Desperate talents, concerned employers, and employment agencies in Ethiopia

David Qihang Wu
Sam Zicheng Wang

IGC

Desperate Talents, Concerned Employers, and Employment Agencies in Ethiopia[*]

David Qihang Wu[†]   Sam Zicheng Wang[‡]

This version: November, 2022

Abstract

High unemployment among college graduates is a pressing issue of many developing countries. In Addis Ababa, Ethiopia, suggestive evidence shows private firms avoid hiring college graduates because employers are concerned of early turnover when college graduates find a better offer outside. An emerging type of labor market intermediary, employment agency, provide jobs for college graduates and may send a credible signal to employers of applicants' lack of outside offers. We sample 400 private formal firms that are actively hiring in Addis Ababa to test the role of employment agency on firms' hiring outcomes. We conduct an intervention on a random subset of 197 firms where an major employment agency recommends a qualified applicant for each treated vacancy. We find that treated firms see a 21% increase in hiring at least 1 worker within 1 month, and the treatment effect concentrates in jobs requiring vocational training certificates where hiring inefficiency is more severe. College graduates from employment agencies

[†]Department of Economics, UC Berkeley, qihangwu@berkeley.edu.

[‡]Department of Economics, UC Berkeley, samzwang@berkeley.edu.

1

are more likely to be interviewed in the treated firms compared to college graduates from non-agency hiring channels. We find suggestive evidence that the hired workers in treated firms who post jobs requiring vocational training certificates are no more likely to quit, with higher productivity, are less likely to have absent days, and are able to negotiate a higher salary.

1   Introduction

Despite the rapid growth of tertiary education in recent decades, private firms in developing countries are reluctant to hire college graduates. In Addis Ababa, Ethiopia, expecting college graduates to find a better outside offer and quit soon, private firms tend to avoid interviewing college graduates in the first place, resulting in inefficiently low level of successful matches.

Employment agencies, a recently emerging sector in Addis Ababa, may be a potential to address this hiring friction. They attract college graduates with little work experience and currently out of work. When matching job seekers to employers, employment agencies present a credible signal to employers of college graduates' lack of outside options and willingness to stay on the job, thus increasing the chance of employers hiring college graduates from employment agencies.

We conduct a randomized control trial in Addis Ababa, Ethiopia to examine the effect of employment agencies on hiring outcomes. We first design a novel census method to sample 400 private formal firms that are actively hiring and collect 1 vacancy from each firm. We then randomly select half of the vacancies, provide them to 10 major employment agencies, and ask the agencies to recommend 1 qualified job seeker for each vacancy. We observe firm-level hiring outcomes one month and four months after the intervention. In addition, we conduct a comprehensive data collection of all applicants for each vacancy to understand firms' decision rules as well as the role of employment agencies.

We first present suggestive evidence of a specific form of hiring frictions where firms avoid interviewing college graduates. For jobs requiring no college degrees, college graduates are significantly less likely to be interviewed or hired compared to non-college graduates. This hiring practice does not lead to better matches; for jobs requiring vocational training (or TVET, Technical and Vocational Education and Training) certificates, only 45% firms hire any worker within 4 month, among with only 80% stay on the job after four months, the

lowest retention rate among all groups. We hypothesize that firms who post jobs requiring TVET certificates cannot observe workers' outside options and avoid interviewing college graduates who may find a better offer soon. Employment agencies may be most helpful for this type of jobs because they provide college graduates and signal their lack of job offers at the moment.

We formally test the hypothesis as follows. First, we examine the treatment effect on whether firm hires any worker within 1 month. Results show that treated firms are 10.1 percentage points more likely to hire any worker within 1 month, or 21% compared to the control mean. This effect is largely concentrated among jobs requiring TVET certificates. Second, we examine whether college graduates are more likely to be interviewed in the treated firms. In general, we do not find causal evidence of college graduates from non-agency hiring channels more likely to be interviewed, but we find suggestive evidence of college graduates from employment agencies getting more interviews compared college graduates from non-agency hiring channels. The correlation cannot be explained by applicants' observable characteristics, but partially captured by adding employer fixed effects. In addition, among treated firms who post jobs requiring TVET certificates, both effects become significant even controlling for employer fixed effects. Results support the hypothesis that employment agencies are able to signal college graduates' willingness to accept the offer and stay on the job, which particularly helps jobs requiring TVET certificates where hiring inefficiency is more severe.

We then look at the treatment effect on match quality four months after. Treated firms that post jobs requiring TVET certificates still have higher match success rate four months after compraed to control firms, are no more likely to hire someone who quits or is fired within four months, are more likely to hire workers with above-average productivity, are more likely to hire workers with no absent days in the last 30 days. We also find evidence that treated firms that post jobs requiring TVET certificates are willing to accept a higher negotiated salary. Results suggest that applicants recommended from the employment agencies do not quit early as employers are afraid, that employment agencies persuade firms to hire college graduates with better on-the-job performance in general, and that employers are willing to pay higher salary for college graduates if the turnover concern is addressed.

A growing literature has documented prohibitive hiring frictions in developing countries. Hardy and McCasland (forthcoming) shows that firms in Ghana are labor-constrained; Carranza et al. (forthcoming) shows firms observe noisy signals of applicants' quality; Fernando

3

et al. (2022) suggests firms are reluctant to hire workers outside their networks. Such hiring frictions are also observed in developed country (Algan et al., 2020). In a similar context, Hensel et al. (2021) subsidized formal employee search for 625 small and medium enterprises in Addis Ababa, but did not see an increase in vacancy creation or hires, suggesting firms are not financially constrained to post more vacancies. This paper adds to the literature by exploring another important friction induced by firms unable to observe the outside offers of applicants.

This paper further speaks to a broader literature of search and matching frictions in developing countries. In the early stage of industrialization such as Ethiopia, high turnover may reflect workers' lack of information of the industrial jobs (Blattman and Dercon, 2018), over-optimism of job search outcomes (Banerjee and Sequeira, 2022), or sub-optimal matching that does not consider workers' preferences (Banerjee and Chiplunkar, 2022). This paper adds to our understanding of how high turnover may affect firms' consideration of job applicants, an understudied side effect of high turnover specifically prevalent in developing countries.

This project also relates to a branch of literature in labor economics about labor market intermediaries (or LMIs, see Autor (2008)). Autor (2001) and Stanton and Thomas (2016) use administrative data and find suggestive evidence of induced positive selection of workers into LMIs. Cowgill and Perkowski (2020) use audit studies and find LMIs over-interview applicants that are unlikely to reciprocate interest. This project collects hiring details and outcomes to explore a different kind of selection of workers in terms of outside options and a different matching strategy, which may fit better the hiring frictions in developing countries.

The paper proceeds as follows. Section 2 introduces more details to the context of Ethiopia as well as employment agencies. Section 3 discusses details of sampling method, data collection, and intervention. Section 4 presents suggestive evidence of the hiring frictions faced by firms in control group. Section 5 presents the effect of employment agencies on firm-level and applicant-level outcomes. Section 6 presents the effect of employment agencies on match quality four months after. Section 7 concludes.

2 Context

The last two decades saw the rapid growth of tertiary education in developing countries. UNESCO estimates about 9% of young population aged 18-25 are enrolled in tertiary education in Sub-Saharan Africa, compared to 5% in the early 2000. With that also comes the increasing trend of unemployment among young population in many developing countries. An estimate from African Development Bank estimates one-third of young population aged 15-25 in Africa were unemployed in 2015.[1]

Such pattern is especially present in Ethiopia. In the early 1990s, there were only three public universities across the whole country enrolling 1% of all young people aged 18-25. In 2018, about 10% young people aged 18-25 are enrolled in tertiary education (UNESCO, 2018). It is, however, difficult for college graduates to find a formal job today. Abebe et al. (2021) followed 3,052 young job seekers in Addis Ababa, among whom 65.7% found any work within 3 years, 24.8% had a permanent job, 25.9% had a formal employment. One of the common complaints is that college degrees are "useless" nowadays, with too many college graduates yet not enough formal jobs in the city.

On the other hand, it is difficult to reconcile a large number of unemployed college graduates with a large number of unfilled vacancies. 30% of the vacancies collected in our sample remain idle four months after posting. During qualitative interviews, we asked firms to list out three most important hiring challenges. 62.2% stated lack of qualified job seekers, 57.3% stated hired workers quitting too soon, and 50.1% stated the fact that many workers negotiated a salary too high to afford. Although many firms hope to hire higher quality workers such as college graduates, firms are also concerned about workers negotiating a high salary only to quit too soon for a better offer.

