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Assessing the gender wage gap: Turkey in the years 2002–2019[1]

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Abstract: This study investigates the wage differential and discrimination between genders in Turkey based on data taken from the nationally representative Turkish Household Labour Survey for 2002 to 2019. The Blinder–Oaxaca decomposition technique was used which was then integrated into the Heckman's selection correction procedure. It was found that the gender wage gap is small in the Turkish labour market, while most of this gap originates from the discrimination against women. In addition ignoring the occupational and sectoral effects on the gender wage gap could result in underestimation of the discrimination effects both directly and indirectly through higher human capital of female employees. Lastly all these indicate that the results could likely be specific to the data set.

Keywords: gender wage gap, gender wage discrimination, selection bias, Turkey.

JEL codes: J30, J31, J71.

Introduction

Wage inequality between the sexes in labour markets has attracted a great deal of scholarly attention over many years. The very early study about the neo-classical theory of wage inequality was Edgeworth (1922) in which "equal pay for equal work" is emphasized in the sense of free competition among the sexes. He states that the main factor responsible for the low levels of women wages is the crowding of women into relatively few occupations. The causes of gender wage inequalities / gap have kept their positions on the top of the labour economics agenda especially with regard to the discrimination against women (Altman, 1995). In

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most cases gender, race and marital status are the principal contributors to labour market discrimination (Bergmann, 1974; Bukodi & Dex, 2009; Mendola & Carletto, 2012; Petrović, Jovanović, Marković, Armenski, & Marković, 2014; Perugini, 2020). In a recent study, Blau and Kahn (2017) find that while human capital variables such as education and full-time labour market experience only explain a little of the gender wage gap, gender differences in occupation and industry as well as differences in gender roles and the gender division of labour still keep their importance. They argue that discrimination cannot be discounted.

The gender wage gap has also been accentuated by international organizations such as the International Labour Organization, United Nations Development Programme and The Organization for Economic Co-Operation and Development. For instance, in the United Nations Sustainable Development Goal (SDG) 8, target 8.5 states that "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities and equal pay for work of equal value." According to ILO (2018) labour market characteristics which also constitute the basic determinants of wages cannot explain much of the gender wage gap and almost all of the gender wage gap remains unexplained even in high-income countries. The same report has emphasized occupational segregation and polarization by gender of industries as the principal factors of gender wage discrimination as stated in the literature.

The statistical analysis along with some special indicators measuring the gender wage gap provide information about inequalities in the labour market both within and between countries, and enable monitoring and evaluation of the policies and improvements on this topic. According to Global Gender Gap Index (GGGI) measuring the extent of gender-based gaps among four key di-

Table 1. Economic participation and opportunity sub-indexes for Turkey

Gender gap index		Female to male ratio			
year	**score**	**wage equality for similar work**	**income (PPP US$)**	**legislators, senior officials, and managers**	**professional and technical workers**
2006	0.585	0.64	0.46	0.06	0.43
2009	0.583	0.62	0.28	0.12	0.5
2011	0.595	0.58	0.26	0.11	0.54
2015	0.624	0.62	0.39	0.15	0.59
2017	0.625	0.59	0.44	0.18	0.64
2020	0.635	4.07[a]	0.43	0.17	0.67

[a] – (1 = not at all, significantly below those of men; 7 = fully, equal to those of men).

Source: (World Economic Forum, Global Gender Gap Reports).

mensions, countries all over the world have made more or less progress since the beginning of 2000s. As seen in Table 1, Turkey has also come a long way in terms of GGGI but as these analyses reveal it is not enough. It is important to note that Turkey has a noteworthy status in terms of "educational attainment" and "health and survival" sub-indexes.

In respect to the gender wage gap, studies have generally found discrimination against women employees to some extent in both developed and developing countries regardless of which decomposition procedure is used. Researchers typically use the Blinder–Oaxaca type decomposition to decompose the gender wage gap into explained (differences in characteristics; productivity) and unexplained (differences in returns / remuneration to characteristics; discrimination) parts. However since this type of decomposition raises the selection problem, Heckman's two-step procedure is generally used to address this issue. Studies evaluating labour market wage discrimination by using both the Blinder–Oaxaca type decomposition and Heckman's two-step procedure and comparing the results are scarce and none uses continuous data over eighteen years. In this study the gender wage gap and its components in Turkish labour market through data taken from the Turkish Household Labour Survey from 2002 to 2019 are investigated. Since most of studies in literature utilize either discontinuous data or data for a short period of time, using such a long sample period constitutes the novel contribution of our study. Although it is not panel data monitoring the same people over years, its continuity allows an inference to be made about the effects of economic and social policies and circumstances on the labour market in Turkey. In addition the occupational and sectoral effects on gender wage gap decomposition are also controlled. There are several studies investigating gender wage differences at occupational level but the number of studies controlling occupational and sectoral effects on this gap is very limited (e.g. Miller, 1987a). Since this study controls both the effects of selection bias and occupational / sectoral differences on the gender wage gap the opportunity to compare the relative importance of them is created.

The rest of the study is organized as follows: The next section reviews the available literature. In Section 2, methodology and the data are briefly explained. In Sections 3 and 4 empirical results and concluding remarks are presented.

1. Literature review

1.1. Literature review on empirical evidence

Much has been written on gender wage inequalities and a huge amount of literature exists on explaining the reasons why men continue to be paid more than women all around the world. Theoretical backgrounds of wage inequality go back to Edgeworth (1922), and the human capital theory (e.g. Becker,

1964; Mincer, 1970) along with the discrimination theory (e.g. Becker, 1957; Phelps, 1972; Arrow, 1973) are the two principal complementary theories of gender wage inequality coexisting in literature. According to the human capital theory which is also called as supply side theory, gender wage differences arise mainly from gender differences in human capital investments such as education and labour market experience. The discrimination theory which is also called as demand-side theory expresses the gender wage gap in terms of differences that men and women face in labour markets. These differences could arise purely from employers' attitudes or from gender based segmentation of the labour market or from social norms that treat women differently in terms of roles, expectations, opportunities, etc. Both of these theories are used concomitantly in explaining the gender wage gap. Newell and Reilly (1996) find that women employees earn nearly 30% less than their male counterparts in Russia. They also show that gender discrimination in one-digit occupational groups rather than across these groups explains a large part of the gap. Blau and Kahn (1996) find that wage structure is important in explaining why the US gender gap is higher than that in most other countries. Kunze (2005) finds an important gender wage gap at entry into first employment and states that gender segregation in occupations causing wage disadvantage for women explains a significant part of this gap. In the sample of European countries. Perugini (2020) also found that lower levels of employment protection bring along higher gender inequality and the magnitude of the inequality varies with different segments of the labour market. Evidence of higher wage discrimination against women in private sector relative to public sector is also revealed in Tandrayen-Ragoobur and Pydayya (2016) for Mauritius.

