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REVIEW

Assessing the role of gender in hiring: a field experiment on labour market discrimination

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Abstract

The under-representation of females within the labour market, particularly in managerial roles, has sparked a local and global debate on whether women, mostly mothers, face negative discrimination. This study distinctly adopts a field experiment methodology to investigate the presence of gender discrimination and the motherhood penalty against higher education (Bachelor, Master's, and Doctoral degree) females seeking full-time employment in the labour market at the initial stage of the recruitment process, being the call-back to the interview. This study took place in Malta, which was characterised by a low unemployment figure, complemented by strong economic growth at the time, thus enabling a proper analysis of the possible presence of gender-based discrimination even when labour demand is high. Field experiments were chosen as the methodology. This involved sending pairs of fictitious job applications belonging to two fictional male and female candidates (identical to each other except for the demographic characteristics) in response to job vacancies. Then, the employers' behaviour was recorded to assess whether they engaged in discriminatory practices. The analysis of the replies through the use of econometric models shows that there is no statistically significant evidence that employers engage in discrimination at the call-back stage of the recruitment process. Furthermore, during this distribution period, no particular age class was favoured or discriminated against, a finding that contradicts the idea that young female workers are discriminated against due to their maternal responsibilities. Such a study contributes to the growing literature on the subject, by being the first study done in Malta to scientifically test whether the significant gender employment gap present in various industries in Malta is attributed to negative discrimination against women or mothers with young children.

Keywords Discrimination · Field experiment · Gender

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Introduction

European and local context

Discrimination in the workplace is unlawful in most nations; however, despite difficulties in attributing unequal outcomes to this phenomenon, recent evidence suggests that, on average, females within the European Union (EU) receive 13% less salary than males for equivalent work (Eurostat 2022a). In the EU although there is a political will to narrow the gap, more progress needs to be registered, as indicated in the European Institute for Gender Equality's (2017) publication, which highlighted that European women tend to take more career breaks and have fewer options for upskilling with informal working arrangements than men.

Among the studies performed within EU Member States (MS), Mitsis (2020) concludes that there appears to be a presence of substantial discrimination against women working in culinary occupations in Cyprus. However, in Finland, Liebkind et al. (2016) produced opposite results, whereby male applicants are put at a disadvantage when applying for equivalent jobs as women in occupations that are typically characterised as female dominant.

In Malta, the recent publication by Eurostat (2022b) tells a story, where the employability rate of males in 2022 exceeded the rate of females by 16.8%, leading policymakers to debate whether employers in Malta discriminate according to gender. The idea that distinct groups of workers receive different employment treatments implies that each group differs when considering certain characteristics that are valued on the market. According to the Maltese constitution, discrimination is

> based on sex or because of family responsibilities, sexual orientation, age, religion or belief, racial or ethnic origin, or gender identity, gender expression or sex characteristics and includes the treatment of a person in a less favourable manner than another person (Chapter 456 of the Constitution of Malta 2003, p.1).

Scope of the study

Gender equality is important for both men and women to ensure economic independence and a peaceful and prosperous world (United Nations: Gender Equality and Women's Empowerment 2022). However, inequality in terms of unpaid domestic housework and childcare activities might be contributing to the gap in the labour market (Tabatabaei and Mehri 2019).

This study employs experimental economics techniques and applies them to the Maltese labour market to study discrimination using a twofold approach: call-backs and duration (in days) before receiving a positive reply. This is a first for such forms of experimental studies as earlier works focused solely on call-backs (refer to Bertrand and Mullainathan 2004; Riach and Rich 2006). Moreover, the core objectives of the study are also two, being to uncover the possible presence of (1) gender discrimination against females and (2) the motherhood penalty among females who are in their prime years of having their first child. Using an objectivist methodology, the

employed research hypotheses test whether there is the presence of discrimination against a group of workers or not.

Literature review

Gender discrimination

Marimpi'S (2014) evidence concludes that women are the first to be dismissed during an economic crisis, as felt recently during the COVID-19 pandemic, whereby according to the United Nations (2020), economic impacts were felt especially by women. Variations in perceived productivity due to physical and natural characteristics, such as childbirth and physical strength, together with the brain structure and sex hormones, lead to such results (Albanesi and Olivetti 2009; Sofoluwe 2019). Recent studies, in fact, recognise a correlation between menstruation and work absenteeism, making it another invisible hurdle for female employment (Herrmann and Rockoff 2012, 2013; Schoep et al. 2019). In addition, on average, women allocate 4.5 h/day to unpaid domestic work, while men's contribution in this regard amounts to less than half (Organisation for Economic Cooperation and Development [OECD] 2021).

All these hurdles give root to Joan Acker's 'theory of gendered organisations' (1990), which presents employers as non-gender-neutral agents, acting as structural barriers to women's advancements. This creates gender bias against females, which shapes one's perception as to who is right and fit for the post (Foley et al. 2019). Acker (1990) concludes that "men's bodies, sexuality and relationships to procreation and paid work are subsumed in the image of the worker" (p.139).

