

# Do Employers Discriminate against Married Women? Evidence from a Field Experiment in Egypt

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## Abstract

This research submitted fictitious resumes to online job postings in Egypt, randomizing gender and marital status. More job postings explicitly required men (14 per cent) than women (4 per cent). Despite the gender discrimination in postings, women were only slightly less likely to receive callbacks than men, with only a small difference between single and married women. Differences in callbacks by sex and marital status were not statistically significant. Women and especially married women were, however, particularly likely to be asked for more information rather than scheduled for an interview.

**Keywords:** Discrimination, Gender, Marital Status, Labour Market, Field Experiment, Egypt

**JEL codes:** J71, J23, J31

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## Data availability statement

Data are available from the Economic Research Forum at [www.erfdataportal.com](http://www.erfdataportal.com). Replication Stata .do files will be made available on the corresponding author’s website.

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## 1. Introduction

Around the world, far fewer women are employed than men. As of 2024, while 69 per cent of men were employed globally, only 46 per cent of women were employed (ILO 2024). Women who marry and have children are particularly less likely to be employed (Angelov, Johansson, and Lindahl 2016; Kleven, Landais, and Søgaard 2019; Kuziemko et al. 2018). If they do engage in employment, married women may face a motherhood wage penalty (Correll, Benard, and Paik 2007; Kleven et al. 2019; Yu and Hara 2021). In contrast, for men, family formation is associated with higher rates of employment and a fatherhood wage premium (Glauber 2018; Yu and Hara 2021).

Both supply- and demand-side factors have a role in these gendered, life-cycle labour market disparities. On the supply side, gender norms emphasize women's caregiving, thus increasing their opportunity cost of time and exits from employment (Assaad, Krafft, and Selwaness 2022; Attanasio, Low, and Sánchez-Marcos 2008). On the demand side, employers may discriminate against women and particularly married women (Arceo-Gomez and Campos-Vazquez 2014; Bedi, Majilla, and Rieger 2022; Zhang et al. 2021). There is, however, relatively less research on these demand-side factors than supply-side issues, in part due to the challenges of accurately assessing discrimination. Understanding the role of discrimination on the demand side versus supply side issues is critically important to ultimately addressing gender and motherhood disparities in employment.

This paper investigates employer discrimination against women and especially married women, based on a field experiment in Egypt. The Middle East and North Africa (MENA) region has the world's lowest female labour force participation (FLFP) (Verick 2018). As of 2023, only 18 per cent of Egyptian women were in the labour force and only 15 per cent were employed (Krafft, Assaad, and McKillip 2024). Employment in the private sector, which this paper focuses on, is halved at marriage for women in Egypt (Assaad, Krafft, and Selwaness 2022; Krafft, Assaad, and Keo 2022). Gender and marital status are thus both extremely salient to labour market outcomes in this context. In the experiment, gender and marital status were randomized on 2,676 resumes sent to 710 online job postings.

Among the online job postings, 14 per cent explicitly stated they required a male applicant and 2 per cent preferred a male applicant. Only 4 per cent required a female applicant and 79 per cent did not specify applicant gender. Less than 1 per cent stated a preference for marital status (single). Although this is clear evidence of labour market discrimination in postings tied to gender and particularly specific occupations, women were, on average, only slightly less likely to receive callbacks (10.4 per cent) than men (12.0 per cent). Married women were the group least likely to receive callbacks (9.8 per cent), followed by married men (10.7 per cent), single women (10.9 per cent) and lastly single men (13.2 per cent). Married women were, additionally, the most likely to have callbacks asking for more information (37.0 per cent of positive callbacks), with lower rates for single women (27.0 per cent) and much lower rates for men regardless of marital status (8-11 per cent). Men were more likely to have an interview scheduled (82-83 per cent). In multivariate models, there were not statistically significant differences in receiving callbacks by sex or marital status. Nor was there significant heterogeneity in callbacks when assessing differences by industry, economic activity, age requirements, work experience requirements, or most skill requirements.

Women were, however, significantly more likely to be asked for more information when analysing specific types of callbacks.

These findings are an important addition to the extant but limited literature using field experiments to assess gender discrimination (Azmat and Petrongolo 2014; Bertrand and Duflo 2017; Lippens, Vermeiren, and Baert 2023). Most of the literature does not find discrimination against women, on average (Lippens, Vermeiren, and Baert 2023). Yet, there may be discrimination both in favour of and against women in different segments of the labour market (Azmat and Petrongolo 2014). A recent review of the discrimination field experiment literature highlighted the paucity and importance of studies examining the bias against women with children (Bertrand and Duflo 2017). Furthermore, as of 2021, most field experiments on gender were from developed countries, along with almost all the studies on motherhood or marital status, which find a mix of no and negative effects (Lippens, Vermeiren, and Baert 2023).

This work, on gender and marital status from a developing country context, shows that married women do not necessarily face substantial employer discrimination, on average, at least in the labour market segment of online job postings this paper is able to examine. The findings are in contrast to the body of evidence in other developing countries showing that married women and mothers are often discriminated against in the labour market (Arceo-Gomez and Campos-Vazquez 2014, 2019; Bedi, Majilla, and Rieger 2022; Bedi, Majilla, and Rieger 2018; Maurer-Fazio and Wang 2018). That employers in Egypt are particularly likely to ask for more information of women may signal a willingness to consider women, but discrimination manifesting in uncertainty about proceeding with interviews and hiring.

This research also adds to the body of evidence trying to diagnose persistently low FLFP in developing countries generally and MENA particularly. MENA has the lowest FLFP of any region in the world, at 20 per cent (El-Kogali and Krafft 2020). In the private sector in MENA, nearly half of working women exit employment before or at marriage (Assaad, Krafft, and Selwaness 2022). There is a large body of research characterizing low FLFP in MENA, but primarily from the labour supply side (e.g. Assaad et al. 2020; Bursztyn, Gonzalez, and Yanagizawa-Drott 2020; Gauri, Rahman, and Sen 2019; Spierings 2014; Spierings, Smits, and Verloo 2010), with little evidence on labour demand and especially discrimination.

Only a few past experiments have assessed gender discrimination in MENA. Correspondence studies in Turkey and Tunisia did not find discrimination against women, on average, and did find some potential favouritism of women in certain segments of the labour market (Alaref et al. 2020; Balkan and Cilasun 2018, 2019). A list experiment with certain sectors of employers in Egypt demonstrated half of employers both openly and in the experiment discriminated against women (Osman, Speer, and Weaver 2025). However, because smaller *employers* were more likely to discriminate than larger ones (Osman, Speer, and Weaver 2025), the magnitude of discrimination facing *applicants* is necessarily less, but this magnitude has not previously been estimated. None of these studies assessed discrimination against married women, specifically.

## 2. Background

## ***2.1. Gendered employment over the lifecycle***

Both supply- and demand-side factors have historically shaped women's participation in the labour force (Goldin 2006; Verick 2018). Marriage and childbearing decrease FLFP, since, given women's disproportionate role in caregiving, women face increased opportunity costs when they work (Attanasio, Low, and Sánchez-Marcos 2008; Bloom et al. 2009; Schultz 1997). Social norms that emphasize the role of men as breadwinners and women as caregivers may contribute to reductions in both the supply and demand for female labour and especially married women's labour (Jayachandran 2021; Spierings 2014).

Discrimination could also be a factor in low female and especially married female employment. Field experiments, both correspondence studies, sending fake resumes, and audit studies, sending matched male-female pairs of job applicants, have tested for discrimination. In developed countries, field experiments do not show discrimination against women in hiring, and some even favour women (Bertrand and Duflo 2017; Kline, Rose, and Walters 2022; Lippens, Vermeiren, and Baert 2023). Women may, however, be discriminated against in terms of high-wage jobs (Keller, Molina, and Olney 2023; Neumark, Bank, and Van Nort 1996). There are fewer studies from developing countries, with findings of no discrimination against women on average in most cases (Alaref et al. 2020; Balkan and Cilasun 2018, 2019; López Bóo and Trako 2010), but some contexts showing discrimination against women (Chen 2024; Zhang et al. 2021). Studies often find favouritism of women in female-concentrated sectors and favouritism of men in disproportionately male sectors (Alaref et al. 2020; Kübler, Schmid, and Stüber 2018; Muradova and Seitz 2021; Zhou, Zhang, and Song 2013). Discrimination may thus be context-specific, both in terms of differential discrimination across country contexts, and even within different sectors and segments of one country's labour market.

Some studies, globally, have specifically examined the interaction of parental or marital status and gender. The studies to date in developed country contexts have found a mix of no discrimination or discrimination against mothers (Bygren, Erlandsson, and Gähler 2017; González, Cortina, and Rodríguez 2019; Lippens, Vermeiren, and Baert 2023). Those few studies in developing country contexts have generally found discrimination against mothers (Arceo-Gomez and Campos-Vazquez 2014, 2019; Bedi, Majilla, and Rieger 2022; Bedi, Majilla, and Rieger 2018; Maurer-Fazio and Wang 2018), with some exceptions (Horvath 2020). Single young women or married women without children may also face discrimination due to the expectation that they will, subsequently, become mothers and leave the labour force, or be less productive if they remain (Lommerud, Straume, and Vagstad 2015). A number of studies have found evidence of this anticipatory discrimination (Baert 2014; Becker, Fernandes, and Weichselbaumer 2019; He, Li, and Han 2023; Petit 2007). To date, there is no evidence of pro-mother discrimination. Magnitudes of discrimination against mothers can be substantial. For instance, in India, female applicants who were mothers were 20 percentage points (57 per cent) less likely to receive a callback for their job application (Bedi, Majilla, and Rieger 2022).

## ***2.2. MENA and Egyptian context***

As of Egypt's 2003 labour law, women were entitled to non-discrimination in employment (World Bank 2022). Yet, despite rising educational attainment, employment of women has been falling

over time in MENA generally and Egypt specifically (Assaad et al. 2020; El-Mallakh, Maurel, and Speciale 2018; Krafft, Assaad, and Keo 2022). A strong male breadwinner/female homemaker norm shapes gendered labour supply and demand (Hoodfar 1997; El-Feki, Heilman, and Barker 2017). Norms also prioritize men's employment; more than 80 per cent of men and women in Egypt agreed that when jobs are scarce, men should have more of a right to employment than women (Keo, Krafft, and Fedi 2022).

Employment is a pre-requisite to marriage for men, but women may never work and if they do, often leave work at marriage (Assaad, Krafft, and Selwaness 2022; Krafft and Assaad 2020). Challenges for women's, and especially married women's employment are particularly acute in the private sector (Assaad, Krafft, and Selwaness 2022; Barsoum 2010, 2004, 2023). Wage work in the private sector, which is rare even for single women, is halved as women marry (Assaad, Krafft, and Selwaness 2022; Krafft, Assaad, and Keo 2022). The relative roles of supply- and demand-side factors, particularly employer discrimination, in married women's exit are unknown.

There are three other correspondence field experiments assessing employer's gender discrimination, as of 2024, in MENA. Two correspondence studies were in Turkey, applying to jobs in Istanbul (the capitol) using an online job platform (Balkan and Cilasun 2019, 2018). Resumes were for college graduates aged 22-23. The studies did not find discrimination against women, and even some potential favouritism for female sub-groups (Balkan and Cilasun 2019, 2018). Another labour market correspondence field experiment looked at gender discrimination in Tunisia (Alaref et al. 2020). The study randomized gender for university graduates and entry-level job postings in the capitol region for 14 occupations in four fields (engineering, finance/economics, information technology (IT), and marketing). The study applied to jobs listed on Tunisia's two largest jobs platforms. The study found positive discrimination – in favour of women – although there was substantial heterogeneity by field, with some fields having discrimination in favour of women and other fields in favour of men. Because marital status is not typically listed on resumes in Tunisia, it was not studied (Alaref et al. 2020). These past studies were more limited in the scope of postings included than this experiment.

