

Labor Market Penalty for ‘Single Mothers’*

Somdeep Chatterjee^{1,2}, Ralitza Dimova³, and Shubham Ojha¹

¹Economics Group, Indian Institute of Management, Calcutta

²Centre for Development Economics and Sustainability, Monash University

³Global Development Institute, University of Manchester

Abstract

It is well established that there exists a motherhood penalty in the labor market for child-bearing women. Theoretical models as well as empirical estimates suggest that unmarried or never married women without children have a relative advantage in terms of labor market opportunities. However, little is known about *single mothers* and their labor market outcomes. Single mothers constitute an interesting demographic because on one hand, they do not have the perceived disadvantages of a married woman which leads to a labor market penalty while also being mothers, they face exactly the same constraints with respect to child care and child bearing as with other mothers. While aggregate data suggests that single mothers’ labor market participation rates are usually higher than even unmarried women, in contrast to married non-mothers and married mothers; we argue that this realized labor market equilibrium masks potential demand-side discrimination and likely reflects strong supply-side incentives. We conduct a correspondence study experiment and apply to real jobs using fictitious resumes to uncover pure demand side discrimination effects. We show that equally qualified single mothers are much less likelier to receive interview call-backs with respect to unmarried non-mothers, married non-mothers and married mothers. For every interview callback a single mother has to apply to about 30 jobs whereas an unmarried woman receives more than 2 callbacks for as many job applications. As a potential mechanism for our findings, we find suggestive evidence of inaccurate statistical discrimination by employers.

Keywords- single mothers; labor market discrimination; motherhood penalty

JEL Classification- J71; J23; O12

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1 Introduction

While the notion of a motherhood penalty in the labor market is fairly well established empirically (Correll et al. (2007), Glauber (2018), Anderson et al. (2002)), it is not known whether the penalty extends to single mothers, and if yes, to what degree. This is partly due to the fact that it is not obvious that the penalty would naturally extend to single mothers in equilibrium. Unlike mothers in civil unions, the supply side factors affecting single mothers' labor market outcomes are likely to be very different. For instance, while a mother in a union may rely on other sources of household income and therefore prefer childcare and adjust her labor market participation hours downwards, a single mother may not have this choice. Childcare responsibility, limited government support, poor socio-economic background etc., may compel single mothers to disproportionately participate more in labor market i.e. to increase their labor supply (Meyer and Rosenbaum (2001), Gonzalez (2004), Pronzato (2009)). Consequently, observing labor market equilibrium matches for single mothers and statistics on their employment status may largely reflect this supply side mechanism and mask any demand side inequalities and/or discrimination.

In this paper, we study whether single mothers face a labor market penalty. We construct a unique experimental design using a correspondence study (Bertrand and Mullainathan (2004), Neumark et al. (2019), Thorat and Attewell (2007)) approach to estimate if real-life employers discriminate against single mothers compared to equally qualified single non-mothers for actual jobs advertised on a large job market portal in India. In general, the labor market outcomes of any individual or group depend on both demand and supply side (Bhalotra and Fernández (2023)). Simply based on supply side factors, the theory predicts that single mothers should work more in comparison to unmarried women because of their relative deprivation of outside options on various dimensions. We provide suggestive evidence for this theoretical prediction using the Demographic and Health Survey (DHS) data from India, also known as the Indian National Family Health Survey - 4 (NFHS 4) from 2015-16.

In this connection, Figure 1 provides summary statistics of current working status of different groups based on parenthood (or marital) status. This figure suggests that in equilibrium single mothers are more likely to work than married mothers, unmarried women, and married women. The figure also establishes that the regular motherhood penalty and marriage penalty (labor force participation of married women and married mothers relative to unmarried women) can be observed from the summary statistics, i.e., in the labor market equilibrium.

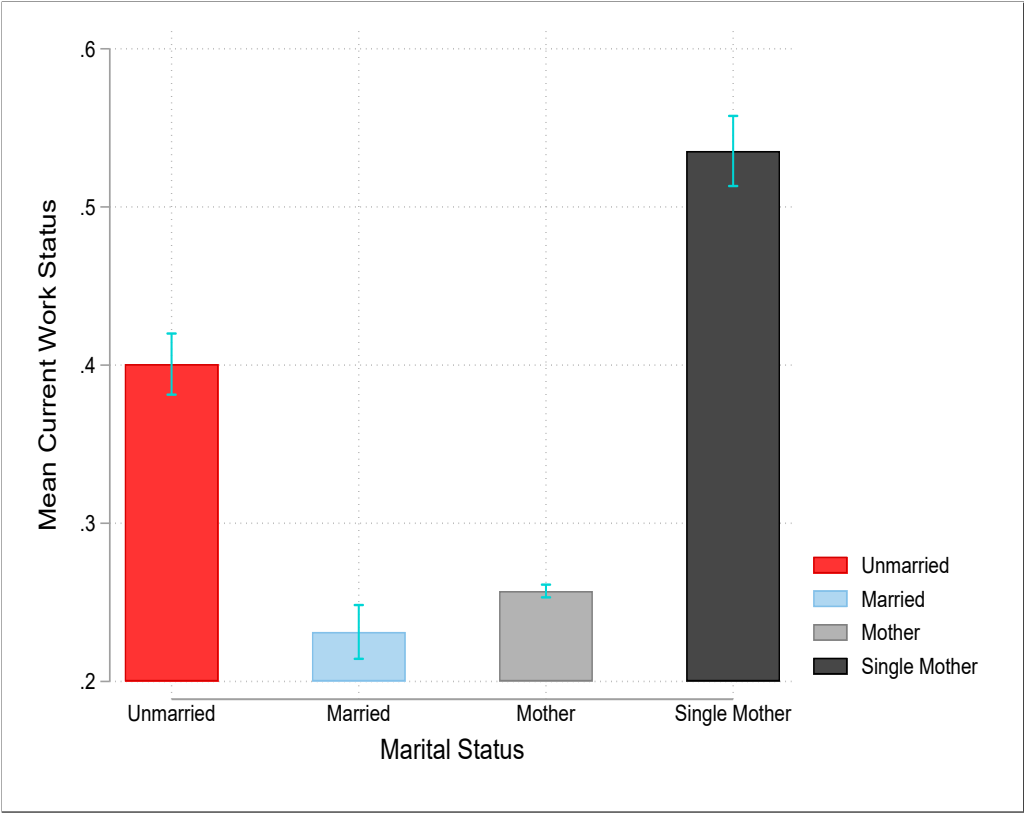


Figure 1: Mean comparison of working status across different parenthood (or marital) groups

On the other hand, labor demand for single mothers is a function of a host of factors including the taste and preferences of the employer. Ex-ante, it is not obvious that the employers would discriminate against the single mother in the same way that discrimination manifests towards mothers, in general. This is because a reason for the standard motherhood penalty is discrimination by employers based on their perception of time use patterns, availability of resources, and resultant estimates of the candidates' productivity (Phelps (1972),

Jessen et al. (2019), Aigner and Cain (1977)). Many of these contexts, therefore, imply an implicit advantage for unmarried or single women in the labor market. However, the demographic of ‘single mothers’ presents a unique interaction of characteristics of a ‘mother’ and an ‘unmarried’ person, that may result in a labor market penalty or a premium. Consequently, it is not apparent as to what is the likeliest demand-side response.