According to Acker, women have to act like men to be considered ideal workers. Commitments to third-party individuals (for example, children) outside paid work could cause workers to be deemed unsuitable, especially for high-ranking positions. Indeed, it must be noted that based on Eagly and Carli's (2007) findings, hours of work increase by seniority, something which is encouraged in most organisations (Westover et al. 2010). Wang and Binachi (2009) add that informal networking outside working hours is another potential factor that may act as a hindrance for working mothers. Finally, a manager's portfolio involves travelling for work, another hurdle for women, especially mothers, when it comes to advancing in their careers (Gustafson 2006). This is why studies portray the classic successful woman to be single or childless (Ellemers 2014). However, Munn (2015) present an alternative vision, suggesting that due to the rise in dual-earning families, the classical role of males has evolved, requiring them to share household responsibilities. Hence, males are no longer the natural or ideal workers, as portrayed by Acker.

Local context

The latest publications by Eurostat (2022b) show evidence of a gender pay gap in the EU. In fact, Malta was confirmed to be one of the worst-performing EU and

Euro Area (EA) Member States in relation to the gender employment gap, as is evident in Fig. 1.

To add salt to the wound, the situation in Malta is in-line with the EU average, with an estimated 10% gender pay gap in 2022. This is especially among high-income earners, equivalent to 16% (Eurofound 2022). Moreover, National Statistics Office (NSO) data highlights that in Malta there exists male domination in certain economic sectors, exceeding female presence by more than double, while female domination is more present in social sectors, such as in the education and human health and social work sectors (Table 1).

Table 1 identifies which sectors are male dominant and which are female dominant (mostly humanitarian occupations). This concept of occupational segregation has been a challenge for Malta for several years, as cited in Borg and Vella's (2007) report for Malta's public employment services. However, Table 1 recognises that there is more male domination in the areas of Science, Technology, Engineering and Mathematics (STEM), which according to Tandrayen-Ragoobur, and Gokulsing (2021) is due to students' academic performance in STEM subjects at the secondary school level, while females lead in what economists call pink-collared jobs, such as teaching and nursing (Kalokerinos et al. 2017). Literature is divided about this concept; on the one hand, Albert et al. (2011), for instance, state that there is discrimination against males in female-dominant areas, while other studies, such as that by Riach and Rich (2006), imply that there is discrimination against females in male-dominant areas.

Findings from Riach and Rich's (2006) study shed further light on correspondence studies. The authors discovered that gender discrimination in an economic or occupational sector stimulates the probability of getting a reply for an interview, whereby those sectors that are more dominant by one gender tend to cause discrimination against the less represented gender. This phenomenon follows the

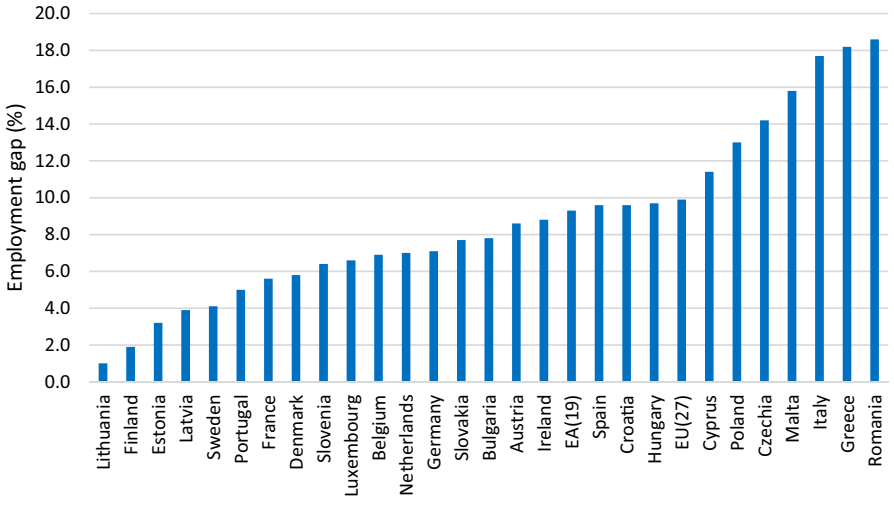

Fig. 1 Gender employment gap (2020). Source: Eurostat 2022a

Table 1 Nomenclature of economic activities (NACE) sectors distributed by gender for Malta

Economic activity	Gender employment gap (%)
Agriculture, forestry, and fishing	72
Mining and quarrying	76
Manufacturing	48
Electricity, gas, steam, and air conditioning supply	79
Water supply; sewerage, waste management, and remediation activities	66
Construction	87
Wholesale and retail trade; repair of motor vehicles and motorcycles	27
Transportation and storage	61
Accommodation and food service activities	32
Information and communication	42
Financial and insurance activities	−2
Real estate activities	25
Professional, scientific, and technical activities	12
Administrative and support service activities	20
Public administration and defence; compulsory social security	24
Education	−43
Human health and social work activities	−32
Arts, entertainment, and recreation	22
Other service activities	−14
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	−78
Activities of extraterritorial organisations and bodies	28

Source: NSO (2022a)

overcrowding hypothesis developed by Bergmann (2010), who argues that sectors that are over-concentrated by females facilitate female entry.