Responding to the increasing gap between unemployed college graduates and unfilled vacancies, many employment agencies have emerged over the last three years. These employment agencies are previously brokers who focused mostly in informal sector (mainly construction contract workers and housemaids). In 2018, the new Ethiopian government issued an initiative to encourage qualified brokers to register in the government in hope for

---

[1]A relevant report of youth unemployment in Africa on Foreign Policy: https://foreignpolicy.com/2021/10/19/africa-youth-unemployment-crisis-global-problem.

boosting private and formal employment.[2] Figure A2 shows that the number of registered employment agencies in Bole sub-city after 2018 increases drastically.[3]

In 2021, we conducted interviews with 23 professional employment agencies, and observed 20 recent job seekers. The majority of the labor pool is college graduates with few experience: 63% job seekers have a college degree, the average work experience is 2.0 years. Most job seekers who come to the employment agencies are not personally connected to the owner or the employees of the employment agencies. Most employment agencies provide no more than a minimum level of additional screening: 39% check recommendation from previous employers, 13% provide additional training, and only 1 employment agency conducts additional grading test. It is thus unlikely that employment agencies provide additional signals of job seekers' productivity, but rather selecting a certain type of job seekers that may stay on the job.[4]

Currently, employment agencies are still very new to most employers in Addis Ababa. They mostly work with hospitality industry and provide college graduates to middle-level positions such as receptionists and accountants. To understand the role of employment agencies on private sectors and the implication on labor market, We design a randomized control trial on 400 firms described in detail below.

---

[2]To qualify for registration, an employment agency should obtain a business license for taxation purpose, hire at least one expert with professional license in human resources, have at least 4 employees, have a physical office, and deposit 200,000 Ethiopian birr in a security account. Addis Ababa Labour, Enterprises, and Industry Development Office appoints local officials to specifically regulate and audit all the registered employment agencies. Figure A1 shows an outlook of a typical employment agency in Addis Ababa.

[3]There is another form of labor market intermediaries, outsourcing companies, that are more prevalent in Addis Ababa prior to 2018. Firms outsource low-skill occupations to these companies such as janitors and security guards, similar to the Germany context in Goldschmidt and Schmieder (2017). Contrary to the trend in employment agencies, we see a downward trend of registered outsourcing companies post 2019, which may imply an increase in the demand of higher-skilled labor instead of low-skill labor.

[4]Autor (2001) provides a model to explain why temporary agencies might have incentives to induce self-selection by training novices. Stanton and Thomas (2016) provides suggestive evidence of online agencies providing credible signals of workers' higher productivity potentially observed through personal network. Our qualitative evidence seems to suggest a different function of employment agencies in the context of Ethiopia.

3 Data and Intervention

3.1 Sampling

To sample active vacancies, we conduct a novel sampling approach as follows. First, we consult with local government officials from two sub-cities (Bole, Akaki Kality) to understand where most businesses are located within the sub-cities. We then delineate 40 business areas in total where most firms conduct businesses; each business area has about 50-100 formal firms. In each business area, enumerators will spend 2-3 days listing as many formal firms as possible ("census"). Enumerators will then select 10 firms from each business area following three criteria: (1) at least 4 employees; (2) currently hiring or planning to hire within 1 month; (3) respondents agree that hiring is challenging. Figure 1 shows the geographic distribution of 40 sampled business areas and 400 baseline firms.

This sampling method has a few unique advantages. First, we are able to observe firms that are currently operating in a much faster way. An alternative sampling method is to obtain a firm registry from Ministry of Trade (Hensel et al., 2021). Such registry, however, may obtain obsolete information of firms. During our pilot, we obtained a firm registry from Bole sub-city and only succeeded in contacting less than 20% of the listed firms. Table B1, Panel (a) compares the sampling of firms to that of Hensel et al. (2021), who sampled from the firm registry. Our firm sample tends to include more firms more hospitality sector and of larger size in general.

Second, we are able to observe firms that do not post jobs on public platforms, such as notice boards or online job search platforms. Franklin (2018) discusses potential sampling bias when only using notice boards in the city center. During our pilot in November 2020, we collected 150 job posts from 3 major notice boards of Addis Ababa; we also collected job posts from a major online job search platform of Ethiopia. Table B1, Panel (b) compares the posted salary distribution between the three different samples. Our vacancy sample is able to capture more middle-paid jobs, that is, salary between 2,000-4,000 birr per monthly. Notice boards and online platforms tend to select higher-paid jobs, partly because firms are able to afford high job-posting costs on these public platforms.

Third, we specifically target formal firms with a reasonable size (at least 4 employees). The median firm size in our sample is 25 employees. Such firms may have a higher labor

7

demand that cannot be met through personal recommendation, hence higher labor demand through formal hiring channels.

3.2   Selection of employment agencies

From the pilot study, we sampled 40 active employment agencies operating in Bole sub-city where most of such job-matching activities take place. We then discuss with the local government officials and select 10 employment agencies for the intervention following 3 criteria: (1) the agency focuses on formal employment instead of informal (e.g., construction contract workers, babysitters), (2) the worker base consists of some college graduates, (3) the agency is actively operating currently. We compensate the selected employment agencies following the convention of the labor market: for each job seeker eventually hired by an employer, we pay 20% of the first-month salary as a commission fee. The matching between firms and employment agencies is described in the next sub-section.

3.3   Survey data and intervention

We conduct two rounds of survey in total. The first round started from May 2022 to October 2022. The second round will start from October 2022 to March 2023. During each round of survey, enumerators first conduct a baseline survey of 400 firms, collect basic information of sector, labor workforce, and hiring practices. We then select one active vacancy from each firm and collect details of the active vacancy. Throughout the analysis, we will use "firm" and "vacancy" interchangeably.[5]

At the end of the baseline, half of the firms are randomly selected into treatment group. Enumerators match each active position with a major employment agency selected from Bole sub-city. The employment agency is requested to provide one qualified job seeker for each position. Enumerators then directly deliver the CV of the selected job seeker to the treated firm and encourage firms to interview the job seeker. Essentially, the intervention is providing one additional CV from the employment agency to the firm. The survey team does not interfere with either the agency's selection of job seekers, or the firm's decision of interviewing or hiring the job seeker.

---

[5]Most firms post only one vacancy during the baseline survey. For those who post more than one vacancy, we avoid low-skill positions such as janitors, or high-skill positions such as executive managers.

Figure 1: Sampling map
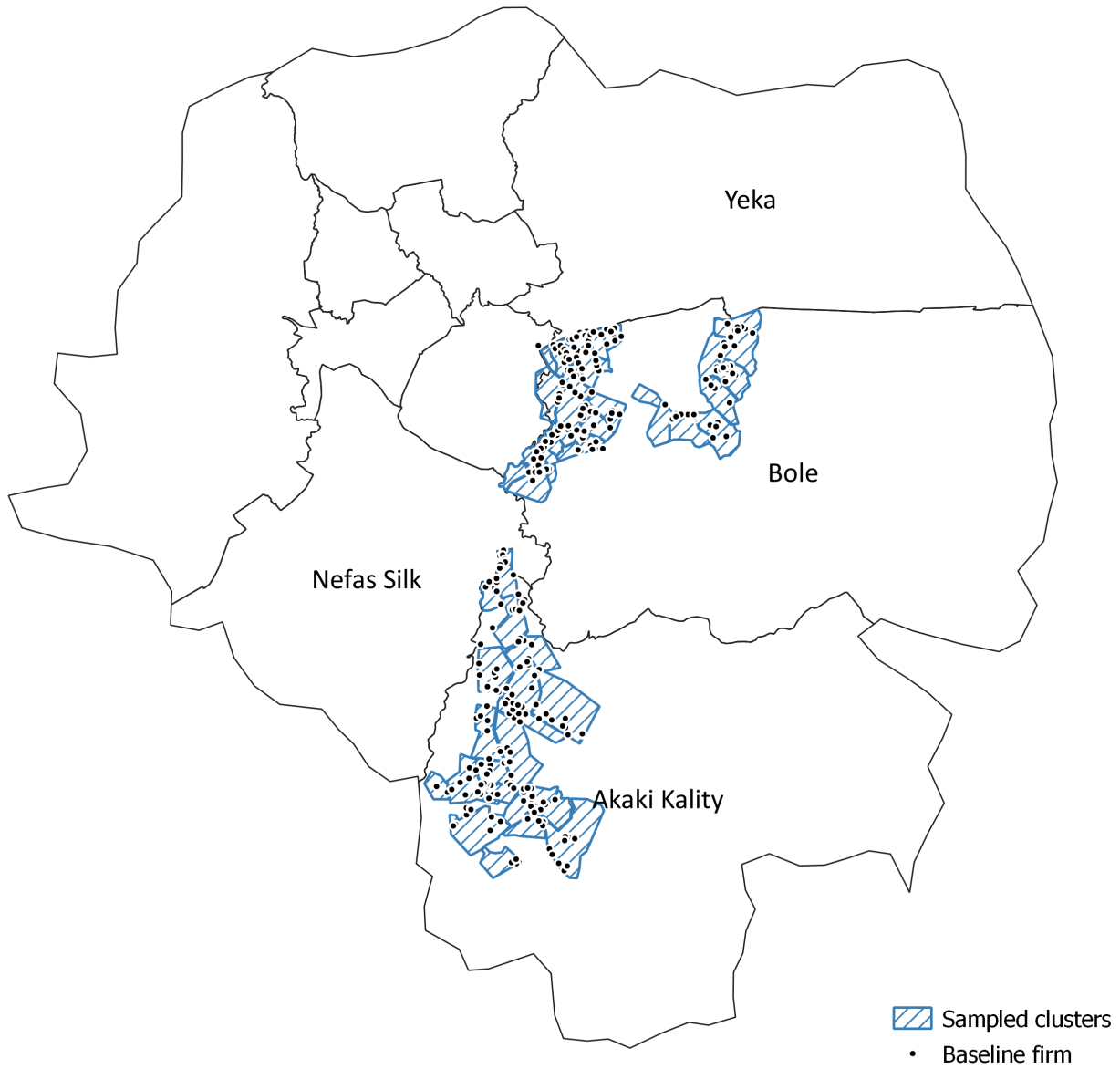
Notes: This figure shows the geographical distribution of 40 business areas from Bole and Akaki Kality sub-cities and 400 firms selected in the baseline survey.