Also, if the penalty were to exist, it is further not clear if the penalty would be more substantial than the regular motherhood penalty or weaker or perhaps remain the same. Standard estimates of the motherhood penalty would mask the marriage penalty for women, as suggested by Becker’s theory of specialization(Becker (1985)). For single mothers, the marriage penalty should essentially not exist, and therefore, the magnitude could be weaker. On the other hand, if the penalty manifests through employer discrimination and the motivations described above, such as lack of time available for the job, the penalty should be accentuated for single parents because of the potential lack of spousal support for child care. Moreover, the existence of negative societal attitudes(Haire and McGeorge (2012), Eby et al. (2004)) towards single parents might potentially translate into discrimination against them in the labour market(Bertrand et al. (2005)). Therefore, studying single mothers in the labor market helps revisit many unanswered questions within the motherhood penalty literature in labor economics.

Against this backdrop, our correspondence study design has two major advantages. First, it allows us to capture a pure motherhood penalty which is not contaminated by an associated marriage penalty for women. Second, we are able to isolate a pure demand-side effect by eliminating the supply side heterogeneity experimentally and therefore make predictions about the counterfactual labor market equilibrium, in the absence of distortions due to potential demand side discrimination. Additionally, to answer our question on the relative magnitudes of this penalty vis-a-vis the standard motherhood penalty, we also compare callback rates for equally qualified married non-mothers and married mothers to single non-

mothers.

We create fictitious resumes/CVs of applicants that were identical in all relevant aspects but differ only in their respective parenthood and marital status. In our experiment, we have four treatment arms (unmarried, married, married mother, and single mother), and we apply to each job with all 4 CVs. We only applied for openings in private sector firms and avoided job openings for highly specialized positions that required many years of on-the-job experience. Our aim was to select jobs that a university graduate might be eligible for entry-level jobs. The companies whose job posts we responded to included Banking and financial services, education, IT services, business process management, retail, manufacturing, marketing, and mass media.

Our estimates suggest that there seems to be a clear rank order of the potential discrimination, as evidenced by differences in callback rates. Compared to equally qualified single non-mothers, all other categories are less likely to receive a callback. However, the effects are smaller for married non-mothers, followed by married mothers, and the highest for single mothers, suggesting that single mothers are least likely to receive callbacks. This suggests that in the absence of such discrimination, in the counterfactual, the labor demand for single mothers would have been higher and therefore in equilibrium, we would have even more single mothers participating in the labor force than what we observe in the DHS data and the average worker, including those already working, would have higher earnings.

Finally, we examine some likely mechanisms driving our results using two complementary approaches. First, we conduct a heterogeneity analysis by looking at differences in results based on potential relocation costs of the applicants. We find that for job locations which are near the applicants' inferred locations, the discrimination is non-existent. This provides evidence in support of inaccurate statistical discrimination where employers may inaccurately assume that single mothers may have higher opportunity costs of relocation. Second, we perform a vignette experiment on potential future employers and recruiters. The vignettes

were conducted in a classroom of business school students in a leading (top 70 in global FT rankings) business school in India. Through this survey, we attempt to tease out general beliefs about the potential sources of labor market discrimination against single mothers. We employ a method similar to [Haaland and Roth \(2023\)](#), and we find that the modal belief among our respondents is that the callback differential is due to implicit discrimination: 44% of our respondents believe employers subconsciously rely on negative stereotypes about single mothers, and 41% state that the main reason driving this result relates to inaccurate statistical discrimination (employers incorrectly believing that single women are less productive on average).

2 Background and Context

Recent data from a UNICEF report reveals that approximately 4.5% of all Indian households are headed by single mothers, resulting in a staggering 13 million lone-mother households. Additionally, an estimated 32 million single mothers are living in extended households.¹ This highlights the context of the study as this trend is projected to persist in the foreseeable future. Single parenthood may be due to a host of factors, including personal choice, or natural events. However, in terms of labor market implications, this should not affect the demand for women workers from firms, unless there is discrimination.

To the best of our knowledge, there is little empirical evidence to substantiate a link between single motherhood and labor market outcomes. The aim of this study is, therefore, twofold. First, we seek to find whether the advent of single parenthood is associated with any form of adverse labor market consequences. Second, through our novel experimental design, we aim to place this problem in a causal setting, a facet that has been absent in the literature on labor market discrimination.

The importance of this research is further emphasized by the continuous rise in the num-

¹See here: <https://timesofindia.indiatimes.com/india/un-report-13-million-households-in-india-where-lone-mothers-live-alone-w/articleshow/69949845.cms>

ber of single parents, underscoring the need to study this subject matter. Changes in societal dynamics, such as shifts in family structures, higher divorce rates, and evolving gender roles, have contributed to a steady increase in single-parent households globally. The upward trend of single parenthood is projected to persist in the coming years, influenced by economic factors, evolving social norms, and shifts in relationship dynamics. Hence, comprehending the challenges and discrimination faced by single parents, particularly single mothers, becomes imperative in addressing the requirements of this expanding demographic.

The outcomes of this study will yield empirical evidence that can guide the development and implementation of policies aimed at combating labor market discrimination. Policymakers can utilize these insights to formulate interventions and regulations that safeguard the rights of single parents and foster an inclusive labor market environment. Moreover, organizations can benefit from the study's findings by implementing workplace interventions to address the specific challenges single parents encounter. By understanding the barriers and biases inherent in the job application process, organizations can create supportive environments, provide flexible work arrangements, and introduce diversity initiatives that promote fair treatment and equal opportunities for single parents.

Beyond influencing policy and workplace practices, the results of this study can raise social awareness regarding the labor market discrimination experienced by single parents. Enhanced awareness can foster greater societal understanding and support for the employment rights of single parents. Consequently, this can contribute to advocacy efforts to establish a more inclusive and equitable labor market for single parents. The significance of this study also extends beyond immediate applications as it lays the groundwork for future research and contributes to the academic comprehension of labor market discrimination. This includes exploring the long-term career impacts on single parents, considering intersectionality in discrimination, and evaluating the effectiveness of interventions in addressing these issues.

3 Experiment Design

3.1 Field Work

The correspondence study used to measure parenthood-based discrimination was carried out over a period of 3 months between November 2023 and January 2024 across all cities in India. The sample consisted of firms that posted job vacancies online on job search websites. These job vacancies were located in different parts of the country (4 major locations in terms of the number of jobs applied are Mumbai, Gurugram, Delhi, and Bangalore). Job search sites are extensively used for recruitment into white-collar jobs in India. The largest of such sites have as many as 20,000 recruiters and 10 million resume postings. The majority of jobs posted on the job websites are in IT-related fields, call centers and customer services, sales, marketing, management, and human resources.

Recruiters post job vacancies on the website, and applicants post resumes. The recruiter can contact applicants who have posted publicly available resumes. The applicants can also be the ones to contact the recruiter in response to a particular job vacancy posted by the recruiter in response at a specific job vacancy posted by the recruiter. An additional feature introduced by the main website used in the study during the data collection was that individual applicants who were single parents mothers could declare their status as “single parent” and “working mother”, respectively.

3.2 Creating the Resumes

The first step of the experiment design is to generate templates for the resumes to be sent. The challenge is to produce a set of realistic and representative resumes without using resumes that belong to actual job seekers. To achieve this goal, we start with resume templates given by various job portals.