Literature gap

The key methodology adopted by past researchers to investigate the presence of discrimination is field experiments, especially following the publication of Bertrant and Mullainathan's (2004) paper. This study revealed the presence of racial discrimination, whereby white applicants received one call-back for every ten advertisements they applied for, while African Americans' rate was one for every fifteen advertisements. This study followed in their steps by sending pairs of fabricated résumés to genuine job vacancies issued both on online job search websites and also in newspapers. For randomisation purposes, Bertrand and Mullainathan (2004) used résumés of various qualities; thus, they utilised both high-quality résumés (which have low employment gaps, an excellent employment history, and extensive listed skills) and low-quality résumés (which are the contrary). Similarly, this study also varied

the applicants' age to ensure randomisation, allowing the study to examine whether, besides the presence of gender discrimination, there might be a motherhood penalty present among females who are in their prime years of giving birth, thus contributing further to the growing literature on the subject.

In another seminal paper by Riach and Rich (2006), the authors investigated the potential existence of gender discrimination in the United Kingdom (UK) in four areas: computer programming, engineering, accountancy, and secretarial work, focusing on sectors which are traditionally considered either male- or female-dominant areas. This study classified Accountancy and programming as gender-neutral occupations; however, the engineering profession is male-dominated, while secretarial work is normally associated with females, in line with the revelations in Table 1 (Professional, scientific, and technical activities; Human health and social activities). Overall, this study by Riach and Rich (2006) narrowly focused on and proved the presence of gender discrimination in the aforementioned four areas; however, this study aims to be more holistic by examining the possible presence of discrimination in all sectors of society.

Determinants for receiving a call-back

Riach and Rich's (2006) results converge with Petit's (2007), who investigated whether maternal and paternal constraints have any significant impacts on the employability of different family members. Following a novel methodology, the author produced a series of résumés, including, young, single and childless; prime-age, single and childless; and prime-age with children (Petit 2007, as cited in Azmat and Petrongolo 2014 p.6).

The motherhood penalty leads females not to apply for leadership roles (Cukrowska-Torzewska and Lovasz 2020). Therefore, the applicants' age indirectly indicates their marital status to potential employers, as well as their likelihood of having children. The older the age of the candidate, the higher the probability of being married and having children. According to Petit (2007), young female workers are discriminated against when applying for vacancies, but other authors, including Acker (1990), obtained opposite findings, portraying dependent (older) females with children at a disadvantage. The Gender Equality Index (Franklin et al. 2017) also identifies age as a major determinant of the gender employability gap.

According to Becker (1957), the stock of skills, abilities, and knowledge produces an economic value that increases worker productivity. Economists cite perceived productivity as a determinant for receiving a call-back for an interview (Albanesi and Olivetti 2009; Bailey 2006). The higher the educational level attained by individuals, the more human capital is accumulated, implying an increase in the probability of receiving a call-back (Mpendulo and Mang'unyi 2018; Neumark 2018). Furthermore, experience and placements in similar fields are also forms of human capital investment for labour, improving the chances of being deemed employable (Smith et al. 2018).

According to Baert (2018), the distance between the workplace and the applicant's locality is another statistically significant determinant for receiving a

call-back. A negative correlation was proved between the two variables, implying that the further the distance between the place of work and the applicant's locality, the lower the probability of receiving a call-back. Baert (2015) admits that "they [employers] may prefer workers with a social network in the neighbourhood of the firm, since they may expect a higher commitment from workers living close to the firm." (p. 7). Another viewpoint by Lang and Lehmann (2012) is that the applicant's neighbourhood conveys a message to employers about the former's personal attributes, including educational/social background, income, and personality.

According to Van Staveren (2014), leading roles are mostly occupied by males, making it difficult for females to apply. Malta has one of the lowest numbers of female board members, Chief Executive Officers (CEOs), and managers among all 27 EU countries, whereby 95% of most managerial roles are, in fact, held by men, while professional roles are more evenly distributed among the two sexes (Eurostat 2022b). Through this study, the hypothesis proposed by Van Staveren et al. (2014) was tested by applying for vacancies from various hierarchical levels to study the latter as one of the variables that could help explain call-back rates.

Another determinant that was proven by past authors to affect the call-back rate is whether the employer operates within the public or private sector. Most mothers in Malta are employed within the public administration, possibly due to the family-friendly benefits that can be received. Eurostat (2022b) findings also conclude that in most EU countries, including Malta, the gender pay gap is wider in the private sector than in the public sector, which may be attributed to the fact that many public sector employees are protected by collective pay agreements as a technique to promote equality.

Experimental design

This study took place within a context close to full employment, with official statistics reporting an unemployment rate of 4% (NSO 2022a). Consequently, this study could minimise potential confounders and focus on uncovering the ultimate effect. Therefore, the rationale behind this study was to assess the following research hypotheses against the null hypotheses:

H_1 There are differences between males and females call-back rates.

H_2 There are differences in the duration to receive a call-back between males and females.

Research design

Correspondence experiments were completed by sending pairs of fictitious employment applications, following the techniques adopted by past researchers on the subject. The primary data collected were analysed using reduced-form logit and

Ordinary Least Squares (OLS) regression models. The former regression model was used to help answer whether gender has any impact on the probability of getting a call-back, while the second conceptual model examined the potential effect of gender on the number of days that pass before receiving a call-back.

Research instrument and format

Creating a bank of résumés

A database of realistic and representative résumés covering numerous employment occupations that might be demanded by employers was created. A pool of CVs was collected from real job applicants. The CVs were then altered sufficiently to meet the requirements of this study. A Maltese context had to be applied to respect the environment in which this study took place. Therefore, the applicants' educational backgrounds and the names of previous employers had to respect the local scenario.

