



Regular article

Formalized employee search and labor demand[☆]Lukas Hensel^{a,*,}, Tsegay Tekleselassie^b, Marc Witte^{c,d}^a Peking University, China^b Wellesley College, United States of America^c VU Amsterdam, The Netherlands^d IZA, Germany

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ABSTRACT

Firms in low- and middle-income countries rarely advertise their vacancies formally and instead use social networks to find employees. We experimentally reduce the cost of formal employee search for small and medium-sized enterprises in Ethiopia to test whether informal search constrains the number and type of positions firms create. We find that treated firms increase formal search and shift their labor demand towards more demanding white-collar positions. However, they struggle to fill these newly created vacancies. We provide suggestive evidence that expectations contribute to this result, especially when firms lack prior experience with formal hiring channels: firms appear overly optimistic about the applicant pools formal search will generate, and job-seekers' wage expectations exceed firms' wages.

1. Introduction

Labor markets in low- and middle-income countries are often characterized by frictions that lead to the coexistence of high unemployment and persistent hiring difficulties among firms (Caria et al., 2024). This combination has motivated a growing number of active labor market policies aimed at reducing such frictions. However, most existing work studies frictions on the side of job-seekers, despite the fact that firms themselves may face substantial barriers to finding suitable workers. Firms often rely heavily on informal hiring through personal networks rather than publicly advertising vacancies to alleviate frictions. Such informal recruitment may improve match quality by alleviating information frictions and moral hazard problems (Dustmann et al., 2016; Heath, 2018). However, sparse networks might limit firms' ability to expand their business, leading to aggregate welfare losses (Chandrasekhar et al., 2020). Negative effects are particularly likely if firms and job-seekers differ in their use of formal search channels, limiting the scope for successful matches.

Addis Ababa in Ethiopia displays such a striking mismatch between firms' and job-seekers' search channels. Fig. 1 compares the prevalence of formal and informal search methods of both job-seekers and firms. While only 10% of our sample of small and medium-sized firms use formal search methods (such as posting vacancies on job boards and in newspapers), over 80% of job-seekers in Addis Ababa search in these public channels. In comparison, almost 80% of firms use informal, network-based methods to identify suitable employees, while fewer than 40% of job-seekers search for work using their networks. This asymmetry suggests that firms forgo a large fraction of potential applicants in their search for employees, which might limit their ability to hire (specific types of) workers.

In this paper, we explore whether the use of informal employee search indeed constrains firms' labor demand, both in terms of quantity and quality. We conduct a field experiment in Addis Ababa, Ethiopia, through which we incentivize firms to advertise their vacancies through formal channels. We offer vacancy posting services to a randomly

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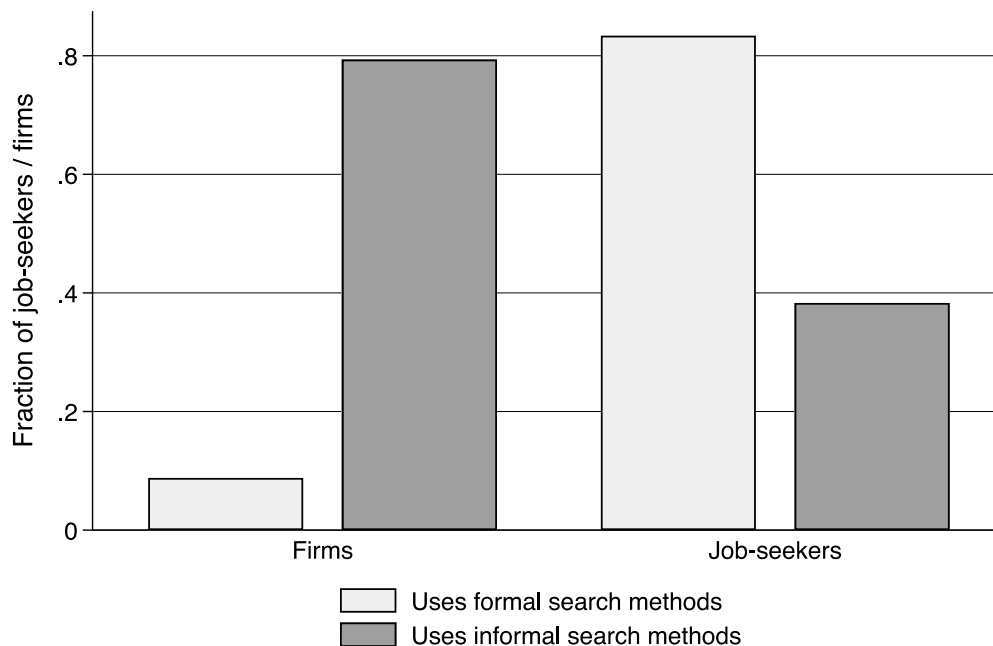


Fig. 1. Formal and informal search on both sides of the labor market.

Notes: Fig. 1 shows that the search channels of firms and job-seekers in Addis Ababa are mismatched. It shows the fraction of either relying on formal or informal methods of employee/job search. The responses are not mutually exclusive, meaning that both firms and job-seekers can search in more than one way. Search through employment agencies is treated as a separate category. The firm data is based on baseline responses in our experimental sample of 625 actively hiring firms in 2019. We describe the recruitment process and sample in detail in Section 3. The job-seeker data are from the Ethiopian National Labor Force Survey 2021. Formal search methods include online and offline job boards and newspapers. Informal search methods are through social contacts/networks (including family and co-workers).

selected subset of 625 small and medium-sized firms that do not rule out hiring a worker over the next three months. As part of these services, we first fully subsidize firms' vacancies in all commonly-used 'formal' channels, including online and offline job boards and newspaper advertisements. Second, we also cover the logistical costs of posting the vacancy and provide job-advert templates. Taken together, we subsidize and post all job adverts of the firm, with the posting costs per vacancy exceeding the average monthly wage of employees in our sample. Treated firms are eligible to use the vacancy services for about four months. We collect detailed data on vacancy creation and hiring behavior of all firms during and after the treatment period. To ensure that we capture all attempts at finding new employees across treatment groups, we also administer regular phone surveys during the treatment period, in addition to an in-person endline survey and multiple post-treatment surveys.

We have five key findings. First, our intervention successfully increases formal vacancy posting: treated firms are 4.3 times more likely than control firms to post at least one vacancy through formal search channels. However, firms are selective in their use of the subsidy. They only post formal adverts for 38% of created vacant positions, suggesting that the perceived returns to formal search vary across vacancy types.

Second, we observe no average increase in the total number of vacancies created. However, there is substantial heterogeneity by vacancy type: treated firms are a significant 7.2 percentage points (pp) more likely to create at least one white-collar vacancy.¹ This is an increase of 91% relative to the control group mean. The overall number of white-collar vacancies and the share of white-collar postings among all vacancies also approximately double compared to control firms, suggesting a strong shift in the composition of firms' labor demand.

¹ White-collar vacancies are defined as "professional, managerial, or administrative" workers. Typical white-collar job titles include manager, accountant, and supervisor. Typical non-white-collar jobs are cooks, waiters, or carpenters.

For lower-skill, non-white-collar vacancies, we observe a corresponding 6.9 pp decrease in the fraction of firms creating at least one such vacancy. These results suggest that in response to the treatment, firms attempt to fill more high-skilled positions, which is consistent with firms anticipating being able to access a higher-skilled applicant pool through formal employee search.

Third, we find that treated firms struggle to fill newly created vacancies. Their share of filled vacancies decreases by 20 pp relative to the control group. This results in a marginally significant 7pp decrease in the likelihood of making any hire during the treatment period. The decrease in vacancy filling rates is stronger for white-collar vacancies (–36pp) relative to non-white-collar vacancies (–17pp). This, combined with the increase in white-collar vacancy creation, leads to an insignificant treatment effect on the number of white-collar hires, with point estimates close to zero. In contrast, we observe a relatively large (8.6pp) and significant decrease in the fraction of firms reporting any non-white-collar hires.

We provide evidence for two mechanisms that could explain the reduction in vacancy filling rates. First, we find that managers' expectations about the number and quality of applicants obtained through formal channels are not met and that they negatively update their beliefs about the returns to formal search channels. This disappointment may explain the reduction in vacancy filling rates. Second, we observe a mismatch between wage expectations and offered wages. Applicants obtained through formal search channels have high wage expectations and reservation wages relative to the realized wages of filled vacancies and average baseline salaries. This might make it difficult for firms to hire new employees through formal channels.

In line with expectation-based mechanisms, we provide evidence that this decrease in successful matches is driven by firms' lack of experience with formal search channels, which could be driven by — potentially rational — under-experimentation (Chandrasekhar et al., 2020). Firms without experience in using formal search channels at baseline exhibit a significant reduction of 23pp in vacancy filling rates.

In contrast, firms familiar with formal search channels at baseline see an insignificant increase of 11pp in the vacancy filling rate and sizable but noisily estimated increases in hiring numbers.

Fourth, we explore whether information frictions about applicants' skills limit firms' use of formal search channels. We randomly offer half of the treated firms the additional option of having all applicants to their vacancies screened for three cognitive or socio-emotional skills or traits of their choice. This additional treatment component does not differentially impact the uptake of the intervention, vacancy creation, or hiring outcomes, though effects are somewhat noisily estimated. This finding contrasts with a growing body of literature documenting the importance of such frictions for *job-seekers* (Abebe et al., 2021; Carranza et al., 2022; Bassi and Nansamba, 2022; Abel et al., 2020; Kiss et al., 2023; Tekleselassie et al., 2025; Witte et al., 2025).