We begin with resume templates posted on two job search websites as the basis for our artificial resume(naukari.com and monster.com). The templates provided on these websites may not be entirely representative of the average job seeker, but they provide a practical approximation. We also restricted ourselves to two occupational categories: sales and customer service. We constructed our resumes to be eligible for out-of-college jobs with no experience.

We leveraged the “Key Skills” section on the naukri.com portal to optimize profiles for specific job roles. Resumes are screened based on the ‘key skills’ mentioned in this section rather than solely relying on the resumes. To strategically align applicants with customer service and sales positions, we analyzed 100 job descriptions for each category. From this analysis, we curated a standard but diverse set of ‘key skills’ designed to enhance profile visibility on the portal for these particular job types (sales and customer service).

3.3 Identities of Fictitious Applicants

The subsequent phase involves the generation of identities for fictional candidates and the formulation of the experimental manipulation. To ensure uniformity across all four CVs, we maintained consistency in identity attributes. Specifically, we selected common female Bengali names commencing with the letter “S” for first names. We employed Bengali Brahmin surnames for all treatment arms, excluding considerations related to caste and gender heterogeneity.

In crafting personal contact details, diverse email IDs were generated, and distinct phone numbers were provided on both the profile and the CV to facilitate callbacks from both sources. All profiles were geographically located in Kolkata, and postal addresses were deliberately omitted. For educational backgrounds, we standardized the degree (B.Com and M.Com) and aligned institutions based on their NIRF ranking and perceived reputation. The same approach was adopted for schools associated with the profiles.

Our primary challenge involved determining effective methods for conveying candidates’ par-

enthood or marital status. Various studies in the literature have explored diverse approaches, such as incorporating this information in cover letters (Granberg et al. (2020)), using volunteering experiences to signal parenthood (Ishizuka (2021)), and utilizing the “about me” section(He et al. (2023)).

In our scenario, incorporating information into cover letters proved impractical, given that most of the targeted entry-level positions did not require cover letters. Utilizing volunteering experience as a signaling method posed a potential challenge, particularly in defining the parenthood status of the control group. This ambiguity relies on the subjective judgment of the employer, introducing a confounding variable that is not conducive to our study objectives, especially in unveiling the distinct impact of the pure-motherhood penalty. Another available avenue was leveraging the “About me” section, a common practice in India, where individuals provide a brief self-description. However, the verbosity inherent in this section raised concerns about introducing numerous confounding factors.

Hence, we opted for the Personal Information section as the means to convey parenthood status. This section is commonly found in resumes of entry-level candidates, providing a convenient space to input essential details. The advantage of employing the Personal Information section lies in its capacity to deliver a signal for the control group without introducing unnecessary confounding factors. Furthermore, its brevity minimizes the potential confounders that can be induced because of verbose content.

Based on all the factors discussed above, we created four fictitious resumes/CVs of applicants that were identical in all relevant aspects but differed only in their respective parenthood and marital status. In our experiment, we have four treatment arms (unmarried, married, married mother, and single mother), and apply to each job with all 4 resumes.

4 Empirical Specification

The primary aim of our empirical exercise was to understand the causal effect of parenthood status on labour market outcome. For this, we estimated the following specification:

$$Y_i = \alpha + \beta_1(marrnochld) + \beta_2(marrwchld) + \beta_3(singmother) + \gamma * X_j + \delta + \psi + \epsilon_i \quad (1)$$

Here Y_i is ,alternative an indicator of whether the individual i received a callback. X_j is a vector of firm-level covariates and ϵ_i is the idiosyncratic error term. *singmother*, *marrnochld*, and *marrwchld* are all dummy variables which indicate the candidate being a single mother, a married women with no child and a married woman with a child, respectively. And

β_k shows the effect of a candidate being in any specified category compared to the base category, unmarried women. Since for every job ad, we applied with all four resumes, β_k captures the causal effect of parenthood (or marital) status on labour market penalty (in terms of call back differential). And we also include industry and time (date and month) fixed effects and standard errors are clustered at job-ad level across all the analysis. The main coefficient of interest is β_2 and β_3 , as we are interested in understanding the pure motherhood penalty and single motherhood penalty.

5 Results

5.1 Descriptive Analysis

We applied to over 2500 unique jobs, each with the 4 different resumes and as a result our sample comprises nearly 10,020 observations, a relatively larger sample size compared to much of the existing literature related to our study. The variable *callback* measures whether an applicant was invited for an interview. The unconditional probability of receiving a

callback for all the applicants combined across different industry classification is presented in Figure 2.

We find that the callback rate is maximum for Education industry and the BPM industry is very close to the education sector in terms of call backs. This is unsurprising considering the fact that the nature of both education and BPM sector is generally conducive for women. On the other hand, miscellaneous and manufacturing and production industry provide least number of callbacks for all groups combined.

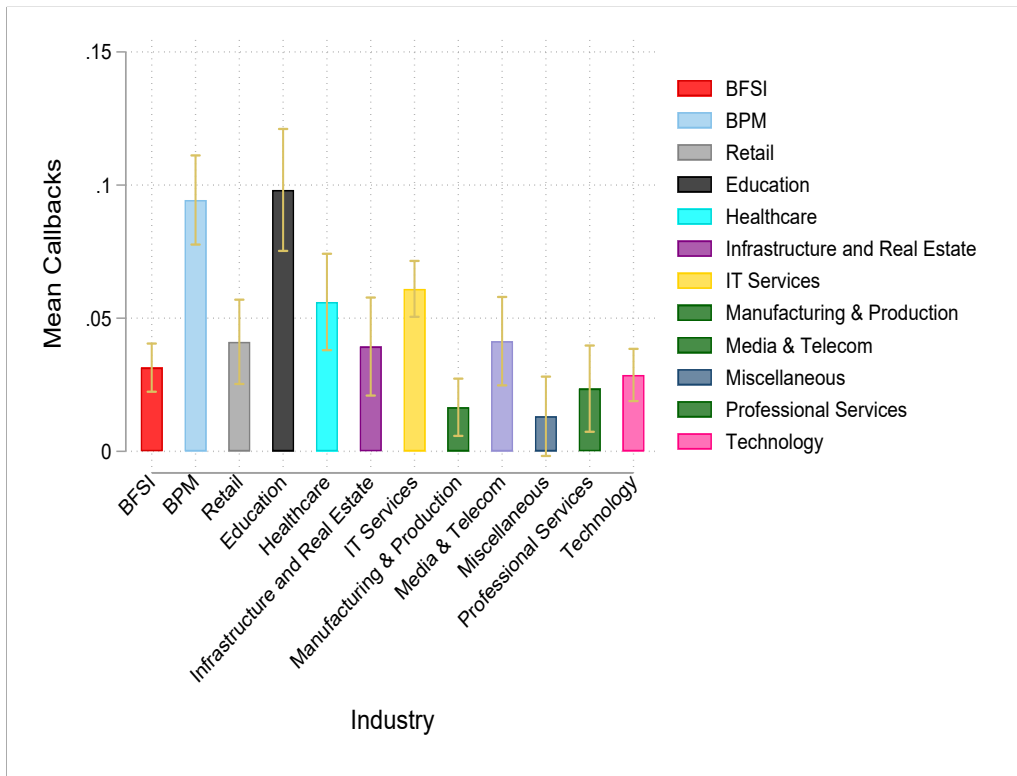


Figure 2: Mean comparison across different industry classification

Figure 3, illustrates the unconditional probability of receiving a callback for applications to all type of jobs and shows the difference between different treatment arms. While for unmarried, the unconditional probability of receiving a callback is 7%, it is only 5.2% for married, 4.3% for mothers and 3.3 % for single mothers.