Given that the Maltese labour market is relatively small vis-à-vis foreign countries, a richer approach was undertaken by considering all industries available, given that they satisfy the established criteria. In addition, unlike the approach undertaken by Bertrand and Mullainathan (2004), the variable 'AGE' was used for randomisation purposes; consequently, the fictional candidates were randomly assigned an age of 28 or 44 years.

The first age cohort was chosen following the NSO's (2019) revelation of the average prime age at which Maltese women have their first child, which imposes pressure and responsibilities on females to balance their employment and family responsibilities. Hence, young female applicants in this experiment increase social salience within the context of recruitment as their age signals to employers that they have children or are thinking of having children. The second age cohort was chosen following recent amendments to the local General Elections Act (Legislation.mt 2021), which now allows 16 years to vote in local elections. Therefore, rational employers might interpret this age as the cut-off point for mothers to bear family responsibilities, subsequent to which they are able to return to gainful occupation. Therefore, the age of 44 was chosen following the summation between when the mother has her first child and the age when the adolescent is perceived to be responsible.

The methodological imperative of this technique allows this study to test for the potential influence of motherhood on the likelihood of receiving a reply for an interview. The process of randomly assigning individuals of two genders and two age classifications ensured that those in the treatment and control groups differed solely in terms of their respective probability of being allocated in each category.

The Curricula Vitae (CVs) were designed following the Europass style and format to ensure that it is internationally recognised. This also guaranteed comparability between the two fictitious candidates when applying for the same vacancy. To perform a neutral comparison between the two applicants, no photo was attached to the CVs. It was also assumed that no applicant suffered from any unemployment

spells during their employment years, meaning that prime-aged workers (28 years) had less employment experience than those passing the peak of their career (44 years).

The identities of the fictitious applicants

The CV structure included several fictitious attributes about the applicants to help ensure realism during the experiment, as summarised in Table 2.

For uniformity purposes, all the above characteristics (except for work experience) were identical for same-gender applicants coming from the two age categories. However, the given information was slightly altered between genders to avoid possible detection. The rationale behind this measure is that this experimental method requires control over all productivity-determining variables. Thus, it was ensured that gender was the only variable that strictly distinguished the two candidates. Whenever employers requested a covering letter to be attached to the job application, this was designed as well. Once again, the covering letter was identical for both applicants, except for their names and signatures.

Personal data The applicants' names were crucial as they needed to reveal the applicants' gender to the employers. For the male candidate, the name "Luke" was chosen, while the female applicant went by the name "Elena". The names were chosen based on the NSO (2021b) data publication detailing the most popular names given to newborns in 2015. Furthermore, to validate the link between the name and the gender of the fictitious applicant, a field was added to the CV that stipulated the applicant's gender. Meanwhile, the applicants' surnames were selected based on the two most common Maltese surnames in Malta, as established by the National Statistics Office (2011). As a result, "Luke Borg" and "Elena Cutajar" were created.

Since the literature identifies the distance between the workplace and the applicant's locality as a key determinant for receiving a call-back, the applicants were said to come from "Birkirkara" and "Balzan", locations from the same geographical district in Malta. Once again, this decision was based on census findings concerning the most populated cities in Malta. Moreover, the two localities face similar social and economic characteristics. The residential addresses of the fictitious candidates

Table 2 Components of the CV

Personal data	Gender Name and surname Residential home address Mobile phone number Electronic mail address Date of birth Nationality
Professional experience	Work experience Education and training
Personal skills	

included real main roads found within the selected locations to further improve realism.

To be able to apply for vacancies and track employer call-backs, the same electronic mail address and mobile phone number were used for all male candidates, while female candidates were assigned alternative contact details. The applicants' date of birth was randomly assigned between the two age categories. In addition, for consistency, all job seekers were assumed to be Maltese; this was stated in an appropriate field.

Professional experience For comparability purposes, each fictitious applicant followed a professional career within the same economic sector so as to ensure homogeneity between the male and female applicants. Indeed, the methodology adopted follows the work by Carlsson et al. (2014), who assumed equal returns for both genders following their educational degrees, work experience, job tenure, and employment status.

The two respective candidates were equipped with the same level of employment practice, including the same mix of public and private sector exposure. In addition, all the applications satisfied the least minimum level of professional experience requested by the employer for the job that the candidate was applying for. Furthermore, the names of the training courses followed by the applicants were altered each time to match the requirements stipulated in the job advertisement.

Meanwhile, the Gender Equality Index (Franklin et al. 2017) points out that gender discrimination is more prominent among those who have higher levels of education. This proposition was tested with the inclusion of a variable that captured the highest level of education achieved by each candidate. This consistency in human capital investment was also reflected in the level of training that the two candidates had received.

Every fictitious interviewee involved in this study had attained at least a bachelor's level of education (International Standard Classification of Education [ISCED] level 6) at an upper second-class level. The degree was obtained from the University of Malta.

Personal skills The two applicants were equipped with similar personal skills (language proficiency, digital skills, car driving licence) for uniformity. Cultural and personal interests were not included in the résumés due to their heterogeneous nature. Therefore, the two CVs submitted for each application were largely identical to one another, except for the gender, name, surname, residential home address, mobile phone number, and electronic mail address.