Although these studies were also in MENA, the contexts in terms of women's employment are different than Egypt. In Tunisia, women's employment rate, at 23 per cent as of 2019 (ILO and ERF 2022), is higher than Egypt's 15 per cent (Krafft, Assaad, and McKillip 2024). Private sector employment is much more common for women in Tunisia than Egypt, and there is a much smaller relative and absolute drop in Tunisian women's employment at marriage – even returning to its pre-marriage level within eight years of first marriage (Assaad, Krafft, and Selwaness 2022). In Turkey, women's employment rates are higher (double Egypt's) at 29 per cent in 2018 (Turkish Statistical Institute 2025), although married women were half as likely to work as single women (Ilkcaracan 2012). Egypt is thus notably a lower employment rate context than studied previously, even within MENA. Disparities in employment rates, however, do not necessarily correlate one to one to discrimination. Indeed, it is theoretically possible that the few women who seek work are so strongly selected that employers could engage in pro-women discrimination.

A recent experiment examined gender discrimination among employers in Egypt (Osman, Speer, and Weaver 2025). The study both asked employers directly and used list experiments to elicit gender discrimination among establishments in the hotel, restaurant, retail, and IT sectors. Half

(51 per cent) of employers admit they prefer hiring men over women, with a similar share in the list experiment. Discriminating employers do not take more time to hire, but do pay productivity costs for their discrimination (Osman, Speer, and Weaver 2025). Although the study suggests that there is substantial gender discrimination in Egypt's labour market, the magnitude of discrimination facing applicants and employees could be quite different on several axes. First, in a segmented labour market, some employers may prefer women over men, but this is not assessed in the experiment. Second, the average *employee* could face different discrimination from the average *firm*. Indeed, Osman, Speer, and Weaver (2025) show the preference for men declines with firm size. Since there are more employees in larger firms, the average *employee* necessarily, mathematically, faces lower discrimination than the *firm* average. Specifically, calculations based on the same four industries indicate that, while 51 percent of *employers* prefer hiring men, on average, 14 per cent of *employees* are in a firm that prefers men.<sup>2</sup> Furthermore, how gender discrimination interacts with marital status has not been previously assessed in Egypt or elsewhere in MENA.

### 3. Data and methods

This paper reports the results of a field experiment – a correspondence study – randomizing applicant gender and marital status in Egypt. A J-PAL MENA research team undertook data collection. The team included four research assistants, two men and two women. Online job postings were randomly sampled, with details (including gender and marital status requirements) recorded. Resumes with characteristics corresponding to the ad, along with random gender and marital status, were sent to employers. Data were collected on employer callbacks. These outcomes are used to estimate discrimination by gender and marital status. Analyses follow what was laid out in the pre-analysis plan, registered as AEARCTR-0009534 on the American Economic Association Randomized Controlled Trials Registry (<https://www.socialscienceregistry.org/trials/9534>), unless otherwise noted. The study received IRB approval from the American University at Cairo (case #2021-2022-135). A detailed structured ethical appendix is provided (Appendix B) following Asiedu et al. (2021).

Data collection proceeded in two batches,<sup>3</sup> the first from June 7, 2022, to October 5, 2022, and the second from December 8, 2022, to February 1, 2023. In the first batch, information on all job postings was collected, to be able to characterize the universe of online job postings. In the second batch, job posting details were only collected for those positions that were in our application universe, to maximize the number of applications submitted and the experiment's power.

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<sup>2</sup> Calculations are based on the 2018 Economic Census (OAMDI 2022) restricted to the same four industries (retail, ICT, hotels, and restaurants). The starting point for the calculations is the industry-specific percentage of firms reporting preferring men in Table 1 and the OLS regression for preferring men that includes number of employees (coefficient -0.004, column 2) in that same table. Because Osman, Speer, and Weaver (2025) used firms of 5+ workers only, the average firm size in each industry for firms with 5+ workers is calculated from the 2018 Economic Census; at this average size the average proportion of firms reporting preferring men occurs, and the coefficient of -0.004 can be used on the number of workers above or below the average size (including assuming the coefficient extends to firms with fewer than five workers) to linearly predict an industry- and size- specific probability of preferring men for each firm. The sample weights for the Economic Census times the number of workers can then be used to weight this probability; the result is the percent of employees that are in a firm that prefers men (14 per cent).

<sup>3</sup> The two batches were due to the logistics of funding.

### *3.1. Job postings*

The research team sampled 13 different online job platforms that included (often exclusively) jobs in Egypt. Research assistants were responsible for a particular platform or platforms. They were given a sampling rate for that platform based on the number of positions posted daily. In some cases, the sampling rate was 100 per cent (for sites with fewer postings), and in other cases 5, 10, 30, or 40 per cent. For cases where research assistants took a sub-sample, positions were randomly selected. A research manager oversaw the process and de-duplicated postings, so that if a position was listed on more than one platform, it was entered into our job posting database only once.

Research assistants recorded a number of characteristics of each posting, including: the number of workers required; age requirements; education requirements, in terms of degree either listed or best fitting the position; location; firm industry; job occupation; specific skills from a pre-populated checklist (technical, literacy, mathematics/statistics, physical fitness, computer, management, customer service, foreign language skills); soft and technical skills required as open-ended fields; requirement for a driver's license; military status requirement;<sup>4</sup> and work experience requirement.

Of particular relevance for this study, research assistants recorded postings' explicit gender and marital status requirements. Categories for gender requirements were male required, female required, male preferred, female preferred, or none specified. Likewise, research assistants recorded marital status in terms of single required, married required, single preferred, married preferred, or none specified.

The research assistants also checked for a number of potential exclusion criteria for submitting resumes; data on positions were still recorded to analyse the universe of all postings in batch 1 but not for excluded positions in batch 2. Position data were excluded from submitting resumes for a number of reasons related to the universe we are considering: the position was in the public-sector or a state-owned enterprise (we are focused on the private sector); the position is a job working outside Egypt; the position is for non-Egyptians only; the position was a volunteer position (unpaid; paid internships are still included).

Positions were also excluded from resume submission for more pragmatic reasons related to the experiment design: if the position required more than five years of experience; if the position was at the senior/executive level; or if the position had extremely specific technical requirements that the research team could not understand adequately to generate a fictitious resume. We also excluded positions that required a license or certification (e.g., medical license) to be provided as part of the application or that required the upload of documents other than a resume and/or cover letter (e.g., a writing sample) on pragmatic grounds.

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<sup>4</sup> Egypt has mandatory military service for men, and employers will typically check if this is completed before hiring men. Being done or exempted from military service ensures that a male candidate would not have to suddenly leave for service and therefore creates gender equity in resumes (since women do not have mandatory service). Done versus exempted does not provide a strong signal of any kind, since the most common exemption is if you are the only son in your family, although there are other reasons such as having a widowed mother, as well as medical exemption. Given that 0.2 per cent of the job postings required physical fitness, as shown below, even a medical exemption is unlikely to be a barrier to hire.



Since, as we discuss below, we included photos on the resumes, we restricted positions with age requirements to include some part of ages 18-29 (e.g., ages 25-40 posting would be included, with age randomized between 25-29). We also excluded postings where the employer had no name or was confidential, as this would preclude identifying anything about the organization or matching a callback. Some job sites also required creating a profile; positions posted there we sought elsewhere or used the HR email, if available, but if neither of these were available, we excluded them from creating resumes. Although these are a number of exclusions, this set retains a substantially larger set of included postings than most previous studies from developing countries, which tend to focus on university graduates from specific fields, often only in the capitol region (Alaref et al. 2020; Balkan and Cilasun 2018, 2019; Zhang et al. 2021).

Table 6, in appendix A, details the number of positions entered (N=4,533). Of these, 38 per cent (N=1,114) met inclusion criteria. The rest were excluded, most commonly due to requiring more experience (19 per cent; multiple reasons possible), being senior (15 per cent) or too technical (12 per cent), or being on a website that requires a profile with the job not listed elsewhere (24 per cent). Additionally, primarily initially due to procurement difficulties obtaining the phones for callbacks, 404 positions expired before resumes could be submitted. There were therefore 710 postings included (with 2,676 resumes submitted), although we present descriptives on postings with the full universe from batch 1.

### ***3.2. Comparisons to nationally representative data: The Egypt Labor Market Panel Survey***

Online job postings are not representative of all the available jobs in developing countries. We draw on the Egypt Labor Market Panel Survey (ELMPS) 2018 wave as a point of comparison (Krafft, Assaad, and Rahman 2021; OAMDI 2019). In the appendix (Table 7) we compare the ELMPS 2018 data (weighted) for private sector wage work to our job posting data from batch 1, although we note that the ELMPS is all current private sector wage jobs, and wage employment vacancies are of course distributed differently.

### ***3.3. Resumes***

We generated up to four resumes (one single male; one single female; one married male; one married female) for each position. Marital status was listed near the top of the resume (e.g., “Marital status: Married”).<sup>5</sup> We did not generate resumes for identities that were excluded by the position requirements (i.e., if female required, male required, single required, or married required). We do, however, include these observations in our analyses, so while we sent 2,676 resumes, our analyses are based on 2,840 observations (710 positions times four identities). We used Stata to randomly generate resumes as word documents with characteristics matching the position requirements.<sup>6</sup>

In order to have a manageable number of phones for the research assistants to answer by (fake) name, we used only sixteen first names. We selected eight common male and eight common female first names (no names that were common for both men and women). Common last names were

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<sup>5</sup> In a sample of resumes posted to one of the job platforms we sampled from, which also posts resumes (2.4 million at the time), 50 per cent included marital status.

<sup>6</sup> Using the Stata command “putdocx.”

also selected. Names were Muslim, reflecting the majority religion in Egypt, and to avoid confounding religious with other discrimination. Names were selected to be free of socioeconomic status identifiers. Names were randomized onto resumes, by gender. Corresponding email addresses and phone numbers were provided.

Resumes included photos to increase the salience of gender at the application stage. Resumes in Egypt sometimes (but not universally) include photos.<sup>7</sup> We used artificially generated (composite) photos from a publicly available website. Photos were matched across gender to the best of the research team's ability in terms of perceived skin tone, perceived age (plausibly 18-29), and perceived attractiveness.<sup>8</sup> Photos had neutral backgrounds and avoided any markers of socioeconomic status as much as possible (e.g., in hairstyle or clothes). Women were shown wearing the hijab (photoshopped onto the generated pictures), since the vast majority of women aged 15-29 in Egypt report they wear the hijab (Population Council 2011). Within gender, photos were randomized in creating resumes.

A number of other characteristics matching the job ad were included in the resumes. We randomized age within the intersection of the position requirements, plausible age given education requirements, and ages 18-29. This age range is also a plausible one over which to have both married and unmarried individuals. Based on the ELMPS 2018 and individuals aged 18-39,<sup>9</sup> marriage by age 39 is nearly universal (92 per cent of men and 96 per cent of women have married by age 39). The median age at marriage for men is age 27 and for women age 21. For higher education graduates (as we show below, the vast majority of postings are jobs requiring higher education), the median age at marriage for men is age 28 (75<sup>th</sup> percentile of age 32) and for women is age 24 (75<sup>th</sup> percentile of age 27).

