JAME
E-ISSN:2791-7401
Volume : 1, Issue 1, 2021
URL: https://journals.gen.tr/jame

Received: 09.05.2021
Acccepted: 15.06.2021

RESEARCH ARTICLE

Has the gender wage gap narrowed or widened in a decade? Some recent evidence from the Turkish labor market

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Abstract

The principal objective of this study is to determine the variation in the gender wage gap in the last decade of the Turkish labor market and to reveal possible factors driving the wage disparities. The data set covers the Household Budget Statistics surveys 2009 and 2018. In order to prevent biased results, the empirical strategy contains a two-stage model estimation and selectivity corrected decomposition approach. The findings claim a widening gender wage gap over the 10 years period. The portion of the gender wage gap resulting from the labor market discrimination tends to increase whereas the wage gap based on gender differences in characteristics decreases. Despite the decrease, if the female employees had the same characteristics as males, their mean wages would be higher. Moreover, the gender wage gap attributable to gender discrimination in the labor market continues to increase.

Keywords: *Mincer wage equation, gender wage gap, sample selection model, labor force participation, selectivity corrected decomposition, Turkey*

JEL Codes: *C31, C34, J16, J31*

Citation: KOMURYAKAN, F,. YILGOR, M., (2021). "Has the gender wage gap narrowed or widened in a decade? Some recent evidence from the Turkish labor market". Journal of Applied Microeconometrics (JAME). 1(1), 1-17, DOI: 10.53753/jame.1.1.01

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1. INTRODUCTION

The female labor force participation and the gender wage inequality are some of the most significant socio-economic issues that economies have to deal with. Females experience challenges to participate in the labor force for majority of labor markets. Even if they manage to participate, in spite of the efforts, females still struggle with a gender wage gap as a reason for occupational segregation, the patriarchal structure of society, gender norms set by the society, motherhood, long maternity leaves, and discrimination. Although most of the industrialized countries have acknowledged equal treatment for females in their labor markets, the gender wage gap, while declining in some countries, is still a longstanding issue of every labor market (Blau and Kahn 2003). Yet, policymakers may have concerns to confront the gender pay differences in favor of males (Kunze 2008).

Turkey is an emerging market and newly industrialized economy with a population of 83.4 million (International Monetary Fund 2021). According to the International Labour Force (ILO), the female employment rates (percent of female population ages 15-64) have increased between 2009 and 2018 from 27.81% to 38.15% in Turkey. Despite a slightly more than 10 percent increase in a decade, this rate has not still reached to any rates reported by the European Union (EU), Asia-Pacific, or the United States (US). The female labor force participation rate of Turkey is still at least 30% lower than the EU, Asia-Pacific, and the US. Nevertheless, surprisingly, male labor force participation which is reported as 78.39% in 2018 is almost similar or even greater than the EU, Asia-Pacific, the US economies (ILO 7.5.2021a).

Since the ratios and reports indicate a presence of wage disparity in the Turkish labor market, it becomes crucial to examine this socio-economic problem and provide information and policy recommendations to the policymakers. In this line, this study has two main objectives. The first main objective is to determine whether the gender wage gap tends to narrow or widen in a decade by employing cross-sectional data for 2009 and 2018. Determining the possible factors that drive the wage disparities in the Turkish labor market is the second main objective of this study. In line with these objectives, this study estimates an extended wage equation and decomposes the estimation results. In order to prevent biased results, the empirical strategy of this study takes into account the possible sample selection bias for both model estimation and decomposition approaches.

The contribution of this paper is to provide recent insights into the gender wage gap for the Turkish labor market and to determine the variation in the wage disparity by adopting a robust estimator in the case of sample selection bias. The empirical findings may help policymakers take precautions that are more accurate in order to reduce the gender wage gap in the Turkish labor market.

This paper is structured into six main sections. The next section provides an insight into the previous studies on the gender wage gap for both Turkish and other labor markets. The third section explains the data used in the study. The fourth section describes the methodological strategy. The fifth section presents the empirical findings. The last section concludes remarks and provides further discussion.

2. A BRIEF REVIEW OF THE PREVIOUS STUDIES

There exists a wide literature investigating the gender wage gap. This section contains a brief review of the studies that examine the gender wage disparity for both the Turkish and the other labor markets at different time periods via mostly decomposition methods.

2.1. The Gender Wage Gap in Labor Markets

Wright and Ermisch (1991) examine the gender wage gap using a decomposition method for the United Kingdom (UK) in 1980 and find that females would earn 20 percent more in the case of a non-discriminative labor market. Another study in the UK by Harkness (1996) reports that the gender wage gap has been narrowing by applying the decomposition method over the 1973-1993 period. Khitarishvili (2009) evaluates the gender wage gap in Georgia for the period of 2000 - 2004 by selectivity corrected model and decomposition methods. The results indicate a wider gender wage gap in Georgia than in other transition economies; however, the gender wage gap has narrowed in five years. Mysíková (2012) analyzes the gender wage disparity in some of the European labor markets. The study adopts the selectivity corrected model and decomposition methods and the findings indicate that the gender

wage gap is wider in Czech and Slovak Republics than in Hungary and Poland. Hinks (2002) is one of the first studies on the gender wage gap by race in South Africa. The selectivity corrected decomposition findings indicate a gender wage gap and the largest gap is between the Indian/Asian and colored and black population groups. Assaad and Arntz (2005) analyze the gender gap in wages for the Egyptian labor market and find that the gender gap is widened from 1988 to 1998.