Responding to job vacancies

Job advertisements that called for applicants who possessed professional skills below ISCED Level 6 were discarded to satisfy the set criteria. No applications were

submitted to advertisements that required the applicants to appear in person or call either, as they contradicted the core approach behind this methodology, which was built on the homogeneity of the two candidates. Job advertisements that requested the applicants to submit their identity card number, a link to their social media account, or the submission of certificates or warrants alongside their employment application were also discarded. Only advertisements that required the applicants to work on a full-time basis were selected to ensure better comparability within the data generated.

The process of applying for advertisements required sending applications on different days to further ensure realism. On average, a 2-day gap is allowed between the submission of applications, with the gender of the individual who submits the CV first randomly chosen each time.

Measuring the responses

A total of 330 résumés were sent between October 2018 and February 2019 in response to 165 employment advertisements over the entire sample period. A positive call-back for an interview was registered whenever an electronic mail or mobile phone call was received, inviting one or both candidates to attend the first interview. Conversely, a negative call-back for an interview was noted whenever the applicants were either informed that their application could no longer be processed or no response for an interview was received by the end of the sample distribution period for applications whose deadline had expired.

Empirical strategy

Since the first research hypothesis tests whether being a female has any impact on the interview call-back rates of females while considering a dichotomous qualitative dependent variable, it was decided that binominal logit regression models should be used. The binary values opted for this analysis are (2) in case of a positive call-back and (1) in case of a negative call-back or if no call-back is received. Conversely, to test the second research hypothesis, a linear OLS regression model was employed with a set of independent variables, as summarised in Table 3.

Therefore, the regression models to be used are:

$$\begin{aligned} \mathrm{CALL}_i = {} & \beta_0 + \beta_1 \mathrm{GENDER} + \beta_2 \mathrm{AGE} + \beta_3 \mathrm{HIERARCHY} \\ & + \beta_4 \mathrm{DOMINATION} + \beta_5 \mathrm{DISTANCE} + \beta_6 \mathrm{EXPERIENCE} \\ & + \beta_7 \mathrm{ISCED} + \beta_8 \mathrm{ONLINE} + \beta_9 \mathrm{PRIVATE} + \beta_{10} \mathrm{GENDERxAGE} + \varepsilon_i \end{aligned}$$

$$\begin{aligned} \mathrm{DURATION}_i = {} & \beta_0 + \beta_1 \mathrm{GENDER} + \beta_2 \mathrm{AGE} \\ & + \beta_3 \mathrm{HIERARCHY} + \beta_4 \mathrm{DOMINATION} + \beta_5 \mathrm{DISTANCE} \\ & + \beta_6 \mathrm{EXPERIENCE} + \beta_7 \mathrm{ISCED} + \beta_8 \mathrm{ONLINE} \\ & + \beta_9 \mathrm{PRIVATE} + \beta_{10} \mathrm{GENDERxAGE} + \varepsilon_i \end{aligned}$$

Table 3 Variables analysis

Variable	Description	Value
CALL	Call-back for an interview	2— Yes; 1—No
DURATION	Duration gap	Measures the time taken to receive a call-back in days
GENDER	The applicant's gender	1—Female; 0—Male
AGE	The applicant's age	1—28 years; 0—44 years
GENDERxAGE	Motherhood penalty	1—Female and 28 years 0—Otherwise
HIERARCHY	Hierarchical level for the vacancy	1—Managers; 0—Professionals
DOMINATION	Female domination in the occupation sector	Percentage of female domination
DISTANCE	Distance between home residence and the workplace	Distance in kilometres
EXPERIENCE	The applicant's work experience	Experience in years
ISCED	The applicant's educational level	Scale from 6 to 8
PRIVATE	Economic sector	1—Private sector 0—Public sector
ONLINE	Job advert source	1—Online; 0—Newspaper

Data Analysis

Descriptive statistics

The descriptive statistics output in Table 4 summarises the collected data, whereby the patterns of interest are displayed. Most of the explanatory variables used in the regressions are dummy variables, taking a definite range of values {1,0}. This table serves as a testimonial to the candidates' identity structures, where the two fictitious applicants have identical socio-economic identities. Furthermore, prior to starting to conduct causality tests between variables, the behaviour of the dependent variables needs to be statistically analysed. Based on Fig. 2, the dependent variable 'DURATION' is not normally distributed, as confirmed by the Jarque–Bera test, as is the second dependent variable 'CALL' given the nature of this binary variable. This follows the data in most other experimental data (refer to Petit 2007), leading the researcher to choose non-parametric tests to be performed for statistical analysis.

Logit regression model

The logit regression model includes the core variables, these being the candidates' gender and age, together with a set of control variables. Given the presence of severe multicollinearity between the applicants' age and their years of experience (correlation of 0.8413), the latter variable was removed from the analysis as the former is required to test for the possible presence of the motherhood penalty. Robust standard errors were used in all regression models to overcome for the possible presence of heteroskedasticity and serial correlation across the data.

