDC staff followed up with the job candidates and firms on a weekly basis to record the outcome of the matching process and to offer the firm alternative resumes if the initial set of candidates did not work out.

3.2.3 Theory of change: how might this intervention increase employment?

The intention of this intervention is to lower search costs for both job candidates and for firms. On the worker side, this may connect job candidates to job opportunities that they would have otherwise been unaware of and additionally provide more information about the potential match quality of a job since we would be telling them that this is a job that fits their personality and ability traits. This could, in principle, lead to more youth in the treated group finding jobs and to the jobs they find being of higher match quality.

On the firm side, the intervention can potentially lower the costs of filling job openings that the firm already had by giving them access to a wider pool of job candidates and by saving them many of the costs of screening these workers. The candidates chosen may also be better matches for the positions, saving them on rehiring costs. In addition, with access to this service lowering search costs, there may be some positions that firms would not have otherwise filled that they now hire workers for, resulting in an increase in total hiring.

3.3 Results

The matching attempts began in January 2012 with the 1,000 treatment firms from the experimental sample. These firms were selected as firms that had the potential to hire but needed not to have definite hiring plans, based on the idea that lowering search

costs may result in them opening up jobs that they wouldn't otherwise offer. However, in practice, initial take-up from these firms was extremely low, so we also included the experimental control sample of firms and the booster sample of firms as possible candidates for matching and began matching on this full sample in June 2012, ending in December 2012. We have two main sources of data that allow us to see the results of this process. The first are detailed administrative data on the matching process. The second are two rounds of follow-up surveys with the job candidates: a midline follow-up survey in October 2012 that measures short-term impacts midway through the matching period and an endline survey conducted in May 2013 that measures impacts five months after the conclusion of the matching services. The attrition rates were 8 and 19 percent, respectively, for these two surveys.[5]

Table 4 provides a summary of the outcomes at different stages of the matching process. This uses data from the period after the first couple of months in which only the experimental sample was used, since no job hires took place from this period, and recording systems on the intermediate phases were not fully developed during this set-up phase. Only 134 of the 2,454 firms we contacted had one or more job openings they were interested in having us help fill during this full phase (5.5%). Some firms had multiple positions to fill. The vast majority of the firms participating were from the booster sample, in part due to BDC focusing more on these firms after the initial phase had proved unsuccessful. Although we do not have information on employment size for this booster sample, these firms were typically larger in size than the experimental sample and known to BDC through its business networks. It did not include multinational firms but rather included consulting, engineering, technology, and other white collar firms that have previously hired college educated Jordanian youth.

Of the 1,011 individuals in the treatment group, 56 percent (564 individuals) were matched to at least one job opening. Conditional on being matched at all, 55 percent of candidates were matched to more than one job opening, with a total of 1,142 initial matches being made. However, only 10 percent (114 matches) of these matches resulted in a job interview. In 28 percent of matches, job candidates said they were not interested, and in 55 percent of matches, firms did not invite candidates for an interview. Of the 114 matches leading to job interviews, job offers were extended by the firm in almost half the cases (54). However, job candidates refused 30 out of the 54 job offers extended, resulting in only 24 individuals getting hired. This represents only 4.3 percent of the job candidates who were matched at least once, and only 2.1 percent of the matches made. Furthermore, out of these placements, 15 individuals quit within the first month. As a result, only 9 jobs were directly generated through this matching: 6 to female candidates and 3 to male candidates. Conditional on receiving a job offer, only 15 percent of females and 20 percent of males took up this job offer and stayed in the job for at least a month.

If we had found a large number of job matches arising from this matching process, treatment regressions would then be useful to see whether they represent a net gain in employment versus merely providing jobs to individuals who would have found a job anyway. In our case, given the incredibly low rate of direct placement into jobs, it seems unlikely that we would find a treatment effect. Nevertheless, one could hypothesize that the process of being asked about a potential match (which occurred for 55 percent of the treatment group) might cause youth to either consider a wider