Nationality was always listed as Egyptian, and the location of residence was given to match the location in the job ad. Military service was included only for men as done or exempted.<sup>10</sup> The degree and specialization were per the position ad and the same across resumes, but the school/university was randomized among options matching the specialization and, if possible, in the same governorate (the first level of administrative geography). The grade received in school was randomized across excellent, very good, and good per the distribution in the ELMPS 2018. Skills were included as per the ad, but in varying/random order. A driver's license was listed only if mentioned in the job ad. All of these items were automated into the initial word version of the resume.

Research assistants then added experience corresponding to the position (and corresponding with the automatically generated education, age, dates, etc.) to the resumes. They generated sets of fictitious experiences which were randomized onto the identities. Fictitious experiences were saved for potential re-use (e.g., fake cashier experience could be reused in a future cashier

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<sup>7</sup> In a sample of resumes posted to one of the job platforms we sampled from, which also posts resumes (2.4 million at the time), 55 per cent included photos.

<sup>8</sup> Photos ensuring balance on perceived attractiveness by sex could be advantageous, if it avoids statistical discrimination that may be related to employer's beliefs about the appearance of different groups (Weichselbaumer 2017) (in our case, men vs. women).

<sup>9</sup> Statistics based on the Kaplan-Meier estimator, which accounts for right censoring (individuals not yet married).

<sup>10</sup> We had initially planned on including this only if listed in the position ad, but HRs were sensitive to this question, so we added it to all male resumes.

posting and re-randomized across resumes). Resumes had formatting (randomly) applied and formatting/content tidied as needed before submitting. This design and process worked, overall, to try to match the job requirements and create variation in resumes (so they did not look identical) while still carefully randomizing gender and marital status relative to resumes. The resumes were then sent from corresponding email addresses and with specific phone numbers for the randomly generated identity, spaced out randomly over the course of a few days.

### 3.4. *Callbacks and outcomes*

Callback data were collected via phone or email. Each research assistant was responsible for two physical phones with dual sim cards (four identities and names) matching their own gender identity. Email addresses were also created for each identity and regularly checked. When a callback occurred, details were collected on the nature of the callback. Callbacks (N=387) were categorized as: (1) scheduling an interview (N=272) (2) asking for additional information (N=55) (3) accepted without interview (N=0) (4) instant interview (N=12) (5) rejection (N=40) or (6) not able to get reviewed (N=8).<sup>11</sup>

The primary outcome we construct from the callback data is a callback that signals the possibility of hiring (asking for an interview, interview on the spot, asking for additional information, offering the position).<sup>12</sup> When a position was specifically designated as for one gender or marital status only, the other excluded identities were included in the analysis but considered not to have callbacks. As a secondary analysis,<sup>13</sup> we focus on types of callbacks and construct distinct outcomes for (1) scheduling an interview (versus all other outcomes), (2) asking for additional information (versus all other outcomes), and (3) instant interview (versus all other outcomes).

### 3.5. *Estimates of discrimination*

Gender and marital status discrimination could interact in a variety of complex ways. This paper tests specific hypotheses to assess different potential aspects of discrimination. Our first model estimates the degree of gender discrimination for outcome  $y$  (e.g., callback signalling the possibility of hiring). Using data on each job posting,  $j$ , and identity,  $i$ , we estimate the following:

$$y_{i,j} = \alpha + \beta \text{Female}_i + \varepsilon_{i,j} \quad (1)$$

The coefficient  $\beta$  in equation (1) on the female dummy will test our hypothesis (H1) that there is gender discrimination. We expect discrimination against women in the labour market, on average.

Our second model includes a covariate for being married, along with an interaction between being married and being female. We thus estimate:

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<sup>11</sup> Not able to get reviewed usually was a request to apply via a profile website.

<sup>12</sup> We had originally planned to also consider wages as well, but only 252 of the postings we applied to had wages listed in the posting, so we did not undertake these analyses.

<sup>13</sup> Not in the pre-analysis plan, added at the suggestion of reviewers.

$$y_{i,j} = \alpha + \beta_1 \text{Female}_i + \beta_2 \text{Married}_i + \beta_3 \text{Female}_i * \text{Married}_i + \varepsilon_{i,j} \quad (2)$$

$\beta_1$  in equation (2) is the test for discrimination for single women versus single men (testing H2). We expect there is discrimination against single women.

$\beta_2$  in equation (2) is the test for discrimination for married men versus single men (testing H3). We expect there will be a preference for married over single men.

$\beta_2 + \beta_3$  from equation (2) is the test for whether there is differential discrimination for married women versus single women (testing H4). We expect that there will be additional discrimination against married women. Discrimination could also be anticipatory, such that single women are treated as though they will soon marry and have children (and thus picked up in  $\beta_1$ , tested by H2), as has been found in some studies (Baert 2014; Becker, Fernandes, and Weichselbaumer 2019; He, Li, and Han 2023; Petit 2007). However, other studies have specifically found additional discrimination against mothers (Arceo-Gomez and Campos-Vazquez 2014, 2019; Bedi, Majilla, and Rieger 2022; Bedi, Majilla, and Rieger 2018; Bygren, Erlandsson, and Gähler 2017; González, Cortina, and Rodríguez 2019; Maurer-Fazio and Wang 2018), and H4 tests for this additional discrimination. This hypothesis test is particularly pertinent for understanding whether the drop in women's employment at marriage observed in Egypt (Assaad, Krafft, and Selwaness 2022) is due to discrimination against married women.

$\beta_1 + \beta_3$  from equation (2) is the test for whether there is discrimination for married women versus married men (testing H5). We expect that there will be additional discrimination against married women.

The analyses use ordinary least squares regressions. Standard errors are clustered at the level of the job (posting). Tests adopt a critical level of 5 per cent for statistical significance. All descriptive and multivariate estimates are weighted by the number of workers required for the posting and the inverse of the sampling rate for the posting website. These weights ensure that the results are representative of the universe of online job postings we consider.

Analyses also estimate heterogeneity in the callback outcome by a number of key characteristics.<sup>14</sup> We specifically re-estimate our two main models for our primary callback outcome by subgroups based on:

- Occupation (professional/managerial versus other)<sup>15</sup>
- Industry (services vs. other)<sup>16</sup>
- Whether the position had a specific age requirement

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<sup>14</sup> Because names and photos were gender specific, we are not able to control for or test for differential effects of particular names or photos in the sample as a whole. However, we ran models for the callback outcome for men and women separately, which included dummies for the different (gender-specific) photos and dummies for the different (gender-specific) names. Out of 28 coefficients, two individual coefficients were significant (particular photos for men), and when testing the statistical significance of the models with the photo and name dummies as a whole neither the male nor female models were significant.

<sup>15</sup> We had originally planned white-collar versus blue collar, but there was not an adequate sample of blue-collar jobs.

<sup>16</sup> We had originally planned a number of industries, but given limited sample size, focused on services vs. other.

- Whether the position required work experience<sup>17</sup>
- Skills required (whether the position requires technical, mathematics/statistics, computer, management, customer service, foreign language, or none of these skills).<sup>18</sup> Note that skills categories are not mutually exclusive.

## 4. Results

### 4.1. Characterizing job postings

Comparing online job postings (for the universe of postings, in batch 1) to the nationally representative ELMPS 2018 data (for private sector wage work) highlights that online job postings are a selected segment of Egypt’s labour market. When preparing our sampling we estimated 775 jobs posted per day on online job platforms (which includes duplicates), equivalent to 282,875 jobs annually. In the ELMPS 2018, approximately 1.2 million wage workers started their jobs in 2017, a rough proxy for how many vacancies there might have been during a year. Furthermore, one of the job platforms that posted resumes as well as positions had 2.4 million resumes<sup>19</sup> (individuals seeking work; possibly employed or unemployed) for Egypt. Per ELMPS 2018 estimates, there were 18.5 million wage workers. The online job posting segment of the labour market is thus a sizeable but minority segment of the labour market overall and may be selected along a variety of dimensions.

As shown in Table 7 (Appendix A), the universe of online job postings vastly and significantly over-represented professionals (57 per cent, versus 8 per cent in the ELMPS) as well as managers (9 per cent versus 2 per cent in the ELMPS). In terms of economic activity, agriculture was significantly under-represented, along with construction work, while the ICT, professional, and administrative sectors were significantly over-represented. For example, 23 per cent of online postings were in the ICT industry, compared to 1 per cent of jobs in the ELMPS.

Almost all the online job postings required a bachelor’s degree (91 per cent) compared to 11 per cent in the ELMPS. Comparing workers’ self-reported skills requirements in the ELMPS to skills mentioned in the job postings, significantly fewer required literacy, math, or physical skills. However, these skills may be implied (e.g., the posting does not spell out literacy but requires Microsoft Office skills). Significantly more required computer skills, 40 per cent, versus 13 per cent in the ELMPS.

Table 8 (Appendix A) further characterizes position requirements from the online job postings (based on details collected in batch 1). Around a fifth (22 per cent) had age requirements, with an average minimum of 23 years and an average maximum of 35 years. The modal job did not require any experience (30 per cent), but 10 per cent of jobs required five years of experience and 10 per

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<sup>17</sup> Heterogeneity by age requirements and work experience requirements were not in the pre-analysis plan, but were added in response to concerns about whether discrimination might vary based on expected persistence in a position, proxied here by work experience and age.

<sup>18</sup> Since no jobs required physical skills and only 20 literacy, we do not analyze those skills. We had also planned to undertake heterogeneity analysis by education required, but since higher education was required for almost all jobs, we eschewed this analysis.

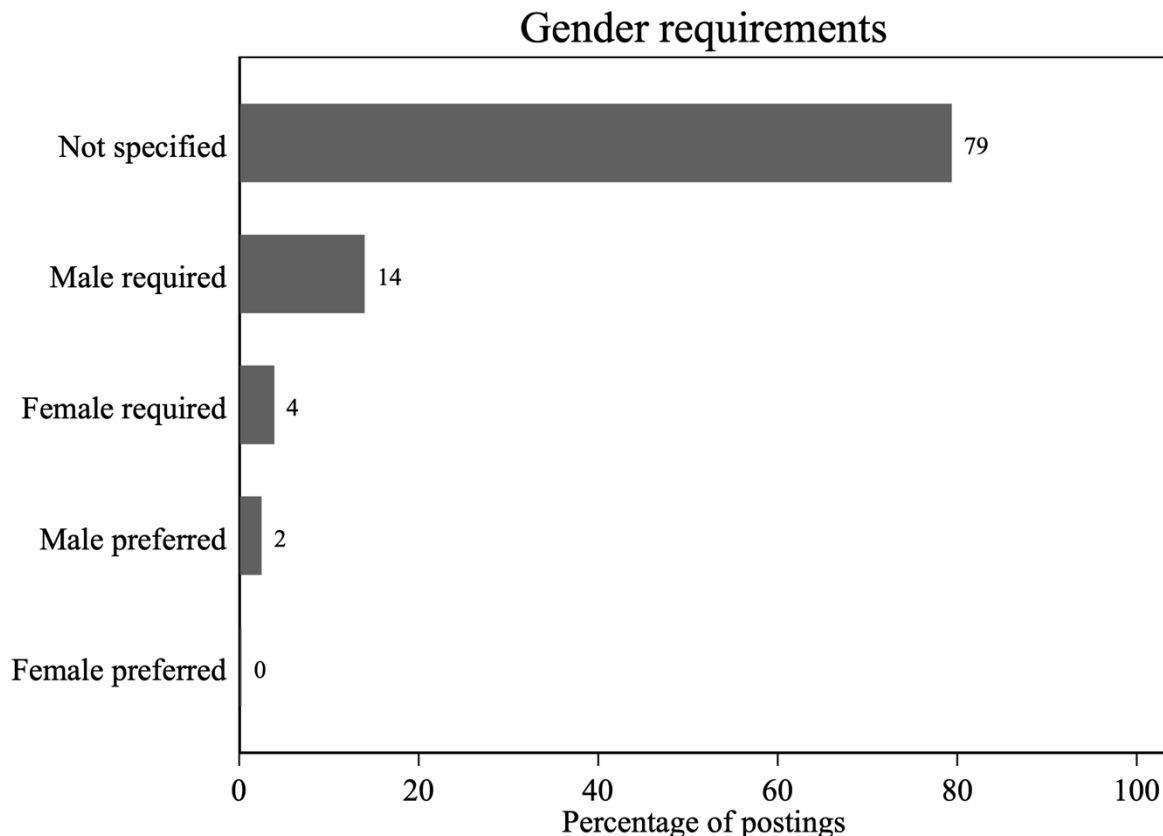
<sup>19</sup> Number of resumes posted is as of 2024.

cent more than five years. We further calculated the 10 most common words<sup>20</sup> in the open-ended technical and soft skills questions. “Communication” was the most common, followed by “management,” “Microsoft,” “office,” “team,” “analytical,” “written,” “solving,” “design,” and “software.” Skill requirements thus generally emphasized soft skills, along with computer and analytical skills. The highly educated and highly professional nature of the online job posting universe must be kept in mind when interpreting the results.