Table 1 shows the balance between control and treated firms. We compare treated and control firms in terms of four categories: sector, current workforce, hiring practices, and characteristics of posted vacancies. Treated firms are slightly less likely to be in hospitality sector (p-value 0.12) and less likely to post vacancies that require manual task (p-value 0.08), but no systematic difference is detected in any of the four categories.

We interpret the treatment effect as whether treated firms change their hiring behavior when receiving one extra job seeker selected *non-randomly* from a competent employment agency. The random variation comes from the extra connection with a new search platform, *i.e.*, employment agencies who attract a large pool of college graduates, instead of an extra match with a random job seeker which may result in poor match quality. We are thus particularly interested in the non-random selection of job seekers by an employment agency that may improve the match quality. We will discuss the identification strategy in detail in Section 5.[6]

After intervention, we conduct two follow-up surveys for each firm. One month after, enumerators visit each firm, ask for all applicant CVs for the sampled vacancy, and record the following information: (1) skill indicators (education, experience), (2) hiring decision (whether the applicant is invited to the interview, whether the applicant passes the interview), (3) applicant decision (whether the applicant shows up for the interview, whether the applicant accepts the offer). In addition, enumerators conduct a phone survey of up to 6 job seekers selected from the applicant list and record the following information: (1) demographics (age, marital status, residential district), (2) number of outside offers in the last 30 days.[7]

Four months after the intervention, enumerators visit each firm again and observe following outcomes of the hired worker: (1) turnover, (2) performance compared to average

---

[6]In addition, the matching between treated firms and employment agencies may not be randomly assigned. Every week, the survey team randomly select two employment agencies, present them with a random subset of vacancies collected from the treated firms. However, it is likely that the randomly assigned employment agency is not able to find the qualified job seeker. As a result, the survey team rematch around 30% of the treated vacancies to a different employment agency. This mimics how firms may shop around to find an employment agency with high value-added to match quality, and it does not post a threat to our identification strategy.

[7]If the firm has no more than 6 applicants, enumerators conduct phone surveys on all applicants. If the firm has more than 6 applicants, enumerators randomly pick 2 job seekers from 3 categories: (i) applicants who pass the interview, (ii) applicants who are invited to the interview but do not show up, (iii) applicants not invited to the interview.

workers at the similar positions, (3) absent days in the last 30 days and overtime hours in the last 7 days. In addition, enumerators collect information about future hiring plans and perceptions of job seekers with college degree and from employment agencies.

Table 1: Balance Table

	Mean outcomes					P-value
	All	Control		Treated		
Observations	400	203		197		
Sector						
Manufacturing and construction	0.36	0.34	(0.47)	0.39	(0.49)	0.36
Hospitality (Hotels, restaurants)	0.41	0.45	(0.50)	0.37	(0.48)	0.12
Education	0.04	0.04	(0.20)	0.05	(0.22)	0.58
Health	0.03	0.03	(0.18)	0.03	(0.16)	0.57
Current employees						
Number of current employees	61.77	54.46	(77.92)	69.31	(140.27)	0.22
Pct of female employees	25.30	24.66	(33.73)	25.96	(32.90)	0.74
Pct of employees with college degree	18.29	18.72	(29.84)	17.84	(30.47)	0.78
Pct of employees with zero exp	10.70	9.61	(19.39)	11.81	(22.49)	0.21
Pct of temporary employees	5.18	6.02	(20.48)	4.31	(16.00)	0.44
Pct of employees hired through rec	8.07	7.62	(18.49)	8.53	(19.19)	0.62
Hiring practices						
The firm has a HR department	0.47	0.49	(0.50)	0.46	(0.50)	0.63
Hiring only from formal channels	0.26	0.24	(0.43)	0.28	(0.45)	0.35
Hiring from agencies or brokers	0.40	0.40	(0.49)	0.39	(0.49)	0.72
Hiring through recommendation	0.53	0.55	(0.50)	0.52	(0.50)	0.58
Posted vacancy						
Posted salary (1k ETB)	3.75	3.55	(2.58)	3.96	(5.12)	0.39
Require college degree	0.32	0.33	(0.47)	0.31	(0.46)	0.75
Require TVET certificate	0.11	0.11	(0.31)	0.11	(0.32)	0.87
Require high school degree	0.14	0.16	(0.37)	0.11	(0.32)	0.27
Require min experience (years)	1.59	1.47	(1.76)	1.72	(2.06)	0.19
Require previous training	0.46	0.46	(0.50)	0.46	(0.50)	0.90
Manual task	0.74	0.79	(0.73)	0.68	(0.47)	0.08
Routine task	0.79	0.81	(0.72)	0.76	(0.43)	0.40

Notes: This table shows the balance between 197 treated firms and 203 control firms during the first round of baseline survey. Standard deviations are shown in parentheses. The last column shows the p-value of a simple comparison of each characteristics between treated and control firms, clustered at the level of business area.

4 Hiring frictions: Avoiding College Graduates

Figure 2 shows the likelihood of college graduates getting interviews and being hired who are observed in the control firms. Among jobs that require college degree, as expected, college graduates are at least no less likely to be interviewed or hired. Among jobs that only require TVET certificate (Technical and Vocational Education and Training), high school degree or less, college graduates are significantly less likely to be interviewed or hired. This is aligned with the "over-qualification" concern expressed by many employers: College graduates are perceived with higher productivity, hence higher chance of finding a better offer and quitting too soon from these lower-level jobs. The comparison cannot be explained by higher competition among college graduates, given that college graduates often face less challenge from other job seekers if they apply for lower-level jobs.

Such hiring practice might be efficient if employers correctly predict high turnover among college graduates, from which we should predict a higher successful match rate and higher retention among these employers.

Figure 3, however, shows an opposite pattern among jobs that require TVET certificate. Only 45% firms in this group hired at least 1 worker to fill in the position within 4 months, among which only 80% successfully retained the hired worker after 4 months, the lowest retention of all the three groups. For jobs that require only high school degree or less, despite the low retention 82%, more firms are able to fill in the position (82%) within 4 months. Indeed, for low-level jobs requiring at most high school degree, it is easier for firms to find a replacement worker, so it may be justifiable that these firms avoid interviewing or hiring college graduates. For middle-level jobs requiring TVET certificates, however, such hiring practice seems misaligned with its lowest successful match rate and the lowest retention rate.

Employment agencies, on the other hand, frequently match college graduates to all sort of jobs. Figure A3 compares the composition of applicants by education background in each type of vacancies. Applicants from non-agency hiring channels mostly sort into vacancies that match their education qualifications. However, applicants from employment agencies are unequivocally college graduates regardless of the education requirement. We thus expect that employment agencies are most helpful to address the hiring frictions faced by jobs