Asian labor markets struggle with wage disparities just like the European and African labor markets. Liu (2004) examines the gender wage gap in the Vietnamese labor market over the period 1993 - 1998 and confirms a gender difference among wages in favor of males. Agrawal (2014) examines wage discrimination in India by adopting the selectivity corrected estimator and decomposition approaches. The results determine a gender wage gap based on the discrimination in the Indian labor market.

Fortin (2008) examines the gender wage gap in the context of psychological factors among young employees in the US via the corrected decomposition method. The findings show that the gender differences in the importance of money and work have a significant but modest effect on the gender wage gap. One study that performs a cross-country analysis for the gender wage gap and employment by considering sample selection bias and applying the decomposition method is by Olivetti and Petrongolo (2008). The results of the study determine a wider wage differential for several Organization for Economic Co-operation and Development (OECD) countries. However, the gender wage gap is smaller for economies where the gender employment gaps are low such as the UK, the US, and some EU countries.

The studies addressing the gender wage gap for European, African, Asian, and American labor markets provide evidence that most of the economies have wage differential in favor of males, and females still experience discrimination. Some of the labor markets, especially European, may have succeeded in narrowing the gender wage gap over time. However, the differences in wages by gender are still a serious socio-economic problem that economies have to deal with.

2.2. The Gender Wage Gap in the Turkish Labor Market

The gender wage gap is a serious socio-economic problem in the Turkish labor market as well. The findings of the limited studies addressing the gender wage gap in the Turkish labor force examined by mostly selectivity corrected model and decomposition methods are discussed below.

A study by Tansel (2005) is one of the first studies addressing the wage gap in the Turkish labor market. The study examines the public and private sector wages by gender using the 1994 Household Expenditure Survey data with selectivity corrected model and decomposition method. The findings claim a gender wage gap in the Turkish labor market and the wage gap is wider in the private sector, unlike the public administration. Kara (2006) analyses the occupational gender wage disparity by employing selectivity corrected estimator and decomposition methods using the 1994 Household Expenditure and Income Survey data. Parallel to the former study, the results show that the gender wage gap exists in the Turkish labor force, however, it tends to decrease with an increase in education. Another study that determines a gender wage gap in the Turkish labor market is by Ilkkaracan and Selim (2007). The study finds a wage disparity in favor of males by exploiting the decomposition method using the Employment and Wage Structure Survey data for 1995. Cudeville and Gurbuzer (2010) estimate the gender wage discrimination in the Turkish labor force by analyzing the Household Budget Statistics via selectivity corrected model and decomposition methods. The findings indicate a gender wage gap in the labor force and the gap is wider than the labor forces of Spain and Greece. One of the recent studies on the gender wage gap is by Tekguc et al. (2017). The study adopts a selectivity corrected model along with the decomposition and examines the Labor Force Survey for 2004 and 2011. The findings provide an insight into the presence of the gender wage gap and report that the gender wage gap becomes wider for 2011 compared to 2004.

3. DATA

Our study exploits the cross-sectional Turkish Household Budget Statistics (HBS) data conducted by the Turkish Statistical Institute (TURKSTAT). According to the TURKSTAT, the HBS data has been collected annually since

2002 in order to provide information about the socio-economic structures of households living in Turkey and to test the validity of the applied socio-economic policies. Therefore, the HBS data is one of the most important and reliable sources to examine socio-economic problems like the gender wage gap.

The households in HBS data are collected with a stratified two-stage cluster sampling method. In order to examine the variation of the gender wage gap for the recent decade in the Turkish labor force, this study employs 2009 and 2018 HBS data. The HBS data was conducted on 1,050 and 1,296 households that change every month between January 1st and December 31st in 2009 and 2018. 12,600 and 15,552 households have taken the surveys in 2009 and 2018, respectively. The HBS data contains 28,041 and 30,737 individuals aged above 15 in 2009 and 2018, respectively. Following the previous studies for both national and international labor markets, the data are restricted to those aged between 15 and 65 in order to take into account the retirement choices and to receive results that are more relevant. The restricted data contain 12,128 (48%) males and 13,125 (52%) females in 2009 whereas it contains 13,284 (49%) males and 13,872 (51%) females in 2018.

This study adopts secondary data containing no identifying information for any of the individuals in the surveys. The data that support the findings of this study are used under the license and not publicly available due to the privacy restrictions of TURKSTAT.