#### 4.2. Job postings by gender and marital status requirements

In Egypt, job postings on some platforms listed positions as for men, women, or both/not specified. These requirements are initial evidence of discrimination. Figure 1 shows, for the batch 1 sample of job postings, the gender requirements. Almost no postings (N=5, less than 1 per cent) had a required marital status, all single.<sup>21</sup> Gender requirements were more common. While 79 per cent of postings did not specify gender, 14 per cent listed male required, and 2 per cent male preferred. Only 4 per cent listed female required and less than 1 per cent female preferred. There is thus clear discrimination in favour of men at the posting stage.

**Figure 1. Gender requirements of job postings (percentage)**



<sup>20</sup> Using the Stata command wordfreq. We excluded words shorter than four characters and dropped words that are part of common grammar (e.g., “that” or “over”).

<sup>21</sup> Since such marital status requirements were rare, we do not show their joint distribution with gender.

Source: Author’s calculation based on job posting data (batch 1). Observation is a posting.

In appendix A, Table 9 presents the ten most common detailed occupations and detailed industries in the job postings data (batch 1) and the percentage of jobs requiring men or women in each. The results illustrate potential labour market segregation. For a number of occupations, including the two most common occupations, software developer (8 per cent of postings) and sales professionals (7 per cent of postings) there were few gender requirements. However, occupations such as security guards almost all required men (98 per cent male required, 3 per cent of postings). None of the industries or occupations had a majority requiring women. The closest was other ancillary business support services (8 per cent of postings, 27 per cent female required). The gender requirements in postings are thus suggestive of gendered discrimination embedded as occupational segregation.

### *4.3. Callbacks by gender and marital status*

We turn now to callbacks that signal potential hiring, our key outcome. Overall, 11.2 per cent of the time there was a positive callback (Table 1). Callback rates were 12.0 per cent for men and 10.4 per cent for women. They were higher for single individuals (12.1 per cent) than married ones (10.3 per cent). Single men were the most likely to receive a callback (13.2 per cent), followed by single women (10.9 per cent), married men (10.7 per cent), and married women (9.8 per cent). There is thus some suggestive evidence of discrimination by gender and marital status, but not to the same extent as disparities in employment rates.

**Table 1. Callback rates (percentage), by gender and marital status**

	<b>Single</b>	<b>Married</b>	<b>Total</b>
<b>Male</b>	13.2	10.7	12.0
<b>Female</b>	10.9	9.8	10.4
<b>Total</b>	12.1	10.3	11.2

Source: Author’s calculation based on resume data and callback data

### *4.4. Discrimination in callbacks*

Turning to testing whether these disparities in callbacks are statistically significant, Table 2 presents the linear probability model for the primary callback outcome. Specification 1 tests for gender differences without considering marital status. Women have a lower (1.6 percentage point; 13 per cent) probability of a callback, but differences are not significant (counter to H1). In specification 2, with female and married main effects and interactions, we test a number of hypotheses. First, for single women relative to single men, the main effect of female shows a 2.3 percentage point lower callback probability (17 per cent) for women but is insignificant (counter to H2). For the reference group (men) being married reduces the probability of a callback by 2.5 percentage points (19 per cent), but the difference is statistically insignificant. This result is counter to H3. Comparing the probability of callbacks for married versus single women, married women are 1.1 percentage points (10 per cent) less likely to be called back than single women, but this difference is insignificant (counter to H4). Married women are 0.9 percentage points less likely to be called back than married men (8 per cent less), but again, the difference is insignificant. This

result runs counter to H5. Indeed, in general, we do not see statistically significant differences in callbacks by gender or marital status.<sup>22</sup>

**Table 2. Linear probability model of callbacks**

	<b>Spec. 1</b>	<b>Spec. 2</b>
<b>Sex (male omit.)</b>		
Female	-0.016 (0.032)	-0.023 (0.033)
<b>Marital status (single omit.)</b>		
Married		-0.025 (0.014)
<b>Int. marital status and sex</b>		
Female and married		0.014 (0.019)
<b>Constant</b>	0.120*** (0.032)	0.132*** (0.034)
<b>Mean of dep. var.</b>	0.112	0.112
<b>N (Posting-identity)</b>	2840	2840
<b>N (postings)</b>	710	710
<b>R-sq.</b>	0.001	0.002
<b>H1 p-value</b>	0.616	
<b>H2 p-value</b>		0.482
<b>H3 p-value</b>		0.078
<b>H4 p-value</b>		0.414
<b>H5 p-value</b>		0.791

Source: Author's calculation based on resume data and callback data

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . Standard errors, in parentheses, clustered by job posting. H1: tests for gender discrimination in Spec. 1. H2: tests for discrimination single women vs. single men H3: tests for discrimination married men vs. single men. H4: tests for discrimination married women vs. single women. H5: tests for discrimination married women vs. married men.

<sup>22</sup> Table 10, in appendix A, presents a model with controls for posting and firm characteristics (occupation, economic activity, education and skill requirements, and location [governorate, Egypt's first level administrative geography]). This model was not included in the pre-analysis plan but was added in response to reviewer concerns. Coefficients for sex and marital status are identical, standard errors within 0.001, and p-values for hypothesis tests within 0.004 (none become significant). This result is as expected given the randomization of details on the resumes and perfect balance on posting and firm characteristics (by construction, as there are four resumes with different combinations of sex and marital status per posting). In general, covariates are not needed in order to estimate average treatment effects in experiments when randomization is carried out successfully (Athey and Imbens 2017). There can be gains in precision, but also potentially small-sample costs to inclusion of covariates if they are independent, and in practice, precision gains are modest (Athey and Imbens 2017).



#### ***4.5. Heterogeneity in callback discrimination***

The overall insignificant differences in callbacks by sex and marital status could mask substantial heterogeneity in discrimination across different types of jobs, particularly if there is gendered occupational segregation. In Table 3 we explore potential heterogeneity by occupation, industry, whether the position had an age requirement, whether the position required past work experience, and skills required. In the specification 1 model with only gender, women are significantly more likely (7.8 percentage points) to receive callbacks for jobs requiring customer service skills. There are significant negative coefficients on being married (main effect and thus testing H3 but finding the opposite sign than expected) for jobs requiring technical skills and for jobs with one or more skill required. While the result on customer service skills is suggestive of employer discrimination in favour of women in this segment (perhaps due to gender biases around social skills) and some occupational segregation, there is not clear segmentation by occupation, industry, age requirements, work experience, or most skills. Results are almost all insignificant, and given the number of tests being undertaken, the few significant results should be interpreted with caution. Indeed, when calculating sharpened false discovery rate (FDR) q-values (Anderson 2008), the q-values are all one, meaning there is no false discovery rate less than one for which the null hypotheses would be rejected.<sup>23</sup>

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<sup>23</sup> Sharpened q-values were not included in pre-analysis plan (nor were any other corrections for multiple hypothesis testing).

**Table 3. Heterogeneity of callbacks by occupation, industry, age requirement, and work experience requirement (linear probability model)**

	<u>Occupation</u>		<u>Industry</u>		<u>Age required</u>		<u>Experience required</u>	
	Prof./ manage.	Not prof./ manage.	Not Services	Not services	No age req.	Age req.	No exp. req.	Exp. req.
<b>Specification 1</b>								
<b>Sex (male omit.)</b>								
Female	0.009 (0.019)	-0.053 (0.074)	0.021 (0.018)	-0.091 (0.085)	-0.130 (0.120)	0.024 (0.017)	0.016 (0.019)	-0.064 (0.076)
<b>Constant</b>	0.120*** (0.018)	0.120 (0.076)	0.112*** (0.026)	0.135 (0.081)	0.135 (0.120)	0.114*** (0.015)	0.082*** (0.015)	0.179* (0.084)
<b>N (Posting-identity)</b>	2072	768	1864	976	180	2660	1672	880
<b>N (Postings)</b>	518	192	466	244	45	665	418	220
<b>R-sq.</b>	0.000	0.008	0.001	0.026	0.064	0.001	0.001	0.008
	0 This							
<b>H1 p-value</b>	.640	0.473	0.236	0.285	0.284	0.163	0.402	0.402
<b>Specification 2</b>								
<b>Sex (male omit.)</b>								
Female	0.008 (0.023)	-0.070 (0.074)	0.018 (0.021)	-0.107 (0.084)	-0.124 (0.120)	0.012 (0.020)	0.005 (0.023)	-0.064 (0.077)
<b>Marital status (single omit.)</b>								
Married	-0.025 (0.021)	-0.025 (0.018)	-0.032 (0.021)	-0.012 (0.012)	0.000 (0.010)	-0.034 (0.018)	-0.025 (0.024)	-0.026 (0.018)
<b>Int. marital status and sex</b>								
Female and married	0.002 (0.028)	0.033 (0.023)	0.006 (0.027)	0.031 (0.018)	-0.011 (0.017)	0.023 (0.025)	0.021 (0.029)	0.001 (0.029)
<b>Constant</b>	0.133*** (0.022)	0.132 (0.078)	0.128*** (0.031)	0.141 (0.081)	0.135 (0.121)	0.131*** (0.019)	0.094*** (0.021)	0.192* (0.087)
<b>Mean of dep. var.</b>	0.125	0.093	0.123	0.090	0.071	0.126	0.090	0.147
<b>N (Posting-identity)</b>	2072	768	1864	976	180	2660	1672	880
<b>N (postings)</b>	518	192	466	244	45	665	418	220
<b>R-sq.</b>	0.002	0.009	0.003	0.026	0.064	0.003	0.002	0.009
<b>H2 p-value</b>	0.732	0.350	0.397	0.207	0.307	0.544	0.825	0.404
<b>H3 p-value</b>	0.220	0.161	0.126	0.322	1.000	0.065	0.300	0.145

	<u>Occupation</u>		<u>Industry</u>		<u>Age required</u>		<u>Experience required</u>	
	Not Prof./	prof./	Not	No age	No exp.			
	manage.	manage.	Services	services	req.	Age req.	req.	Exp. req.
<b>H4 p-value</b>	0.224	0.623	0.183	0.180	0.262	0.547	0.853	0.327
<b>H5 p-value</b>	0.681	0.627	0.300	0.384	0.270	0.108	0.273	0.418

Source: Author's calculation based on job posting, resume data, and callback data

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001. Standard errors, in parentheses, clustered by job posting. H1: tests for gender discrimination in Spec. 1. H2: tests for discrimination single women vs. single men H3: tests for discrimination married men vs. single men. H4: tests for discrimination married women vs. single women. H5: tests for discrimination married women vs. married men.