This suggests, that relative to every callback that an unmarried woman receives, the odds of receiving a call back for the single mother is only about 35%, whereas the odds of

a married non-mother receiving the callback is about 64%. The corresponding odds for a married mother receiving a callback for every callback that the unmarried woman receives is around 50%.

We further perform this analysis for different type of jobs (i.e. sales and customer service) in order to identify potential heterogeneities in the effects. In the following section, we also report findings from the multivariate analysis controlling for other observed and unobserved time-invarying characteristics within a regression framework and find that these results largely remain consistent.

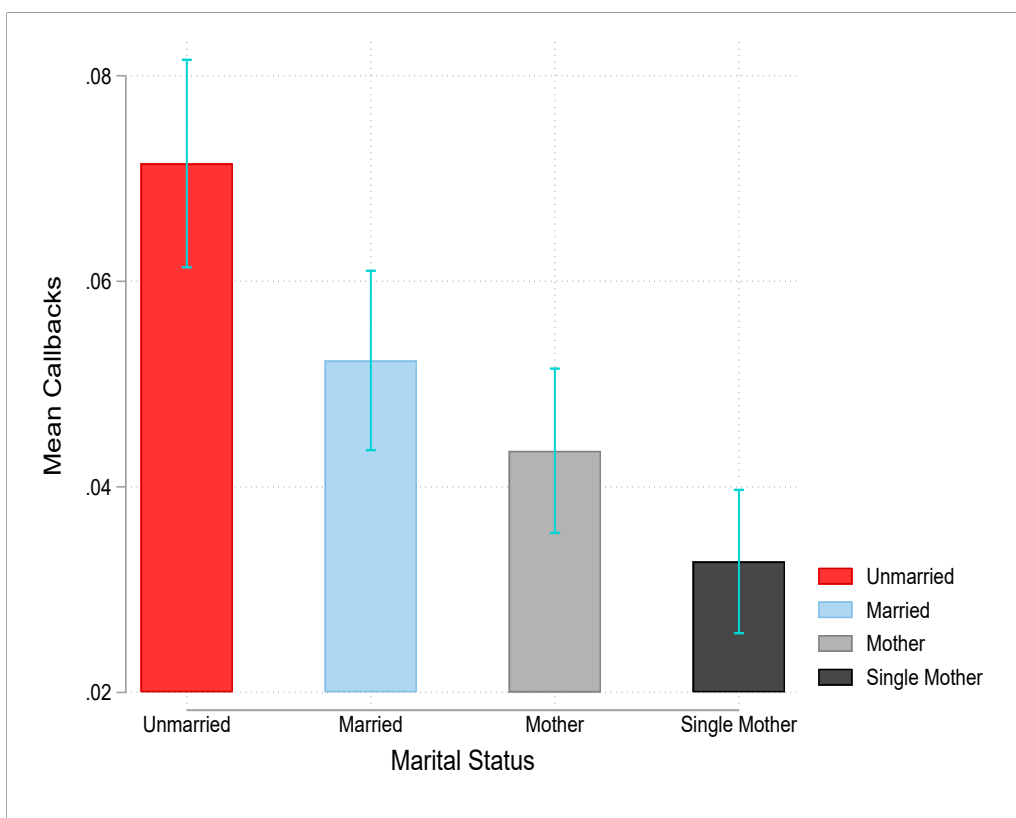


Figure 3: Mean comparison for all type of jobs across different treatment arms

Figure 4 provides the mean comparisons for customer service (left panel) and sales jobs (right panel), respectively. The unconditional probability of receiving a callback in customer service jobs is 8.5% for unmarried, 6.1% for married, 5.3% for mother and 4.9% for single mother. Similarly the unconditional probability of receiving a call is 6% for unmarried, 4.3% for married, 3.2% for mother and 2% for single mother for sales jobs. It seems that

the rank order for the callback rates is preserved for both these types of industries whereas there exists some levels difference in terms of average callback rates with recruiters for sales jobs making fewer callbacks for women in general. However, since we do not have a male sample, we are unable to provide stronger evidence along this dimension and we cannot rule out the fact that sales jobs systematically require fewer employees and therefore have lower callbacks in general, regardless of gender identity. Interestingly, we find that the single-motherhood penalty is relatively muted for customer service jobs when compared to sales, where it appears more stark.

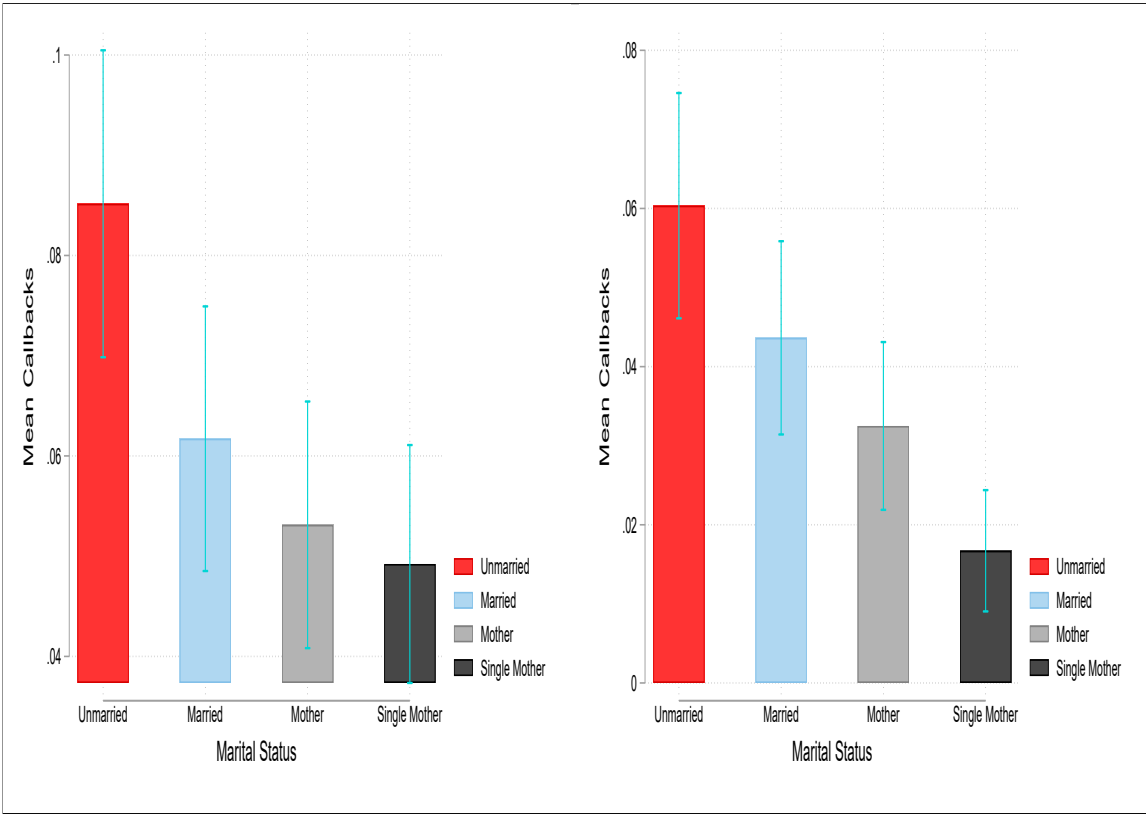


Figure 4: Mean comparison for customer service jobs (left panel) and sales jobs (right panel) across different treatment arms

5.2 Multivariate Analysis

In the following, we present our results from a variety of OLS regressions of the dependent variable “callback” on a broad set of controls. In addition to the treatment variables (parenthood or marital status), all regressions incrementally include controls for variable like zone

(North, West, South, East, Central , multiple), time (date and month), of the application sent, industry type, number of employees and job type. The industry type is defined by using data from linkedin profile of the firms and then we used the industry classification given by Naukari.com to classify similar industries in one group. We also have data on firm size as given by the number of employees (seven dummies ranging from “1 to 10” to “more than 10000”).