Table 4 Descriptive statistics output

Variable	Gender = 0 (Control group)					Gender = 1 (Treatment group)				
	Minimum	Maximum	Mean	Standard deviation	Skewness	Minimum	Maximum	Mean	Standard deviation	Skewness
CALL	1	2	1.55	0.50	− 0.18	1	2	1.55	0.50	-0.18
DURATION	0	50.0	10.39	11.86	1.67	0	83.0	11.16	13.90	2.46
AGE	0	1	0.48	0.50	0.09	0	1	0.48	0.50	0.09
HIERARCHY	0	1	0.23	0.42	1.29	0	1	0.23	0.42	1.29
DOMINATION	0.06	0.70	0.48	0.15	− 0.09	0.06	0.70	0.48	0.15	-0.09
DISTANCE	0	33.8	6.02	4.73	3.53	0	33.8	6.72	4.60	3.40
EXPERIENCE	3.0	28.0	12.10	7.59	0.41	3.0	28.0	12.10	7.59	0.41
ISCED	6.0	7.0	6.12	0.33	2.34	6.0	7.0	6.12	0.33	2.34
ONLINE	0	1	0.41	0.49	0.36	0	1	0.41	0.49	0.36
PRIVATE	0	1	0.78	0.42	− 1.33	0	1	0.78	0.42	-1.33
GENDER × AGE	0	0	0	0	0	0	1	0.48	0.50	0.09

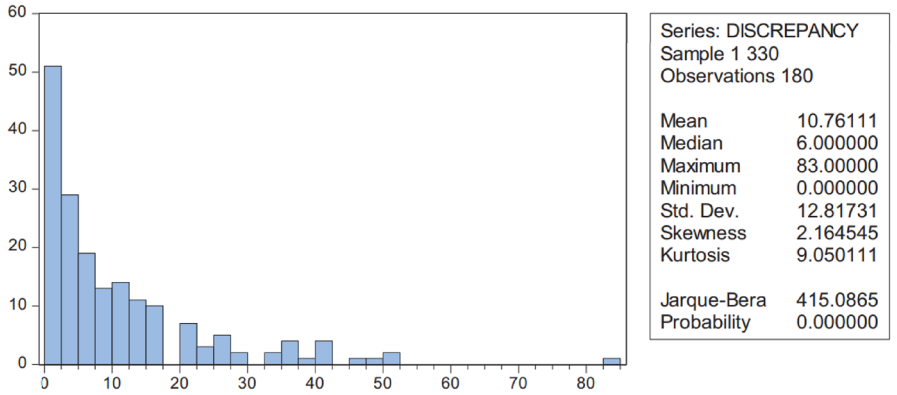

Fig. 2 Normality test for the dependent variable 'DURATION'

Table 5 Regression analysis for the dependent variable 'CALL'

Dependent variable: CALL				
Variable	Model 1	Model 2	Model 3	Model 4
C	0.3285* (0.1897)	2.9951 (2.2386)	3.0326 (2.2884)	3.0510 (2.2468)
GENDER	0.000 (0.2217)	0.0132 (0.2358)	0.0127 (0.2354)	− 0.0931 (0.3213)
AGE	− 0.3032 (0.2218)	− 0.3112 (0.2623)		− 0.4228 (0.3528)
HIERARCHY		0.2720 (0.3382)	0.5197 (0.3243)	0.2723 (0.3385)
DOMINATION		0.6332 (0.7858)	0.7301 (0.7944)	0.6237 (0.7849)
DISTANCE		− 0.019 (0.0218)	− 0.0184 (0.0218)	− 0.0191 (0.0218)
ISCED		− 0.3502 (0.3656)	− 0.3904 (0.3711)	− 0.3505 (0.3656)
ONLINE		− 1.1846*** (0.2548)	− 1.1589*** (0.2567)	− 1.1855*** (0.2547)
PRIVATE		− 0.3197 (0.3168)	− 0.2609 (0.3184)	− 0.3199 (0.3173)
EXPERIENCE			− 0.0089 (0.0168)	
GENDER x AGE				0.2226 (0.4715)
SER	0.4988	0.4729	0.4769	0.4766
McFadden R^2	0.0041	0.0948	0.0787	0.0818

The models were estimated using a logit link function with CALL as the dependent variable. The standard errors are shown in parentheses. The asterisks show the statistical significance of each coefficient: ***indicates significance at the 1% level, **at the 5% level, and *at the 10% level

A series of regression models have been tested to examine for possible causations between the independent and dependent variables. The main empirical findings of Model 2 (Table 5) prove that the gender of the applicant, being the coefficient of discrimination (Becker 1957), has no statistically significant impact on the probability of being called for an interview. Therefore, this result rejects the proposal for gender discrimination. Moreover, the candidate's age class was found not to be a statistically significant determinant when considering the probability of being contacted

for an interview. In addition, there is no proof of negative discrimination against prime-aged females who have a higher probability of having a child in the coming years. Therefore, it can be concluded that in such a tight labour market, employers were not differentiating between experienced and novel employees in the market, nor between sexes, leading such variables to be insignificant, despite having an economic meaning.

Meanwhile, the variable ONLINE was found to be significant at the 1% level, indicating that there is a negative relationship between the probability of being called for an interview and applying for online vacancies. The log-odds transformation using the odds ratio gives a value of 0.3059, which means that the odds of receiving a positive call-back for an interview are 30.59% smaller when applying for online vacancies than when considering traditional newspaper vacancies. The use of newspapers for advertising purposes has been on the decline over these past few years due to the shift toward more modern online platforms (Lindstädt and Budzinski 2011). Therefore, it is possible that a larger pool of applicants applied for vacancies through online platforms rather than traditional media, thus lowering the probability of receiving a call-back using the former approach due to the larger number of competing applications.