**Table 3 Continued. Heterogeneity of callbacks by skills required (linear probability model)**

	<u>Technical skill</u>		<u>Mathematics/statistics</u>		<u>Computer</u>		<u>Management</u>		<u>Customer Service</u>		<u>Foreign Language</u>		<u>None</u>	
	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.	One+ skill required	None
<b>Specification 1</b>														
<b>Sex (male omit.)</b>														
Female	0.026	-0.092	-0.018	0.051	-0.028	0.010	-0.011	-0.058	-0.044	0.078*	-0.020	0.033	-0.022	-0.000
	(0.020)	(0.077)	(0.033)	(0.119)	(0.045)	(0.020)	(0.036)	(0.059)	(0.040)	(0.037)	(0.034)	(0.024)	(0.044)	(0.018)
<b>Constant</b>	0.103***	0.150*	0.120***	0.119	0.133**	0.091***	0.108**	0.224***	0.114**	0.141***	0.125***	0.048*	0.148***	0.045
	(0.025)	(0.074)	(0.033)	(0.081)	(0.046)	(0.024)	(0.035)	(0.065)	(0.041)	(0.028)	(0.035)	(0.022)	(0.038)	(0.026)
<b>N (Posting-identity)</b>	1392	1448	2732	108	1388	1452	2436	404	2340	500	2588	252	2392	448
<b>N (Postings)</b>	348	362	683	27	347	363	609	101	585	125	647	63	598	112
<b>R-sq.</b>	0.002	0.023	0.001	0.005	0.002	0.000	0.000	0.005	0.006	0.010	0.001	0.005	0.001	0.000
<b>H1 p-value</b>	0.190	0.232	0.578	0.675	0.541	0.602	0.752	0.330	0.267	0.035	0.569	0.167	0.612	0.990
<b>Specification 2</b>														
<b>Sex (male omit.)</b>														
Female	0.022	-0.104	-0.025	0.028	-0.039	0.013	-0.018	-0.065	-0.049	0.061	-0.031	0.085	-0.034	0.007
	(0.023)	(0.077)	(0.034)	(0.151)	(0.046)	(0.025)	(0.037)	(0.060)	(0.040)	(0.047)	(0.035)	(0.044)	(0.044)	(0.020)
<b>Marital status (single omit.)</b>														
Married	-0.023	-0.030*	-0.026	0.000	-0.028	-0.019	-0.018	-0.088	-0.015	-0.060	-0.029	0.037	-0.037*	0.007

	<u>Technical skill</u>		<u>Mathematics/ statistics</u>		<u>Computer</u>		<u>Management</u>		<u>Customer Service</u>		<u>Foreign Language</u>		<u>None One+ skill requiredNone</u>	
	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.	Not req.	Req.
	(0.021)	(0.012)	(0.015)	(0.054)	(0.020)	(0.014)	(0.015)	(0.048)	(0.012)	(0.046)	(0.015)	(0.031)	(0.017)	(0.021)
<b>Int. marital status and sex</b>														
Female and married	0.009 (0.026)	0.024 (0.026)	0.013 (0.019)	0.046 (0.119)	0.023 (0.023)	-0.005 (0.033)	0.014 (0.018)	0.014 (0.087)	0.008 (0.018)	0.035 (0.056)	0.022 (0.020)	-0.104 (0.070)	0.025 (0.024)	-0.014 (0.025)
<b>Constant</b>	0.115*** (0.029)	0.164* (0.074)	0.133*** (0.035)	0.119 (0.087)	0.146** (0.048)	0.100*** (0.026)	0.117** (0.036)	0.267*** (0.072)	0.121** (0.042)	0.171*** (0.041)	0.140*** (0.037)	0.030 (0.018)	0.166*** (0.039)	0.042 (0.027)
<b>Mean of dep. var.</b>	0.116	0.103	0.111	0.145	0.119	0.096	0.102	0.195	0.091	0.180	0.115	0.065	0.136	0.045
<b>N (Posting-identity)</b>	1392	1448	2732	108	1388	1452	2436	404	2340	500	2588	252	2392	448
<b>N (postings)</b>	348	362	683	27	347	363	609	101	585	125	647	63	598	112
<b>R-sq.</b>	0.003	0.024	0.002	0.007	0.003	0.002	0.001	0.016	0.006	0.014	0.002	0.017	0.003	0.000
<b>H2 p-value</b>	0.335	0.175	0.460	0.857	0.398	0.616	0.614	0.284	0.231	0.197	0.382	0.059	0.438	0.741
<b>H3 p-value</b>	0.282	0.018	0.076	1.000	0.156	0.178	0.225	0.074	0.224	0.189	0.053	0.234	0.034	0.758
<b>H4 p-value</b>	0.427	0.795	0.342	0.619	0.724	0.376	0.777	0.298	0.611	0.517	0.613	0.174	0.474	0.669
<b>H5 p-value</b>	0.216	0.315	0.736	0.525	0.729	0.762	0.911	0.549	0.332	0.037	0.818	0.647	0.831	0.766

Source: Author's calculation based on job posting, resume data, and callback data

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001. Standard errors, in parentheses, clustered by job posting. H1: tests for gender discrimination in Spec. 1. H2: tests for discrimination single women vs. single men H3: tests for discrimination married men vs. single men. H4: tests for discrimination married women vs. single women. H5: tests for discrimination married women vs. married men.

#### 4.6. Discrimination in type of callback

An important limitation to correspondence studies is that they can only assess discrimination at the posting and callback stages, not hiring. Types of callbacks may, however, be suggestive of subsequent hiring outcomes. Table 4 presents the distribution of detailed callback outcomes among the positive responses. The most common positive callback was scheduling an interview (74 per cent), followed by asking for more information (20 per cent) while 6 per cent were instant interviews. Women (32 per cent), and particularly married women (37 per cent) were much more likely to be asked for additional information. This is suggestive of employers being potentially interested in considering married women, but also potentially dubious of their availability or ability to reconcile domestic responsibilities and employment, which may then feed into discrimination in final hiring decisions.

**Table 4. Detailed callback outcomes (percentage) if receive a positive callback, by gender and marital status**

	Schedule interview	Ask for more info	Instant interview
<b>Male married</b>	82.0	11.3	6.7
<b>Female married</b>	60.8	37.0	2.2
<b>Male single</b>	83.3	8.3	8.5
<b>Female single</b>	66.4	27.0	6.6
<b>Male total</b>	82.7	9.6	7.7
<b>Female total</b>	63.8	31.7	4.5
<b>Single total</b>	75.7	16.7	7.6
<b>Married total</b>	71.9	23.6	4.5
<b>Overall total</b>	73.9	19.9	6.2

Source: Author's calculation based on resume data and callback data

To formally test for differences in the type of callback that may signal subsequent discrimination, Table 5 models the different detailed callback outcomes (linear probability models for the specific outcome versus all other outcomes). While women are less likely to have an interview scheduled, differences are not significant. Women are, however, significantly more likely to be asked for more information (around 2 percentage points more likely; note that the rate for the reference group of men is 1 per cent). This is the case (in specification 2) for hypothesis tests for both single women versus single men and for married women versus married men.

**Table 5. Linear probability models of detailed callback outcomes**

	<u>Specification 1</u>			<u>Specification 2</u>		
	<b>Schedule int.</b>	<b>More info.</b>	<b>Instant int.</b>	<b>Schedule int.</b>	<b>More info.</b>	<b>Instant int.</b>
<b>Sex (male omit.)</b>						
Female	-0.033 (0.032)	0.021** (0.006)	-0.005 (0.004)	-0.038 (0.033)	0.019** (0.007)	-0.004 (0.003)
<b>Marital status (single omit.)</b>						
Married				-0.022 (0.013)	0.001 (0.004)	-0.004 (0.003)
<b>Int. marital status and sex</b>						
Female and married				0.010 (0.017)	0.006 (0.010)	-0.001 (0.006)
<b>Constant</b>	0.099** (0.031)	0.012* (0.005)	0.009 (0.006)	0.110*** (0.032)	0.011 (0.006)	0.011 (0.006)
<b>Mean of dep. var.</b>	0.083	0.022	0.007	0.083	0.022	0.007
<b>N (Posting-identity)</b>	2840	2840	2840	2840	2840	2840
<b>N (postings)</b>	710	710	710	710	710	710
<b>R-sq.</b>	0.004	0.005	0.001	0.005	0.006	0.001
<b>H1 p-value</b>	0.298	0.001	0.198			
<b>H2 p-value</b>				0.248	0.006	0.124
<b>H3 p-value</b>				0.092	0.786	0.124
<b>H4 p-value</b>				0.221	0.431	0.353
<b>H5 p-value</b>				0.393	0.009	0.401

Source: Author's calculation based on resume data and callback data

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . Standard errors, in parentheses, clustered by job posting. H1: tests for gender discrimination in Spec. 1. H2: tests for discrimination single women vs. single men H3: tests for discrimination married men vs. single men. H4: tests for discrimination married women vs. single women. H5: tests for discrimination married women vs. married men.

#### **4.7. Statistical discrimination and ability**

The randomization of grades (as an ability signal) and work experience on resumes means that all signals of productivity in the experiment are random relative to sex and marital status. However, employers may still engage in statistical discrimination, particularly in regards to assumptions about productivity and which women and especially married women select into the labour force. In low-employment contexts, women in the labour force could be extremely selected. Whether this statistical discrimination would be favourable or unfavourable is difficult to know a priori. For instance, in India, where there is a marriage market penalty for working women (Dhar 2021), women may select out of the labour force to avoid this penalty. Whether

women who are high-ability or low-ability would select out is theoretically ambiguous, as it depends in part on whether they expect low or high returns to work and therefore whether employers hire and remunerate based on ability.

To investigate the direction of selection in Egypt, Table 11, in appendix A, explores a proxy for ability: university grades for higher education graduates in the labour force (based on ELMPS 2018 data). For those in the labour force, within men and within women, there are not large differences in the distribution of grades by marital status (only 0-2 percentage point differences by marital status, within men or within women). There are substantial differences by sex in the labour force generally, favouring women; for instance, 3 per cent of women earn excellent grades (vs. 2 per cent of men) and 34 per cent of women earn very good grades (versus 24 per cent of men). Fewer women earn the lower grades of good (55 per cent vs. 58 per cent of men) or passing (8 per cent of women vs. 16 per cent of men).

Women are in fact somewhat positively selected into the labour force (not shown); the women who do not participate in the labour force have a substantially worse distribution of final grades than women in the labour force, and slightly worse (but within a few percentage points) compared to men in the labour force. Whether or not this proxy is a true signal for ability, and furthermore whether employers know that women tend to be higher ability and engage in (pro-woman) discrimination on this basis remains unknown from these results. However, that women applicants in the population tend to be higher ability does suggest one potential reason employers may be less likely to discriminate against women in Egypt and in specifically the educated, professional segment of the labour market explored in this experiment. Other research that did show employer discrimination in Egypt was also more consistent with taste-based than statistical discrimination (Osman, Speer, and Weaver 2025).