Finally, we find that in the months following the treatment period firms revert to mostly using informal search channels. They also significantly reduce their labor demand for non-white-collar workers, potentially because they increase retention among non-white-collar workers. Still, treated firms report a 24% higher *share* of white-collar employees in their workforce at endline. This leads to an increase in the relative demand for white-collar workers. This suggests that, while the intervention did not persistently alter search channels, it shifted the quality and quantity of labor demand post-treatment.

With these findings, we make three main contributions to the literature.² First, ours is the first paper to study the firm-side effects of a reduction in vacancy posting costs on vacancy posting behavior.³ Our results suggest that search frictions can be specific to the type of vacancy, which can ultimately affect firms' labor force composition.⁴ This finding also contributes to an emerging literature studying the constraints to hiring high-skilled workers in developing countries. Difficulties in hiring high-skilled (managerial) workers have been shown to constrain the growth and productivity of firms (Akcigit et al., 2021; Anderson and McKenzie, 2022). We contribute by linking firms' lack of hiring white-collar employees to the structure of their search process.

Related to our study, Fernando et al. (2023) study the impact of increasing firms' applicant pool and providing identity verification services on firms' hiring outcomes on an Indian online job portal. They find that both interventions together, but not individually, increase hiring among treated firms. Similarly, Wu and Wang (2025) provide firms in Ethiopia with subsidized access to employment agencies for a single vacancy. They also find that firms negatively update about applicant quality. However, contrary to our findings, firms increase vacancy filling rates and reduce their hiring of highly educated workers. A key difference to our study is that both studies randomized access to applicants for already existing vacancies. In contrast, we allow firms to adjust their vacancy posting behavior in response to our treatment, arguably estimating the more policy-relevant parameter.

In another related paper, Algan et al. (2022) study an intensive bundled hiring support intervention for French SMEs. In contrast to

their bundled intervention, we disentangle the role of two specific frictions: vacancy posting cost and information frictions about work seekers. Moreover, our study is set in a labor market with a much higher prevalence of informal employee search and thus speaks to frictions that might prevent the development of more formal labor market institutions studied by Algan et al. (2022).

Second, we study the impact of reducing firm-side search frictions while most of the existing literature focuses on search frictions on the side of job-seekers. In particular, both Franklin (2018) and Abebe et al. (2021) study transport subsidies as a form of formal search subsidies for job-seekers — the equivalent of our firm-side intervention — on the labor supply side. Both papers find short-run effects on the *quality* of jobs found, suggesting that formal search is beneficial for young job-seekers in the same context as ours.⁵ Our evidence suggests the same is not true for firms. In studying the public advertisement of vacancies, we relate to the literature on different hiring channels such as networks (Calvó-Armengol and Jackson, 2004; Beaman and Magruder, 2012; Kramarz and Skans, 2014; Heath, 2018; Witte, 2025) and job fairs (Beam, 2016; Abebe et al., 2025). Similar to the literature on job fairs, we do not find strong short-term effects on aggregate hiring numbers. However, we document a marked shift in the composition of created vacancies. This emphasizes the importance of firms' endogenous response to changes in the cost and availability of search methods.⁶

Finally, we speak to a nascent body of literature documenting unintended long-term consequences of labor market interventions on the beliefs and behavior of firms and job-seekers in developing countries. Recent papers study the impact of negative surprises about the quality of newly-created matching interventions,⁷ while we document that firms face negative surprises, even within *existing* labor market institutions. This suggests important information frictions during the hiring process and a lack of experimentation by firms, with potentially important consequences for firms' labor demand. As an example focusing on the job-seeker side of the labor market, Kelley et al. (2024) study the impact of using job portals for entry-level job-seekers in India. They find that treated job-seekers have higher reservation wages and end up working less in response to signing up for the platform. Our study emphasizes that unintended consequences of being exposed to existing labor market structures can also affect the firm side of the labor market.

2. Labor market search in Addis Ababa

Our study took place between March and November 2019 in Addis Ababa, the capital of Ethiopia. With an average GDP growth rate of almost 10% over the decade prior to our study, Ethiopia is one of the fastest-growing countries in Sub-Saharan Africa (World Bank, 2020). At the same time, most of the country's young urban population

² Like much of the experimental literature on labor markets in developing countries, we encourage off-equilibrium behavior by reducing its cost to understand the constraints faced by firms. In contrast to much of the *published* literature (e.g., Franklin, 2018; Abebe et al., 2021), we conclude that firms' ex-ante behavior is unlikely to have been constrained by cost (though costs seem to constrain their learning about the labor market).

³ A separate literature studies the labor constraints faced by small and medium-sized enterprises (SMEs) in low- and middle-income countries and has found mixed results. Hardy and McCasland (2023) document that alleviating employee search constraints for SMEs in the manufacturing sector in Ghana through a local matchmaking process leads to increases in firm size and profits. Other experiments that use temporary wage subsidies to encourage hiring without alleviating search constraints find no evidence of permanent effects on firm outcomes (de Mel et al., 2019; Groh et al., 2016; Galasso et al., 2004).

⁴ We also provide developing country evidence consistent with Rebien et al. (2020)'s finding that firms search more formally for high-skilled workers in Germany.

⁵ Banerjee and Sequeira (2023) find that transport subsidies in South Africa affect beliefs and search behavior but not employment outcomes.

⁶ By emphasizing the importance of different search channels we provide additional evidence on the importance of search frictions for job-seekers (Carranza et al., 2022; Bassi and Nansamba, 2022; Abel et al., 2020; Wheeler et al., 2021; Kiss et al., 2023; Tekleselassie et al., 2025; Balgova et al., 2025). In particular, our finding of a change in vacancy composition might, in part, be a response to the selection of job-seekers into different search channels. This is in line with evidence demonstrating an important role of liquidity constraints in application decisions (Abebe et al., 2021).

⁷ Abebe et al. (2025) document that after attending a 'disappointing' job fair in the same context as our study, firms negatively update about the average quality of job-seekers and, as a consequence, shift towards more formal search channels and reduce hiring levels. This latter finding is in line with our results, which suggest that firms could become additionally disappointed by formal search. Similarly, Bandiera et al. (2025) show that lower-than-expected callback rates of a matching intervention have long-term impacts on the beliefs and search behavior of job-seekers, leading to substantially worse labor market outcomes.

is out of permanent or formal employment, while rural areas are traditionally dominated by subsistence agriculture. Unemployment is particularly high among young people who graduate from high school or higher education institutions, despite widely reported shortages of qualified employees by Ethiopian firms (Abebe et al., 2021), suggesting a problem with matching job-seekers to vacancies.

To motivate our intervention, this section describes key facts about job and employee search in Addis Ababa. Our evidence is based on (i) representative labor force data on job-seekers and workers, (ii) a random subset of publicly posted vacancies during our study period, and (iii) data on firms in our experimental sample.

Experimental firm sample. For our study, we recruited SMEs with between 5 and 50 employees in Addis Ababa in two ways. First, we obtained a list of registered firms in Addis Ababa from the municipal authorities. Second, our field team went to recruit firms face-to-face in well-known business areas. To participate in our study, firms had to meet four criteria that ensured the relevance of our intervention for them. First, they had to have between 5 and 50 employees. Second, they had to not rule out hiring a new worker over the next three months. Third, they had to express interest in a generically-described service that would help their firm with job advertising. Finally, they could not exclusively hire through employment agencies. We chose these screening criteria to identify firms that were likely to use our intervention to increase statistical power. Among formally registered firms we reached out to, 50% met the employment criterion. Among those, 33% were interested in the intervention, and 24% planned to hire at least one worker. Only 16% of firms of the right size exclusively used the service of agencies in the last 12 months. While the firm data is not representative of the universe of firms in Addis Ababa, it describes a population that is likely to be most affected by employee search frictions in this context (Appendix B compares our sample to representative data from Addis Ababa). In total, we recruit 625 firms to take part in our experiment. These firms are spread out across Addis Ababa (see Figure A1).

2.1. Firms' search behavior

Firms' search behavior is characterized by a large degree of informality but clearly distinct patterns for white-collar and non-white-collar vacancies. We define white-collar vacancies as "professional, managerial, or administrative" workers. Typical white-collar job titles include manager, accountant, and supervisor. Typical non-white-collar jobs are cooks, waiters, or carpenters. Formal employee search is relatively rare, with only 9% of firms posting vacancies in formal channels at baseline, and concentrated among white-collar vacancies.

Formal search is costly. Employee search via formal channels, defined as the public advertising of job adverts on offline and online job boards as well as in newspapers, is quite costly for firms in our sample.⁸ 91% of firms mention the monetary cost of formal search as an important obstacle to posting vacancies on formal channels (Figure A2(a)).⁹ In addition to the monetary costs, managers also mention the effort costs of formal search (41%) and difficulties in designing proper job adverts (65%), supported by evidence that job adverts in Addis Ababa tend to be relatively uninformative (Balgova et al., 2025). These numbers

suggest that the monetary and non-monetary costs are a major barrier preventing firms from using formal employee search. Our intervention is directly aimed at lowering this cost through monetary subsidies and logistical support, taking over part of the effort cost of formal search.

Formal vacancy posting is rare. Perhaps as a consequence of the substantial costs involved, formal vacancy posting is not very common among firms in Addis Ababa. To illustrate this, we create a database of publicly posted vacancies in Addis Ababa, comprising 29,312 job advertisements posted over 36 weeks in 2019.¹⁰ In February 2019, there were 438,747 formally registered firms in Addis Ababa. If we conservatively assume that every firm seeks to hire one employee per year, we should expect on average $438,747/52 \approx 8437$ posted vacancies per week. Instead, we find approximately 814 unique vacancies posted in the city per week. This is also substantially below the numbers in similarly-sized cities in rich countries: there were approximately 6500 unique vacancies per week in Berlin, 7000 in Birmingham, and 14,000 in Madrid in late 2021 on indeed.com alone.