Table 1: Probability of a callback for all types of jobs

	Callbacks					
	(1)	(2)	(3)	(4)	(5)	(6)
Married	-0.019*** (0.005)	-0.019*** (0.005)	-0.019*** (0.005)	-0.020*** (0.005)	-0.020*** (0.005)	-0.020*** (0.005)
Mother	-0.028*** (0.005)	-0.028*** (0.005)	-0.029*** (0.005)	-0.031*** (0.006)	-0.031*** (0.006)	-0.031*** (0.006)
Single Mother	-0.039*** (0.005)	-0.039*** (0.005)	-0.040*** (0.005)	-0.040*** (0.006)	-0.041*** (0.006)	-0.041*** (0.006)
Zone		-0.009*** (0.002)	-0.009*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)
Number of Employees			0.002 (0.001)	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)
Job-type				-0.027*** (0.007)	-0.022*** (0.007)	-0.026* (0.016)
Observations	10,020	10,020	9,552	8,988	8,952	8,952
Industry FE	No	No	No	No	Yes	Yes
Time FE	No	No	No	No	No	Yes

Notes: Standard errors clustered at the job-ad level are presented in parentheses. The outcome variable in each specification is a binary variable indicating whether a callback was received for a job application. In columns (2)-(6), we additionally control for job location (zone), size of the firm (number of employees), and job-type (sales vis-à-vis customer service). In all specifications, our base category (control group) is the unmarried female applicant.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1 presents the findings for the aggregated pool of applicants, encompassing both job categories. The regression analysis involves the outcome variable “callback,” regressed against the treatment variables representing different marital statuses (unmarried, married, mother, and single mother). The table illustrates the estimated probabilities of receiving a callback for mothers and single mothers relative to unmarried individuals across all occupa-

tions.

Successive columns in the analysis introduce progressively more comprehensive sets of covariates. In Column 2, the zones are included as a control variable, followed by the addition of firm size (number of employees) in Column 3. Further, in Column 4, we include a control for job type. Moving forward, Column 5 extends the model by incorporating industry-fixed effects alongside the existing set of controls. The final specification, Column 6, enhances the analysis by introducing time-fixed effects (date month).

Across both types of jobs combined, the probability of receiving a callback is 3.1 percentage points lower for mothers than for unmarried women, which we define as a “pure motherhood” penalty. And we also find evidence for the “single-motherhood penalty,” i.e., the probability of receiving a callback is 4.1 percentage points lower for single mothers than for unmarried women. Our first important result from the multivariate analysis is the presence of statistically significant effects associated with parenthood status, i.e., employers respond to the parenthood status of job applicants.

5.3 Heterogeneity Analysis

5.3.1 Job Type

The sub-sample analysis is undertaken due to systematic differences in job requirements between sales and customer service roles. The distinct characteristics of these job types, such as the travel demands in sales and potential non-standard work hours in customer service, create uncertainties regarding the magnitude of observed penalties.

Table 2: Probability of a Callback by Job Type

Callbacks				
Panel A: Customer Service Jobs				
	(1)	(2)	(3)	(4)
Married	-0.023*** (0.008)	-0.023*** (0.008)	-0.023*** (0.008)	-0.023*** (0.008)
Mother	-0.032*** (0.008)	-0.033*** (0.008)	-0.033*** (0.008)	-0.033*** (0.008)
Single Mother	-0.036*** (0.008)	-0.036*** (0.008)	-0.036*** (0.008)	-0.036*** (0.008)
Zone		-0.015*** (0.005)	-0.015*** (0.004)	-0.015*** (0.005)
Number of Employees		0.003 (0.002)	0.001 (0.002)	0.002 (0.002)
Observations	5,120	4,896	4,864	4,864
Controls	No	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Time FE	No	No	No	Yes
Panel B: Sales Jobs				
	(1)	(2)	(3)	(4)
Married	-0.017** (0.007)	-0.017** (0.007)	-0.017** (0.007)	-0.017** (0.007)
Mother	-0.028*** (0.007)	-0.028*** (0.008)	-0.028*** (0.008)	-0.028*** (0.008)
Single Mother	-0.044*** (0.007)	-0.046*** (0.008)	-0.046*** (0.008)	-0.046*** (0.008)
Zone		-0.005* (0.003)	-0.003 (0.003)	-0.003 (0.003)
Number of Employees		-0.001 (0.002)	0.002 (0.002)	0.003 (0.002)
Observations	4,308	4,092	4,088	4,088
Controls	No	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes
Time FE	No	No	No	Yes

Notes: Standard errors clustered at the job-ad level are presented in parentheses. The outcome variable in each specification is a binary variable indicating whether a callback was received for a job application. In columns (2)-(4), we additionally control for job location (zone), size of the firm (number of employees), and industry-specific and date-month fixed effects. Panel A: sub-sample of customer service jobs; Panel B: sub-sample of sales jobs. In all specifications, our base category (control group) is the unmarried female applicant.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 delineates the estimated probabilities for mothers and single mothers receiving callbacks compared to unmarried individuals in customer service and sales jobs, respectively. In Panel A, we observe that the probability of receiving a callback is 3.3 percentage points and 3.6 percentage points lower for both mothers and single mothers, respectively, compared to unmarried women. Similarly, in Panel B, we find the probability of receiving a callback is 2.8 percentage point lower and 4.6 percentage points lower for both mothers and single mothers, respectively.

The results from both tables reveal that the “pure motherhood” and “single-mother” penalties are more pronounced in sales jobs than in customer service roles. This analysis indicates that the employer might perceive that the personal cost of dealing with the job requirement of sales jobs might be higher for single mothers.

5.3.2 Industry Specific

We investigate heterogeneity based on industry classification, which allows us to uncover industry-specific factors that may contribute to disparities in callback rates as industries often possess distinct work cultures, job requirements, and employer expectations. By scrutinizing the variations in callback responses across different industries, we can discern whether the observed penalties for mothers and single mothers are consistent or divergent. Given the eleven industry classifications in our dataset, we focus our heterogeneity analysis on the four major industries, considering both the volume of data and the number of callbacks to ensure robust results. In Table 3, we observe that pure motherhood and single motherhood penalty is present for all the sectors except BFSI. For BFSI industry (column 1), we find that only single motherhood penalty is present.