Several studies find the gender wage gap to be narrowing over time especially in the United States (O'Neill & Polachek, 1993; Wellington, 1993; Blau & Kahn, 1997; Weinberger & Kuhn, 2010), by considering some job related factors while some studies find it stable. O'Neill and Polachek (1993) remark that the convergence of female employees to male counterparts in measurable job-related characteristics accounts for an important part of the decrease in the gender wage gap. Wellington (1993) ascertains that half of the reduction in the gender wage gap between white men and women is due to average changes in work history variables. Blau and Kahn (1997) reveal the decreasing structure of the gender wage gap despite unfavourable net supply shifts for women in the labour market. Weinberger and Kuhn (2010) assess that an important factor in the decreasing gender wage gap can be the changes in relative earnings levels at labour market entry. Böheim, Hofer and Zulehner (2007) argue that the gender wage gap narrowed marginally from 1983 to 1997 in Austria although discrimination still explains a greater part of the higher wage quantiles. Van der Meer (2008) indicates a steady gender wage gap at about 20% in the Netherlands of which the larger part is due to discrimination. Similarly Bhorat and Goga (2012) point that there is no important decrease in the gen-

der wage gap in post-apartheid South Africa through the years 2001–2007. Wu, Pieters and Heerink (2020) find that wage rates for female migrants are lower than that of male migrants in China and differences in the returns to characteristics are the most important source of the gender wage gap especially for migrants living in urban communities

1.2. Literature review on applied methods

Most of the empirical studies on the gender wage gap are based on the standard Blinder–Oaxaca type decomposition method. However, from a methodological perspective this traditional method suffers from criticisms about non-random selection into employment. Since the selection bias in sampling in empirical analysis could affect both the magnitude and the direction of the gender wage gap the selection problem has drawn a great deal of research attention in literature. For the sake of brevity, only mention studies that use the Blinder–Oaxaca type decomposition method and selectivity correction method through Heckman's two-step procedure to determine the gender wage gap and discrimination in earnings are. Miller (1987b) and Miller and Rummery (1991) argue that the observed gender wage gap obtained by Blinder–Oaxaca type decomposition is found to be less than the actual gender wage gap that considers selection effects in the sample of Canadian and Australian labour markets respectively. Both studies find that the unexplained part (discrimination effect) of the actual wage gap is larger than that of observed wage gap. Although these studies have similar results in terms of the comparison of selectivity corrected and uncorrected gender wage decomposition results, they are different in terms of the magnitude of selection effect. It is relatively high in the first one, while very small in the latter. By using the Oaxaca decomposition technique and Heckman's two-step procedure to address the selection problem and survey data on 1980 in Great Britain, Wright and Ermisch (1991) argue that female wages would be nearly one fifth higher if there was no gender discrimination. Madden (2000) argues that there is wage discrimination at point of entry to the labour market in Great Britain and the selection effect is very minimal. Beblo, Beninger, Heinze and Laisney (2003) examine different decomposition methods including Blinder–Oaxaca and Heckman's two step procedures to evaluate the gender wage gap in five EU countries and notice that choice of the estimation method and selectivity correction affect the decomposition results even though the selection effect is small. Neuman and Oaxaca (2003) investigate whether the results of selectivity-corrected and non-corrected wage decomposition estimates differ among professional workers in Israel in 1995, finding that the results are different from each other and that the selectivity correction can affect both the magnitude and the direction of the discrimination. Ponthieux and Meurs (2005) find small and different selection effects among the sampled European countries and emphasize that wage dis-

crimination against women in the public sector is less than that in the private sector. Mysíková (2012) quantifies the basic structure of the gender wage gaps in four Central European countries and finds the highest gender wage gap in Czechia by using a dataset for the year 2008. In his study the observed wage gap is mostly explained by the remuneration effect and relatively less explained by the endowment effect in all considered countries. In detail and more importantly in relation to this study, the selection-corrected gender wage gap is found to be higher than that observed in two of the investigated countries. Kim (2020) reveals that young women in Malawi earn significantly less than their male counterparts and more than 70% of the unadjusted gender earnings difference arises from differences in returns or gender discrimination.

By contrast, the body of research in Turkey is less rich. Cudeville and Gurbuzer (2010) find gender wage discrimination against women in Turkey by using data in 2003 and the Oaxaca–Ransom decomposition method and Heckman's two-step procedure to correct selection bias. They show that female wages are 38% less than those of men on average and that 63% of this discrepancy is caused by discrimination. Based on the 2009 Turkish Household Labour Survey, Eraslan (2012) also finds that female workers face wage discrimination in Turkey (see also Kara, 2006). Mercan and Karakaş (2015) use the same data for Turkey but normalized equations to cope with the identification problem of the Blinder–Oaxaca type decomposition analysis, finding that the gender wage gap is relatively high and in favour of men in human health activities, education activities and financial service activities in Turkey. Aktas and Uysal (2012) investigate wage discrimination in Turkey in 2006 by using the quantile regression method. Although they use a different decomposition method (i.e. Machado–Mata), they find that a gender wage gap generally originates from gender differences in returns not in characteristics which shows the extent of gender discrimination in Turkey. By utilizing quantile regression analyses again with the Machado-Mata method Toksoz and Memis (2020) find that wages of informally employed women are less than that of their male counterparts in some sub-sectors in Turkey in the years of 2004–2016.