This is in line with firms' vacancy creation behavior in our experimental control group. Our inclusion criteria imply that the sample consists of relatively actively recruiting small- and medium-sized firms. Despite the pre-screening, we observe that 50% of firms do not create any vacancies during the study period. This is despite baseline expectations of 3.5 hires over the next three months.¹¹

Search strategies differ by vacancy type. Firms in our control group mostly create non-white-collar vacancies but use formal search relatively more for white-collar workers (Table A1). Specifically, we observe that non-white-collar vacancies make up 88% of all created vacancies in the control group. This is in line with the structure of existing employees of firms (86% of existing employees are non-white-collar; Table 1). We also observe that only 12% of vacancies in our control group are posted formally (at baseline 8.8% of firms report using formal search channels). This suggests that the returns to formal search are, on average, not perceived to be high enough to warrant the increased costs among most firms in our sample. When considering white-collar and non-white-collar vacancies separately, we find that 42% of white-collar vacancies are posted formally, compared with only 8% of non-white-collar vacancies. Firms seem to perceive substantially higher returns to formal search for white-collar vacancies compared to non-white-collar vacancies. Figure A2(b) mirrors this directly: almost all firms consider formal search to be useful for white-collar positions, whereas this share decreases substantially for non-white-collar (including blue-collar) positions.

This difference we observe in our firm sample is also reflected in the characteristics of publicly posted vacancies in Addis Ababa. Appendix C with Table C1 describes the composition of the random sample of $N = 999$ vacancies for which we hand-coded the white-collar classification. We find that 59% of all publicly posted vacancies are white-collar, while only 41% are non-white-collar vacancies. Taken together, this

⁸ Numbers in the following paragraph are based on responses by 103 randomly sampled control group firms about the main factors preventing formal employee search. We conducted this additional descriptive survey in 2023, four years after the original experiment.

⁹ The price of formal search is sizable relative to the prevailing wage level. For example, in the context of our study, posting a single job ad in a newspaper in the smallest available format costs about 3800 ETB (198.12 USD PPP), which is more than the average monthly salary that firms in our sample pay their workers.

¹⁰ This database covers close to 100% of all posted vacancies in Addis Ababa. We collect data on job advertisements from the four main sources of job advertisements in the city. These include (i) the ten largest physical vacancy boards located across the city, (ii) vacancies in the three major newspapers, (iii) the four largest online job boards (www.employethiopia.com, www.ethiojobs.com, www.ezega.com, www.mjobs.com), and (iv) the largest social media job channel (on the messaging service 'Telegram') We collect the data on a weekly basis between March and October 2019.

¹¹ The lower-than-expected hiring activity is at least partly due to external events. In May and June of 2019, there were frequent power cuts due to nationwide electricity shortages that negatively affected the operations of firms in our sample. Around 35% of baseline firms reported that they changed their business activities in response to the electricity outages, with 20% of firms postponing hiring. Furthermore, there was a coup attempt on June 22, 2019, which led to a nationwide internet shutdown and slowed down or stopped business activities for about two weeks.

suggests that reducing the cost of formal search might increase firms' propensity to create white-collar vacancies that rely more on formal advertisement. White-collar vacancies also have higher demands in terms of experience and education than non-white-collar vacancies.

2.2. Mismatch with job-seekers' search behavior

According to the 2018 Urban Labor Force Survey, 80% of job-seekers in Addis Ababa search in public channels, while fewer than 40% search in their networks. We thus observe a substantial mismatch of search activity. Job-seekers are much more likely to use formal search methods than firms. This mismatch could have two important consequences. First, it could mean that firms forgo a large part of their potential applicant pool which might prevent them from growing. Second, the lack of formal search activity by firms might exclude job-seekers without sufficient network connections from jobs. This might be particularly severe for young, inexperienced job-seekers.

The consequences of this mismatch may be mitigated by sorting: job-seekers in formal search channels are positively selected on education, but not on experience (Table A2). The pool of formal job-seekers is thus more likely to meet the more demanding education criteria of formally posted white-collar vacancies though they fall short of the experience criteria. This suggests that both sides of the labor market are aware that returns to formal search are higher for more highly educated individuals and for white-collar vacancies that require higher education levels. However, we also see that using formal search is associated with longer unemployment durations, even conditional on experience and education (columns 3 and 4). This suggests that the mismatch of search methods may have negative effects on search duration even after accounting for selection.

3. Experiment design

Our field experiment is designed to study how subsidizing formal employee search affects firms' vacancy posting and employment flows. We randomly allocate firms in our sample to one of two groups. With a two thirds probability firms are allocated to the treatment group and are offered the opportunity to post their job adverts on up to five physical vacancy boards, the biggest online job board at the time of the experiment (www.ezega.com), and the major newspaper "The Reporter" at no cost. The implied posting subsidy amounts to 5779 ETB per vacancy, which is about 68 percent higher than the mean baseline salary in our sample (Table A3 and Figure A3). To facilitate take-up of the intervention, firms are offered to send an electronic copy of the job advert or, alternatively, research staff would pick up a hard copy at the firm's premises. Moreover, we provide a standard job advert template to help firms engage with this new search format. We designed the treatment to reduce the cost of formal posting, though we acknowledge that the template may also affect the quality of firms' job adverts (see Section 6 for a discussion of the role of advert quality). This offer covers all vacancies during the four-month treatment period (for a timeline see Figure A4). We additionally randomize 50% of firms in the vacancy subsidy group to receive an applicant screening intervention in addition to the vacancy subsidy. Firms in this group are offered a screening of all applicants to their vacancies for a range of cognitive and socio-emotional skills. The results of this screening are then passed on to the firm. We use this additional treatment to test whether a lack of information about job-seekers' skills affects firms' vacancy posting and hiring. For most of the analysis, we use the pooled treatment group to focus on the effect of the vacancy posting subsidy. This reflects the fact that there are few significant differences in endline firm outcomes between the two arms (see Section 6.1). With a one third probability firms are allocated to the control group and receive no intervention. Randomization happens at the firm level at the end of the baseline survey without stratification.

Data collection. We survey the 625 firms in our sample before, during, and after the treatment period, for a total of 6068 interviews. After an initial screening survey, we conduct an in-person baseline survey to capture manager and firm characteristics, expectations, as well as pre-existing hiring practices. The end of the baseline survey also marks the beginning of the four-month intervention period. During the intervention period, we carry out regular phone and if necessary in-person surveys to capture vacancy postings and hiring. On average, we conduct over five surveys per firm during the treatment period.

During every survey, we measure created vacancies as an "attempt to hire at least one worker since the last interview". We thus cover the complete period between surveys, even when firms are not reached for some survey rounds. If managers respond with yes, we follow up to ask about the nature of the position, the search process, and the search success for all hiring attempts. If they tell us that the hiring process has not yet been completed, we follow up on the same vacancy during our next scheduled survey round.

At the end of the treatment period, we conduct an in-person endline survey to capture employment flows and levels, firm-level characteristics, and manager beliefs regarding the effectiveness of different hiring channels. For the main analysis of vacancy posting and employment flow data, we aggregate the phone surveys and the endline survey at the firm level to facilitate interpretability (McKenzie, 2012). After the treatment period, we conduct further phone surveys with sampled firms to assess whether our intervention changes behavior in the following months.

Summary statistics. Baseline summary statistics based on our firm-level data collection are presented in Table 1. Firms in our sample have, on average, 14.5 employees, of which 14% are white-collar workers. 51% of firms are in the manufacturing sector and 27% are in the hospitality or retail sectors. 26% of our firm respondents are female and the average respondent age is 35 years.¹² They are well-educated, with 45% of respondents having a university degree.

Existing employee search channels are largely informal and network-based. 79% of sampled firms use network-based search for employees, and 50% of firms exclusively rely on network-based employee search. Only 9% of firms post their vacancies through formal channels (i.e., in newspapers or on job boards; no firm uses online job boards at baseline), closely mirroring our city-wide back-of-the-envelope calculations.¹³

Overall, the firms in our sample are relatively optimistic about their business. 62% and 77% of firms have a positive business outlook for the next three and twelve months following the baseline survey, respectively. Furthermore, in the three months after the intervention firms expect to hire, on average, 3.46 new workers.

Firms' perceptions of their current hiring process are heterogeneous. 46% of firms were confident or very confident that they could find suitable candidates. 47% agree or absolutely agree that they attract the right kind of applicants. 23% of firms state that they receive too few applications (40% receive too many with the remainder being satisfied with current levels). Importantly, 72% of firms in our sample do not have positive views on at least one dimension of finding candidates, attracting the right candidates, or receiving too few applications.

¹² For all of our data collection activities, we asked to speak with *the person in charge of hiring decisions*. In the vast majority of cases, this is the firm manager or owner. In the few cases where there was managerial turnover during the study period, we instead interviewed the new person in charge of hiring decisions.

¹³ 67% of firms in our sample use other search channels, including employment agencies, posting on-premise, and waiting for unsolicited applications. Notably, 39% of firms use employment agencies at baseline. However, these agencies typically focus on specific segments of the labor market and do not generally provide candidates that match firms' expectations (Wu and Wang, 2025). This suggests intermediaries are not able to overcome the existing labor market frictions.

Table 1
Summary statistics.