Similarly in Column 2 and Column 4 of Table 4 we provide the analyses for the education and healthcare sectors, respectively. The findings reveal an absence of penalties based on motherhood in both sectors. However, a notable single-motherhood penalty is observed. This heightened discrimination against single mothers in the education and healthcare sectors may

Table 3: Probability of a callback for 4 major Industries

	Callbacks			
	BFSI	BPM	IT Services	Technology
	(1)	(2)	(3)	(4)
Married	-0.012 (0.011)	-0.029 (0.019)	-0.029** (0.014)	-0.019 (0.012)
Mother	-0.009 (0.012)	-0.059*** (0.021)	-0.035*** (0.013)	-0.038** (0.015)
Single Mother	-0.024** (0.011)	-0.062*** (0.019)	-0.026* (0.014)	-0.049*** (0.016)
Number of Employees	-0.002 (0.004)	-0.031*** (0.010)	0.015*** (0.003)	-0.004 (0.004)
Job-Type	0.001 (0.003)	-0.181 (0.133)	-0.087 (0.104)	-0.014 (0.019)
Observations	1,336	1,088	1,816	1,052
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the job-ad level are presented in parentheses. The outcome variable in each specification is a binary variable indicating whether a callback was received for a job application. Each column corresponds to a separate regression on a sub-sample based on the industry classification of the firm. In all specifications, our base category (control group) is the unmarried female applicant.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

be attributed to the vital care element characterizing these industries, potentially leading to increased bias based on negative stereotypes.

6 Robustness Check

6.1 Exact test of Randomisation

We perform a test for random simulation of treatment status or exact randomization. To perform the test we run two specific simulations. For the first simulation, we randomly assign motherhood and single motherhood status instead of using the parenthood status as assigned under the experiment. We then run the regression as stated in Equation (2) for our primary outcome. We repeat this exercise 1000 times and record the results.

Table 4: Probability of a callback for 4 major Industries (in terms of callbacks)

	Callbacks			
	BPM	Education	IT Services	Healthcare
	(1)	(2)	(3)	(4)
Married	-0.029 (0.019)	-0.038 (0.028)	-0.029** (0.014)	-0.050** (0.022)
Mother	-0.059*** (0.021)	-0.038 (0.030)	-0.035*** (0.013)	-0.035 (0.022)
Single Mother	-0.062*** (0.019)	-0.083** (0.033)	-0.026* (0.014)	-0.064*** (0.024)
Number of Employees	-0.031*** (0.010)	0.018* (0.011)	0.015*** (0.003)	0.005 (0.011)
Job-Type	-0.181 (0.133)	0.008 (0.039)	-0.087 (0.104)	0.014 (0.026)
Observations	1,088	628	1,816	564
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the job-ad level are presented in parentheses. The outcome variable in each specification is a binary variable indicating whether a callback was received for a job application. Each column corresponds to a separate regression on a sub-sample based on the industry classification of the firm. In all specifications, our base category (control group) is the unmarried female applicant.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$$Y_i = \alpha + \beta_1(\text{SingleMother}) + \gamma * X_j + \delta + \psi + \epsilon_i \quad (2)$$

Again, if our critical identifying assumption is true then most of the results from the randomization of profiles into single mother and married mother status would give us imprecise results which should also be much smaller in magnitude as compared to our true causal estimate.

We analyse the result for callbacks which specification mentioned in equation (2), we find that only 1% of the simulated results come out to be significant at a 95% confidence interval. This is on expected lines and adds to the confidence in our identification strategy and efficiency of our experiment design. Also, when we observe the distribution of simulated coefficients given in Figure 5 we find that nearly all the coefficients are smaller than the true

causal estimate of -0.098 . The distribution is also largely centered around zero.

We observe similar results for another specification. Under which regress a dummy variable on callbacks and by construction this variable randomly allocate single mother and other women status to different profiles and here we observe that only .46% of the results turn out to be significant at a 95% confidence level. The true causal estimate is again much larger and in the right direction when compared with the distribution of coefficients given in Figure 6.

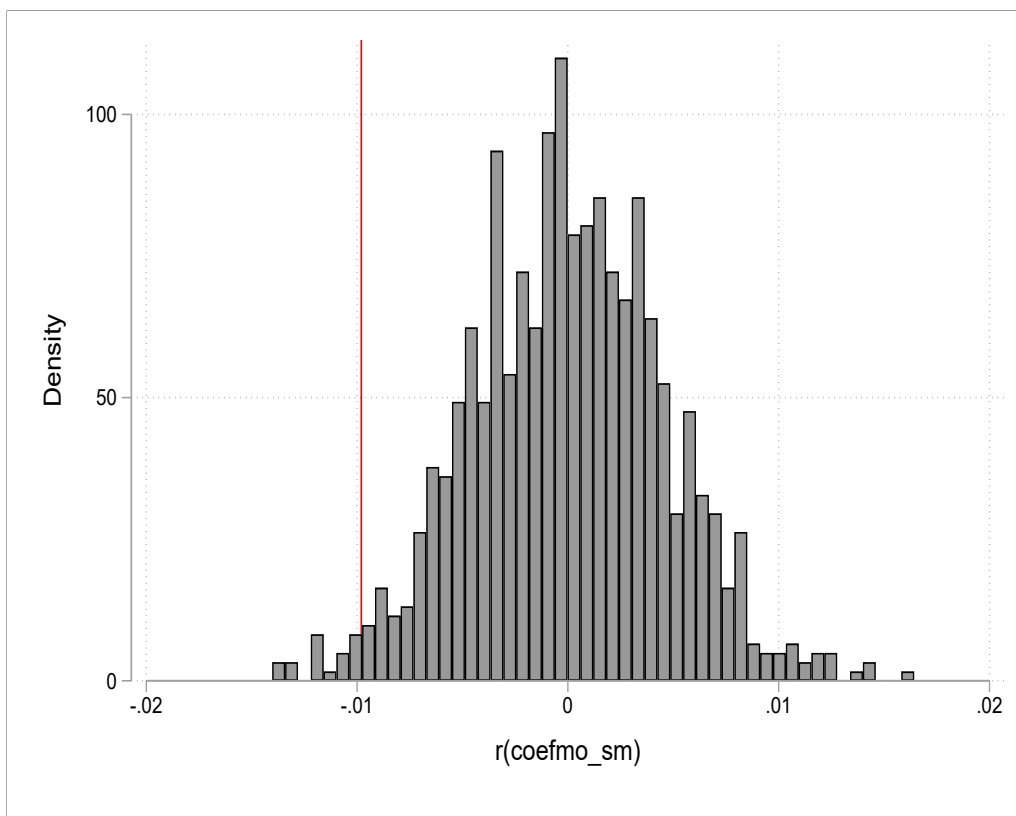


Figure 5: Callbacks: Single mother relative to mothers randomisation

7 Potential Mechanism

In this section, we attempt to identify potential mechanisms that may explain the observed demand-side discrimination against single mothers. We explore various possibilities of why