2. Methodology and data

As is common in literature to this day (e.g. Böheim et al., 2007; Böheim, Fink, & Zulehner, 2020; Kim, 2020; Fisher, Biyase, Kirsten, & Rooderick, 2020) this analysis depends on the standard Blinder–Oaxaca type wage decomposition method. This is the mostly used and robust decomposition method such that it is also being used beyond the labour market (Etezady, Shaw, Mokhtarian, & Circella, 2020; Koh, Kaiser, Sweeney, Samadi, & Hyder, 2020). To investigate the difference between male and female earnings such a regression is estimated for each group:

$$W_i = \gamma_i X_i + \varepsilon_i \qquad i = M,\ W \tag{1}$$

where W_i is the hourly wage of the i-th worker (M = man, W = woman), X_i is the vector of the individual characteristics, γ_i is the vector of the coefficients, and ε_i is the disturbance term (Oaxaca, 1973). To examine discrimination, the following Mincer-type wage equation can be written as:

$$lnW_i = \beta_i X_i + u_i \qquad i = M,\ W \tag{2}$$

The difference in the mean wages of male and female can be written as:

$$\overline{lnW}_m - \overline{lnW}_w = \beta_m(\overline{X}_m - \overline{X}_w) + (\beta_m - \beta_w)\overline{X}_w \tag{3}$$

This equation separates the difference in average wages into two parts. The first term on the right-hand side measures the differences in average human capital endowments in terms of the earnings men receive for these endowments. This term is also assumed as reflecting the productivity differences between men and women (Mysíková, 2012; Beblo et al., 2003). The second term on the right hand side measures the difference in the coefficients that exists only because the same characteristics possessed by the different groups are valued differently in the labour market (Blinder, 1973), that is also called as remuneration effect or discrimination in the literature.

Since this type of wage decomposition analysis can suffer from the selection problem Heckman's two-step procedure is applied.[4] In the first step a probit equation is estimated. This includes a set of variables that might affect the probability of labour force participation such as age, education, tenure and marital status and an estimator of inverse Mills' ratio, λ. The estimated wage equation for the selectivity correction takes the following form:

$$lnW_i = \beta_i X'_i + \theta_i \lambda'_i + \mu_i \qquad i = M,\ W \tag{4}$$

where θ is the coefficient indicating the selection effect on the wage.

As stated in Neuman and Oaxaca (2003) there are some ways to decompose the wage gap by taking into account the selection bias. Here the simplest and most commonly used one is preferred which is to treat gender differences in the selectivity terms as a separate component of wage decomposition equation:

[4] Indeed Blinder–Oaxaca type decomposition method produces the same results with Heckman's two step procedure in terms of signs of coefficients in our sample. However when the results are examined thoroughly it is found that Blinder–Oaxaca type decomposition method compared to Heckman's two-step procedure underestimates both the gender wage gap and significance / power of endowment effects and it overestimates the significance of discrimination effect.

$$\overline{lnW}_m - \overline{lnW}_w = \underbrace{\beta_m(\overline{X}_m - \overline{X}_w)}_{\text{endowments}} + \underbrace{(\beta_m - \beta_w)\overline{X}_w}_{\text{discrimination}} + \underbrace{(\theta_m\lambda_m - \theta_w\lambda_w)}_{\text{selectivity}} \quad (5)$$

A negative selection effect means that selection-corrected gender wage gap would be higher than the observed gap if the women not currently working had the same observed human capital endowments with the currently working ones (Mysíková, 2012). However a positive selection effect means that selection-corrected gender wage would be lower than the observed gap.

The data used in this study are taken from the nationally representative Turkish Household Labour Survey for 2002 to 2019[5]. These surveys are unique. They present the most comprehensive information about the labour market in Turkey. These surveys contain detailed information on individual and household characteristics, working conditions and job-related features. Although the survey has been conducted since 2000, no data on the wages and tenure information of participants was collected in 2000 and 2001. Each survey includes around 500,000 individuals of whom nearly 52% are women but a maximum of 110.000[6,7] individuals are included in the analysis for each year. Data on the ages of participants are presented in age groups in 2002 and 2003. Thus the averages of these groups as the age of individuals are taken. For this analysis the sample is restricted to employees who have at least one year of working experience. Tenure or working experience is calculated as the survey date minus start date of employment. The survey data contains net wages of full and part-time employees and casual employees with weekly working hours. The observations with missing information on net income are excluded.

The survey data presents occupational and sectoral information according to international classifications (two-digit) such as The International Standard Classification of Occupations (ISCO), International Standard Industrial Classification of All Economic Activities (ISIC) and European Classification of Economic Activities (NACE) but the utilized versions of these international classifications are changed in some years. For instance occupational and sectoral information is classified according to ISCO (68) and ISIC Rev. 3 until 2004, and thereafter ISCO (88) and NACE Rev. 2 until 2012.

[5] The structure of the first two years of survey data in this sample is different from other years. This difference originates from the application of different international standards in terms of definitions and concepts used in surveys such that structure of surveys is based on standards of International Labour Organization for the years 2002–2003, while the structure of the remainder ones is based on EUROSTAT standards. This difference reveals itself especially at the decomposition results.

[6] The sample used is very small relative to the number of surveyed people because an important number of respondents did not give the information about their wages.

[7] When Heckman's two-step procedure is applied the maximum sample size decreases by half on average.