Figure 2: Hiring Likelihood of College Graduates

(a) Likelihood of getting an interview in one month
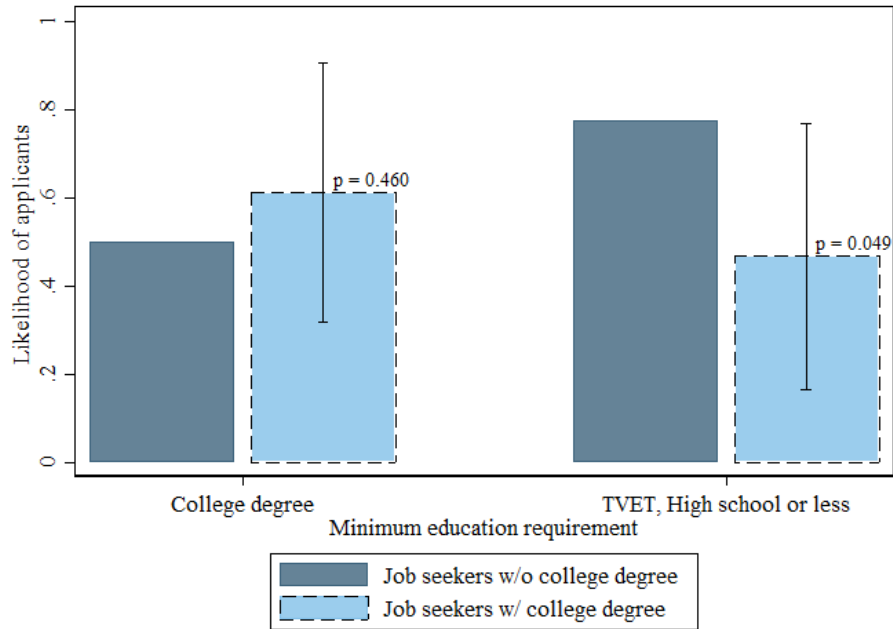
(b) Likelihood of being hired in one month
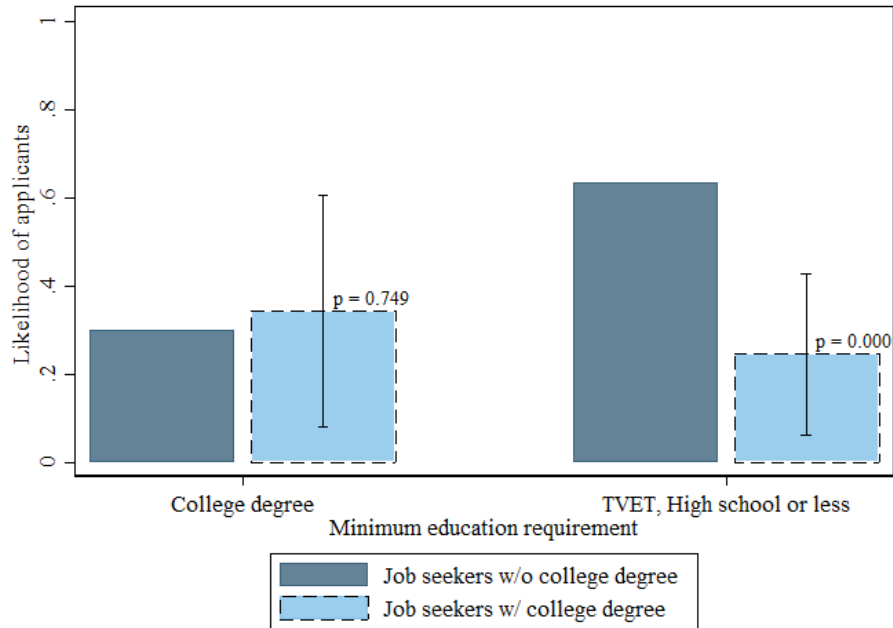
Notes: This figure compares the hiring likelihood of college graduates to non-college applicants in jobs requiring college degree and jobs requiring no college degree, respectively. Panel (a) compares the likelihood of getting an interview from 203 control firms within one month. Panel (b) comapres the likelihood of getting hired by 203 control firms within one month. Dark blue bars show the means of job seekers without college degree. Light blue bars show the means of theh means of job seekers with a college degree. We show the p-value of each comparison, clustered at the firm level.

13

Figure 3: Hiring Inefficiency of Jobs Requiring Vocational Training
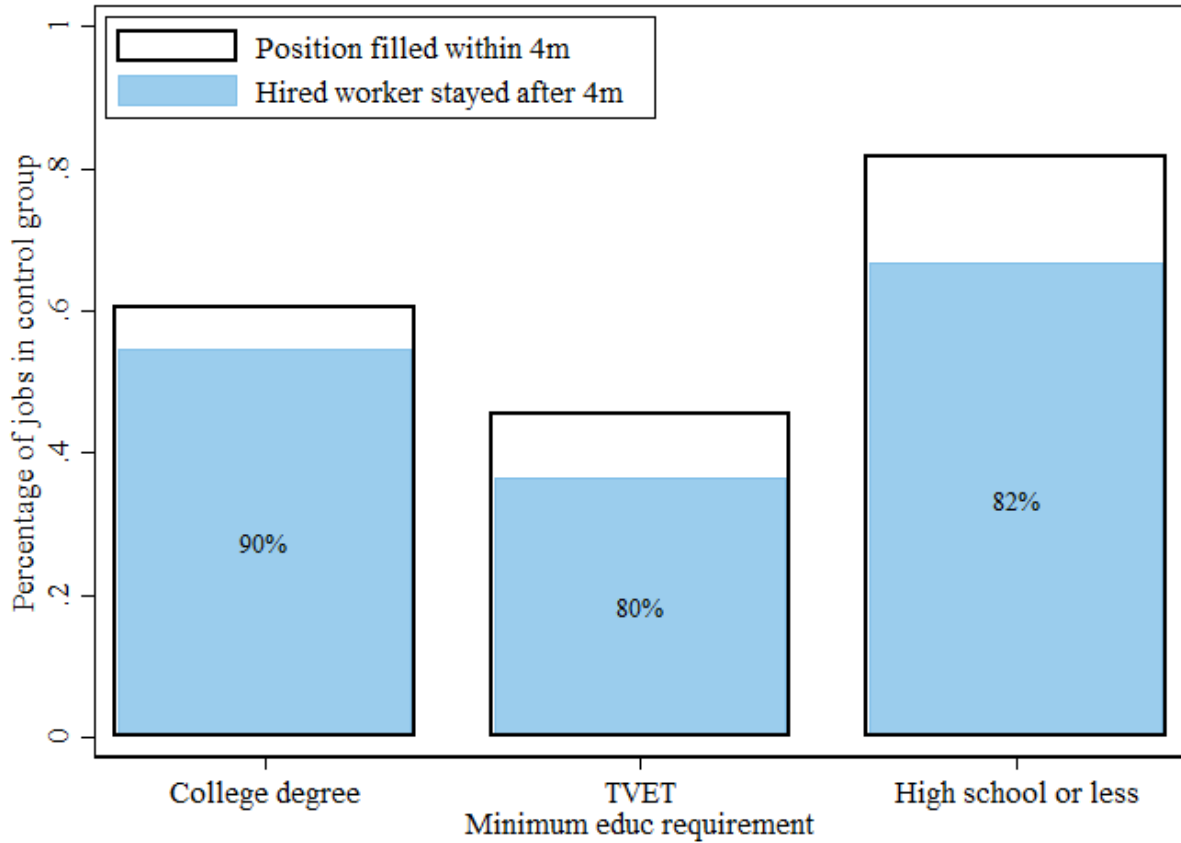
Notes: This figure shows the match success rate for vacancies in control group. We categorize vacancies into jobs requiring college degree, jobs requiring TVET certificate (Technical and Vocational Education and Training), and jobs requiring at moest high school degree. The solid bar shows the percentage of vacancies that hire at least 1 worker within 1 month. The light blue area shows the percentage of vacancies where the hired worker stays after 4 months.

requiring TVET certificates. In Section 5, we first look at the treatment effect on firms, in particular firms who post jobs requiring TVET certificates. Then we look at whether college graduates from the employment agencies have a better application outcome. We present evidence that supports our hypothesis that employment agencies signal workers' lack of outside options. Last, in Section 6, we show the effect of employment agencies on match quality four months after the intervention.

5   Effect of Employment Agencies on Match Rate

5.1   Firm-level econometric specification

We use the following specification for most of the firm-level analysis:

$$Y_{jc} = \alpha_1 + \beta_1 T_{jc} + \delta_1 X_{jc} + \epsilon_{jc} \tag{1}$$

T_{jc} is the treatment status of firm j in business area c. X_{jc} is a vector of baseline characteristics of the baseline firms and the posted vacancies. ϵ_{jc} is the idiosyncratic error clustered at the level of business area. Y_{jc} is the outcome of interest, that is, hiring decision within 1 month. β_1 is the parameter of interest, that is, the effect of being matched to an employment agency on outcome Y_{jc}.

For some treated firms, employment agencies are not able to find qualified job seekers for the matched position. Thus, equation 1 provides an intention-to-treat estimate of treatment effect. To provide a causal estimate of the effect of receiving an extra job seeker selected from an employment agency, we use the following instrumental variable specification:

$$Y_{jc} = \alpha_2 + \beta_2 I_{jc} + \delta_2 X_{jc} + \epsilon'_{jc} \tag{2}$$
$$I_{jc} = \kappa + \pi T_{jc} + \mu X_{jc} + \nu_{jc} \tag{3}$$

I_{jc} is whether the employment agency successfully delivers an extra job seeker to firm j in business area c. The exclusion restriction, $E[T_{jc}\epsilon'_{jc}] = 0$, is guaranteed if the treatment status does not correlate with the unobserved characteristics of the outcome.