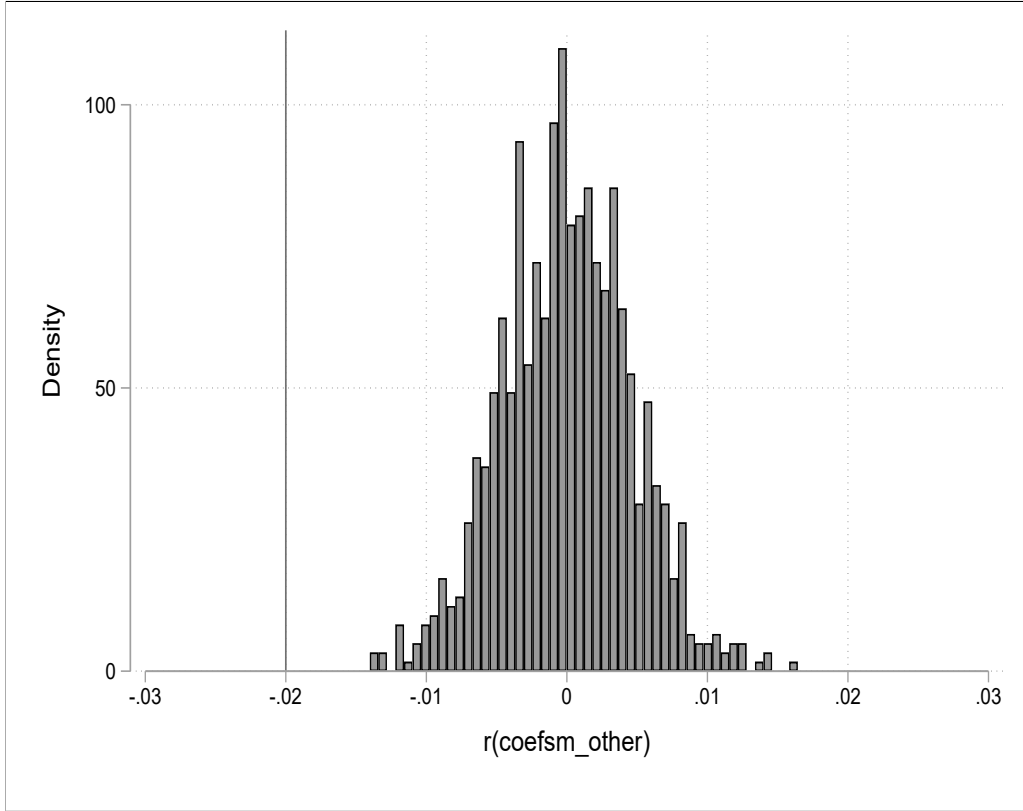


Figure 6: Callbacks: Single mother relative to other groups randomisation

the odds of an equally qualified single mother getting called for interview is substantially lower than that of her unmarried non-mother counterpart. We perform two complementary analysis here to uncover potential sources of discrimination. Typically, there are a few sources of discrimination that have been identified in the literature, viz, taste-based or statistical including inaccurate statistical discrimination (Bohren et al. (2019), Bohren et al. (2023) and implicit discrimination (Bertrand et al. (2005)). The central ideal of inaccurate statistical discrimination posits that such discrimination arises due to heuristics and biases or asymmetric information (Bohren et al. (2023)). In our context, this would imply that employers incorrectly correlate group identity, such as single mother status, with productivity or misconstrue the identity as a signal of low productivity. We generally find support in favor of inaccurate statistical discrimination while we cannot entirely rule out potential implicit discrimination mechanisms. We describe these motivations and our attempts to isolate these in more details below.

7.1 Geographic Variation in Effects

Table 5: Probability of a callback for all type of jobs

	Callbacks			
	North	West	South	East
	(1)	(2)	(3)	(4)
Married	-0.016* (0.010)	-0.020* (0.011)	-0.030*** (0.009)	-0.028 (0.039)
Mother	-0.026*** (0.010)	-0.035*** (0.011)	-0.040*** (0.010)	-0.037 (0.037)
Single Mother	-0.031*** (0.011)	-0.054*** (0.011)	-0.051*** (0.010)	-0.019 (0.035)
Number of Employees	0.007** (0.003)	-0.001 (0.003)	0.002 (0.003)	-0.012 (0.019)
Job-Type	-0.076** (0.030)	-0.035 (0.034)	-0.025 (0.021)	0.007 (0.120)
Observations	2,964	2,168	2,900	432
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Notes: Standard errors clustered at the job-ad level are presented in parentheses. The outcome variable in each specification is a binary variable indicating whether a callback was received for a job application. Each column corresponds to a separate regression on a sub-sample based on job location (zone). In all specifications, our base category (control group) is the unmarried female applicant.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

One way that inaccurate statistical discrimination may operationalize is through inaccurate beliefs about candidates' ability to relocate. For instance, if the employer believes, without any foundational basis, that a single mother is constrained by relocation costs and is unlikely to relocate for jobs given her specific childcare responsibilities, then the employer may disproportionately invite fewer single mothers for interviews and this is a form of statistical (inaccurate) discrimination.

One way to test this hypothesis would be looking at effects based on distance of the job location from the location of the applicant. We do not include specific addresses but we create an applicant pool based on Bengali demonyms. Essentially, the names of our fictitious applicants are usually identified with people who are Bengalis, i.e., natives of the state of West Bengal and largely inhabit eastern parts of India. Additionally, the educational

institutions from which our fictitious applicants have graduated are all located in Kolkata, the capital of West Bengal. This provides a reasonable signal to the employer about the typical location preference of the candidates. More specifically, few of the fictitious resumes explicitly mention that their current location is the city of Kolkata. Consequently, if employers are practising inaccurate statistical discrimination along this dimension, for jobs that are located around Kolkata (eastern zone of India) - we would not expect any evidence of differential callbacks.

Table 5 presents these results. It shows the richest set of specifications (mirroring column 6 of Table 1) for four primary geographic regions or zones, North, West, South, and East, separately. The table illustrates that results vary across different zones. We find that results go in the same direction for the northern, western, and southern zones. We clearly document an absence of pure-motherhood and single-motherhood penalty for the east zone. As a result, we fail to reject the hypothesis that employers are using inaccurate statistical discrimination based on potential opportunity costs of relocation and this is leading to observed difference in callback rates.

7.2 Uncovering Evidence of Inaccurate Statistical Discrimination through Vignettes

As discussed above, the literature has categorized labor market discrimination mainly into four broad types: taste-based (Becker, 1957), statistical (Arrow, 1973; Aigner and Cain, 1977), inaccurate statistical (Bohren et al., 2019), and implicit discrimination (Bertrand et al., 2005). There are some studies (Siddique (2011)) that infer the nature of discrimination by using employer characteristics. Since we are unable to observe employer characteristics, we employ a different method to capture potential sources of discrimination. We collect data to examine this potential mechanism using a vignette study.

We conducted the vignette study in February 2024 with masters-level business school students at a leading B-School in India. Similar to the design of Haaland and Roth (2023), we attempt to elicit the participants' beliefs about the potential source of discrimination

against single mother applicants. First, we provide participants with information on the general design of correspondence study followed by communicating results from our own study summarised by table 6. Then, we asked our respondents what they think is the main reason why employers are more likely to call back unmarried applicants. We presented participants with possible options in such a way that it captures most commonly cited theoretical reasons for differences in callback rates.