#### ***4.8. Re-weighting estimates by national employment data***

As illustrated in Table 7, the jobs posted online are quite different from employment in the Egyptian labour market generally. As an investigation on the degree to which this might affect the findings on discrimination, postings were re-weighted to be representative of the Egyptian labour market using all the characteristics in Table 7.<sup>24</sup> Specifically, a logit model using the data in Table 7 from the ELMPS 2018 and job postings was used to predict the probability that an observation was from the job posting data (versus ELMPS 2018). This predicted probability was then used to create an inverse probability weight, multiplied by the sampling weight.<sup>25</sup> The main models from Table 2 were re-run with these weights (see Table 12 in appendix A). There were still no significant differences in callbacks by sex or marital status after this re-weighting.

That the re-weighted results are similar does not, necessarily, guarantee that the results from the job posting segment of the labour market generalize to the labour market as a whole. It should be kept in mind that jobs posted online and the firms posting them may be different in unobservable

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<sup>24</sup> This re-weighting was not in the pre-analysis plan but was based on a reviewer suggestion.

<sup>25</sup> Denote  $w_i$  as the existing sampling weight. The predicted probability from the logit model,  $p_i$ , was used to generate revised weights for the job posting data as:  $w'_i = w_i * (1 - p_i)/p_i$ . A logit model is necessary so that predicted probabilities range from 0 to 1 and avoid negative weights.

ways not accounted for by these covariates. Some types of jobs and firms also appear in the job postings data very rarely, e.g., those requiring less education and physical fitness, and those that do may have had no callbacks, such that generalizing is tenuous.

## **5. Discussion and conclusions**

### ***5.1. Summary***

This paper investigated discrimination by gender and marital status in the Egyptian labour market. The research focused on the (select) segment of online job postings, and randomized gender and marital status across resumes, tracking callbacks indicating potential hiring as the key outcome. Job postings more often listed a requirement for men (14 per cent) than women (4 per cent). However, in terms of callbacks, differences were small. Single men were the most likely to receive a positive callback (13.2 per cent), followed by single women (10.9 per cent), married men (10.7 per cent) and married women (9.8 per cent). In the multivariate models, differences were not statistically significant. There was not significant heterogeneity by occupation, industry, work experience, age requirements, nor by most skills. Women were significantly more likely to be called back than men for jobs that required customer service skills, but this result may be spurious given the number of tests. While disparities in callbacks were limited, women were significantly more likely to be asked for more information, which may be a negative signal about subsequent hiring.

The lack of callback discrimination against women that this paper finds is consistent with much of the global literature (Lippens, Vermeiren, and Baert 2023), as well as other correspondence studies in MENA (Alaref et al. 2020; Balkan and Cilasun 2018, 2019). There are fewer studies on gender and marital status or motherhood and those are mostly in developed countries (Bertrand and Duflo 2017; Lippens, Vermeiren, and Baert 2023). Out of the ten studies on motherhood from developed countries, three found negative discrimination against mothers and seven no effect (author's calculations based on supplemental data from Lippens, Vermeiren, and Baert 2023). Our findings contrast with the other studies from developing countries demonstrating that married women and mothers are discriminated against in the labor market (Arceo-Gomez and Campos-Vazquez 2014, 2019; Bedi, Majilla, and Rieger 2022; Bedi, Majilla, and Rieger 2018; Maurer-Fazio and Wang 2018). In a correspondence experiment in India, for example, mothers faced a 20 percentage point (57 per cent) reduction in callbacks (Bedi, Majilla, and Rieger 2022). The finding that there is no discrimination against married women in Egypt is consistent with the evidence that women tend to leave work in the private sector in advance of marriage (Selwaness and Krafft 2021), more so than at marriage. This suggests that women are anticipating the irreconcilability of employment and care work, rather than that employers fire or refuse to hire married women.

It is important to keep in mind that the absence of discrimination, on average, does not preclude gender discrimination in terms of specific occupations. Security guards may be male-stereotyped but business support services female-stereotyped, as we see in our results. Other studies likewise show gender stereotyping in job ads (Muradova and Seitz 2021) and that discrimination in favour of men and in favour of women can occur within different segments of the same labour market (Azmat and Petrongolo 2014).



## 5.2. Limitations

The results showing the absence of callback discrimination only apply to the specific universe we consider: online job postings. This universe is the same as for other similar studies (Alaref et al. 2020; Balkan and Cilasun 2019, 2018; Bedi, Majilla, and Rieger 2022; Bedi, Majilla, and Rieger 2018). However, this segment of online postings is selected relative to Egypt's labour market, an issue for similar contexts as well. Online postings almost exclusively required higher education, were strongly skewed to managerial and professional jobs, and over-represented certain industries such as ICT. Although when re-weighting by nationally representative comparable characteristics, the lack of discrimination persisted, results are still not necessarily generalizable. Given the characteristics of postings we see, other, unobserved aspects are also likely to be different; these employers are likely to be larger, more likely to be formal and employ people formally (Assaad, AlSharawy, and Salemi 2022), and thus may have more professional human resources practices, all of which features could potentially shape discrimination. The results should thus be interpreted only in terms of this universe; there is not substantial discrimination against women or married women among employers who post jobs online.

Other segments of the labour market may still engage in different patterns of discrimination. Indeed, results from an employer experiment in Egypt that examined retail, IT, hotels, and restaurant employers, found IT had the least discrimination against women (Osman, Speer, and Weaver 2025). Larger employers (who are also presumably more likely to post online) were also less likely to discriminate in this same study,<sup>26</sup> such that while half (51 per cent) of *employers* discriminated in preferring men, additional calculations presented in this paper suggest that only 14 per cent of *employees* worked for employers who preferred men. This 14 per cent of *employees* calculation building on Osman, Speer, and Weaver (2025) is notably identical to the 14 per cent of job *postings* in this study (Figure 1) that explicitly state they require men. It is also similar to the 13 per cent (albeit insignificant) lower callback rate for women. Furthermore, there may be some industries or firms that prefer women (4 per cent of postings explicitly required women in this study). Future research should nonetheless explore a wider universe of jobs than online job postings (or revisit this universe as online postings become more common).

The analyses also focus on a somewhat selected segment of online job postings, primarily those for new entrants. The universe is broader than past studies from the region, which focused on particular occupations, education levels, even narrower age ranges, and the capitol (Alaref et al. 2020; Balkan and Cilasun 2019, 2018). However, results are still not generalizable outside the segment we consider. The Egyptian labour market is not dynamic (Yassine 2015), so discrimination for new entrants is quite important. However, discrimination may vary by age and for more experienced workers, although heterogeneity analyses for age requirements and experience required within our sample did not show discrimination. Discrimination may also be different in the public sector, which employs nearly half of women who work in Egypt, and is the preferred sector of employment for women (Assaad, AlSharawy, and Salemi 2022; Barsoum and Abdalla 2022).

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<sup>26</sup> Larger firms that discriminate had a longer time to productivity than smaller firms that discriminate (Osman, Speer, and Weaver 2025), suggesting that for larger firms there may be costs to discrimination that reduce the incentive to discriminate.

Although the study sent a substantial number of applications (N=2,676), the number of postings was limited (N=710). We therefore may have power to detect only larger differences by marital status and gender in callbacks.<sup>27</sup> In general, power calculations for matched correspondence study experiments, as with this one, are difficult to do *ex ante* due to lack of information on key statistics (such as callback rates and discordance, e.g., where male applicants receive a callback but female to do not and vice versa) (Vuolo, Uggen, and Lageson 2016). Appendix C (summarized in Table 13) illustrates some *ex post* simulations for the sample sizes necessary to detect varying levels of discrimination by sex. For example, the sample size in this study is more than sufficient to detect if half or more of employment disparities by sex were due to discrimination. However, additional divisions, such the heterogeneity analyses, may also have less power.

The results also do not necessarily generalize to later stages of the hiring process, a problem with correspondence studies generally (Gaddis 2018). In particular, there may be differential discrimination at the hire stage than at the callback stage, as well as in wage-setting and promotion. Women and especially married women may face particular scrutiny at the hiring stage, as suggested by the higher rate of callbacks asking for more information of women and especially married women. Employers may be concerned about married women's ability to reconcile employment with care responsibilities. This challenge could be addressed by policy and information; signalling child care was found to substantially reduce but not eliminate discrimination against mothers in on experiment India (Bedi, Majilla, and Rieger 2022). However, it may also be the case that relatively equitable patterns persist into the hire stage; an experiment that included randomized employment services for married women with young children in Egypt found that 25 per cent of those who applied to jobs received an interview (they could apply to multiple positions, so this rate is unsurprisingly higher than this study's callback rate) (Caria et al. 2025).<sup>28</sup> Among those women who attended the interview and knew the outcome, 36 per cent were offered the position, suggesting callbacks are a non-trivial signal of hiring even for married women.

### ***5.3. Policy implications***

The results, overall, are suggestive that supply-side challenges are key to women's low and unequal employment, at least in the segment of the labour market covered by online job postings. If employers in these firms are not appreciably discriminating against women, lower employment rates are due to women being less likely to apply for or remain in such jobs. Discriminatory gender norms in society and their households, particularly unequal care work responsibilities (Assaad, Krafft, and Selwaness 2022; Keo, Krafft, and Fedi 2022; El-Feki, Heilman, and Barker 2017), therefore may be the key constraints on such women's employment. The experiment in Egypt that included randomizing employment services for married women with young children found that while half of women created a profile in an online platform (signalling interest in employment),

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<sup>27</sup> As a point of comparison, this N=710 posting sample size falls between the 25<sup>th</sup> percentile (N=600) and 50<sup>th</sup> percentile (N=1155) for studies by gender and summarized in a recent meta-analysis (author's calculations based on supplemental data from Lippens, Vermeiren, and Baert 2023). It is very similar to the median sample size of N=742 for studies on motherhood discrimination in that same meta-analysis.

<sup>28</sup> Per the employment services' administrative data.

only half of those women applied, largely due to mismatch between available jobs and their preferences (Caria et al. 2025). While a quarter of those women who applied received interviews, half of those women declined the interviews, and even women who interviewed and were offered positions were twice as likely to turn them down as accept them (Caria et al. 2025). Future research should assess the role of mismatch and specific supply-side factors and policy levers to address such factors.

Although the findings of this study do not necessarily generalize beyond the segment of the labour market covered by online job postings, the lack of discrimination found in this segment in this and other research in MENA (Alaref et al. 2020; Balkan and Cilasun 2019, 2018) has some important policy implications. These implications are corroborated by the findings that specific segments of employers in Egypt (specific industries, smaller firms) are more likely to discriminate (Osman, Speer, and Weaver 2025). Hiring may thus be segmented into relatively non-discriminating firms that post online and firms that are more likely to discriminate but do not post online. Firms that post jobs online are presumably larger and have more professional human resource staff or processes, characteristics that have been found to reduce employment discrimination in other contexts (Banerjee, Reitz, and Oreopoulos 2018). Thus, policies and programs that encourage firm growth and support HR professionalization might reduce discrimination in other segments of the labour market. Similarly, policies and programs encouraging firms to post jobs online or publicly, particularly rather than hire through social networks, could potentially reduce discrimination. Social network hiring is common in developing countries, with almost half of retail hires in Egypt coming through networks (Osman, Speer, and Weaver 2022). Men are much more likely to use social networks as part of their job search than women (El-Mallakh 2020). A causal impact on discrimination of encouraging non-posting firms to switch into public posting and thus moving from network-based to competitive hiring is not guaranteed but does merit further investigation.