	Mean	SD	Median	Min	Max	# obs
Firm characteristics						
Age of firm (in years)	7.19	7.99	5.00	0.10	63.00	616
# of employees	14.49	11.60	10.00	4.00	88.00	625
Share of white-collar employees	0.14	0.15	0.11	0.00	0.94	625
Manufacturing sector	0.51	0.50	1.00	0.00	1.00	625
Service sector (retail, hospitality)	0.27	0.45	0.00	0.00	1.00	625
Health Sector	0.11	0.31	0.00	0.00	1.00	625
Hiring practices						
Uses formal hiring channels	0.09	0.28	0.00	0.00	1.00	625
Uses network hiring channels	0.79	0.41	1.00	0.00	1.00	625
Uses other hiring channels	0.67	0.47	1.00	0.00	1.00	625
Manager expectations						
Expected number of hires in next 3 months	3.46	5.93	2.00	0.00	90.00	624
Positive bus. outlook next 3 months	0.62	0.49	1.00	0.00	1.00	611
Positive bus. outlook next 12 months	0.77	0.42	1.00	0.00	1.00	584
Manager characteristics						
Female	0.26	0.44	0.00	0.00	1.00	625
Manager age	35.32	10.30	32.00	19.00	84.00	625
Manager has univ. degree	0.45	0.50	0.00	0.00	1.00	625
Perceptions of hiring process						
(Very) confident to find suitable candidates	0.46	0.50	0.00	0.00	1.00	620
(Absolutely) agree attracts right applicants	0.47	0.50	0.00	0.00	1.00	625
Too few applications	0.23	0.42	0.00	0.00	1.00	556
Too many applications	0.40	0.49	0.00	0.00	1.00	556
# of add. applications if posting on one more job board	11.13	14.46	5.00	0.00	100.00	418

Notes: Table 1 presents baseline summary statistics of firm and firm manager characteristics. The number of observations varies due to “don’t know” answers and refusals to answer. Two firms report more than 50 employees due to changes between the initial screening and baseline survey. The total number of firms is 625.

This suggests that, while specific constraints vary, many firms do face barriers that could potentially be alleviated by the use of formal channels.

Experimental integrity. Table A4 shows that treatment achieves balance on baseline observable characteristics. Out of sixteen tested variables, we only observe one significant baseline imbalance (at the ten percent level).

Table A5 shows that attrition levels are low and mostly balanced across treatment groups. We reach 96% of firms to conduct at least one phone survey and we conduct, on average, 5.6 surveys per firm. Furthermore, we successfully reach 97% of firms for our in-person endline survey. For our main analysis, we pool both phone and endline data sources, which means that we have outcome data for 100% of control group firms and 99% of treatment firms (four firms in the treatment group could neither be reached during phone surveys nor the endline survey). While the latter difference is significant at the 5 percent level, it is very small and very unlikely to influence our results.

4. Theoretical framework

This section summarizes the theoretical framework described in detail in Appendix E. It describes firms’ decisions of whether to create a vacancy, how to advertise it, and what type of position to fill, in light of the descriptive patterns shown in Section 2. The framework considers a firm i deciding whether to create a vacancy or not. First, the firm chooses its optimal search strategy s_i^* and the vacancy type t_i^* to maximize the expected profits:

$$(s_i^*, t_i^*) = \operatorname{argmax}_{s_i, t_i} \pi(s_i, t_i) - c(s_i) \quad (1)$$

where $\pi(s_i, t_i)$ is firm i ’s expected profit of searching for an employee of type t_i (white-collar (wc) or non-white-collar positions (nwc)) through

channel s_i (formal or informal) excluding the search cost. $c(s_i)$ are the costs of searching for employees in search channel s_i . If and only if $\pi(s_i^*, t_i^*) - c(s_i^*) > 0$, the firm decides to create a vacancy. We model our treatment as reducing formal search cost $c(\text{formal})$ through subsidies.

To derive unambiguous predictions about treatment effects, we assume that the returns to informal search are higher for non-white-collar vacancies compared to white-collar vacancies ($\pi(\text{informal}, nwc) > \pi(\text{informal}, wc)$). This is in line with the empirical observation that informal search channels are most commonly used for non-white-collar vacancies. This framework yields the following key predictions that we test empirically using the experimental variation:

Result 1: Reducing formal search cost increases take-up of formal search. This result follows from the intuition that reducing the price of formal search will allow firms with lower benefits from formal search to use formal search. However, the model also implies that even with reduced formal search costs, there will still be firms who prefer to use informal search channels. Hence, the take-up of formal search channels will not be complete.

Result 2: Reducing formal search cost increases the number of created vacancies. The subsidy can induce non-searching firms to create a vacancy if they are close to being indifferent between creating a formally advertised vacancy and not posting at all. The magnitude of the effect depends on the mass of firms that fall into this category. If there are many firms who are close to being indifferent between posting a vacancy formally and not posting a vacancy at all, we would expect relatively large effects of the subsidy. However, if most firms without initial vacancies are far from the threshold values for formal search, we would expect relatively small treatment effects.

Result 3: Reducing formal search cost leads to an increase in white-collar vacancies. The vacancy subsidy makes formal posting more attractive

overall, leading to a substitution of informal with formal search channels for some firms. The subsidy reduces the number of informally posted vacancies, which are (disproportionately) non-white-collar. Conversely, it increases the number of formally posted vacancies. As firms disproportionately use formal channels for white-collar positions, the overall share of white-collar vacancies increases. Intuitively, some firms are induced to switch from informal non-white-collar vacancies to formal white-collar vacancies as the relative profitability of both types is a function of the cost of formal posting.¹⁴

Result 4: Reducing formal search cost might negatively affect hiring for inexperienced firms. So far, we have assumed that firm managers have full information about the expected returns to search through different channels. This is a reasonable assumption for managers with experience in using formal channels. However, managers without such experience might be overoptimistic about the returns to formal search, for example, because they have, potentially rationally, not experimented with those channels in the past (Chandrasekhar et al., 2020). This might lead to unsuccessful searches as managers have unrealistic expectations about the quality and quantity of applicants and, consequently, to negative treatment effects on hiring levels. If this were the case, we would expect managers to update their beliefs and revert back to informal search methods in the longer run.

5. Results

How do the theoretical predictions hold up empirically? We estimate the treatment effects of the vacancy subsidy intervention using the following equation¹⁵:

$$y_i = \beta_0 + \beta_1 \text{vacsub}_i + \epsilon_i \quad (2)$$

where y_i is the firm-level outcome of interest. y_i is aggregated across phone surveys and the endline survey whenever possible.¹⁶ vacsub_i is a dummy variable equal to one if firm i is eligible for the vacancy posting subsidy treatment. We use heteroskedasticity robust standard errors throughout the analysis and include sharpened q-values to correct for multiple hypothesis testing within each outcome family in brackets.¹⁷

¹⁴ Another channel also contributes to the same result. The subsidies could additionally increase white-collar vacancies by causing previously non-posting firms to start posting white-collar vacancies (as in Result 2). This channel could further be strengthened by production complementarities between white- and non-white-collar workers, which could lead to increased demand for white-collar workers due to more non-white-collar hires.

¹⁵ We registered a pre-analysis plan for this project with this as the main specification. We deviate from the pre-analysis plan in the following main ways. First, we expand the number of outcomes, as we consider studying both the extensive and intensive margins and the success ratio of vacancy creation. To account for this we include all variables in the multiple hypothesis test correction. In line with these changes, we do not normalize outcomes over time to be able to use extensive margin outcomes (we also do not observe differential timing by treatment group). Third, we focus on the pooled treatment effect estimation instead of separate effects for a screening add-on intervention as our main specification. We show disaggregated results in Tables A17, A18, and A19 and discuss the results in Section 6.1. Finally, we do not show hire- and vacancy-level specifications and outcomes for which the data quality is insufficient. More details can be found in Appendix Section F.

¹⁶ We aggregate outcomes across high-frequency and endline surveys to construct two types of variables: total counts across the treatment period (e.g., the total number of created vacancies) and averages across the treatment period (e.g., the fraction of filled vacancies). Our surveys are designed to always elicit recalls of the full treatment period regardless of the number and timing of successful follow-up surveys. Estimating effects at the survey level does not substantially affect point estimates or standard errors.

¹⁷ In Appendix A.2 we estimate treatment effects controlling for observable firm and manager characteristics. Specifically, we control for pre-specified covariates selected using the post-double LASSO for each outcome separately (Belloni et al., 2013). The results remain quantitatively and qualitatively similar.

Take-up and formalization of search. We find that the treatment causes a large and highly significant increase in the use of formal vacancy posting (columns 1 to 6 of Table 2). In particular, we find a 17pp increase in the fraction of firms posting vacancies through formal channels for at least one of their vacancies ($q < 0.01$).¹⁸ This is equivalent to a 331% increase relative to the control mean. This goes hand in hand with a substantial increase in the absolute number of formally posted vacancies (by 0.46 vacancies per firm or 320%, $q < 0.01$) and the fraction of vacancies posted through formal means (31pp or 447%, $q < 0.01$). The formalization of vacancy posting goes along with a significant substitution away from the use of other search channels (columns 7 to 9 of Table 2). We observe this reduction in the use of other search channels for all of network-based, agency-based, and on-premise advertising (Table A7, Panel A), in line with the model prediction. These large effect sizes suggest that our intervention succeeds in increasing the formalization of vacancy posting among treated firms, in line with result 1 of our theoretical framework.