Table 4 Matching results

Group	Result	Match Attempts	Match Result	Interview Result	Hire Result
All	Match Attempt	1142			
	Unable to Contact Job Candidate		82		
	Job Candidate Not Interested		319		
	Firm Not Interested		627		
	Interview		114		
	Job Candidate Refused Job Offer			30	
	No Job Offer			60	
	Hired			24	
	Quit Within First Month				15
	Continued Past First Month				9
Female	Match Attempt	591			
	Unable to Contact Job Candidate		39		
	Job Candidate Not Interested		177		
	Firm Not Interested		307		
	Interview		68		
	Job Candidate Refused Job Offer			22	
	No Job Offer			29	
	Hired			17	
	Quit Within First Month				11
	Continued Past First Month				6
Male	Match Attempt	551			
	Unable to Contact Job Candidate		43		
	Job Candidate Not Interested		142		
	Firm Not Interested		320		
	Interview		46		
	Job Candidate Refused Job Offer			8	
	No Job Offer			31	
	Hired			7	
	Quit Within First Month				4
	Continued Past First Month				3

Note: Data calculated based on administrative records; the same individual was sometimes matched to multiple positions, and the same firm to multiple job candidates.

range of jobs than they had otherwise done or perhaps to exert more effort in search to avoid the alternative of being matched to jobs they consider less desirable. It is therefore worth checking whether any such channels result in higher employment outcomes or higher salaries conditional on finding a job.

To test this, we run intention-to-treat (ITT) regressions for youth I of the form:

$$Employment_i = \alpha + \beta Treat_i + \gamma Male_i + \delta' S_i + \varepsilon_i,$$

where *Treat* is an indicator for being assigned to the group that will be matched, *Male* is a dummy variable indicating the youth is male, and S_i are the randomization strata dummies. Robust standard errors are then reported. We likewise run a similar regression for salary conditional on being employed. This is a potentially endogenous outcome, so it

should thus be viewed as providing a descriptive statement of whether employed treated individuals are earning more or less on average than employed control individuals.

Table 5 reports the resulting ITT estimates. We find small and statistically insignificant impacts on both the likelihood of being employed and on the monthly salaries graduates earn conditional on being employed. This is consistent with the lack of direct effect from the matching and suggests that there are no strong effects occurring through these other channels. Note that 44 percent of the control group is employed by the October 2012 survey, and 56 percent by the May 2013 survey, so the lack of effect on employment is not because nobody is able to find a job – youth are finding jobs, just not through the matching process.

Designing, validating, and computerizing the psychometrics assessments cost $28,800. The management and implementation cost of enrolling and testing the job candidates and matching them to firms cost $146,000 over 14 months. This excludes the cost of the firm listing exercise and survey of 2,000 firms, which was used to generate a list of firms to match with but which was also used to ask more detailed questions on the firms. An approximate cost for the listing itself would be $30,000. The total implementation cost is thus approximately $204,800. If we consider just the 9 jobs in which graduates lasted beyond one month, the cost per job directly matched is $22,755, or $19,556 if we ignore set-up costs and consider only the steady-state variable costs. This is approximately 39–45 months of income for a youth earning the average of 350 JD ($500). Furthermore, we cannot rule out that these youth would have found jobs in the absence of the treatment. This screening and matching service does not seem cost effective.

4 Explaining the lack of results

The randomized experiment shows that the matching intervention had very little success in helping job candidates find jobs. Although the experiment itself cannot tell us why there was no effect, we can use data collected as part of the evaluation to examine several possible explanations for this lack of effect.

4.1 Did the testing process not reveal any new information about the graduates?

A first explanation for the lack of impact is that the various tests we employed did not reveal any new information about the employability of graduates. Groh et al. (2014) provides evidence against this explanation, showing that our test measures do have predictive power for subsequent employment and earnings conditional on employment, even after conditioning on field of study, university, and other control variables that

Table 5 ITT Results of impact of job matching on job candidates

	Employment		Salary conditional on being employed	
	Oct 2012	May 2013	Oct 2012	May 2013
Assigned to treatment (getting matched)	0.00713	0.0235	−9.360	0.173
	(0.0378)	(0.0360)	(20.38)	(12.29)
Control Group Mean	0.43	0.57	313	350
Observations	984	1,097	428	605

Notes:
Sample size for October 2012 is smaller since some job candidates joined study after this date.
Salary is a monthly salary, expressed in terms of Jordanian Dinar (JD).
Robust standard errors in parentheses, *, **, and *** indicate significance at the 10, 5, and 1 percent levels.

might be easily observed from curriculum vitae. Several of the measures have both statistically significant and economically meaningful correlations with future employment outcomes. Therefore, these test measures do appear to contain new information, which therefore offers the possibility of lowering search and matching costs by reducing information asymmetries.

4.2 Was the matching just not done very well?

With any new program that does not find effects, the question which always then arises is whether the lack of effect is due to the program not being implemented effectively or due to the program itself not having an effect even when correctly implemented. The implementing agency, BDC, has a strong reputation in Jordan and is well known for its existing training and job placement program Maharat. Nevertheless, since our new intervention was a new program, we undertook several efforts to assess the quality of the service provided.