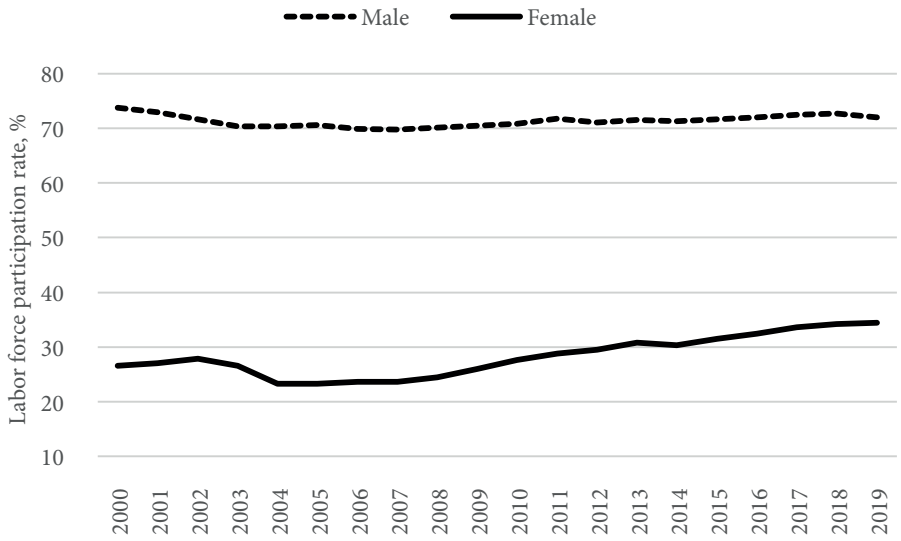

Figure 1. Labour force participation rate by gender in Turkey (age fifteen and over)
Source: (Turkish Statistical Institute).

Figure 1 shows the labour force participation rates among genders in Turkey. While male participation has a steady trend, female participation has been slowly increasing over years. But it is still lower than male participation.

In the raw data used, the monthly average gender wage gap ranges between 3% and 11%, and over the whole period average is about 9%. As seen in Table A1 (in the appendix), the hourly gender wage gap is not noticeably large on average while male employees always earn more than their female counterparts.

Table 2. Educational attainment by gender (%)

	2002		2008		2014		2019	
	male	female	male	female	male	female	male	female
Illiterate or literate but not completed any educational institution	3.1	5.1	2.4	3.8	1.9	5.3	1.2	5.1
Primary school	41.8	26.3	33.9	17.1	26.0	18.5	19.8	13.4
Secondary school, vocational school at secondary school level	13.6	6.6	15.4	7.8	16.0	7.3	11.0	3.7
High school, Vocational or technical high school	25.9	27.9	28.1	28.1	26.6	20.3	25.1	14.3
Higher education (university, faculty or upper)	15.7	34.2	20.2	43.2	29.6	48.8	43.0	63.4

Source: (Turkish Statistical Institute, Household Labor Surveys 2002–2019).

Illiterate or nongraduate employees constitute about five percent of the female sample used and this ratio is greater than among male employees. This characteristic of female employees could result in relatively high employment of them in unqualified occupations. In high school and higher education levels, however, female employees exhibit a tremendous improvement which could be the result of government's social and educational policies on female children. For instance in the beginnings of the 2000, in order to draw attention to schooling and increase schooling among daughters various important projects commenced in Turkey such as "Father, Send me to School" and "Come on Girls, to School." It is important to say that education is not seen as the main issue for the gender wage gap; almost all over the world female employees have just as good—if not better—educational endowments than their male counters (ILO, 2018).

Table 3. Marital status by gender and age (%)

	Marital status				Age intervals							
	single		married		13–22		23–32		33–42		43+	
	male	female	male	female	male	female	male	female	male	female	male	female
2002	16.4	43.4	83.6	56.6	11.14	22.45	34.18	37.98	33.75	28.78	20.73	10.78
2006	15.6	38.8	84.5	61.2	5.37	11.54	31.37	39.61	35.49	32.52	27.74	16.34
2010	17.0	38.5	83.0	61.5	7.55	12.59	34.31	40.64	33.76	32.82	24.38	13.95
2014	17.7	32.4	82.3	67.6	3.68	4.55	25.99	31.94	35.67	36.15	34.62	27.37
2017	10.9	23.6	89.1	76.4	0,5	0,49	16.86	20.25	38.77	42.37	36.92	43.84
2019	9.3	22.3	90.7	77.8	0,14	0,14	10.6	13.46	39.38	43.1	49.82	43.28

Source: (Turkish Statistical Institute, Household Labor Surveys 2002–2019).

Table 3 shows marital status and age structure statistics of the sample used for selected years. The difference in marital status between male and female employees reveals the high burden of motherhood and housework activities on women's shoulders. However the increasing number of married women in employment could be a good indication of gender equality, from both social and economic perspectives. In addition the sharp increase in the number of kindergarten or day care centres could increase the possibility of participation of married females in the labour force in the last ten years. While age structure is not importantly different between genders, male employees have (a few) more years of work experience during all the sample period.

In general Tables 2 and 3 above put clearly forward the difference in characteristics between men and women employees in this sample. It is seen that education and marital status are also determinative factors in terms of labour force participation in Turkey.

3. Empirical results

In this analysis the logarithm of individual hourly wages is regressed against the following explanatory variables: age, age squared, age cube, tenure, tenure squared, dummy variable for education level, dummy variable for marital status, dummies representing economic sector, and dummies representing occupation. For the sake of clarity, age, tenure, occupational and sectoral dummies are the determinants of wage, while marital status, age and education are assumed to determine whether the dependent variable is observed (the selection correction).

Figure 2 illustrates the breakdown of the gender wage gap into the human capital (explained part, i.e. endowment effect), discrimination (unexplained part), and selectivity components[8] (selection effect). Irrespective of controlling the selection bias or not these results show that gender wage gap between males and females is less than one log point against women in the Turkish labour market over the considered period.