Furthermore, firms are selective in using our intervention to post job adverts. Column 3 of Table 2 shows that, on average, firms in the treatment group post 0.56 vacancies through our intervention, which amounts to 73% of vacancies of firms that use the intervention at least once (or 35% of all posted vacancies in the treatment group). In total, among firms that posted any vacancy during the treatment period, 48% use the vacancy subsidy at least once. This suggests that despite initially being interested in using the intervention, firms are selective in their use of formal search channels. Moreover, this indicates that the expected returns to formal employee search might vary substantially across firms and vacancies.

5.1. Impact on vacancy creation

The vacancy subsidy intervention was designed to reduce the marginal cost of posting vacancies through formal channels. This decrease in marginal costs should make it more attractive for firms to post vacancies, as result 2 of our theoretical framework suggests. To test this hypothesis, we estimate treatment effects on vacancy creation in Table 3.

We find no significant treatment effect on overall firm-level vacancy creation on either the extensive or intensive margin of vacancy creation. On average, we observe an increase in the total number of vacancies by 0.12 (column 2). However, this effect is not statistically significant. The treatment group also exhibits a 4.8pp, insignificant decrease in the fraction of firms posting any vacancy (column 1). Interpreted within our theoretical framework, this implies there are few firms who are close to indifferent between not posting and posting formal vacancies. We do find a significant increase of 23% or 0.53 vacancies in the number of vacancies posted for those firms that post any vacancy during the study period (column 3; $q < 0.1$). This suggests that there might be some fixed costs associated with starting the search for new employees.

Composition effects. Result 3 of our theoretical framework establishes the possibility that vacancy subsidies might shift the composition of created vacancies. We present two descriptive pieces of analysis that explain why vacancy subsidies might induce changes in the type of

¹⁸ Table A6 compares compliers to non-compliers. Complying firms are larger, are more likely to work in the service sector, and less likely to be in manufacturing. They have an insignificant 2.5pp higher share of white-collar employees and pay white-collar workers 16% more (there is no difference in average baseline wages). Thus, compliers are not negatively selected in terms of offered salaries.

Table 2
Formalization of employee search.

	Take-up			Formal search			Other search		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Any	Any any vacs	# vacs	Any	# vacs	% vacs	Any	# vacs	% vacs
Treatment	0.215*** (0.020) [0.001]***	0.481*** (0.037) [0.001]***	0.556*** (0.080) [0.001]***	0.169*** (0.025) [0.001]***	0.459*** (0.111) [0.001]***	0.310*** (0.038) [0.001]***	−0.145*** (0.041) [0.001]***	−0.370*** (0.123) [0.001]***	−0.332*** (0.036) [0.001]***
Control mean	0.000	0.000	0.000	0.051	0.144	0.070	0.486	1.046	0.951
Observations	621	288	621	621	621	288	621	621	288

Notes: Table 2 shows that the vacancy subsidy increased formal employee search. Column 1 shows the fraction of firms posting at least one vacancy through our intervention. Column 2 shows the number of vacancies posted through our intervention conditional on creating at least one vacancy. Column 3 shows the number of vacancies for which the vacancy subsidy was used. Columns 4 to 6 show the impact of the vacancy subsidy on formal employee search. Columns 7 to 9 show the impact of the vacancy subsidy on other methods of employee search (e.g., networks and employment agencies). Heteroskedasticity robust standard errors are displayed in parentheses. Minimum q-values from two-stage false discovery rate correction are displayed in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3
Impacts on vacancy postings.

	Pooled			White collar			Non-white collar	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Any	# vacs	# vacs any	Any vac	# vacs	% vacs	Any vac	# vacs
Treatment	−0.048 (0.042) [0.188]	0.124 (0.171) [0.252]	0.529* (0.283) [0.085]*	0.072*** (0.026) [0.021]**	0.173*** (0.066) [0.021]**	0.118*** (0.040) [0.021]**	−0.069* (0.042) [0.110]	−0.051 (0.147) [0.376]
Control mean	0.495	1.153	2.327	0.079	0.144	0.119	0.449	1.009
Observations	621	621	288	621	621	288	621	621

Notes: Table 3 shows that the treatment increased white-collar but not non-white-collar vacancy creation. Columns 1 to 3 show effects on overall vacancy creation by firms. Column 1 shows effects on a dummy indicating at least one created vacancy. Column 2 shows the effect on the number of created vacancies. Column 3 shows effects on the number of vacancies conditional on creating at least one vacancy. Columns 4 to 6 show the impact on the creation of white-collar vacancies. Column 4 shows effects on a dummy indicating at least one created white-collar vacancy. Column 5 shows the effect on the number of created white-collar vacancies. Column 6 shows effects on the fraction of white-collar vacancies. Columns 7 and 8 show the impact on the creation of non-white-collar vacancies. Column 7 shows effects on a dummy indicating at least one created non-white-collar vacancy. Column 8 shows the effect on the number of created non-white-collar vacancies. White-collar vacancies are defined as “professional, managerial, or administrative” workers. Typical white-collar job titles include manager, accountant, and supervisor. Typical non-white-collar jobs are cooks, waiters, or carpenters. Heteroskedasticity robust standard errors are displayed in parentheses. Minimum q-values from two-stage false discovery rate correction are displayed in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

vacancies firms search for in our context. First, we make use of the following survey question in which we ask firm respondents about the expected quality of applicants obtained through formal channels: “Imagine that you posted a vacancy for a (non-)white-collar employee on [search channel]. What do you think would be the quality of applicants compared to hiring through family and friends?” We measure this for two types of jobs (white-collar and non-white-collar) and three formal search channels (newspapers, offline and online job boards).

We show firms’ beliefs about the returns to formal search in Figure A5. We focus on control group firms because the question was asked at endline. We find that a sizable share between 40% and 55% of respondents expects to get better applicants through formal channels compared to social networks. Across different search channels and worker types, the share of respondents expecting to get better applicants through formal channels compared to social networks is never smaller than the share of respondents expecting worse applicants. Yet, there are stark differences between higher-skilled white-collar applicants — where over 50% of respondents expect better applicants from formal channels — and non-white-collar applicants, where the corresponding number is only 40%, on par with the share of respondents expecting worse applicants.¹⁹

Second, in line with these expectations, we find that among firms in the control group, white-collar vacancies are more than four times as likely to be posted formally compared to non-white-collar vacancies (42 vs. 8 percent, see Table A1). This — together with managers’ perceived

usefulness of formal hiring channels by position type shown in Figure A2b — suggests that the returns to formal employee search are higher for white-collar positions, which could affect how firms use the vacancy posting subsidy.

In line with these patterns, we find that the intervention significantly affects the composition of vacancies created during the treatment period. Columns 4 to 8 of Table 3 show the impact on the skill composition of posted vacancies. We observe a significant increase in the level of white-collar vacancy creation at all margins (columns 4 and 5). On average, the number of white-collar vacancies increases by 0.173, which is equivalent to an increase of 120% relative to the control group mean. We also observe a relatively sizable decrease in the likelihood of posting any non-white-collar vacancy by 6.9pp or 15% of the control group. The two results combined yield a significant increase in the fraction of white-collar vacancies by 11.8pp on average (column 6). This suggests that the treatment leads firms to use white-collar vacancies as a substitute for non-white-collar vacancies as hypothesized in result 3 of our framework.²⁰

5.2. Impact on hiring

Next, we investigate to what extent the treatment effects on formal vacancy creation and vacancy composition translate into effects on firms’ hiring.

In terms of overall hiring, we observe a significant reduction in the fraction of vacancies successfully filled (Table 4). Specifically,

¹⁹ We also ask firm respondents about the expected number of applicants when posting a vacancy in the same three formal channels, for both white-collar and non-white-collar vacancies. Here, the differences between the two collar types are very small and insignificant, Figure A6.

²⁰ This substitution can be interpreted as evidence for convex cost of posting vacancies in a given time period. Our framework abstracts from this interpretation by only considering the decision to post a single vacancy.

Table 4
Impacts on hiring.

	Pooled			White collar				Non-white collar		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Any hire	# hires	% vacs filled	Any hire	# hires	% hires	% vacs filled	Any hire	# hires	% vacs filled
Treatment	−0.078* (0.042) [0.092]*	−0.210 (0.171) [0.159]	−0.203*** (0.041) [0.001]***	0.019 (0.022) [0.273]	0.005 (0.062) [0.379]	0.062 (0.042) [0.137]	−0.357*** (0.102) [0.003]***	−0.086** (0.041) [0.067]*	−0.215 (0.154) [0.137]	−0.167*** (0.043) [0.001]***
Control mean	0.454	1.218	0.877	0.069	0.153	0.118	0.847	0.412	1.065	0.877
Observations	621	621	288	621	621	250	78	621	621	252

Notes: Table 4 shows that the treatment had negative effects on vacancy filling rates. Columns 1 to 3 show effects on average hiring outcomes. Column 1 shows effects on a dummy indicating at least one hire during the treatment period. Column 2 shows the effect on the number of hires. Column 3 shows effects on the fraction of filled vacancies. Columns 4 to 7 show the impact on white-collar hiring outcomes. Column 4 shows effects on a dummy indicating at least one white-collar hire. Column 5 shows the effect on the number of white-collar hires. Column 6 shows effects on the fraction of white-collar hires. Column 7 shows effects on the fraction of filled white-collar vacancies. Columns 8 to 10 show the impact on non-white-collar hires. Column 8 shows effects on a dummy indicating at least one non-white-collar hire. Column 9 shows the effect on the number of non-white-collar hires. Column 10 shows effects on the fraction of filled non-white-collar vacancies. White-collar vacancies are defined as “professional, managerial, or administrative” workers. Typical white-collar job titles include manager, accountant, and supervisor. Typical non-white-collar jobs are cooks, waiters, or carpenters. Heteroskedasticity robust standard errors are displayed in parentheses. Minimum q-values from two-stage false discovery rate correction are displayed in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

we observe a reduction of 20pp in the fraction of successfully filled vacancies (down from a control group mean of 88%, $q < 0.01$, column 3). Similarly, the fraction of firms filling any vacancy (and thus making any hire) falls by 8pp ($q < 0.1$). This could be due to various factors, including a shift in the nature of posted vacancies or the observed shift in employee search channels. This pattern translates into a sizable decrease in the number of hires (0.21 hires or 17% of the control group mean). This decrease is driven by a reduction of firms successfully hiring any candidate rather than by the number of hires of actively-hiring firms. Put differently, we observe marginally significant treatment effects on the extensive but not the intensive hiring margin.