First, we hired a firm to hire an independent human resources expert who was tasked with assessing the matching process. She sat in on a sample of the matching attempts. Her assessment was that the process was communicated clearly and managed efficiently. She wrote that the matchers "spoke clearly and passionately" with firms and job candidates to explain the pilot project, listened intently to firms' needs, and asked good probing questions to understand the specifics of many job types. She confirmed that the matches were usually completed within 48 hours, and CVs were sent to firms within this timeframe.

Second, we conducted a mystery shopping exercise. We hired 10 firms to apply for matching and assess the matching process from a customer perspective. The mystery shopping reports confirmed that the matchers asked detailed questions about the firm and sent CVs within 2 days. They reported that direct questions about the process were answered well and did the basic duties faithfully, but they suggested that the matchers could have done a better job in marketing the added value of using psychometric measures for matching.

Taken together, we view this evidence as suggesting that, while not perfect, the matching was competently done, and lack of an effect is not simply a result of poor implementation. Of course, this does not mean it could not have been done better. Firms only opted to interview 15 percent of the matches that hadn't been rejected by job candidates (115/742). We do not have detailed records to tell how many of the rejections reflect the job position no longer being open versus some firms not being satisfied with the quality of the matches sent, with our qualitative feedback suggesting both occurred.

4.3 Binding minimum wages?

In a previous experiment with female community college graduates, Groh et al. (2013) find that one reason these individuals had difficulty finding jobs was that the minimum wage of 150 JD per month appeared to be binding, with 85 percent of those employed through a wage subsidy program receiving exactly this minimum wage. Jordan subsequently raised the minimum wage to 190 JD per month, beginning 1 February 2012. This raises the

possibility that one reason for the lack of hiring is that firms would like to hire workers for lower wages but find the minimum wage binding.

The minimum wage appears to be much less of an issue for our current sample of mainly university graduates. Only 1.7 percent of those employed in the May 2013 follow-up survey are earning 190 JD,[6] with a median monthly salary of 300 JD for females and 350 JD for males in our sample. Moreover, the job offers that candidates received and turned down typically had salaries above the minimum wage. It therefore does not appear that the main reason for a lack of impact is binding minimum wages.

4.4 Perhaps search costs are not the main reason firms are not hiring more workers

Our experiment was premised on the assumption that one reason firms do not hire more workers is that the search and matching costs are high for them, especially for small and medium firms. Survey results from the baseline survey of firms find many firms giving responses that make it seem like they have difficulty matching: 60 percent say they find it difficult to distinguish between good and bad workers; 35 percent say hiring a new young worker is more a question of chance than skill; and 39 percent agree or strongly agree that it is difficult to find qualified employees. Nevertheless, it is unclear how costly this is for them in practice. Only 6.5 percent of firms surveyed at baseline say they would be willing to pay a reasonable price to learn more about the quality of job candidates. Moreover, we saw only a minority of firms respond to the opportunity offered by our matching service to lower search costs. In a follow-up survey of firms which had participated in the matching services, 25 percent said they can usually fill a position for a fresh graduate within a week, and 94 percent within four weeks. Thus, firms do not appear to be spending large amounts of time with unfilled vacancies.

In order to provide further evidence on how firms in Jordan fill positions, we conducted a 4 round panel survey based off of the United States Bureau of Labor Statistics Job Openings Labor Turnovers Survey (JOLTS) on 350 firms in Amman that employ recent graduates. During the non-holiday months, 26 percent of firms hired new employees who were under the age of 26. On average, 245 new youth employees were hired, 105 youth employees quit, and 8 youth employees were laid off. Given the high level of churn among these 350 firms; many firms are constantly looking to fill positions. On average, 51 percent of positions that firms seek to fill are perennially available. The other 49 percent of positions that firms seek to fill are unique to the firm's circumstances and timing. Firms are able to fill 88 percent of these positions within 4 weeks, which means only 6 percent of positions overall require greater than 4 weeks to hire a new employee.

Therefore, for many firms, it appears that they are able to fill positions reasonably easily, and lowering search costs may not generate a great deal of new employment. This might explain the firm response to the matching intervention, but the question then remains as to why many youth turned down the opportunity to be matched, and turned down actual job offers.

4.5 Reservation wages and reservation utility

Recall that job candidates turned down 28 percent of the match opportunities they were given and turned down or quickly quit 83 percent of the job offers given.