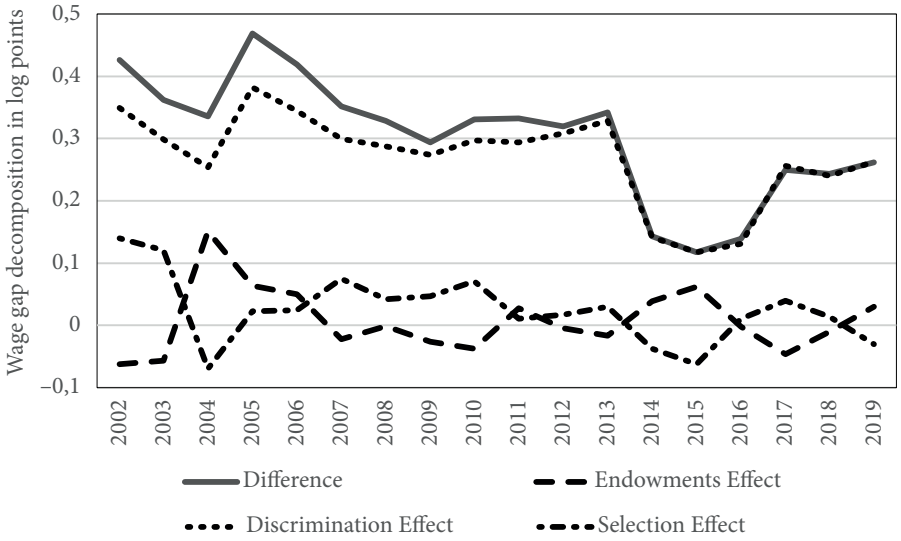

Figure 2. Inter-temporal changes in hourly wage differentials (considering Heckman's two-step procedure)
Source: Own estimates.

If there is no difference in average characteristics of working males and females then there would be no endowment effect (Mysíková, 2012). These results show that in eleven sample years endowment effect is negative indicating

[8] These estimates are based on equation (5). All results are presented in Table A3 in the appendix.

that the average female employee is endowed with better characteristics than her male counterpart, at least concerning those characteristics included in our dataset such as tenure and education. In addition, endowments effect does explain a little part of the gender wage gap compared to discrimination effect. If the gender-specific discrimination of the same individual and job characteristics are the same (meaning there are no differences in returns by gender), the discrimination effect would be zero. The discrimination effect or unexplained part of the gender wage gap accounts for 90 per cent of this gap on average. The trend of the discrimination effect fluctuates a lot and it is almost similar to that of gender wage gap. Since the explanatory power of discrimination effect is higher than the endowment effect, it is asserted that either uncovered characteristics in the wage decomposition model and/or discrimination have more important roles than individual characteristics in determining gender wage differences in Turkey. The selection effect shows a fluctuating, decreasing trend. While it explains nearly one third of the gender wage gap in 2002, it explains on average only 10% of it in the last four years showing that sample selection bias is almost insignificant in the Turkish labour market in recent years. The selection effect is generally positive in the results presented indicating that an inflow of non-participants to labour market could lead to a decrease in the observed gender wage gap.

On reviewing the estimated coefficients obtained from Heckman's two-step procedure[9] it is found that marital status and education are the most important determinants of wage for both male and female employees. When we consider the summary statistics, these two variables already constitute the main difference between genders. Regarding male employees, the effects of education and being married on wages are positive and increase over years where education exhibits a sharp increase. Married males could be working overtime and since the wage data used here includes base wage plus all payments, high return on overtime working could increase the average hourly wage of male employees. Education has positive and increasing effect on female wages as well, but not as much as that on their male counterparts. It could be the result of a smaller heterogeneity of education levels among women who are much more frequently than their male counterparts highly educated (see Table 2). Being married is, by a long shot, the most important determinant of female wages. Its effect is negative but decreases over the sample period. The extent of the negative effect of marriage on hourly wages of female employees could arise directly by reducing their productivity or indirectly by reducing their participation in the labour force (which is clear in Figure 1) and reducing their tenure (especially in case of motherhood) in turn[10]. ILO (2018) reveals that motherhood brings

[9]All results are presented in Table A4 in the appendix.

[10]Since this data does not give any information about having children it was not possible to control the effect of motherhood or fatherhood.

a persistent wage penalty for a female employee's whole working life and a wage premium for male employees. Lastly work experience increases the average hourly wages of male and female employees as expected.

Conclusions

In this study the gender wage gap and gender wage discrimination in Turkey is estimated and evaluated based on data taken from the nationally representative Turkish Household Labour Survey for 2002 to 2019. In particular the Blinder–Oaxaca decomposition technique is used which is then integrated into Heckman's selection correction procedure. It is found that the gender wage gap is small in the Turkish labour market and individual characteristics along with the dummy variables included in the models are more determinative in decomposing the wage gap than the estimation method. In other words ignoring the occupational and sectoral effects on the gender wage gap could result in an underestimation of the discrimination effects both directly and indirectly through higher human capital endowments of female employees. However the effects of occupational dummies on the decomposition components are more important than the effects of sectoral dummies.

The analyses show that the average female employee is generally has better characteristics than that of her male counterpart. The endowment effect, however, only slightly explains the gender wage gap and thus the discrimination effect against female employees is high and persistent. Indeed it is not easy to attribute the unexplained part of wage gap decomposition to purely discrimination. This effect could possibly include the effects of unobserved differences in individual or other characteristics, and only an unknown fraction of the unexplained part of the decomposition can be attributed to discrimination.

When the determinants of the hourly wages are examined, it is found that age, tenure and education variables have significantly positive effects on the hourly wages of male and female employees. While marriage significantly increases the average hourly wages of male employees, it decreases those of females. This situation could also be an important sign of discrimination against female employees in Turkey. On the one hand although the discrimination against female employees decreased in Turkey over the considered period, the persistence of it illustrates the ineffectiveness of social policies dealing with gender discrimination in the labour market. On the other hand, as seen in Table 1, global indicators also point to similar results in terms of the gender wage gap and its evolution over time. The Government could promote both the participation of females in the labour force and the pursuit of a career, which could be hard for married females with children due to the social and cultural structure in Turkey. However it should be kept in mind that Turkey has a chronic un-

employment problem. Possible fierce competition in the labour market could be leading to the current situation of women employees, so structural reforms could be more important than simple statutory arrangements about employees and the labour market in Turkey.