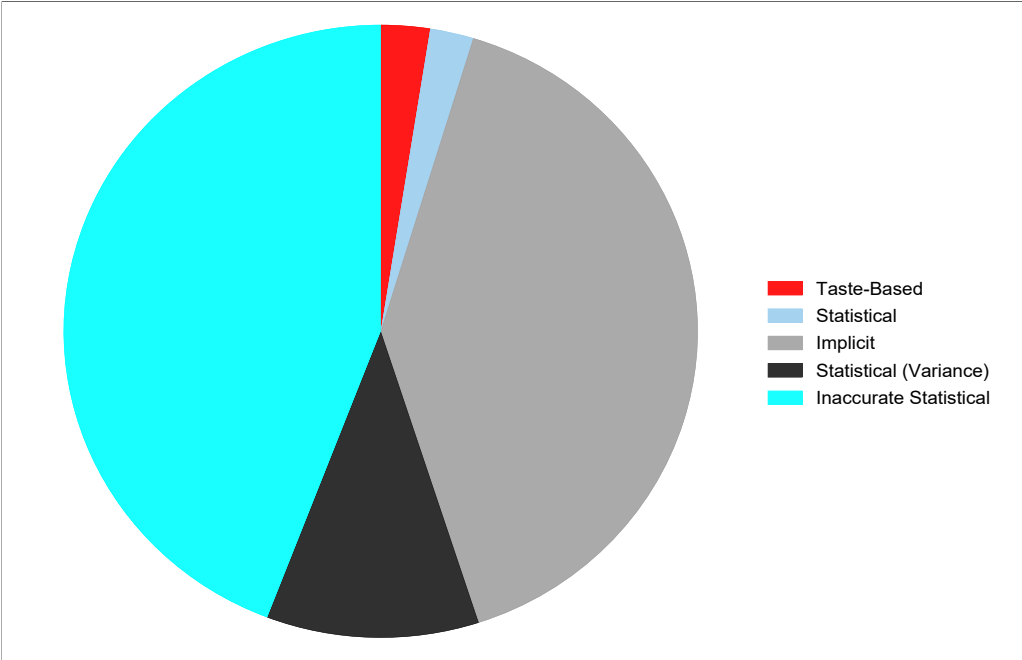


Figure 7: Vignette Results: Potential Sources of Discrimination

As reported in figure 7, we find that respondents believe that the most likely sources of the observed callback rates correspond to (i) the fact that employers incorrectly think that single mothers, on average, tend to be less productive than unmarried women. , and (ii) employers sub-consciously rely on negative stereotypes about single mothers. This provides suggestive evidence that the channel underlying the callback differentials is either inaccurate statistical or implicit discrimination.

8 Discussion

In this paper, we study single mothers and the associated labor market penalty. Single mothers are unique because in principle, they are unlikely to face the marriage penalty in the labor market relative to married women but are likelier to face a child penalty in the labor market relative to childless women. Consequently, for this category of mothers, the manifestation of the typical motherhood penalty is not obvious.

A snapshot of aggregate data from household surveys suggests that married women and mothers are less likelier to work compared to unmarried women in the Indian labor market. However, single mothers are more likely to work compared to unmarried women in the same setting. This could potentially be due to higher supply side incentives that single mothers are responding to and the equilibrium realization of their outcome potentially crowds out the demand-side discrimination.

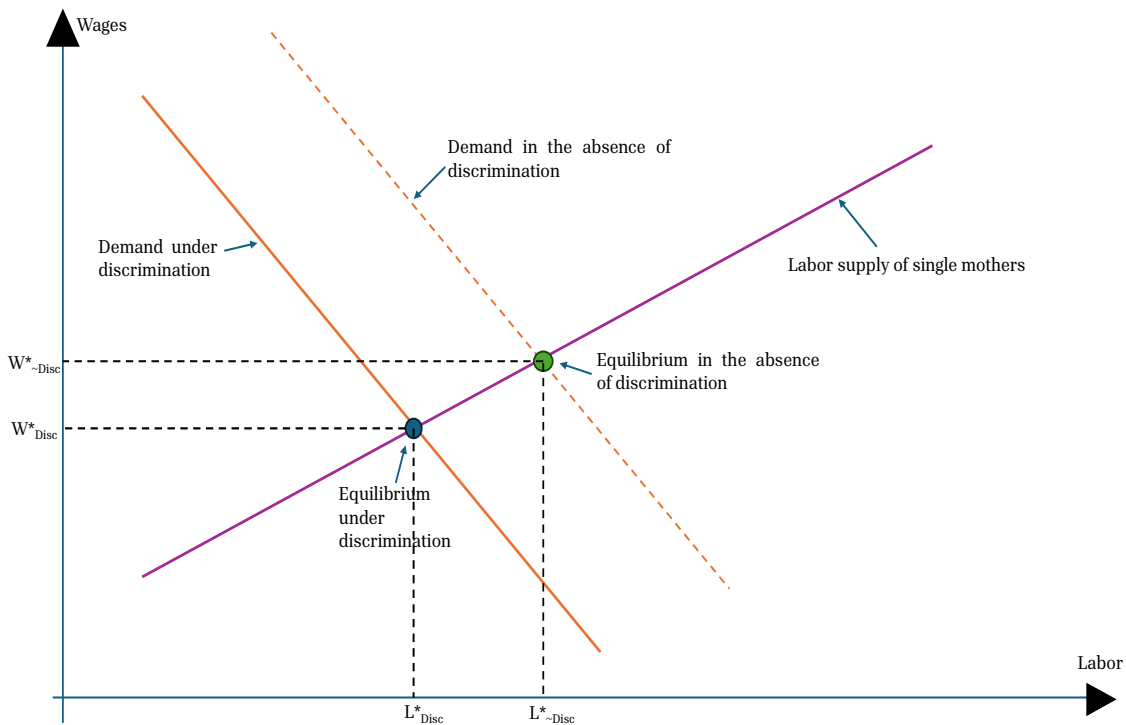


Figure 8: Conceptual Framework- Labor Market of Single Mothers

We represent this idea in Figure 8 where we consider a textbook labor market model with an upward sloping labor supply curve for single mothers. The tuple (W_{Disc}, L_{Disc}) represents the equilibrium that we observe in the labor market. The numbers that we get from the DHS data, for instance, would correspond to the L_{disc} optimal value for labor force participation rates of single mothers. We argue that this is an equilibrium which masks the demand-side discrimination.

We perform a correspondence study and provide evidence of such discrimination by experimentally eliminating any supply side variation. We show that equally qualified single mothers get fewer callbacks relative to unmarried women. This implies that in the counterfactual, without the existence of such discrimination (which we hypothesize as inaccurate statistical discrimination), the demand curve for single mothers would shift to the right as depicted in Figure 8. The resultant equilibrium would have higher earnings and a higher labor force participation number for such women.

This has policy implications and suggests that labor market discrimination against single mothers can be distortionary and lead to welfare losses. Transparent shortlisting measures and explicit equal opportunity initiatives in firms may result in the representative shift in the demand curve to the right and responding to increased wages and earnings opportunity, the overall labor force participation rate would also go up as a result.

To get a better sense of the extent of discrimination that we are able to capture, we present some analysis in the of the callback rates in Table 6 below, in the spirit of [Bertrand and Mullainathan \(2004\)](#).

Table 6: Average Number of Applications Required to Receive ONE Callback By Treatment Category

Marital/Parenthood Status	Average Number of Applications
Unmarried	14
Married	19
Married Mother	23
Single Mother	30

If the results of our correspondence studies can be generalized, a potential unmarried applicant with similar qualifications may need to apply to at least 14 jobs to get one callback for interview. However, an equally qualified married woman will need to apply to about 19 jobs and the corresponding number for married mothers is 23. In stark contrast, a single mother with similar qualifications with respect to all the other categories will need to apply to 30 such jobs. This is purely at the extensive margin. At the intensive margin or at next rungs of shortlisting and interviewing, if there exists further discrimination, this only magnifies the job search problem for single mothers and imposes heavy search costs for finding potential matches in the labor market on them.

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