Jovanovic (1984) discusses two views of matches: matches as inspection goods, in which job-seekers learn the quality of the job just by inspecting it (e.g., by having the job described or having an interview), and matches as experience goods, in which job-quality can only be learned through on-the-job experience. Our results suggest the majority of matches fit the inspection view, while the quits within the first month may provide an example of the job experience view. In both cases, the unemployed are turning down potential job opportunities. We therefore want to understand whether this is due to high reservation wages or high reservation utility driven by non-wage job attributes.

The first piece of evidence comes from directly asking the graduates. The main reasons for rejecting the opportunity for a potential interview were that the graduate was not interested in the company or type of job. When we asked those who had turned down job offers the reason for doing so, only 8 percent said that the wage was too low, whereas 41 percent said that it was not in their career path, 8 percent said they didn't want to work outside, and 8 percent said it was not a culturally appropriate job. These answers are more supportive of the reservation utility than reservation wage explanation.

To explore this in more detail, the follow-up surveys asked about willingness to work in different types of jobs. In the October 2012 survey, 84 percent of job candidates said that the type of work mattered more to them than the salary paid. The median reservation wage for those who were unemployed was 250 JD, below the median wage of those who were employed. This suggests high reservation wages are not the main constraint. In contrast, youth do appear to be unwilling to work in certain types of jobs. Table 6 reports the results from the May 2013 survey, which asked unemployed youth their willingness to work temporarily in a range of different jobs. We see that the majority are prepared to work in jobs such as human resource management, data entry, public sector jobs, and being a bank teller. However, only 3 percent of unemployed youth say they are willing to work as a waiter, only 10 percent in outdoor sales, and only 25 percent in telemarketing. Most youth therefore appear to prefer to stay unemployed than work in jobs that they consider undesirable.

What are the non-wage characteristics that make certain jobs less desirable and therefore matches to these jobs offering below the reservation utility level? Three characteristics stand out from a mixture of qualitative work and survey responses. The first is that youth consider some of these jobs to be hard work, tiring, and/or monotonous. A second is that certain jobs such as outdoor sales and waitressing conflict with gender norms, and therefore female graduates in particular are very unwilling to work in such jobs. A third, related reason concerns the prestige of the job and the social costs of working in particular jobs. In our firm survey, 48.7% of firms who agree that Jordanian youth are less willing to take low paid, less skilled jobs than youth in other countries think that it is because doing so would have negative effects on the way they and their family is perceived in terms of prestige. We view attempting to differentiate between these different non-wage attributes as an important area for future work.

5 Conclusions

Educated youth unemployment is a major policy issue in Jordan and many other countries in the Middle East and North Africa. In a review of active labor market programs in the region, the number one recommendation of Angel-Urdinola et al. (2010, p. 31) is to

Table 6 Willingness of unemployed to work temporarily in different positions

	All unemployed	Males	Females
Human Resource Management	0.78	0.84	0.75
Public Sector Employee	0.77	0.86	0.72
Administrative Assistant	0.71	0.75	0.70
Data Entry	0.70	0.62	0.74
Bank Teller	0.68	0.75	0.65
Teacher	0.61	0.46	0.68
Customer Service	0.54	0.66	0.48
Indoor Sales	0.29	0.46	0.21
Telemarketing	0.25	0.16	0.30
Outdoor Sales	0.10	0.20	0.05
Waiter	0.03	0.08	0.00

Source: May 2013 endline survey of matching experiment participants.
Sample restricted to 472 unemployed, educated, youth.

"increase the number of programs focusing on employment services and job search assistance (job fairs, job clubs, CV/interview training, and matching services)." We test a program that aimed to do this. We find no significant or sizeable effect on employment, with unemployed graduates turning down many opportunities for interviews and jobs because they did not consider the jobs suitable. Much unemployment appears to be voluntary, with our evidence suggesting this relates more to the type of job graduates desire than to the wages these jobs pay.

Evidence suggesting that a large amount of the unemployment of educated youth in Jordan is voluntary has very different implications for policy than if the problem were simply high minimum wages or high search costs. One reaction would be to view the evidence as saying that the market is working since firms are filling jobs reasonably quickly, and revealed preference is showing that many of the unemployed are not willing to work at the going wage. This would suggest no policy action is needed.