Appendix

Table A1. Summary statistics for hourly wages by gender in logarithmic terms[a]

Year	Male					Female				
	Obs.	Mean	Std. Dev.	Min.	Max.	Obs	Mean	Std. Dev.	Min.	Max
2002	27 722	22.06	0.76	2.48	27.93	7 229	21.79	0.95	14.73	25.12
2003	27 178	22.32	0.68	1.79	26.83	6 989	22.06	0.89	15.83	27.63
2004	42 080	22.49	0.62	2.42	25.73	9 675	22.21	0.88	2.30	25.29
2005	42 361	8.85	0.61	0.41	12.87	9 911	8.60	0.81	2.01	11.38
2006	41 627	8.98	0.59	3.78	12.61	10 144	8.75	0.77	3.11	11.51
2007	41 252	9.09	0.58	1.79	12.44	10 522	8.90	0.73	2.53	11.41
2008	40 961	9.23	0.57	3.22	13.58	10 738	9.06	0.70	2.30	13.82
2009	41 275	9.33	0.56	3.27	14.91	11 333	9.19	0.70	2.01	14.91
2010	44 337	9.43	0.57	3.91	12.95	12 524	9.27	0.71	2.01	12.04
2011	45 391	9.50	0.56	3.22	13.12	13 635	9.32	0.69	2.30	12.15
2012	46 089	9.61	0.55	4.32	12.44	14 977	9.44	0.68	0.56	12.61
2013	46 005	9.71	0.56	2.48	13.53	15 838	9.51	0.70	1.61	12.25
2014	44 383	9.82	0.56	2.86	13.12	15 499	9.64	0.69	2.01	13.12
2015	38 215	9.95	0.53	3.40	13.69	13 530	9.77	0.64	2.71	13.46
2016	33 188	10.13	0.48	5.08	12.62	11 884	9.95	0.61	3.56	12.51
2017	29 666	10.24	0.49	4.09	13.42	11 021	10.08	0.57	4.47	12.19
2018	25 939	10.39	0.48	5.30	13.13	9 816	10.22	0.55	3.56	12.83
2019	23 115	10.59	0.47	5.30	14.00	8 948	10.41	0.58	4.09	13.24

[a] On 1 January 2005, Turkish lira had been revaluated through replacing the previous lira at a rate of 1 new lira = 1,000,000 old lira. Thus, data has a fracture in 2005.

Source: Own elaboration.

Table A2. Summary statistics of age, education, tenure (in years) and marital status (0 = single, 1 = married)

Year	Age				Education[a]				Tenure				Marital Status			
	Male		Female		Male		Female		Male		Female		Male		Female	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
2002	36.17	10.05	32.47	9.51	8.79	4.39	10.65	5.00	10.42	7.68	8.51	6.98	0.84	0.37	0.57	0.50
2003	36.23	9.93	32.50	9.38	8.92	4.40	10.84	4.93	10.60	7.68	8.56	6.76	0.83	0.37	0.56	0.50
2004	36.37	9.65	32.77	9.14	8.70	4.39	10.51	5.04	10.35	7.62	8.43	6.80	0.84	0.36	0.62	0.49
2005	36.50	9.67	32.94	9.40	8.97	4.44	10.84	5.08	10.48	7.67	8.62	7.05	0.85	0.36	0.61	0.49
2006	36.60	9.68	33.20	9.24	9.15	4.45	11.08	4.98	10.15	7.68	8.50	6.81	0.84	0.36	0.61	0.49
2007	36.81	9.66	33.38	8.92	9.29	4.45	11.38	4.85	10.09	7.73	8.28	6.70	0.84	0.37	0.57	0.50
2008	36.98	9.62	33.54	8.80	9.52	4.44	11.76	4.69	9.81	7.64	8.22	6.79	0.84	0.37	0.58	0.49
2009	37.04	9.61	33.97	8.94	9.76	4.48	12.12	4.57	9.74	7.59	8.36	6.93	0.83	0.37	0.60	0.49
2010	37.35	9.82	34.46	8.92	9.97	4.53	12.18	4.61	9.86	7.73	8.44	6.93	0.83	0.38	0.61	0.49
2011	37.78	9.76	35.20	8.93	10.15	4.55	12.10	4.73	10.04	7.89	8.70	7.06	0.83	0.37	0.64	0.48
2012	38.10	9.79	36.01	9.23	10.36	4.56	12.15	4.80	10.01	7.96	8.71	7.34	0.83	0.38	0.65	0.48
2013	38.17	9.86	36.34	9.33	10.48	4.52	12.00	4.89	9.91	8.01	8.62	7.28	0.82	0.38	0.65	0.48
2014	38.59	9.97	36.83	9.74	10.50	4.52	11.74	5.05	10.19	8.23	8.36	7.31	0.82	0.38	0.68	0.47
2015	39.50	9.54	38.13	9.64	10.84	4.50	11.89	5.10	10.35	8.18	8.73	7.41	0.85	0.36	0.71	0.45
2016	40.60	9.30	39.28	9.35	11.10	4.51	12.23	5.05	10.61	8.08	9.07	7.33	0.87	0.33	0.75	0.44
2017	41.46	9.01	40.19	9.07	11.22	4.49	12.40	5.04	10.56	7.96	9.21	7.38	0.89	0.31	0.76	0.42
2018	42.30	8.89	41.33	8.99	11.47	4.48	12.60	4.98	10.84	7.95	9.51	7.37	0.90	0.29	0.78	0.42
2019	43.09	8.73	41.89	8.71	11.75	4.47	12.83	4.90	10.96	7.89	9.64	7.32	0.91	0.29	0.78	0.42

[a] 0 years of schooling = illiterate or literate but not completed any educational institution,
5 years of schooling = primary school,
8 years of schooling = secondary school, vocational school at secondary school level,
12 years of schooling = high school, vocational or technical high school,
16 years of schooling = higher education (university, faculty or upper).

Source: Own elaboration.