Composition effects. The composition effect in vacancy posting does not translate into more white-collar hires. We observe that the negative effects on the fraction of filled vacancies are present for both white-collar and non-white-collar vacancies (columns 7 and 10 of Table 4). However, the point estimate for white-collar vacancies is over twice as large in absolute terms (−35.7pp for white-collar vacancies vs. −16.7pp for non-white-collar vacancies).²¹ Table 4 also explores hiring numbers and shows no significant impacts and overall small effect sizes for white-collar hires. This is true for the fraction of firms hiring any white-collar workers, the total number of white-collar hires, and the fraction of white-collar hires. In contrast, we observe a marginally significant decrease of 8.6pp in the number of firms conducting any non-white-collar hire ($q < 0.1$), in line with the results on overall hiring numbers.²²

One interpretation of this pattern is that the treatment shifted firms’ hiring effort across search channels and vacancy types rather than increasing overall matching capacity. In our setting, non-white-collar workers are more commonly recruited through informal channels, while the treatment lowers the cost of formal recruitment. If formal recruitment is more demanding in terms of screening time and

managerial attention, firms may respond by reallocating effort toward formally posted vacancies and away from the more informal hiring processes through which non-white-collar workers are often hired. This interpretation is consistent with the broader pattern of results: treatment increases formal vacancy posting and shifts vacancy composition toward white-collar openings, but does not increase overall hiring. It is also consistent with the descriptive evidence in Table A9, which shows that formal vacancies are substantially more search-intensive than non-formal vacancies even at baseline.

6. Mechanisms

In this section, we provide evidence for two mechanisms that could contribute to the decrease in vacancy filling rates. First, we show that applicant numbers and quality are below firms’ expectations. Second, we observe a mismatch of applicants’ wage expectations and the wages firms are willing to offer. Consistent with these expectation-based mechanisms, we find that firms without experience using formal search channels drive the negative effects on vacancy filling rates. Finally, we provide evidence suggesting that imperfect information about applicant skills, firms only posting to learn about the market, and extended search durations play a limited role in explaining the results.

Applicant number and quality. We measure managers’ beliefs about the returns to formal search in two ways. First, we once again make use of the question asking our respondents whether different types of applicants obtained through different formal channels are of better or worse quality than those obtained through networks (introduced in Section 5.1).²³ We construct a normalized belief index, with higher values indicating a higher expected quality of applicants through formal search channels relative to network-based search. We find that, on average, managers in the treatment group have significantly lower expectations about the quality of applicants through formal channels (−0.17 standard deviations, $q < 0.1$) than the control group (Table A10). The impacts on expectations for white-collar and non-white-collar applicants are similarly negative (columns 2 and 3). This seems to be driven by firms updating about skills rather than applicants’ formal qualifications: 77.1% of applicants at our screening center meet all required criteria for the posted vacancy, such as education or experience levels.²⁴

²¹ The fact that we also observe an effect on non-white-collar vacancies can potentially be explained by two factors. First, it could be driven by endogenous changes in unobserved vacancy characteristics that make the vacancy harder to fill. For example, firms might try to fill positions that require specialized experience that workers in their network lack. Second, it could be that firms generally have inflated expectations about the quality of job-seekers which leads to them choosing a hiring threshold that is high relative to the realized quality distribution.

²² We find no evidence that our intervention affected the average quality of successful hires. In principle, the observed change in the type of vacancies created could also lead to a change in the quality or type of worker hired, even without affecting overall hiring numbers. To study this, we estimate the impact of the intervention on indicators that measure the match quality of new hires, namely the salary and the satisfaction of the manager with the new hire. Table A8 shows insignificant impacts with point estimates close to zero for both outcomes. We also find no effect on the share of female hires.

²³ Specifically, we ask managers “Imagine that you posted a vacancy for a [white/blue/pink/gray]-collar employee [on one of the central job-boards/on ezeqa.com/in The Reporter]. What do you think would be the quality of applicants compared to hiring through family and friends?” with answers on a 7-point Likert-scale from 1, “Much better”, to 7, “Much worse”.

²⁴ Our findings on belief updating are mirrored by Wu and Wang (2025) who document negative belief updating after being offered access to applicants

We also observe a lower than expected number of applicants. We ask about the *expected* number of applicants after posting a vacancy for different collar types through formal channels. For treated firms, we find a significant decrease in managers' beliefs about the number of applicants (0.21 standard deviations, $q < 0.1$). These effects are more noisily estimated due to the unbounded nature of the variable. The intervention increased average applicant numbers per posted vacancy by about 5.8 applicants (Table A11, $q < 0.1$).²⁵ This number is substantially below firms' baseline expectations of 11 additional applicants per vacancy just from posting on a single job board without taking other formal channels into account. At endline, the average number of expected applicants per vacancy for formal search channels ranges between 32 and 50 per channel in the control group (Figure A6). Figure A7 visualizes this gap between realized and expected applicant inflows by vacancy type. Firms' lower than expected applicant numbers and quality may be an explanation for their difficulty of filling created vacancies.

Mismatch in wage expectations. We observe a strong mismatch between applicants' expectations and realized salaries for the position to which they applied. Table A12 uses the applicant data we collect for firms in the screening treatment group to show applicants' reservation wages, wage expectations, realized salaries, and average baseline salaries. Three facts emerge. First, wage expectations and reservation wages are, respectively, 44% and 25% higher than the realized wage (when the vacancy is filled). For larger firms in our sample, we observe that realized wages almost match reservation but not expected wages. The gap between expectations and average baseline salaries at vacancy postings is even more pronounced. Applicants are also overoptimistic relative to the average earnings of workers in Addis Ababa in comparable positions (see Section B). This suggests that applicants are generally over-optimistic about the possible remuneration.²⁶

Second, applicants to unfilled vacancies have 38% higher reservation wages and 26% higher wage expectations compared to applicants to filled vacancies. This holds both in the raw data and when controlling for vacancy type and popularity to account for the endogeneity of vacancy filling. While firms with unfilled vacancies also offer higher wages at baseline, the gap between average reservation wages and baseline salaries is 15pp larger for applicants to unfilled compared to filled vacancies. Overall, this pattern is consistent with applicants' overly optimistic expectations at least partially explaining why firms face difficulties filling vacancies.

The role of experience. Having provided evidence of two expectations-based mechanisms, we now turn to exploring how they may arise. A candidate explanation is that firms' past experience with formal search drives the results: only 8.8% of firms used formal search channels regularly at baseline.²⁷ Unfamiliarity with formal search channels may be

associated with unrealistic firm expectations about applicants. Indeed, we find that inexperienced firms significantly negatively update about applicant quality whereas experienced firms do not (Table A15). Effects on expected applicant number are similar in size: while experienced firms appear to update even more negatively, the effects are noisily estimated.

Inexperienced firms may also be *ex-post* less attractive to applicants compared to firms who regularly search through formal channels. Table A16 shows that inexperienced firms pay lower wages, but do not differ much in sector composition. Such mismatch is plausible as most job adverts, including our template, lack salary information (Balgova et al., 2025). Advertising on formal channels may be a positive signal of firm quality in itself which could further inflate applicants' wage expectations relative to the wages inexperienced firms typically offer. Together, this could lead to a mismatch between applicant expectations and offered wages.

In line with this hypothesis, we find that treated inexperienced firms generally see negative effects of the intervention whereas experienced firms see noisily estimated positive effects (Table 5). Inexperienced firms are 10.1pp less likely to make at least one hire ($p < 0.05$), whereas experienced firms are a noisily estimated 13.6pp more likely to make at least one hire ($p = 0.303$). The treatment effect difference of 23.7pp is significant at the 10% level, suggesting that experience with formal search channels drives treatment effects.

We find that both inexperienced and experienced firms significantly increase their search for white-collar employees, though experienced firms increase their search even more (columns 3 and 4). However, inexperienced firms do not see an increase in white-collar hires whereas experienced firms see a sizable but not quite significant increase in the likelihood and number of white-collar hires (columns 9 and 10). For non-white-collar hires, we observe a significant decrease in the number of hires but not vacancies for inexperienced firms, whereas experienced firms have sizable but imprecisely estimated positive effects (columns 6 and 12).

This translates into negative treatment effects on the vacancy-filling rates among inexperienced firms (−23pp, $p < 0.01$; column 13). The effect on firms that were already using formal channels at baseline is significantly larger (35pp, $p < 0.05$), with sizable positive but noisily estimated treatment effects for this subgroup (11pp, $p = 0.47$). This pattern holds for both white-collar and non-white-collar vacancies (columns 14 and 15). This effect is not driven by firms familiar with formal channels being better at filling vacancies in general. In the control group, these firms are 35pp less likely to fill vacancies compared to firms that did not use formal channels at baseline. The treatment thus roughly equalizes vacancy filling rates between experienced and inexperienced firms.