For the heterogeneity analysis, we continue using the intention-to-treat specification and

add an interaction term:

$$Y_{jc} = \alpha_3 + \beta_3 T_{jc} + \gamma T_{jc} \times A_{jc} + \delta_3 X_{jc} + \epsilon''_{jc} \tag{4}$$

A_{jc} is the group characteristics of interest, which will also be included in the vector X_{jc}. The interpretation of the parameter of interest, γ, is the additional treatment effect of subgroups with characteristics A_{jc} compared to other subgroups without such characteristics. We focus mostly on the group of jobs requiring TVET certificates.

5.2 Firm-level main result

We first directly present the mean of successful matches of treated and control firms in Figure 4. In general, 48% firms from control group fill in the position within 1 month, 55% firms from treated group fill in the position within 1 month, a 7 percentage point increase. Such comparison is much starker if we focus on jobs requiring TVET certificates, where hiring inefficient is higher as suggested in Section 4. 25% control firms requiring TVET certificates fill in the position within 1 month, while 71% treated firms requiring TVET certificates fill in the position within 1 month. We also see more treated firms requiring TVET certificates hire at least one college graduate for the posted vacancies.

Table 2 presents the main results. Column (1) runs equation 1 without control variables or fixed effects, clustered at the business area level, a direct presentation of the mean comparison of Figure 4. The p-value of such a simple mean comparison is 0.170. Column (2) includes business area fixed effects and controls for baseline characteristics in Table 1. The treatment effect becomes 10.1 percentage points, or 21.0% compared to control group, with a strong significance level. Column (3) runs the IV specification, or equations 2 and 3, to estimate the effect of an extra job seeker selected from employment agency on match rate. The magnitude and standard error both quadruple with a similar significance level.

Column (4) looks into the heterogeneous treatment effect using equation 4 on jobs requiring vocational training. Most treatment effect is clustered within jobs requiring vocational training; treatment effect on other types of jobs, that is, jobs requiring either college degree or jobs requiring at most high school degree, shrinks half and becomes insignificant. This suggests that employment agencies are mostly suitable to help employers to fill in positions

16

Figure 4: Match Rate between Treated and Control Firms
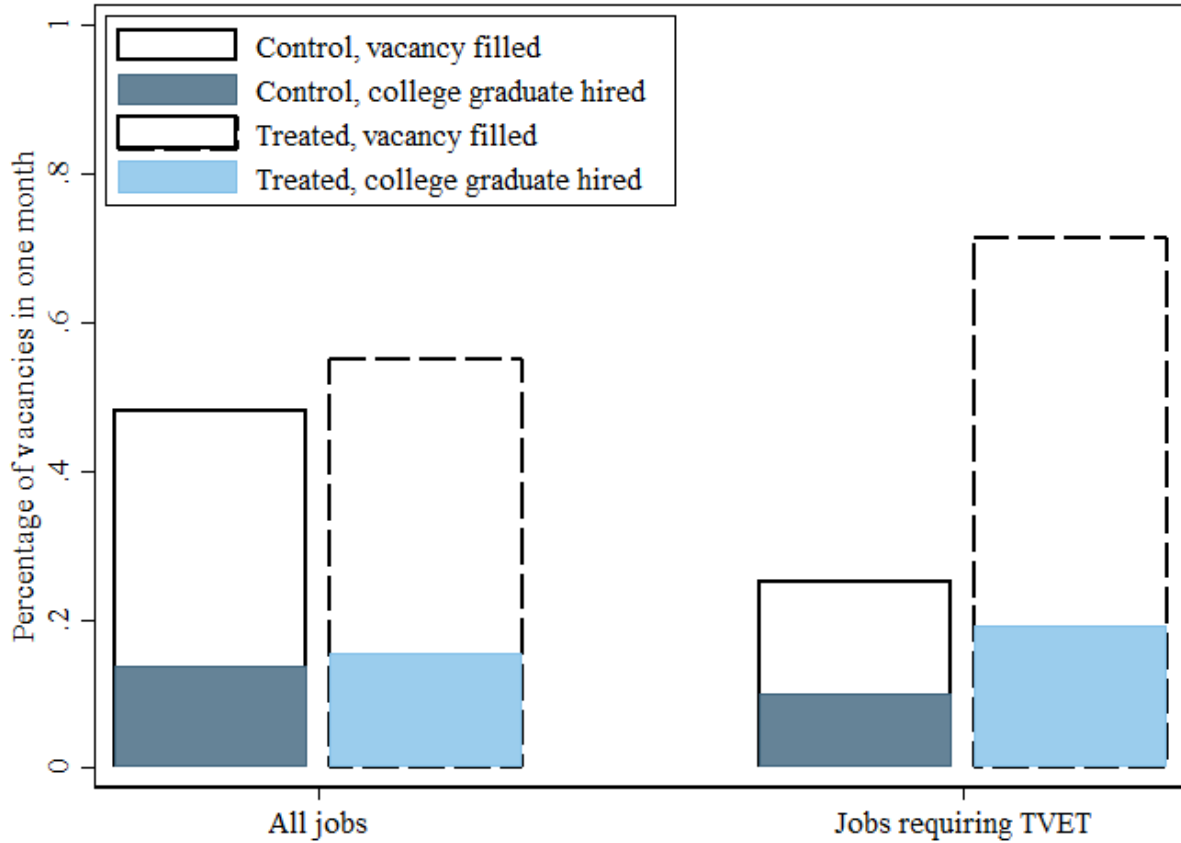
Notes: This figure shows the comparison of match success rate between treated and control in all vacancies and within jobs requiring TVET certificates, respectively. Solid bars show the percentage of control vacancies that hire at least 1 worker within 1 month. Dashed bars shows the percentage of treated vacancies that hire at least 1 worker within 1 month. Dark blue areas show the percentage of control vacancies that hire at least 1 college graduate. Light blue areas show the percentage of treated vacancies that hire at least 1 college graduate.

requiring TVET certificates.

Column (5) looks at the same heterogeneous treatment effect on whether the firm hires a college graduate, given that employment agencies predominantly supply college graduates as their major strategy. Results are less precise but suggestive that treated firms who post TVET jobs are more likely to hire a college graduate. To examine in detail whether college graduates from employment agencies are more likely to hired in these TVET jobs, we turn to the next applicant-level analysis.

Table 2: Effect of Employment Agencies on Successful Matches

VARIABLES	(1) Filled	(2) Filled	(3) Filled	(4) Filled	(5) Filled w/ college grad
Treated firm	0.0710	0.101*		0.0508	0.00214
	(0.0509)	(0.0563)		(0.0604)	(0.0465)
Treatment implemented			0.455*		
			(0.242)		
Treated firm * Require TVET				0.430**	0.0657
				(0.167)	(0.127)
Observations	385	354	354	354	354
R-squared	0.005	0.272	0.031	0.287	0.212
Estimation	OLS	OLS	IV	OLS	OLS
Control baseline char.	No	Yes	Yes	Yes	Yes
Business area FE	No	Yes	Yes	Yes	Yes
Cluster at business area	Yes	Yes	Yes	Yes	Yes
Control mean	0.480	0.480	0.480	0.480	0.136
F-stat			13.76		

Notes: This table presents the main firm-level results. The main dependent variable is whether firm hires at least 1 worker for the vacancy within 1 month. Column (1) regresses the dependent variable on treatment status, clustered at the business area level. Column (2) includes a full set of baseline characteristics from Table 1 (sectors, current workforce, hiring practices, characteristics of post vacancies) and business area fixed effects. Column (3) uses treatment status as an instrument of whether the treatment is implemented, or whether the firm is eventually delivered an extra job seeker selected by an employment agency. Column (4) includes an interaction term in the intention-to-treat model of treatment status and whether the posted vacancy requires TVET certificates. Column (5) runs the same specification as Column (4) with a different dependent variable whether the firm hires at least 1 college graduate within 1 month. Significance level: $+ \ p < 0.15$ * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

5.3 Applicant-level main result

We now look at whether college graduates are more likely to be interviewed or hired, specifically in jobs requiring TVET certificates. We use the following specification to estimate the effect of employment agency on the application outcomes of college graduates:

$$Y_{ijc} = \alpha_4 + \eta_1 C_i + \eta_2 C_i \times T_{jc} + \eta_3 C_i \times T_{jc} \times Agency_{ijc} + \zeta X_{ijc} + u_{ijc} \tag{5}$$

Y_{ijc} is the application outcome of applicant i observed in firm j in business area c. C_i is whether applicant i has a college degree. T_{jc} is whether firm j in business area c is selected into intervention. $Agency_{ijc}$ is whether applicant i is recommended from the matched employment agency to firm j. X_{ijc} controls for a vector of applicant-specific characteristics (e.g., experience), firm-specific characteristics (e.g., firm fixed effects), or applicant-firm-pair-specific characteristics (e.g., $Agency_{ijc}$). u_{ij} is an idiosyncratic error term clustered at the firm level.