However, an equilibrium in which many youth are not in school or working, and in which the duration of unemployment is high, does appear suboptimal from a societal viewpoint. We view our findings as suggesting two promising directions for future policy actions. The first consists of interventions on the firm side to spur the development of a vibrant private sector that provides more skilled jobs. The second, complementary area is efforts to try to lower the resistance of educated youth to take jobs which they consider less prestigious.

On the firm side, much of the Middle East suffers from a lack of entrepreneurship and private sector competition, with a combination of unequally applied regulations and other barriers to entry limiting the entry of new firms and dynamism of the private sector (World Bank, 2009). As a result, relatively few firms are creating the high-skilled jobs desired by graduates. Reforms which increase the availability of such jobs can then help alleviate high unemployment from the labor demand side.

However, we also think there is a need for complementary efforts on the labor supply side. One reason for this is that, historically, public sector jobs have been seen as higher prestige than private sector jobs or entrepreneurship in much of the region.[7] Public sector reforms which make such jobs more comparable to the private sector in terms of accountability, work hours, and other conditions may help in connection with efforts

to promote and celebrate the private sector. Universities may be able to play a better role here in promoting different career options for graduates – typically Jordanian universities provide limited support to graduates in the form of job fairs, career development offices, and internship opportunities to help broaden their horizons as to the range of potential jobs.

5.1 Endnotes

[1]Employers may see less signal from grades and university measures given smaller quality differences among universities than in a competitive private education market and given concerns about mismatch between classroom content and workplace skills. Barcucci and Mryyan (2014) report that among Jordanian youth no longer in education, 94 percent said that they had not combined work with their studies at all.

[2]One implication would be to have job matching services very clearly elicit preferences over different job attributes and trade-offs among them, and then use this information in determining the set of potential matches.

[3]An additional 213 youth who joined the program in December were automatically assigned to receive the intervention but only had December in which to be matched. We do not include this group in our analysis.

[4]These measures are similar to the so-called Big-5 personality traits; we rely on the version of these traits that had been adapted and tested for use in Jordan.

[5]The response rates do not differ significantly by treatment status. For example, in the endline survey, 80.9% of the treatment group and 81.3% of the control group answered the survey ($p = 0.860$).

[6]4.4 percent are earning less than 190 JD, which could reflect part-time work or informal employment.

[7]Groh et al. (2013) report that 81 percent of Jordanian community college graduates in their sample say they would prefer a public sector job to a private sector job.

6 Appendix 1

6.1 Putting together the firm sample

From September 2011 through January 2012 we put together a database of firms in Amman that could serve as potential clients for the program. We identified 41,497

Table 7 Summary statistics of firms

	Control firms (N = 1142)		Treatment firms (N = 1137)		T test
	Mean	SD	Mean	SD	P Value
# of Male Full Time Employees	15.6	58.3	14.7	44.9	0.67
# of Female Full Time Employees	2.8	10.3	2.8	8.9	1.00
# of New Employees in 2011	1.6	4.6	1.6	4.4	0.83
# of New Employees in 2010	1.3	7.3	1.4	5.4	0.70
# of Terminated Employees in 2011	1.2	4.5	1.2	4.3	0.90
# of Terminated Employees in 2010	0.9	7.1	0.9	4.7	0.98
Proportion that Say It is Difficult to Distinguish between Good and Bad Candidates	0.6	0.5	0.6	0.5	0.31

In May 2012, we opened the matching eligibility to any firm in Amman and lifted restrictions on matching for firms previously assigned to the control group. Through a series of television, radio, newspaper, job fair, and Facebook advertisements, we contacted nearly 1,000 additional firms, of which 175 were looking to hire. These 175 firms were larger and more prestigious and typically had human resource departments.

legally registered firms through the Chamber of Commerce and 10,025 legally registered firms through the Chamber of Industry. We excluded firms in the construction, oil, and automobile industries, and only sampled meat, tobacco, and alcohol oriented firms at half of the rate of other firms due to their low hiring rates for women. After making these exceptions, we drew a representative sample of 6,611 commercial enterprises and a sample of 1,744 industrial firms (1,267 firms with more than 10 employees and 477 with four to nine employees). We listed over 5,000 firms from these two samples and screened on whether they were looking to hire a worker in the next six months and would consider hiring recent graduates and females for these positions. This was used to arrive at the sample of 1,600 commercial firms and 400 industrial firms used as the experimental sample for this study. In March, we added an additional set of 277 firms stratified and randomized as above to the experimental sample to make up for businesses whose contact information was no longer valid. Table 7 provides summary statistics on this sample.

Competing interests
The IZA Journal of Labor Economics is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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