Table A3. Decomposition of the gender wage gap (in log points)

Year	Difference	Endowments effect	Discrimination effect	Selection effect
2002	0.4263	–0.0626	0.3491	0.1398
2003	0.3619	–0.0568	0.2984	0.1203
2004	0.3354	0.1512	0.2541	–0.0699
2005	0.4687	0.0636	0.3823	0.0228
2006	0.4190	0.0497	0.3448	0.0245
2007	0.3521	–0.0224	0.2999	0.0745
2008	0.3281	–0.0011	0.2874	0.0418
2009	0.2937	–0.0267	0.2740	0.0464
2010	0.3312	–0.0372	0.2974	0.0710
2011	0.3323	0.0277	0.2939	0.0107
2012	0.3198	–0.0050	0.3080	0.0167
2013	0.3422	–0.0164	0.3288	0.0298
2014	0.1433	0.0390	0.1416	–0.0373
2015	0.1171	0.0623	0.1176	–0.0628
2016	0.1391	–0.0024	0.1307	0.0108
2017	0.2500	–0.0460	0.2564	0.0396
2018	0.2430	–0.0103	0.2398	0.0135
2019	0.2619	0.0296	0.2629	–0.0306

Source: Own elaboration.

Table A4. Results of Heckman's two-step procedure predictions (in log points)

Variable	2002		2003		2004		2005		2006	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Age	0.1492515*** (0.0095)	−0.0598036*** (0.0209)	0.1382327*** (0.009)	−0.079243*** (0.0208)	0.0668532*** (0.0065)	−0.0684659*** (0.0179)	0.0991729*** (0.0062)	0.0056901 (0.0153)	0.1107704*** (0.0059)	0.0087961 (0.0151)
Age square	−0.003394*** (0.0003)	0.0019084*** (0.0006)	−0.0031463*** (0.0002)	0.0022545*** (0.0006)	−0.0014038*** (0.0002)	0.0019081*** (0.0005)	−0.0020048*** (0.0002)	0.0002583 (0.0004)	−0.0022188*** (0.0001)	0.000184 (0.0004)
Age cube	0.0000266*** (0.0000)	−0.0000179*** (0.0000)	0.0000248*** (0.0000)	−0.0000191*** (0.0000)	0.0000109*** (0.0000)	−0.0000151*** (0.0000)	0.0000137*** (0.0000)	−0.00000559 (0.0000)	0.0000148*** (0.0000)	−0.00000454 (0.0000)
Tenure	0.0269105*** (0.0017)	0.0127686*** (0.0042)	0.0239815*** (0.0015)	0.0318712*** (0.004)	0.0156365*** (0.0011)	0.0219601*** (0.0032)	0.0164044*** (0.0011)	0.0204204*** (0.0029)	0.0142455*** (0.0011)	0.0193737*** (0.0029)
Tenure square	−0.0005688*** (0.0001)	−0.0001617 (0.0001)	−0.0004622*** (0.0000)	−0.0009391*** (0.0001)	−0.0002949*** (0.0000)	−0.0007448*** (0.0001)	−0.0002868*** (0.0000)	−0.0003448*** (0.0001)	−0.0002294*** (0.0000)	−0.0005371*** (0.0001)
Marriage	0.1319006*** (0.018)	−0.5349545*** (0.0276)	0.1283405*** (0.0174)	−0.5276763*** (0.0289)	0.1491336*** (0.0136)	−0.4190984*** (0.024)	0.1491219*** (0.0152)	−0.4991555*** (0.0246)	0.0798222*** (0.016)	−0.5364963*** (0.0247)
Education	0.0744997*** (0.0013)	0.154966*** (0.0025)	0.0724322*** (0.0012)	0.145769*** (0.0027)	0.0623305*** (0.001)	0.1499239*** (0.0024)	0.0721954*** (0.001)	0.1718933*** (0.0021)	0.0758431*** (0.0011)	0.178201*** (0.0021)
Constant	−0.9607733*** (0.1354)	−3.695985*** (0.2233)	−0.7333535*** (0.1439)	−3.589791*** (0.2419)	−1.793953*** (0.1157)	−3.642168*** (0.2101)	−1.279504*** (0.122)	−3.013041*** (0.2104)	−1.565224*** (0.1251)	−3.216911*** (0.2209)
Number of obs.	27,722	7,229	27,178	6,989	42,080	9,675	42,361	9,911	41,627	10,144
Variable	**2007**		**2008**		**2009**		**2010**		**2011**	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Age	0.1011182*** (0.0058)	0.0806477*** (0.0164)	0.1329277*** (0.0061)	0.1150791*** (0.017)	0.1111802*** (0.0063)	−0.011385 (0.0146)	0.1465145*** (0.0061)	0.0399146*** (0.0147)	0.1283797*** (0.0057)	0.0401327*** (0.0125)
Age square	−0.0020562*** (0.0001)	−0.0019891*** (0.0005)	−0.0027872*** (0.0002)	−0.0027842*** (0.0005)	−0.0023149*** (0.0002)	0.0006453 (0.0004)	−0.0032103*** (0.0002)	−0.0007758* (0.0004)	−0.0026436*** (0.0001)	−0.0007253** (0.0003)