We can establish causal interpretation of η_2 as follows. First, $\eta_2 = E[Y_{ijc}|C_i = 1, T_{jc} = 1, Agency_{ijc} = 0] - E[Y_{ijc}|C_i = 1, T_{jc} = 0, Agency_{ijc} = 0]$, that is, the difference between the application outcomes of college graduates from non-agency hiring channels in *treated* firms versus college graduates from non-agency hiring channels in *control* firms. Given that treated firms are selected randomly regardless of applicants' profiles, college graduates from non-agency hiring channels in treated firms do not present systematic differences than those in control firms, which is identification assumption $E[u_{ijc} \times T_{jc}|C_i = 1, Agency_{ijc} = 0] = 0$.

The interpretation of η_3 may not be causal. Notice that $\eta_3 = E[Y_{ijc}|C_i = 1, T_{jc} = 1, Agency_{ijc} = 1] - E[Y_{ijc}|C_i = 1, T_{jc} = 1, Agency_{ijc} = 0]$, that is, the difference between the application outcomes of college graduates from *agency* in treated firms versus college graduates from *non-agency* hiring channels in treated firms. These two subgroups of college graduates can differ systematically. However, the estimate of μ_3 is particularly useful exactly because we want to understand whether employment agencies systematically select different types of college graduates, or employers perceive job seekers recommended from the agencies systematically differently than college graduates from other channels. To ensure a fully saturated model, we include T_{jc} and $Agency_{ijc}$ in the control for all regressions.[8]

---

[8]The interactions $T_{jc} \times Agency_{ijc}$ and $C_i \times Agency_{ijc}$ are theoretically already fully absorbed in the model

Table 3 shows the applicant-level main results. Column (1) regresses whether applicant i gets an interview invite from firm j on the three independent variables described in equation 5. Indeed, college graduates in general are 18.6 percentage points less likely to be interviewed by firms, compared to the average likelihood of being interviewed among non-college applicants 78%, though not a causal estimate. College graduates in treated firms from non-agency hiring channels do not have a higher chance to be interviewed compared to college graduates in control firms from non-agency channels ($\mu_2 = 0$). However, college graduates from agency in treated firms enjoy a much higher interview likelihood compared to those from non-agency in treated firms ($\mu_3 > 0$). Though not a causal estimate, the result suggests employment agencies may systematically recommend different types of job seekers, or firms perceive these job seekers differently.

Column (2) includes a full control of worker characteristics collected from the phone survey among a random subset of job seekers. The main pattern remains, suggesting the effect of employment agencies cannot be explained by observable characteristics of applicants. Column (3) includes firm fixed effects, a proxy of controlling for employers' different perceptions of college graduates. College graduates from agency see a smaller yet positive interview likelihood, albeit insignificant. Results imply that the main effect of employment agencies may result from that firms perceive college graduates from agency differently than college graduates from non-agency hiring channels.

Column (4) introduces additional interaction terms that focus specifically on firms requiring TVET certificates ("TVET vacancies" for short), controlling for interaction of college graduate and TVET vacancies. Compared to other treated firms, these TVET vacancies are more likely to interview college graduates from non-agency channels, and college graduates from agency channels even have a significantly higher likelihood of being interviewed. Table B2 replicates the same specifications in Table 3, with applicants being hired within 1 month as dependent variable. The main pattern largely remains.

To summarize, the applicant-level main results indicate the following two facts. First, employment agencies seem to increase the chance of college graduates being interviewed and hired compared to college graduates from other hiring channels, which cannot be explained

because only treated firms would see a job seeker recommended from an employment agency in our sample. In reality, a small number of control firms also receive extra CVs from the same set of employment agencies. Adding these two additional interactions do not affect the main results.

by workers' observable characteristics but might be explained by employers' differential perceptions of college graduates from employment agencies. Second, the effect of employment agencies again mostly concentrate in firms requiring TVET certificates, along with the fact from Table 2 that employment agencies have the largest effect on the match success rate among TVET vacancies. These findings support our hypothesis that employment agencies change employers' perceptions of college graduates especially among jobs requiring TVET certificates, persuade employers to interview more college graduates, and eventually lead to higher hiring likelihood of college graduates.

6   Effect of Employment Agencies on Match Quality

We now present the effect of employment agencies on the match quality four months after the intervention. We use the intention-to-treat model in equation 4 to focus on the heterogeneous treatment effect on jobs requiring TVET certificates. Given that jobs requiring college graduates have similar match rate but very different match quality than jobs requiring only high school degree or less, we also include the interaction term of the treatment status and jobs requiring college degree throughout this section.

Table 4, Column (1) shows the treatment effect on whether the firm hires any worker within 4 months. Treated firms that requires only high school degree or less are not more likely to fill in the position than control firms, suggesting low-skill jobs only requiring high school degree or less do not face much challenge in finding workers withihn 4 months. Treated firms requiring TVET certificates stills see a large increase in the match rate compared to control firms (p-value 0.033), suggesting that the employment agencies are able to address the hiring frictions faced by these middle-level vacancies with persistent effect. Treated firms requiring college graduates, however, see a negative effect compared to control firms (p-value 0.231).

Column (2) looks at whether the firm hires a worker who quits within four months. Results suggest that treated firms requiring only high school degree or less see a higher voluntary quitting rate compared to control firms after four months, even if they do not have a higher match success rate after four months. This is in line with the perceptions

21

Table 3: Applicant-level Result: Effect of Employment Agencies on College Graduates' Interview Outcomes

VARIABLES	(1) Interviewed	(2) Interviewed	(3) Interviewed	(4) Interviewed
College graduate (μ_1)	-0.186*	-0.256***	-0.0208	-0.0297
	(0.110)	(0.0932)	(0.151)	(0.153)
College * Treated firm (μ_2)	-0.0434	0.103	0.0225	-0.0236
	(0.136)	(0.115)	(0.182)	(0.188)
College * Treated firm * From agency (μ_3)	0.294**	0.232*	0.122	0.0765
	(0.117)	(0.131)	(0.253)	(0.274)
College * Treated TVET firm				0.249+
				(0.158)
College * Treated TVET firm * From agency				0.283+
				(0.176)
Observations	634	387	518	518
R-squared	0.162	0.262	0.619	0.626
Full worker char. control	No	Yes	No	No
Firm fixed effects	No	No	Yes	Yes
Firm-level cluster	Yes	Yes	Yes	Yes
Control mean: Non-college	0.780	0.780	0.780	0.780

Notes: This table presents the main applicant-level results. The dependent variable is whether applicant gets invited to an interview within 1 month. All regressions control for firm's treatment status and whether applicant is recommended from the matched employment agency. Column (1) regresses the dependent variable on whether applicant is a college graduate, the interaction of college graduate and firm's treatment status, the interaction of college graduates, firm's treatment status, and whether applicant is recommended from the matched employment agency. Column (2) includes a full set of applicant's observable characteristics (age, gender, experience, distance from residential district to the firm). Column (3) includes firm fixed effects. Column (4) includes interaction of college graduates and treated vacancies requiring TVET certificates, and interaction of college graduates, treated vacancies requiring TVET certificates, and whether the applicant is recommended from the matched employment agency, controlling for the interaction of college graduates and vacancies requiring TVET certificates. Table B2 shows the same specification with a new dependent variable whether applicant gets hired within 1 month. Significance level: $+ \ p < 0.15$ * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

that college graduates are over-qualified for these jobs and more likely to find a better offer within four months. Firms with jobs requiring TVET certificate or college degree do not see a higher voluntary quitting rate compared to control firms (p-value 0.868 and 0.818). This suggests that college graduates do not tend to quit these middle-level jobs requiring TVET certificates, which is at odds with firms' perceptions of the early turnover of college graduates among these jobs.

Column (3) looks at whether the firm hires a worker fired within 4 months. Evidence suggests that treated firms with jobs requiring TVET certificates see a lower firing rate, compared to other treated firms as well as control firms (p-value 0.320). Column (4) looks at whether the firm hires a worker perceived with above-average productivity compared to other workers at the similar positions in the same firm. Though a subjective measure, firms with jobs requiring TVET certificates are more likely to hire someone with above-average productivity (p-value 0.107). Interestingly, firms with jobs requiring college graduates actually report a lower evaluation of workers' productivity (p-value 0.0188). This goes against the hypothesis that employment agencies may recommend job seekers systematically higher quality, especially for jobs requiring college degree.

Column (5) looks at whether the firm hires a worker and agrees to pay a high salary after negotiation. Firms with jobs requiring TVET certificates are more likely to agree on a higher negotiated salary (p-value 0.141), even when many firms express concerns of workers asking for an non-affordable salary at baseline. This suggests that firms are willing to pay higher salary to attract college graduates to middle-level jobs that previously only require TVET certificates, likely because of the higher productivity of college graduates compared to workers with lower education background.

Column (6) and (7) look at whether the firm hires a worker with zero absent days in the last 30 days or who work overtime in the last 7 days. Firms with jobs requiring TVET certificates are more likely to hire a worker with zero absent days, although no significant effect in overtime work. Results suggest a potential increase in work effort among jobs requiring TVET certificates, but not in other types of jobs.