6.1. Alternative explanations

In this section, we explore several other channels that could drive the reduction in vacancy-filling rates in the treatment group. We find no evidence that providing skill screening services affects treatment effects on hiring outcomes. We also argue that an increase in search time would have to be implausibly large to explain the reduction in vacancy filling rates we observe.

through an employment agency. They also relate to Caria and Falco (2024) who find that employers' overly pessimistic beliefs about potential employees limit hiring in Ghana.

²⁵ Low applicant inflows are not inconsistent with the fact that job-seekers report using formal search methods. In our candidate survey data, the median job-seeker reports only two applications in the last 30 days, four hours of search in the last seven days, and 100 ETB in search expenditure in the last seven days. This suggests that, although formal search is present, job-seekers are not applying broadly across many formal vacancies, so the market remains relatively thin.

²⁶ Our analysis here is restricted to screened applicants who, by definition, use formal search channels. In Appendix D with Table D1, we show that such overoptimism is significantly stronger among formally searching job-seekers in Addis Ababa, which is consistent with our hypothesis that a mismatch in wage expectations drives the reduction in vacancy filling rates of formally posted vacancies.

²⁷ Past use of formal search channels is not just related to expectations but also hiring professionalism in general. To distinguish these mechanisms, we

construct an index of baseline hiring professionalism based on firms' self-assessed quality of their hiring process and the number of screening steps in a typical hire. As expected, this measure correlates positively with the baseline use of formal search channels. However, we find no meaningful treatment-effect heterogeneity by hiring professionalism (Table A13). This suggests that the heterogeneity by past formal-search use is more likely to reflect the expectation component of prior experience than differences in hiring professionalism per se. Table A14 shows that there is little evidence of heterogeneity by other dimensions.

Table 5
Effects on vacancy filling rates by experience.

	Vacancy creation						Hires						Fraction filled		
	(1) any	(2) #	(3) any wc	(4) # wc	(5) any non-wc	(6) # non-wc	(7) any	(8) #	(9) any wc	(10) # wc	(11) any non-wc	(12) # non-wc	(13) pooled	(14) wc	(15) non-wc
Treatment	−0.067 (0.044)	0.141 (0.162)	0.057** (0.026)	0.166*** (0.060)	−0.088** (0.044)	−0.027 (0.147)	−0.101** (0.044)	−0.278 (0.174)	0.008 (0.023)	0.003 (0.054)	−0.105** (0.043)	−0.281* (0.161)	−0.232*** (0.041)	−0.455*** (0.098)	−0.190*** (0.044)
Treatment × Used formal channels at baseline	0.203 (0.143)	−0.081 (0.902)	0.201* (0.115)	0.167 (0.367)	0.194 (0.139)	−0.245 (0.646)	0.237* (0.139)	0.824 (0.744)	0.143 (0.099)	0.103 (0.387)	0.196 (0.134)	0.720 (0.552)	0.345** (0.160)	0.540* (0.293)	0.320* (0.166)
Used formal channels at baseline	−0.096 (0.111)	0.538 (0.783)	0.064 (0.076)	0.346 (0.281)	−0.146 (0.106)	0.192 (0.578)	−0.151 (0.106)	−0.040 (0.534)	0.024 (0.064)	0.285 (0.323)	−0.155 (0.102)	−0.325 (0.388)	−0.349*** (0.128)	−0.462* (0.254)	−0.327** (0.127)
Treatment effect: Used formal channels at baseline	0.136 (0.136)	0.061 (0.887)	0.258** (0.113)	0.333 (0.362)	0.106 (0.132)	−0.273 (0.629)	0.136 (0.132)	0.545 (0.724)	0.152 (0.097)	0.106 (0.384)	0.091 (0.127)	0.439 (0.528)	0.113 (0.155)	0.085 (0.276)	0.130 (0.160)
Control mean	0.495	1.153	0.079	0.144	0.449	1.009	0.454	1.218	0.069	0.153	0.412	1.065	0.877	0.847	0.877
Observations	621	621	621	621	621	621	621	621	621	621	621	621	288	78	252

Notes: Table 5 shows that the negative effects on vacancy filling rates are driven by firms without previous experience with formal search channels. Columns 1 to 6 show effects on vacancy creation. Columns 7 to 12 show effects on hires. Columns 13 to 15 show effects on vacancy filling rates. Sample in columns 13 to 15 is restricted to firms who create at least one vacancy of considered type during the study period. At baseline, 8.8% of firms used formal search channels regularly. wc indicates white-collar vacancies, defined as “professional, managerial, or administrative” workers. Typical white-collar job titles include manager, accountant, and supervisor. Typical non-white-collar jobs are cooks, waiters, or carpenters. Heteroskedasticity robust standard errors are displayed in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Information frictions about worker skills. The usefulness of the vacancy subsidies may be limited by firms' inability to discern applicants' skills when they arrive through formal channels. Imperfect information about skills is an important aspect in many labor markets in developing countries — including in Ethiopia — and could limit the effectiveness of formal employee search (Carranza et al., 2022; Abebe et al., 2026; Bassi and Nansamba, 2022). The theoretical framework in Appendix E models screening cost as part of the overall search cost through formal channels. It implies that reducing screening costs can further amplify the effect of subsidies on vacancy creation and the shift towards white-collar vacancies.

To test whether limited information about candidate skills constrains the use of formal search channels, we offer half the firms in the treatment group the option to have all applicants screened for three skills or traits of the firm's choice. We invite all applicants to a screening center in downtown Addis Ababa for a screening session. We then pass their test results (grouped in terciles among all applicants to a given vacancy) on to the hiring managers who are free to arrange interviews. Figure A8 shows a sample skill report firms receive. This design serves three purposes. First, giving firms a choice of skills ensures that firms receive relevant information. Second, limiting the number of skills to three limits the cognitive load for managers. Third, ranking within vacancies ensures variation in skill signals for all vacancies.

Overall, we find very little evidence that the additional screening affects treatment effects. Table A17 shows that treatment take-up and the use of formal search methods are not affected by the screening treatment (columns 1 to 6). We see suggestive evidence that the use of other search methods decreases more when screening is offered. The effects are between 33% and 68% larger but mostly insignificant (columns 7 to 9). This heterogeneity is driven by network-based search which only decreases significantly when skill screening is added to subsidies (Table A17, Panel B). This is in line with formal search becoming a better substitute when screening is offered as an add-on, potentially because networks provide better information about applicant skills (Dustmann et al., 2016; Magruder, 2013).

We observe no effect of the screening add-on on vacancy creation and hiring. Interaction effects are insignificant, both in aggregate and when disaggregating white-collar and non-white-collar vacancies (Tables A18 and A19). We are not powered to detect small differences in treatment effects. However, point estimates of the difference in treatment effects are at times sizable and mostly negative, making it unlikely that the screening had substantial positive effects on firms' hiring behavior. This suggests that even if firms face more severe information frictions when using formal search channels, these frictions do not limit firms' use of formal vacancy posting or affect their vacancy creation when posting costs are subsidized.

Job advert quality. The negative effect among inexperienced firms is unlikely to be driven by inexperienced firms drafting bad quality adverts. We provide job-advert templates to all treated firms to ensure consistent advert quality. The template is modeled after typical job adverts on the labor market and most firms end up using a version of our template. Table A20 describes how the content of vacancies posted with and without a template and those in the control group differ. Template job adverts are more likely to describe job details and application instructions but are less likely to contain salary information compared to both treated non-template and control vacancies. It is, thus, possible that the templates increased the quality of job postings which may have contributed to the observed expectations mismatch.

Vacancy creation as exploration. It is possible that firms use the vacancy subsidy to learn about market conditions and never intended to actually hire white-collar workers. However, we find that many of the additional white-collar vacancies are created to replace workers who left the firm. Table A21 shows that treated firms post 0.052 (75% of the control mean) additional vacancies to replace workers who left ($p < 0.1$). We observe no significant impact on vacancies created for other reasons. This pattern suggests that firms have concrete hiring needs and that they do not simply create vacancies to learn about market conditions.

Extended search duration. Another potential explanation for reduced vacancy filling rates is that search through formal channels might take longer. This could lead us to overestimate the share of unfilled vacancies. However, we think that this channel is unlikely to explain the effects we observe. If, in one survey round, firms tell us that the search for a created vacancy is still ongoing, we follow up on this same vacancy in the next survey rounds until they tell us that the search has been concluded. We continue to do that during the post-treatment follow-up period. Hence, we capture hiring outcomes at least a few months after vacancy creation, which is an order of magnitude longer than the average search duration of five days in the control group.²⁸

7. Downstream outcomes

Next, we explore whether the vacancy subsidy has downstream effects on firm behavior and outcomes at endline and beyond.

Workforce effects. One possible way for firms to compensate for lower hiring rates is to increase salaries to incentivize retention of existing employees. We find that firms in the treatment group have a slightly higher average salary level at endline (Table A23). This is driven by their non-white-collar workers, the group of workers for whom we see negative hiring effects. In terms of turnover, we observe a, noisily estimated, 0.36 workers or 14.8% reduction of the number of workers who left between baseline and endline (Table A24). A reduction of turnover is in line with firms posting 0.22 fewer non-white-collar vacancies to replace workers who left the firm ($p < 0.05$, Table A21). Still, firms' overall workforce decreases by an insignificant 2.5 employees or 15% of the control group mean in line with the observed decrease in hiring in the treatment group (Table A25). This negative hiring effect is driven by non-white-collar workers as the share of white-collar employees is a significant 2.4pp (or 24%) higher in treated firms.