Age cube	0.0000141*** (0.0000)	0.0000164*** (0.0000)	0.0000191*** (0.0000)	0.0000215*** (0.0000)	0.0000159*** (0.0000)	−0.00000815** (0.0000)	0.0000233*** (0.0000)	0.0000045 (0.0000)	0.000018*** (0.0000)	0.00000404 (0.0000)
Tenure	0.0141372*** (0.001)	0.0227477*** (0.0027)	0.0139241*** (0.0011)	0.0221465*** (0.0026)	0.0140475*** (0.001)	0.0272507*** (0.0025)	0.0135464*** (0.001)	0.0232882*** (0.0025)	0.0103247*** (0.001)	0.0197781*** (0.0023)
Tenure square	−0.000239*** (0.0000)	−0.000588*** (0.0001)	−0.0001632*** (0.0000)	−0.000399*** (0.0001)	−0.000126*** (0.0000)	−0.0006314*** (0.0001)	−0.0001203*** (0.0000)	−0.0004635*** (0.0001)	−0.0000615** (0.0000)	−0.0004559*** (0.0001)
Marriage	0.0640154*** (0.016)	−0.1379056*** (0.0238)	0.0970067*** (0.0159)	−0.1141403*** (0.0239)	0.1436899*** (0.0151)	−0.4934452*** (0.0235)	0.1498214*** (0.0145)	−0.5794704*** (0.0228)	0.1294033*** (0.0149)	−0.5392187*** (0.0224)
Education	0.0775401*** (0.0011)	0.1807291*** (0.0021)	0.082928*** (0.0011)	0.1883694*** (0.0021)	0.0898215*** (0.0011)	0.1910689*** (0.0021)	0.0899876*** (0.001)	0.1935175*** (0.002)	0.0925617*** (0.001)	0.1844009*** (0.0019)
Constant	−1.737672*** (0.1295)	−2.159388*** (0.2492)	−1.478768*** (0.1368)	−3.100949*** (0.2626)	−1.356758*** (0.1368)	−4.293091*** (0.2471)	−1.054853*** (0.1333)	−4.836949*** (0.2468)	−1.781602*** (0.1301)	−5.31056*** (0.2032)
Number of obs.	41,252	10,522	40,961	10,738	41,275	11,333	44,337	12,524	45,391	13,635
Variable	**2012**		**2013**		**2014**		**2015**		**2016**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Age	0.1030457*** (0.0055)	0.0297452*** (0.0113)	0.1186323*** (0.0055)	0.0383176*** (0.0105)	0.0919167*** (0.0053)	−0.0185792* (0.0102)	0.0517693*** (0.006)	−0.0453166*** (0.01)	0.0549046*** (0.0068)	−0.0405137*** (0.012)
Age square	−0.0019924*** (0.0001)	−0.0004725* (0.0003)	−0.0023626*** (0.0001)	−0.0006556** (0.0003)	−0.0018235*** (0.0001)	0.0004934** (0.0002)	−0.0009885*** (0.0001)	0.0010701*** (0.0002)	−0.0010765*** (0.0002)	0.0010127*** (0.0003)
Age cube	0.0000124*** (0.0000)	0.00000183 (0.0000)	0.0000153*** (0.0000)	0.00000331* (0.0000)	0.0000119*** (0.0000)	−0.00000293 (0.0000)	0.00000637*** (0.0000)	−0.00000728*** (0.0000)	0.00000695*** (0.0000)	−0.00000737*** (0.0000)
Tenure	0.0100649*** (0.0009)	0.0160268*** (0.0021)	0.0090299*** (0.0009)	0.0145284*** (0.0021)	0.0104595*** (0.0009)	0.0203262*** (0.002)	0.0110785*** (0.0009)	0.0143315*** (0.0019)	0.0090204*** (0.0009)	0.0113932*** (0.0021)
Tenure square	−0.00000649 (0.0000)	−0.0002626*** (0.0001)	0.00000691 (0.0000)	−0.0002761*** (0.0001)	−0.0000308 (0.0000)	−0.000511*** (0.0001)	−0.0001402*** (0.0000)	−0.0002975*** (0.0001)	−0.000064** (0.0000)	−0.0002642*** (0.0001)
Marriage	0.1350984*** (0.0146)	−0.5389142*** (0.0219)	0.1147846*** (0.0146)	−0.4984782*** (0.0213)	0.1286755*** (0.0147)	−0.3846035*** (0.0186)	0.1131232*** (0.0163)	−0.3701335*** (0.0198)	0.1437094*** (0.0179)	−0.3178721*** (0.0221)

Education	0.095419*** (0.001)	0.1785375*** (0.0018)	0.0936222*** (0.001)	0.1696437*** (0.0018)	0.1008869*** (0.0011)	0.1549294*** (0.002)	0.1100515*** (0.0012)	0.1565883*** (0.0019)	0.1123372*** (0.0012)	0.1635335*** (0.0022)
Constant	−1.728294*** (0.1302)	−5.424093*** (0.1932)	−1.361384*** (0.1319)	−5.461116*** (0.1873)	−2.73818*** (0.1205)	−5.412269*** (0.1731)	−3.840741*** (0.1459)	−6.640004*** (0.1939)	−4.04639*** (0.1853)	−7.017571*** (0.2395)
Number of obs.	46,089	14,977	46,005	15,838	44,383	15,499	38,215	13,530	33,188	11,884
Variable	**2017**		**2018**		**2019**					
	Male	**Female**	**Male**	**Female**	**Male**	**Female**				
Age	0.015573* (0.0088)	0.0032488 (0.0135)	−0.0081323 (0.0103)	−0.0016971 (0.0149)	−0.0487863*** (0.0109)	0.0194009 (0.017)				
Age square	−0.0002008 (0.0002)	0.0000153 (0.0003)	0.00037 (0.0002)	0.0001633 (0.0003)	0.0012652*** (0.0002)	−0.0003661 (0.0004)				
Age cube	0.0000007 (0.0000)	−0.000000588 (0.0000)	−0.00000381** (0.0000)	−0.00000203 (0.0000)	−0.0000103*** (0.0000)	0.00000187 (0.0000)				
Tenure	0.0101334*** (0.001)	0.0097671*** (0.002)	0.0091236*** (0.0011)	0.0066259*** (0.0021)	0.009041*** (0.0012)	0.0071546*** (0.0025)				
Tenure square	−0.0001061*** (0.0000)	−0.0002241*** (0.0001)	−0.0000743** (0.0000)	−0.000057 (0.0001)	−0.0000867** (0.0000)	−0.0000487 (0.0001)				
Marriage	0.2038097*** (0.0189)	−0.3644243*** (0.0254)	0.1837441*** (0.0209)	−0.3420087*** (0.0272)	0.1546827*** (0.0224)	−0.2869346*** (0.029)				
Education	0.1131697*** (0.0013)	0.177955*** (0.0021)	0.1185504*** (0.0014)	0.1838508*** (0.0022)	0.124834*** (0.0014)	0.184742*** (0.0022)				
Constant	−4.774685*** (0.2315)	−8.523878*** (0.3023)	−4.639889*** (0.2838)	−8.418998*** (0.3581)	−5.605677*** (0.321)	−8.824975*** (0.4251)				
Number of obs.	29,666	11,021	25,939	9,816	23,115	8,948				

Note: ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively, and standard errors in parenthesis. The estimates for occupational and sectoral dummies are not presented for the sake of clarity.

Source: Own elaboration.

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