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## Appendix A: Additional tables

**Table 6. Sample of job postings and exclusion criteria**

<b><u>Inclusion/exclusion (multiple exclusion possible)</u></b>	<b><u>Per cent</u></b>	<b><u>N (observations)</u></b>
Included	37.5	1114
Public sector	0.4	11
Job outside Egypt	1.3	73
Job for non-Egyptians	0.1	7
Position is volunteer	0.5	15
Position req. 5+ yrs. exp.	19.1	1138
Position is senior level	14.7	909
Position too technical	12.3	472
Position does not include ages 18-29	1.4	89
Position req. license/certification	0.4	31
Position req. additional docs.	4.2	145
Position req. profile not elsewhere	24.1	1160
Position org. confidential	4.6	381
<b><u>Among included, per cent expired</u></b>		
Expired	53.5	404

Source: Author's calculation based on job posting data (batch 1 and batch 2). Observation is a job posting.

Notes: Multiple exclusion criteria are possible. Per cent expired among those included.

**Table 7. Characteristics of online job postings versus ELMPS 2018 private sector wage work**

	<u>Job postings</u> Mean (SE)	<u>ELMPS 2018</u> Mean (SE)	<u>Difference &amp; t-test</u> (1)-(2)
<b><u>Occupations</u></b>			
Managers	0.091 (0.006)	0.015 (0.001)	0.077**
Professionals	0.566 (0.010)	0.077 (0.003)	0.489***
Technicians and associate professionals	0.123 (0.007)	0.045 (0.002)	0.077
Clerical support workers	0.090 (0.006)	0.036 (0.002)	0.054
Service and sales workers	0.095 (0.006)	0.180 (0.004)	-0.085
Skilled agricultural, forestry and fishery workers	0.000 (0.000)	0.165 (0.004)	-0.165*
Craft and related trades workers	0.003 (0.001)	0.281 (0.005)	-0.278**
Plant and machine operators, and assemblers	0.028 (0.003)	0.146 (0.004)	-0.119
Elementary occupations	0.003 (0.001)	0.053 (0.002)	-0.050
<b><u>Industries</u></b>			
Agriculture	0.001 (0.001)	0.165 (0.004)	-0.164*
Manufacturing and Mining	0.144 (0.007)	0.166 (0.004)	-0.022
Construction and utilities	0.045 (0.004)	0.220 (0.004)	-0.174*
Retail and wholesale	0.037 (0.004)	0.158 (0.004)	-0.121
Transport and storage	0.017 (0.003)	0.106 (0.003)	-0.089
Accommodation and food service	0.061 (0.005)	0.044 (0.002)	0.018
Information and communication	0.229 (0.009)	0.009 (0.001)	0.220***
Professional activities	0.161 (0.007)	0.026 (0.002)	0.135***
Administrative and support	0.180 (0.008)	0.015 (0.001)	0.165***
Education and Health	0.096 (0.006)	0.045 (0.002)	0.051
Other services	0.030 (0.003)	0.048 (0.002)	-0.018
<b><u>Education requirements</u></b>			

	<b><u>Job postings Mean (SE)</u></b>	<b><u>ELMPS 2018 Mean (SE)</u></b>	<b><u>Difference &amp; t-test (1)-(2)</u></b>
None/Undefined	0.006 (0.002)	0.650 (0.005)	-0.644***
Read & Write	0.009 (0.002)	0.100 (0.003)	-0.091
Secondary	0.072 (0.005)	0.136 (0.004)	-0.064
Bachelor	0.910 (0.006)	0.111 (0.003)	0.799***
Post-graduate	0.003 (0.001)	0.003 (0.001)	-0.000
<b><u>Skills (multiple possible)</u></b>			
Technical	0.352 (0.010)	0.288 (0.005)	0.064
Literacy	0.008 (0.002)	0.384 (0.005)	-0.376***
Mathematics/statistics	0.099 (0.006)	0.314 (0.005)	-0.215*
Physical fitness	0.002 (0.001)	0.545 (0.005)	-0.543***
Computer	0.396 (0.010)	0.130 (0.004)	0.266***
Management	0.128 (0.007)	0.112 (0.003)	0.016
Customer service	0.140 (0.007)	0.167 (0.004)	-0.026
Foreign language	0.123 (0.007)	0.071 (0.003)	0.053
N (Observations)	2420	8542	

Source: Author's calculations based on job posting data and ELMPS 2018 data. Observation is a job posting (experiment, batch 1 only) or worker (ELMPS).

Notes: Standard errors in parentheses. \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

**Table 8. Details of position requirements**

<b>Has Age Requirement (%)</b>	22.0
<b><u>Mean age requirements (position has age requirement)</u></b>	
Minimum Age	23.3
Maximum Age	35.4
<b><u>Experience requirements (%)</u></b>	
No Experience	30.4
1 Year Experience	19.7
2 Year Experience	13.4
3 Year Experience	12.4
4 Year Experience	3.8
5 Year Experience	10.1
More Than 5 Year Experience	10.2
<b>Requires Driver's License (%)</b>	4.9
<b><u>Most Common Skill Words (% of Skill Words)</u></b>	
Communication	3.1
Management	1.5
Microsoft	1.0
Office	0.9
Team	0.8
Analytical	0.8
Written	0.8
Solving	0.7
Design	0.7
Software	0.7

Source: Author's calculation based on job posting data (batch 1). Observation is a job posting.

**Table 9. Ten most common occupations and ten most common industries along with percentage requiring male or female workers**

	<u>Per cent</u>	<u>N (Observations)</u>	<u>Per cent require male</u>	<u>Per cent require female</u>
<b><u>Occupations</u></b>				
Software developer	7.6	188	0.0	0.0
Sales professionals	7.3	123	2.8	0.9
Other business service agents	5.1	16	23.6	0.0
Customer information call center clerk	4.6	77	4.4	2.5
General accountant	2.8	85	14.3	4.8
Security guard	2.7	9	97.7	0.0
Other sales service workers	2.5	38	54.0	0.7
Other equipment assemblers and installers	2.3	1	0.0	0.0
General administration specialist	2.0	30	3.3	0.0
Marketing specialist	2.0	42	5.2	3.4
<b><u>Industries</u></b>				
Other ancillary business support services	8.4	149	11.4	26.9
Human resources supply and management	7.4	131	5.7	0.2
Other activities of computer and information systems	6.8	119	4.3	0.0
Other information services activities	4.5	125	32.0	0.5
Other activities of other manufacturing industries	3.7	46	77.0	0.9
Information-based telephone services	3.4	1	0.0	0.0
Other computer software activities	2.1	48	0.0	0.0
Activities of real estate agencies and brokers	2.1	41	4.5	1.1
Other construction activities	2.1	81	13.6	4.4
Other activities for other food services	1.6	22	83.8	0.0

Source: Author's calculation based on job posting data (batch 1). Observation is a job posting.

**Table 10. Linear probability model of callbacks, with controls**

	<b>Spec. 1</b>	<b>Spec. 2</b>
<b>Sex (male omit.)</b>		
Female	-0.016 (0.033)	-0.023 (0.033)
<b>Marital status (single omit.)</b>		
Married		-0.025 (0.014)
<b>Int. marital status and sex</b>		
Female and married		0.014 (0.019)
<b>Occupation (manager omit.)</b>		
Professionals	0.095** (0.031)	0.095** (0.031)
Technicians & Assoc. Prof	0.032 (0.056)	0.032 (0.056)
Clerical	0.066 (0.039)	0.066 (0.039)
Service & Sales	0.047 (0.042)	0.047 (0.042)
Craft & Related Trades	0.078* (0.034)	0.078* (0.034)
Machine Op. & Assemblers	-0.406*** (0.086)	-0.406*** (0.087)
Elementary Occupations	0.066 (0.052)	0.066 (0.052)
<b>Industry (wholesale &amp; retail omit.)</b>		
Agriculture	-0.042 (0.070)	-0.042 (0.070)
Manufacturing & Mining	0.015 (0.032)	0.015 (0.032)
Construction & Utilities	0.026 (0.031)	0.026 (0.031)
Transportation & Storage	0.124 (0.093)	0.124 (0.093)
Accommodation & Food Serv.	0.020 (0.052)	0.020 (0.052)

	<b>Spec. 1</b>	<b>Spec. 2</b>
Information & Communication	0.042 (0.045)	0.042 (0.045)
Financial Real Estate & Prof.	0.123** (0.039)	0.123** (0.039)
Administrative Support	0.090* (0.046)	0.090* (0.046)
Education & Health	0.107* (0.049)	0.107* (0.049)
Other Services	0.194** (0.067)	0.194** (0.067)
<b>Education requirement (bachelor's omit.)</b>		
None/Undefined	0.065 (0.102)	0.065 (0.102)
Secondary	0.461*** (0.084)	0.461*** (0.084)
<b>Skills required (multiple possible)</b>		
Technical	-0.006 (0.025)	-0.006 (0.025)
Literacy	-0.109* (0.046)	-0.109* (0.046)
Mathematics/Statistics	0.029 (0.053)	0.029 (0.053)
Computer	0.001 (0.025)	0.001 (0.025)
Management	0.117* (0.053)	0.117* (0.053)
Customer Service	0.074* (0.032)	0.074* (0.032)
Foreign language	-0.019 (0.029)	-0.019 (0.029)
<b>Governorate (Cairo omit.)</b>		
Alexandria	0.089 (0.062)	0.089 (0.062)
Suez	0.014 (0.045)	0.014 (0.045)
Damietta	0.521*** (0.036)	0.521*** (0.036)
Dakahlia	0.387* (0.036)	0.387* (0.036)

	<b>Spec. 1</b>	<b>Spec. 2</b>
	(0.182)	(0.182)
Al-Sharqiya	0.030	0.030
	(0.077)	(0.077)
Qalyubia	-0.051	-0.051
	(0.032)	(0.032)
Al-Gharbiya	-0.139**	-0.139**
	(0.054)	(0.054)
Menoufia	-0.143**	-0.143**
	(0.054)	(0.054)
Ismailia	0.007	0.007
	(0.053)	(0.053)
Giza	0.028	0.028
	(0.030)	(0.030)
Beni Suef	-0.071	-0.071
	(0.061)	(0.061)
Fayoum	-0.016	-0.016
	(0.022)	(0.022)
Minya	-0.048	-0.048
	(0.064)	(0.064)
Asyut	0.154***	0.154***
	(0.030)	(0.030)
Sohag	0.402***	0.402***
	(0.050)	(0.050)
Aswan	-0.092*	-0.092*
	(0.045)	(0.045)
The Red Sea	-0.045	-0.045
	(0.087)	(0.087)
Marsa Matrouh	-0.061	-0.061
	(0.067)	(0.067)
South Sinai	-0.027	-0.027
	(0.047)	(0.047)
<b>Constant</b>	-0.079	-0.067
	(0.045)	(0.045)
<b>Mean of dep. var.</b>	0.112	0.112
<b>N (Posting-identity)</b>	2840	2840
<b>N (postings)</b>	710	710
<b>R-sq.</b>	0.130	0.131
<b>H1 p-value</b>	0.619	
<b>H2 p-value</b>		0.486



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	<b>Spec. 1</b>	<b>Spec. 2</b>
<b>H3 p-value</b>		0.080
<b>H4 p-value</b>		0.418
<b>H5 p-value</b>		0.793

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Source: Author's calculation based on resume data and callback data

Notes: \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . Standard errors, in parentheses, clustered by job posting. H1: tests for gender discrimination in Spec. 1. H2: tests for discrimination single women vs. single men H3: tests for discrimination married men vs. single men. H4: tests for discrimination married women vs. single women. H5: tests for discrimination married women vs. married men.