The variable 'EXPERIENCE' is statistically significant with a negative sign in the third model; however, the coefficient is marginal, meaning that there seem to be no significant differences among experienced and inexperienced applicants when considering the possibility of receiving a call-back, in line with the findings obtained by Farber et al. (2017). Since this study took place at a time when the employment rates in Malta were high, while unemployment rates were one of the lowest in the European Union (NSO 2022b), employers did not seem to differentiate between experienced and inexperienced applicants as long as they contributed toward organisational production.

The remaining variables (EDUCATION, EXPERIENCE, and HIERARCHY) were not proven to be statistically significant enough to explain any changes in the call-back rate for the applied vacancies. Such a tight labour market caused by a mean nominal economic growth of 8.91% per year between 2016 and 2019 (NSO 2022c) may have led employers not to differentiate or prioritise a group of workers over another; hence, no form of preference among the different classes of workers was present. Despite not being statistically significant, these variables were to be kept in the final model so as to overcome the problem of irrelevant variable bias.

A series of robustness tests were undertaken, whereby the chosen regression model was re-tested using the Probit and the Linear Probability models. The results in Table 6 reconfirm that there is no discrimination against females during the time of the study.

OLS regression model

Following the nature of the dependent variable DURATION, the sample size for the second model is equal to 180 observations. The chosen model, Model 2, has the

Table 6 Robustness testing for the dependent variable 'CALL'

Variable	Logit model	Probit model	Linear probability model
C	2.9951 (2.2386)	1.8022 (1.3884)	1.1747** (0.5273)
GENDER	0.0132 (0.2358)	0.0068 (0.1439)	0.0028 (0.0527)
AGE	− 0.3112 (0.2623)	− 0.1924 (0.1605)	− 0.0691 (0.0591)
HIERARCHY	0.2720 (0.3382)	0.1609 (0.2047)	0.0597 (0.0742)
DOMINATION	0.6232 (0.7858)	0.3927 (0.4895)	0.1368 (0.1870)
DISTANCE	− 0.019 (0.0218)	− 0.0110 (0.0138)	− 0.00040 (0.0058)
ISCED	− 0.3502 (0.3656)	− 0.2099 (0.2263)	− 0.0778 (0.0857)
ONLINE	− 1.1846*** (0.2548)	− 0.7337*** (0.1564)	− 0.2828*** (0.0579)
PRIVATE	− 0.3197 (0.3168)	− 0.1958 (0.1899)	− 0.0698 (0.0681)
SER	0.4729	0.4761	0.4763
McFadden R^2	0.0948	0.0811	0.0867
Adjusted R^2			

The models were estimated using logit, probit and linear probability models with CALL as the dependent variable. The standard errors are shown in parentheses. The asterisks show the statistical significance of each coefficient: *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level

Table 7 Regression analysis for the dependent variable 'DURATION'

Dependent variable: DURATION				
Variable	Model 1	Model 2	Model 3	Model 4
C	11.0997 (1.5169)	− 4.8389 (19.2498)	− 6.5353 (19.2762)	− 5.6073 (19.3291)
GENDER	0.6735 (1.9270)	0.8844 (1.8526)	0.9075 (1.8455)	2.0782 (2.5993)
AGE	− 1.4097 (1.9023)	− 0.1988 (1.8904)		1.1619 (2.2942)
HIERARCHY		4.7153* (2.5865)	4.1885 (2.8022)	4.6898 (2.5956)
DOMINATION		4.9670 (5.7871)	4.4764 (5.9035)	4.9083 (5.7951)
DISTANCE		0.0875 (0.2133)	0.0722 (0.2130)	0.0920 (0.2138)
ISCED		2.9485 (3.0128)	3.1199 (3.0100)	2.9693 (3.0291)
ONLINE		− 2.2850 (1.5820)	− 2.4052 (1.5386)	− 2.2846 (1.5861)
PRIVATE		− 8.7897** (2.4632)	− 8.8849** (2.4828)	− 8.7022 (2.4476)
EXPERIENCE			0.0939 (0.1464)	
GENDER x AGE				− 2.7027 (3.5319)
SER	12.8343	12.8343	12.8343	12.8343
Adjusted R^2	− 0.0077	0.1215	0.1240	0.1193

The models were estimated using an OLS function with DURATION as the dependent variable. The standard errors are shown in parentheses. The asterisks show the statistical significance of each coefficient: *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level

highest goodness of fit and lowest error in the model, including the core variables together with a set of control variables.

The results displayed in Table 7 prove that the applicant's gender has no statistically significant impact on the length of time taken (in days) to get a reply for

an interview. All the other variables, except for HIERARCHY and PRIVATE, are insignificant. The relatively low number of significant variables follows the results obtained by Bertrand and Mullainathan (2004), as well as Petit (2007), especially due to the nature of this study, which makes use of field experiments aimed at modelling human behaviour, even though modern economic literature contends that economic agents act irrationally (Parisi and Smith 2005).