To summarize, employment agencies increase the match quality for jobs requiring TVET certificates in multiple dimensions: no higher early turnover, better on-the-job productivity, and higher work effort. Employers are willing to pay higher salary for college graduates to

these middle-level positions. Such effects on match quality are not present in jobs requiring college degree, nor in jobs requiring only high school or less. These results further corroborate the previous evidence in Section 5 that employment agencies are most suitable to address the hiring frictions among middle-level jobs requiring TVET certificates.

7   Conclusion

We conduct a randomized control trial to formally test the role of employment agencies on hiring outcomes of 400 firms in Addis Ababa, Ethiopia. We find a 21% increase in the match success rate among treated firms within 1 month, and the treatment effect mostly concentrates among firms who post jobs requiring TVET certificates, who are more likely to avoid interviewing college graduates and face more severe hiring inefficiency. We find that college graduates from employment agencies are more likely to get invited to interviews compared to college graduates from non-agency hiring challenges. We also find that treated firms have better match quality four months after the intervention, they tend to hire workers who stay longer, have better on-the-job performance, and are less likely to have absent days. Treated firms are more willing to pay a higher negotiated salary to hired workers. These results support the hypothesis that employment agencies are able to provide a signal of college graduates' lack of outside options and persuade firms to hire more college graduates, especially for middle-level vacancies requiring TVET certificates.

In the next step, we plan to increase the sample size by another 400 firms to increase statistical power of the analysis. We plan to collect firms' perceptions of college graduates from agency to provide direct evidence of the underlying mechanism. Future research may explore more long-run, macro effect of employment agencies, for instance, whether employment agencies may change employers' perceptions of college graduates in general and thus more likely to hire college graduates in the long run.

Table 4: Effect of Employment Agencies on Match Quality in 4 Months

VARIABLES	(1) Hired w/n 4m	(2) Quit w/n 4m	(3) Fired w/n 4m	(4) Prod. above avg	(5) Higher negotiated salary	(6) Zero absent days	(7) Overtime work
Treated firm (δ_1)	0.0336	0.101*	0.00895	-0.0696	-0.0872	-0.0987	-0.0285
	(0.0599)	(0.0591)	(0.0133)	(0.0755)	(0.0626)	(0.0740)	(0.0445)
Treated firm * Require TVET (δ_2)	0.272*	-0.116	-0.0570	0.331*	0.245*	0.342**	0.0516
	(0.156)	(0.105)	(0.0519)	(0.170)	(0.130)	(0.157)	(0.0901)
Treated firm * Require College degree (δ_3)	-0.148*	-0.0887	0.00228	-0.155+	0.0751	-0.0945	0.0377
	(0.0807)	(0.0736)	(0.0325)	(0.105)	(0.0855)	(0.0839)	(0.0707)
Observations	365	365	365	365	365	365	365
R-squared	0.258	0.222	0.209	0.243	0.268	0.245	0.338
Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Control baseline char.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	No	No	No	No	No	No	No
Cluster	Business area	Business area	Business area	Business area	Business area	Business area	Business area
Control mean	0.709	0.0985	0.0197	0.394	84.93	0.394	0.0837
P-value: $\delta_1 + \delta_2 = 0$	0.0333	0.868	0.320	0.107	0.141	0.0911	0.764
P-value: $\delta_1 + \delta_3 = 0$	0.231	0.818	0.722	0.0188	0.846	0.0286	0.843

Notes: This table presents the firm-level effect of employment agencies on match quality four months after the intervention. We use specification 4, including interaction of treatment status and jobs requiring TVET certificates, and interaction of treatment status and jobs requiring college degree. All regressions cluster at the business area level and include baseline characteristics from Table 1. Dependent variables: Column (1), whether the firm hires at least 1 worker within 4 months. Column (2), whether the firm hires a worker who quits within 4 months. Column (3), whether the firm hires a worker fired within 4 months Column (4), whether the firm hires a worker with productivity above average workers on the similar positions in the same firm. Column (5), whether the firm hires a worker who negotiates a high salary. Column (6), whether the firm hires a worker with zero absent days in the last 30 days. Column (7), whether the firm hires worker who works overtime in the last 7 days. We test whether the treatment effect of jobs requiring TVET certificate or college graduate is significant compared to control firms and show the p-values in the last two rows. Significance level: $+ \ p < 0.15$ * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Bibliography

Girum Abebe, A Stefano Caria, Marcel Fafchamps, Paolo Falco, Simon Franklin, and Simon Quinn. Anonymity or distance? job search and labour market exclusion in a growing african city. *The Review of Economic Studies*, 88(3):1279–1310, 2021.

Yann Algan, Bruno Crépon, and Dylan Glover. Are active labor market policies directed at firms effective? evidence from a randomized evaluation with local employment agencies. *Working Paper*, 2020.

David Autor. The economics of labor market intermediation. *NBER Working Paper No*, 14348, 2008.

David H Autor. Why do temporary help firms provide free general skills training? *The Quarterly Journal of Economics*, 116(4):1409–1448, 2001.

Abhijit Banerjee and Gaurav Chiplunkar. How important are matching frictions in the labour market? experimental & non-experimental evidence from a large indian firm. *Working Paper*, 2022.

Abhijit V Banerjee and Sandra Sequeira. Learning by searching: Spatial mismatches and imperfect information in southern labor markets. 2022.

Christopher Blattman and Stefan Dercon. The impacts of industrial and entrepreneurial work on income and health: Experimental evidence from ethiopia. *American Economic Journal: Applied Economics*, 10(3):1–38, 2018.

Eliana Carranza, Robert Garlick, Kate Orkin, and Neil Rankin. Job search and hiring with limited information about workseekers' skills. *American Economic Review*, forthcoming.

Bo Cowgill and Patryk Perkowski. Delegation in hiring: Evidence from a two-sided audit. *Columbia Business School Research Paper*, (898), 2020.

A. Nilesh Fernando, Niharika Singh, and Gabriel Tourek. Hiring frictions and the promise of online job portals: Evidence from india. *Working Paper*, 2022.

Simon Franklin. Location, search costs and youth unemployment: experimental evidence from transport subsidies. *The Economic Journal*, 128(614):2353–2379, 2018.

Deborah Goldschmidt and Johannes F Schmieder. The rise of domestic outsourcing and the evolution of the german wage structure. *The Quarterly Journal of Economics*, 132(3): 1165–1217, 2017.

Morgan Hardy and Jamie McCasland. Are small firms labor constrained? experimental evidence from ghana. *American Economic Journal: Applied Economics*, forthcoming.

Lukas Hensel, Tsegay Tekleselassie, and Marc Witte. Formalized employee search and labor demand. *Working Paper*, 2021.

Christopher T Stanton and Catherine Thomas. Landing the first job: The value of intermediaries in online hiring. *The Review of Economic Studies*, 83(2):810–854, 2016.

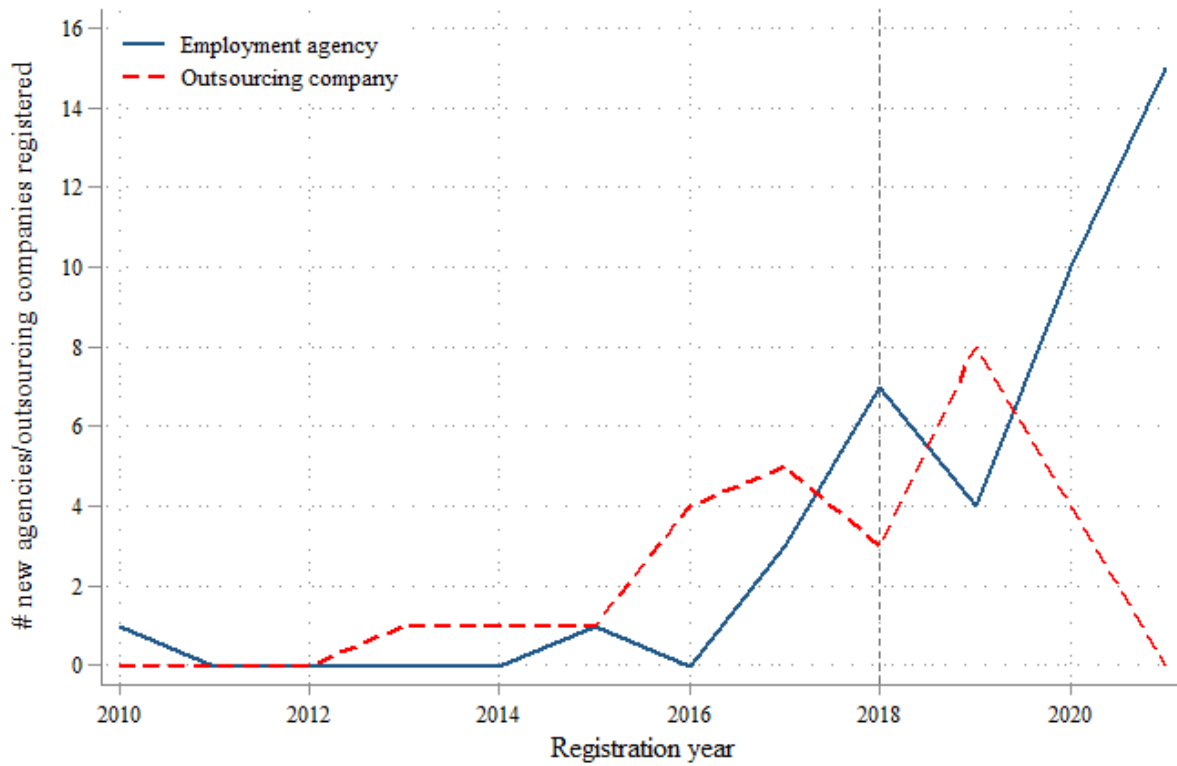UNESCO. Unesco institute for statistics. 2018.