Overall, the data is consistent with firms attempting to, but only partially succeeding at, reducing turnover among non-white-collar employees by increasing salaries. However, given the imprecise nature of the estimates, we treat this result as an informed hypothesis rather than an empirical finding.

Search beyond the experiment. How does our intervention affect firms' employee search behavior beyond the duration of the subsidy? To answer this question we use data from a two-month post-treatment follow-up. We attempt to recontact all firms for four further surveys after their treatment period has lapsed. On average, we conduct 2.9 surveys with 554 firms. Attrition is unrelated to treatment status (columns 5 and 6 of Table A5).

In line with negative experiences with formal channels, we find that the usage of formal channels does not persist beyond the treatment. Column 3 of Table 6 shows a noisily estimated reduction in the likelihood of posting any formal vacancy which is small in absolute terms (1pp) but relatively sizable relative to the control mean of 2.1%.²⁹ We also observe a significant decline in take-up during the treatment period, in line with learning about the usefulness of formal search (Tables A27 and A28). While not conclusive, this is consistent with firms' changed beliefs about the returns to formal search shifting their behavior in the longer term.³⁰ Our results contrast with Abebe et al. (2025) who find

²⁸ We do not observe significant increases in realized search duration of filled vacancies (Table A22). Effects on other search inputs, such as staff time and monetary expenses, are also insignificant and relatively small. So is the effect on a summary index of search costs.

²⁹ Interpreting heterogeneity by baseline usage of formal channels is complicated by the fact that less than 2% of baseline non-users in the control group post formally. This means that there is very little scope for a further reduction and the interaction coefficients in column 3 of Table A26 are hard to interpret.

³⁰ However, we find no significant treatment effects on firms' willingness-to-pay for the continuation of our intervention's vacancy posting services or for formal vacancy posting more generally, potentially because statistical power is limited with an MDE of 62% of the control group mean (Table A29).

Table 6
Impact on post-treatment behavior.

	Vacancy posting							Hires				
	(1) any	(2) #	(3) any formal	(4) % formal	(5) any wc	(6) any non-wc	(7) % wc	(8) any	(9) #	(10) any wc	(11) any non-wc	(12) % wc
Treatment	−0.075** (0.035) [0.031]**	−0.178*** (0.068) [0.015]**	−0.010 (0.012) [0.167]	−0.019 (0.048) [0.263]	0.023 (0.016) [0.075]*	−0.101*** (0.034) [0.013]**	0.205*** (0.071) [0.013]**	−0.081** (0.035) [0.023]**	−0.255*** (0.083) [0.013]**	0.018 (0.016) [0.120]	−0.205*** (0.063) [0.013]**	0.171** (0.070) [0.022]**
Control mean	0.221	0.379	0.021	0.075	0.026	0.211	0.087	0.221	0.458	0.026	0.347	0.087
Observations	554	554	554	95	554	554	95	554	554	554	554	93

Notes: Table 6 shows that treated firms search for relatively more white-collar labor, because they reduce their demand for non-white-collar labor. It displays the effects of the vacancy subsidy intervention on post-treatment vacancy posting and hiring in the two months following the four-month treatment period. Columns 1 to 7 show treatment effects on vacancy creation. Column 1 shows the effects on creating any vacancy post-treatment. Column 2 shows the effect on the number of created vacancies. Column 3 shows the effect on posting any vacancy formally. Column 4 shows the effect on the fraction of formally posted vacancies. Columns 5 and 6 show effects on dummies indicating any white-collar and non-white-collar vacancy, respectively. Column 7 shows the effect on the fraction of white-collar vacancies. Columns 8 to 12 show effects on hiring outcomes. Column 8 shows the effect on having any hire post-treatment. Column 9 shows the effect on the number of post-treatment hires. Columns 10 and 11 show effects on dummies indicating any white-collar and non-white-collar hire, respectively. Column 12 shows the effect on the fraction of white-collar hires. Outcomes in columns 4, 7, and 12 are only defined for firms with at least one created vacancy or hire. White-collar vacancies are defined as “professional, managerial, or administrative” workers. Typical white-collar job titles include manager, accountant, and supervisor. Typical non-white-collar jobs are cooks, waiters, or carpenters. Heteroskedasticity robust standard errors are displayed in parentheses. Minimum q-values from two-stage false discovery rate correction are displayed in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

an increase in formal search after negative search experiences using job fairs. The findings suggest that learning about specific search channels is an important factor for firms’ choice of search method.

We further find that treated firms significantly reduce their labor demand in the post-treatment period (Table 6).³¹ They are 7.5pp less likely to create at least one vacancy ($q < 0.05$, column 1) and create 0.18 fewer vacancies ($q < 0.05$, column 2). This goes along with fewer hires, both at the extensive margin (−8.1pp, $q < 0.05$, column 8) and the intensive margin (−0.26 hires, $q < 0.05$, column 9). Importantly, this is entirely driven by non-white-collar hiring, consistent with the previous results of higher wages and reduced turnover. It is also driven by inexperienced firms who are most likely to learn from experimenting (Table A26).

This pattern implies a persistent post-treatment shift towards more white-collar vacancies and hires. The share of white-collar vacancies in the treatment group is 20.5pp higher than the 8.7% mean in the control group ($q < 0.01$). This also results in a 17.1pp larger fraction of white-collar hires relative to the 8.7% mean in the control group ($q < 0.05$).³²

The persistent shift in behavior post-treatment suggests that firms were ex-ante not perfectly informed about the returns to formal search. However, they updated negatively leading to a reduction in overall non-white-collar vacancy creation, potentially accompanied by an increase in retention effort. This results in a relative shift of firms’ labor demand toward more white-collar workers. Our results highlight how labor market experiences persistently shape both the quantity and relative quality of firms’ vacancy creation behavior and their workforce.

Impact on firm performance. Finally, we turn to effects on firm performance and business outlook. Our results on hiring have ambiguous theoretical implications for these outcomes. On the one hand, we see an increase in the share of white-collar workers in the firm. If white-collar workers substitute for non-white-collar workers, this could increase profits if firms initially had too few white-collar employees relative to non-white-collar employees. On the other hand, firms invested resources in unsuccessful hiring attempts and may have raised wages for existing employees, which could reduce profits, at least in the short term.

Empirically, we find no significant effects of the vacancy posting subsidy on downstream firm outcomes (Table A30). Column 1 shows a

sizable (ca. −29%) but insignificant negative impact on reported profits in the last 30 days. The effect on revenues is much smaller at −2.5% and also insignificant. Similarly, the impact on managers’ business outlook is negative but small, −0.021 and −0.036 standard deviations, and far from significant. However, we caution that limited take-up of the intervention limits statistical power to detect small effects on firm performance and outcomes.

8. Concluding remarks

Do our results imply that firms made a costly mistake in taking up the treatment? They reduce hiring after the treatment period but seem to try to increase retention through higher wages. The persistent effect on behavior suggests that firms update their beliefs and now make potentially better-informed hiring decisions. Moreover, we observe a shift in the composition of both firms’ labor demand and labor force, suggesting that they updated their beliefs about the optimal labor force composition in response to our treatment. To the extent that firms anticipated the expected value of learning, take-up may have been ex-ante optimal even if it resulted in (temporary) unprofitable spending on formal search.

More broadly, our findings suggest that labor market institutions can affect the composition of firms’ labor demand. If job-seekers sort into different search channels based on skills or occupation, channel-specific frictions or costs can shift the composition of labor demand. In our context, this means that firms try to fill relatively more white-collar positions once they have cheaper access to formal search channels and they shift the composition of their workforce towards white-collar workers. The composition effects are thus present both in *realized* labor demand, that is employment stocks, and in *active* labor demand, that is vacancy creation. Whether the additional *active* demand for white-collar workers could be realistically met under current conditions is unclear, though firms seem to initially believe they face positive vacancy filling probabilities.

Our findings suggest that a similar pattern may hold among job-seekers: they may adapt their expectations and reservation wages depending on the type of opportunities they encounter in a given search channel. However, more research is needed to confirm this hypothesis.

Finally, we discuss two factors that affect the external validity of our study. First, it is important to keep in mind the partial equilibrium nature of our research. Our experiment was too small to affect the search behavior of job-seekers in this market, which already is predominantly formal. As such, this study only speaks to the effect of formalized employee search given current job search habits. If a large fraction of firms were to switch to using more formal search channels, this could also incentivize job-seekers to rely even more on these channels. This,

³¹ Firms’ behavior is unlikely to reflect a front-loading of vacancy posting because there is no increase in vacancy creation during the treatment period.

³² The post-treatment results are qualitatively in line with results during the second half of the treatment period. Tables A27 and A28 show that, while take-up decreases over time, treatment effects on vacancy creation and composition remain relatively stable over time.

in turn, might have important consequences for the composition of the applicant pool and the resulting incentives for firms to use formal channels. Studying the general equilibrium characteristics of coexisting formal and informal search processes is a promising avenue for future work.

Second, our findings depend on actual and perceived sorting of labor market participants into search channels. Figure A9 shows that the mismatch in search channels between job-seekers and firms is not unique to Ethiopia. We observe a similar, though less pronounced pattern in Ghana and Vietnam. In these contexts, experience and learning may be of similar importance in determining the effects of one-off vacancy subsidies. In contexts where formal search is already widely used by firms (such as Malaysia, as shown in Figure A10), the expectation mismatch channel is likely to be less important as job-seekers anticipate the quality distribution of firms.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.jdeveco.2026.103876>.

Data availability

The replication data for this article can be found at <https://doi.org/10.17632/2fmcwrwt94.1>.

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