The results indicate that, on average, it takes 5 additional days for applicants who sent their CVs in response to vacancies for managerial roles to be called for an interview when compared to corresponding vacancies for non-managerial roles. One plausible reason for this is that due to the nature of managerial occupations and the responsibilities that the selected candidate would bear, human resource managers undertake additional scrutiny on the candidates before calling them for an interview.

Furthermore, applicants who sent their CV during the distribution period in response to vacancies issued by organisations that operate in the private sector experienced a shorter time taken to receive a call-back (almost 9 days), possibly due to the public sector's additional administrative scrutiny.

The findings from the second regression model complement the findings of the first regression model, since female candidates were not discriminated against in terms of the possibility of receiving a positive reply for an interview nor for the time it takes them to receive a reply. This leads this paper to conclude that presently, neither the gender nor the age of the candidate affects the first stage of job applicants' employment career. This means that male and female candidates, irrespective of their age, have an equal opportunity of being called for an interview and should wait for the same duration of time before being called. Prior to concluding that there is no sign of discrimination, a robustness test is performed in Table 8 using the Tobit model which produced consistent conclusion, proving that the employed model is robust.

Table 8 Robustness testing for the dependent variable 'DURATION'

Variable	OLS model	Tobit Model
C	−4.8389 (19.2498)	−5.2930 (19.4591)
GENDER	0.8844 (1.8526)	0.7635 (1.8994)
AGE	−0.1988 (1.8904)	−0.3032 (1.9568)
HIERARCHY	4.7153* (2.5865)	4.9001* (2.6103)
DOMINATION	4.9670 (5.7871)	4.3505 (5.8209)
DISTANCE	0.0875 (0.2133)	0.1036 (0.2214)
ISCED	2.9485 (3.0128)	3.0735 (3.0729)
ONLINE	−2.2850 (1.5820)	−2.4619 (1.6836)
PRIVATE	−8.7897** (2.4632)	−9.3697*** (2.4906)
SER	12.8343	12.1960

The models were estimated using OLS and Tobit functions with DURATION as the dependent variable. The standard errors are shown in parentheses. The asterisks show the statistical significance of each coefficient: *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level

Therefore, these findings contradict the idea of gender-based discrimination in the labour market, at least before the applicants are called for an interview. Hence, the gender employment gap in Malta, as depicted in Fig. 1, may be caused by other factors rather than discrimination. Specifically, NSO (2022b) estimate that 59% of all inactive workers in Malta are females, and therefore, it may be women's personal choice to remain out of the labour market following the birth of their first child.

Conclusions

Within the context of strong economic growth, complemented by public policy amendments to ensure more representation of women in Parliament (General Elections Act 1991) and leadership roles, the gender of the applicant no longer seems to be a significant determinant for employers during the recruitment process. Therefore, it can be concluded that the attributes of the ideal worker, as discussed by Acker (1990), no longer hold in this economic situation, since, in the case of this study, all the applicants who satisfied the criteria set by the employers in their job advertisements were perceived as relevant, irrespective of their demographic attributes. Therefore, this study fulfilled its aims and concludes that there exists no discrimination against full-time higher education females or prime-aged mothers in the labour market. Therefore, the null hypothesis of this study are not rejected.

It must be noted; however, that since this study was executed at a time when demand for labour equalled and, at times, exceeded supply, the gender and the age of the candidate may not have been significant determinants for the rational agent. This phenomenon is especially significant for the types of job vacancies that were considered as unemployment was considerably low amongst professionals and managers at the time of the study (NSO 2022d). Therefore, this conclusion corroborates with Marimpi's (2014) findings, suggesting that hindrances to female employment vary according to the economic cycle, decreasing at times when labour is needed in the market.

The conclusions obtained from this study do not exclude that discrimination might happen at a later stage in the recruitment process. Therefore, discrimination may be happening at the hiring stage or on the job, an argument which was brought up by some scholars in the literature consulted (Ada 2004; Roach 2014). Therefore, employers might be postponing the exercise of discrimination to a later stage, an issue that should be studied through additional research in this area..

Author contributions This paper contributes to the growing literature on the subject by investigating the possible existence of gender discrimination when receiving a call-back for an interview, as well as the duration it takes to receive such a call-back at a period of time when the unemployment level was exceptionally low. Moreover, this study also aimed to investigate whether employers discriminate against mothers who are in their prime years of giving birth, potentially due to the possibility of taking maternal leave. As a result, such a contribution is two-fold, unlike the traditional 'fictitious job application' method, which is used to investigate discrimination during the hiring process.

Data availability statement Given the sensitive nature of this study, and in line with the requirements of the ethical board, all the data had to be destroyed following the completion of this study as it reveals confidential information about employers' choices with regard to the decision as to whether to hire the applicant or not. Therefore, the data is not available.

Declarations

Conflict of interest I declare that there is no conflict of interest present in this work.

Ethical approval Ethical clearance was granted from the University of Malta's Faculty Research Ethics Committee (FREC) on the 24th of July 2018. The board requested that the collected data be stored in a password protected device and that it will be destroyed upon completion of the study. Moreover, employers were advised that the fictitious applicant is no longer interested in proceeding with the interview so as to minimise discomfort.

Consent for publication I, the undersigned, give my consent for the publication of this piece of research, including figures, data and table available, to be published in the SN Business and Economics Journal. I declare that all the work produced in this study is original, except for other authors' contributions on the subject, which were properly cited.

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