A Figure

Figure A1: Picture of a typical employment agency

Notes: This figure shows a typical outlook of an employment agency located in Bole sub-city. The picture was taken in July 2022 by one of the authors with a 0.5x Ultra Wide iPhone lens.

Figure A2: Number of registered labor market intermediaries during 2010-21

Notes: This figure shows the number of registered labor market intermediaries in Bole sub-city during 2010-21. Blue solid line shows the trend of employment agencies. Red dashed line shows the trend of outsourcing companies, another form of labor market intermediaries focused exclusively in lower-skilled occupations such as construction, security guards, janitors.

Figure A3: Education background of Applicants from Employment Agencies and Non-Agency Hiring Channels

(a) Applicants from Employment Agencies
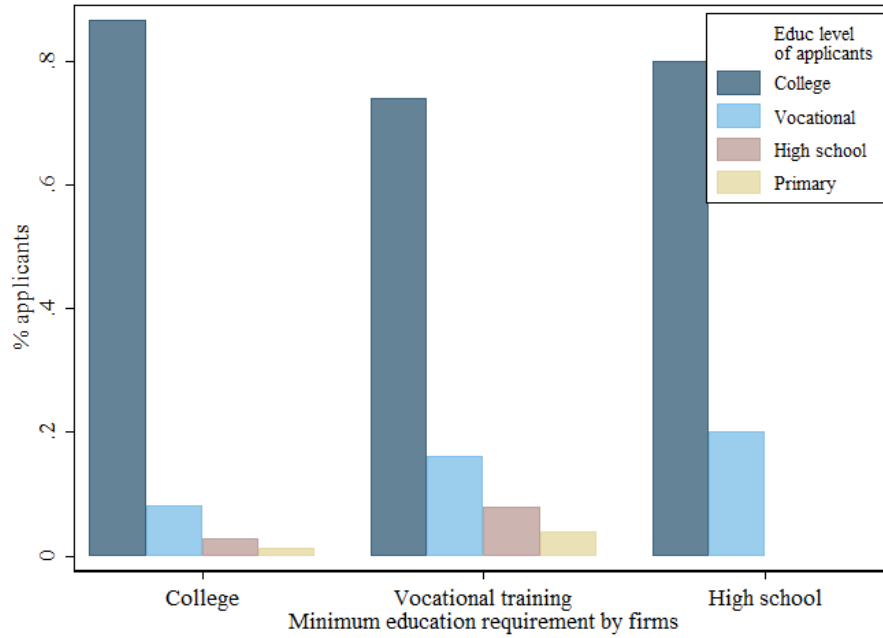
(b) Applicants from Non-Agency Hiring Channels
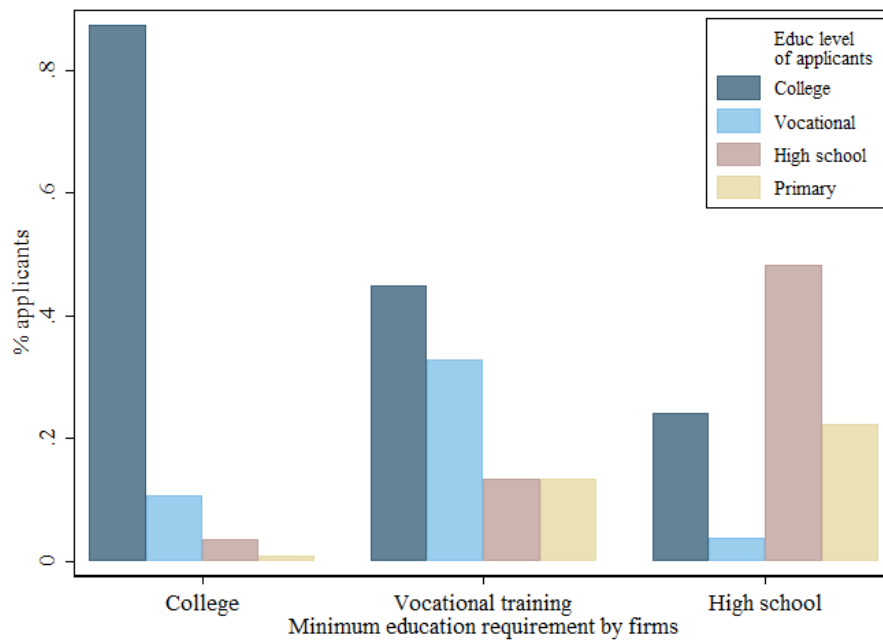
Notes: This figure shows the composition of applicants by education background for three type of vacancies (jobs requiring college degree, jobs requiring TVET certificates, jobs requiring high school degree). Panel (a) shows applicants from employment agencies. Panel (b) shows applicants from non-agency hiring channels.

B Tables

Table B1: Sample Selection Across Different Data

(a) Sampling of Firms

	This paper	Hensel et al. 2022	LMMIS 2014
Sector: Manufacturing	0.36	0.51	1.00
Sector: Hospitality	0.41	0.27	0.00
Sector: Others	0.23	0.22	0.00
Number of employees: Average	62	14	99
Number of employees: Median	25	10	32

(b) Sampling of Vacancies

Salary (birr)	This paper	Notice board pilot	Major online platform
25 percentile	2,000	3,500	4,609
50 percentile	2,650	4,020	8,017
75 percentile	4,500	5,208	13,926
Average	3,748	4,737	12,429

Notes: This table compares sampling of firms of vacancies between this paper and other data sources. Panel (a) compares the sampling of firms between this paper, Hensel et al. (2021), and Large and Medium Manufacturing and Electricity Industries Survey (LMMIS, the latest available year is 2014). Panel (b) compares the sampling of vacancies between this paper, vacancies collected from three major notice boards of Addis Ababa during our pilot in November 2020, and job posts from a major online job search platform in Ethiopia.

Table B2: Applicant-level Result: Effect of Employment Agencies on College Graduates'
Hiring Outcomes

VARIABLES	(1) Hired	(2) Hired	(3) Hired	(4) Hired
College graduate (μ_1)	-0.288***	-0.349***	-0.0657	-0.0745+
	(0.0951)	(0.0790)	(0.0521)	(0.0480)
College * Treated firm (μ_2)	-0.0856	0.0741	0.0345	0.00959
	(0.114)	(0.0945)	(0.101)	(0.122)
College * Treated firm * From agency (μ_3)	0.296***	0.275**	0.0228	-0.0360
	(0.107)	(0.121)	(0.215)	(0.224)
College * Treated TVET firm				0.159
				(0.310)
College * Treated TVET firm * From agency				0.310*
				(0.172)
Observations	634	387	518	518
R-squared	0.238	0.372	0.631	0.637
Full worker char. control	No	Yes	No	No
Firm fixed effects	No	No	Yes	Yes
Firm-level cluster	Yes	Yes	Yes	Yes
Control mean: Non-college	0.667	0.667	0.667	0.667

Notes: This table presents the main applicant-level results. The dependent variable is whether applicant passed the interview of the vacancy and accepted the offer within 1 month. All regressions control for firm's treatment status and whether applicant is recommended from the matched employment agency. Column (1) regresses the dependent variable on whether applicant is a college graduate, the interaction of college graduate and firm's treatment status, the interaction of college graduates, firm's treatment status, and whether applicant is recommended from the matched employment agency. Column (2) includes a full set of applicant's observable characteristics (age, gender, experience, distance from residential district to the firm). Column (3) includes firm fixed effects. Column (4) includes interaction of college graduates and treated vacancies requiring TVET certificates, and interaction of college graduates, treated vacancies requiring TVET certificates, and whether the applicant is recommended from the matched employment agency, controlling for the interaction of college graduates and vacancies requiring TVET certificates. Table 3 shows the same specification with a new dependent variable whether applicant gets interviewed within 1 month. Significance level: $+ \ p < 0.15$ * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$