**Table 11. Distribution of university grades by sex and marital status (percentage), higher education graduates in the labor force (ELMPS 2018)**

	<b>Male single</b>	<b>Male married</b>	<b>Female single</b>	<b>Female married</b>	<b>Male total</b>	<b>Female total</b>	<b>Total</b>
<b>Excellent</b>	2	2	2	3	2	3	2
<b>Very Good</b>	24	24	36	35	24	34	28
<b>Good</b>	57	59	55	54	58	55	57
<b>Passing</b>	17	16	7	8	16	8	13
<b>Total</b>	100	100	100	100	100	100	100

Source: Author's calculations based on and ELMPS 2018 data.

**Table 12. Linear probability model of callbacks, reweighted with inverse probability weights**

	<b>Spec. 1</b>	<b>Spec. 2</b>
<b>Sex (male omit.)</b>		
Female	-0.005 (0.006)	-0.007 (0.007)
<b>Marital status (single omit.)</b>		
Married		-0.000 (0.000)
<b>Int. marital status and sex</b>		
Female and married		0.003 (0.003)
<b>Constant</b>	0.007 (0.007)	0.007 (0.007)
<b>Mean of dep. var.</b>	0.005	0.005
<b>N (Posting-identity)</b>	2840	2840
<b>N (postings)</b>	710	710
<b>R-sq.</b>	0.001	0.002
<b>H1 p-value</b>	0.423	
<b>H2 p-value</b>		0.309
<b>H3 p-value</b>		0.163
<b>H4 p-value</b>		0.386
<b>H5 p-value</b>		0.594

Source: Author's calculation based on resume data and callback data. Re-weighted using ELMPS 2018 data.

Notes: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001. Standard errors, in parentheses, clustered by job posting. H1: tests for gender discrimination in Spec. 1. H2: tests for discrimination single women vs. single men H3: tests for discrimination married men vs. single men. H4: tests for discrimination married women vs. single women. H5: tests for discrimination married women vs. married men.

## Appendix B: Structured Ethics Appendix

Questions are direct quotes from Asiedu et al. (2021). Response, in italics, are the author's own.

1. **Policy Equipoise.** “Is there policy equipoise? That is, is there uncertainty regarding participants’ net benefits from each arm of the study relative to the other arms and to the best possible policy to which participants could have access?”

*There was uncertainty regarding specifically whether there is discrimination against married women in Egypt’s labour market. While clearly there were disparate employment rates by sex and marital status, the extent to which such disparities were due to discrimination was unknown.*

2. **Role of researchers with respect to implementation** “Are researchers “active” researchers, i.e. did the researchers have direct decision making power over whether and how to implement the program? If YES, what was the disclosure to participants and informed consent process for participation in the program?”

*The author had direct decision-making power over how to implement the research (designing resumes or exclusion criteria, for example). J-PAL MENA staff undertook the research implementation. Note that there was no program (gender and marital status were randomized) and there were no individual participants. The firms receiving the resumes did not know that the resumes were fictitious and made their own decisions on the callbacks. This deception (and lack of informed consent) was reviewed and approved by the IRB at the American University in Cairo. Although the ethics of deception in correspondence studies are debated (Pager 2007), the review of fictitious resumes imposed minimal risk on firms.*

3. **Potential harms to participants or nonparticipants from the interventions or policies** “Does the intervention, policy or product being studied pose potential harm to participants or non-participants? Related, are participants or likely affected non-participants particularly vulnerable? Also related, are participants’ access to future services or policies changed because of participation in the study?”

*Reviewing fictitious resumes poses no more than minimal risk to firms. The greatest risk would be spending time considering a non-viable candidate. The research only took the deception to the point of receiving a callback, not interviewing for or accepting a position. Research assistants promptly declined positions to prevent any labour market congestion. Firms that were not contacted would not be affected in any way. The postings were randomly selected and not from particularly vulnerable firms. Firms’ access to future services/policies was unaffected because of participation. Firms remained anonymous in all publicly released data and research.*

4. **Potential harms to research participants or research staff from data collection (e.g., surveying, privacy, data management) or research protocols (e.g., random assignment)** “Are data collection and/or research procedures adherent to privacy, confidentiality, risk-management, and informed consent protocols with regard to human subjects? Are they respectful of community norms, e.g., community consent not merely individual consent, when appropriate?”

Are there potential harms to research staff from conducting the data collection that are beyond “normal” risks?”

*As discussed above, no individual participants (human subjects) were involved in the research. The firms receiving the resumes did not know that the resumes were fictitious. This deception (and lack of informed consent) was reviewed and approved by the IRB at the American University in Cairo. Firms remained anonymous in all publicly released data and research. There were no additional potential harms to research staff from conducting the data collection beyond the “normal” risks of answering phones. Research assistants did have to engage in deception but were aware that this was part of the position requirements.*

**5. Financial and reputational conflicts of interest.** “Do any of the researchers have financial conflicts of interest with regard to the results of the research? Do any of the researchers have potential reputational conflicts of interest?”

*The author has no financial conflicts of interest. The author has previously written substantially on gender, marital status, and employment in Egypt. She had proposed discrimination as one potential explanation. The findings of this paper to the contrary do not pose a reputational risk to the author.*

**6. Intellectual freedom.** “Were there any contractual limitations on the ability of the researchers to report the results of the study? If so, what were those restrictions, and who were they from?”

*This research was supported by a grant from the International Labour Organisation (ILO) to the Economic Research Forum (ERF) for the “Understanding the Low Participation of Women in the Egyptian Labour Market” project. The author’s contract provided for ERF/ILO to publish the first working paper version of the research. The author retained all subsequent research paper intellectual property publishing rights. While ILO was given the opportunity to review and comment on the working paper, the responsibility for the views and opinions expressed in the working paper and journal article rests solely with the author. J-PAL MENA’s contract provided for ERF’s Open Access Microdata Initiative to act as a data repository.*

**7. Feedback to participants or communities.** “Is there a plan for providing feedback on research results to participants or communities? If yes, what is the plan? If not, why not?”

*There were no individual participants, and given the deception involved, firms were not aware they were included in the study. Firms remained anonymous in reporting the results, which was particularly necessary given that they may have been discriminating. The research results were shared with relevant academic and policy communities, including in an ILO “Women Access to Labour Market in Egypt Study Launching Event” in Egypt.*

**8. Foreseeable misuse of research results.** “Is there a foreseeable and plausible risk that the results of the research will be misused and/or deliberately misinterpreted by interested parties to the detriment of other interested parties? If yes, please explain any efforts to mitigate such risk”

*The results indicate that, at least in the segment of the labour market examined by this study, there is not appreciable differential discrimination against women or particularly married women. It is potentially possible that these results could be used to undermine protections against discrimination or efforts to increase (married) women's participation. The paper makes very clear that low rates of employment for women and especially married women remain a problem. The manuscript also makes clear that results do not necessarily generalize to the labour market as a whole and may be specific to the universe of job postings, i.e., primarily professional jobs at larger firms, requiring higher education. However, having an accurate sense of the role of discrimination even in this specific segment is valuable for public policy, as it can then test and target other potential drivers of gender and marital status disparities.*

**9. Other Ethics Issues to Discuss.** “Are there any other issues to discuss?”

*As mentioned above, correspondence studies do require deception of firms and the submission of false resumes, which are ethical issues (Pager 2007). The firms that receive false resumes may spend time reviewing them and undertaking callbacks. Only a small fraction of postings were sampled to avoid creating any labour market congestion with false applications. Refusals were promptly provided after callback results to minimize these costs to firms. The assumption underlying the research is that the ethical problem of deception and firm cost issues are outweighed by the benefits of knowledge gained from the research.*

## Appendix C: Power and sample size calculations

In matched field experiments (as in this study, sending four resumes that vary by sex and marital status to the same position), power depends on statistics that were not known *ex ante* (Vuolo, Uggen, and Lageson 2016). This study therefore did not undertake sample size or power calculations *ex ante*, nor were any *ex post* power calculations proposed in the pre-analysis plan. However, given the insignificant results and based on a reviewer comment, this appendix undertakes simulations of different sample sizes needed to meet various assumptions (Vuolo, Uggen, and Lageson 2016) for matched tests and the main dichotomous outcome (callback). Calculations are undertaken by sex (McNemar's test), since, although there are tests for multiple categories (e.g., combinations of sex and marital status), specifically Cochran's Q test, "no one has attempted to explicitly state an exact formula or create a function to calculate sample size for Cochran's Q, due to the difficulty ... to solve for N" (Vuolo, Uggen, and Lageson 2016, 27). All methods and notation in the appendix are as per Vuolo, Uggen, and Lageson (2016), applied to the case at hand.

Per the pre-analysis plan, the critical level was  $\alpha = 0.05$ . As is typical, tests set power  $(1-\beta) = 0.8$  (neither power nor tests were specified in the pre-analysis plan). Power simulations use the proportion of applications that received a callback on average (11.2 per cent) as a starting point for simulating the necessary sample sizes under different degrees of discrimination.

McNemar's test calculates sample size based on power  $(1-\beta)$ ,  $\alpha$ , the sample size  $n$  of pairs (postings), and the proportion of postings in the discordant cells (where a female resume gets a callback, but a male does not, or vice versa), relative to the total postings.<sup>29</sup> Overall in Egypt, 15 per cent of women were employed in 2023, versus 69 per cent of men (Krafft, Assaad, and McKillip 2024). Sample size calculations are undertaken for simulated cases where 100 per cent of this employment disparity is discrimination (male to female employment ratio of 69/15 per cent and thus callback ratio of 0.184 vs. 0.04) and callback ratios with 75 per cent, 50 per cent, and 25 per cent of the employment gap being due to discrimination.<sup>30</sup> These simulations are in line with guidance to simulate over a range of potential discordance (Vuolo, Uggen, and Lageson 2016).

As Table 13 shows, if 100 percent of employment disparities were discrimination, callback rates would then be 18.4 per cent for men and 4.0 per cent for women, and only 67 postings would be needed. If 75 per cent of the disparity is discrimination (callback rate for men of 15.9 per cent and women 6.5 per cent), 172 postings are needed. If 50 per cent of the disparity is discrimination (13.9 per cent callback rate for men, 8.5 per cent for women), 517 postings are needed. Lastly, if 25 per cent of the disparity is discrimination (12.4 per cent callback rate for men and 10.0 per cent for women), 2,635 postings would be needed. Given the study's sample size of 710 postings, the analyses are well-powered to detect cases where half or more of employment disparities are discrimination-driven.

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<sup>29</sup> Note that since two female and two male resumes varying by marital status were actually sent, calculations are likely conservative.

<sup>30</sup> This approach assumes callbacks translate to employment disparities 1:1.

**Table 13. Sample size calculations for discrimination by sex**

	<b>100% discrimination</b>	<b>75% discrimination</b>	<b>50% discrimination</b>	<b>25% discrimination</b>
<b>Employment rates</b>				
Male employment rate	69.0	69.0	69.0	69.0
(Simulated) female employment rate	15.0	28.5	42.0	55.5
<b>Rates of callback</b>				
Male	18.4	15.9	13.9	12.4
Female	4.0	6.5	8.5	10.0
Total	11.2	11.2	11.2	11.2
<b>N (postings) needed</b>	67	172	517	2635

Notes: Author's calculations based on observed callback rate (11.2 per cent), nationally representative male and female employment rates (Krafft, Assaad, and McKillip 2024), and simulating hypothetical female employment rates when different shares of the male/female employment disparity are discrimination.