4. METHODOLOGICAL STRATEGY

Mincer wage equation, proposed in the pioneer study of Mincer (1974), is known as one of the most important equations to examine the wages in labor markets. The standard Mincer equation provides a better understanding of how wages are distributed across the population by explaining the logarithmic wages with human capital in terms of schooling, experience, and the square of the experience. This study examines the gender wage gap by estimating and decomposing the extended Mincer wage equation explained below for both genders in 2009 and 2018.

$$ln(W_i) = \alpha + \sum_{j=1}^{3} \beta_j EducationDummies_{ij} + \delta Experience_i + \gamma Experience_i^2 + \sum_{j=1}^{8} \emptyset_j OccupationGroups_{ij} + u_i \quad (1)$$

The dependent variable in Equation 1 is the logarithmic monthly wages and represented by . In order to analyze the effect of schooling more specifically, education is divided into four dummy variables as illiterate or compulsory education, high school, associate or bachelor's, and postgraduate degrees. Since the school starting age is 6 in Turkey, the experience variable is calculated by subtracting the age of 6 and the years of schooling from the age variable. The standard Mincer wage equation is extended with the occupation groups in this study. The occupation group variable set indicates the nine major occupation groups based on the International Standard Classification of Occupations (ISCO:08) of the ILO[1]. Lastly, and represent the constant and error terms respectively.

4.1. Heckman's Sample Selection Model

Mincer wage equation has been extended with different variables and estimated in literature via several different methods to examine different socio-economic structures. Some studies restrict their data to working employees who reported positive income in order to estimate the Mincer wage equation. However, Heckman (1979) states that this restriction may lead to sample selection bias. According to Heckman (1979), if the sample of working males and females who reported positive wages are not randomly selected, specification error occurs. In this case, the Ordinary Least Squares (hereafter OLS) estimator tends to be biased and inconsistent. In order to overcome this sample selection bias for non-randomly selected samples, Heckman (1979) proposed a selectivity corrected two-stage efficient estimator. The first stage of the sample-selection model contains an estimation of the probability of labor force participation via a probit model. The first stage also provides an estimation of another variable

1 For detailed occupation classification information, please see International Labour Force (7.5.2021b).

referred to as an inverse Mills ratio[2] (i.e., selectivity term). In the second stage, the extended Mincer wage equation is estimated with the Mills ratio estimated from the first stage of the sample-selection model. According to the Heckman procedure, the inverse Mills ratio is a proxy variable for Equation 2. Adding the inverse Mills ratio as another explanatory variable in Equation 1 makes it possible to measure the sample selection bias because of the individuals which are non-selected for the wage model (Dolton and Makepeace 1986). In the first stage, this study estimates the selection model below that indicates the probability of labor force participation

$$p_i = \Phi\Big(\alpha + \sum_{j=1}^{2} \gamma_j\, AgeCategories_{ij} + \sum_{j=1}^{3} \lambda_j\, EducationCategories_{ij} + \sum_{j=1}^{2} \delta_j MaritalStatus_{ij} + \beta_1 HouseholdSize_i + \beta_2 PresenceofPreschooler_i + \beta_3 ln(NonlaborIncome)_i\Big) \quad (2)$$

where denotes the conditional probability of labor force participation and denotes the cumulative standard normal distribution probability density function. The dependent variable of the model is the labor force participation that takes the values of 1 if the individual is employed. The explanatory variables are age categories, education dummies, marital status dummies, number of people in the household, the dummy variable that indicates the presence of preschoolers in the household, and logarithmic monthly nonlabor income. Monthly nonlabor income indicates income such as pension, interest yield, fund, scholarship, etc. other than wages. The selection of the explanatory variables included in the labor force participation model is based on previous studies (e.g., Korenman and Neumark 1992; motherhood, and wages. We find that heterogeneity leads to biased estimates of the "direct" effects of marriage and motherhood on wages (i.e., effects net of experience and tenureBudig et al. 2012; Mysíková 2012; Agrawal 2014; Glauber 2018).

4.2. Decomposition

As the decomposition method provides more detailed information about the differences and discrimination in different groups such as gender, race, occupation, age, etc., it has become one of the most preferred methods in economics to examine disparities. The very first studies introducing the decomposition method in economics are by Blinder (1973) and Oaxaca (1973). The standard decomposition method was proposed in the same year by Blinder and Oaxaca; therefore, it is referred to as O-B decomposition. Standard O-B decomposition[3] takes into account possible interactions and the relationships and measures the endowments and coefficients after estimating the models in this case, the extended Mincer wage equations for both males and females. Standard O-B decomposition decomposes the differences into two categories as endowment and coefficient effects. The endowment component indicates the portion of the differences attributable to the differences in characteristics (Blinder 1973). The coefficient effect is described as the quantity of the wage gap as a reason for gender differences in coefficients (Daymont and Andrisani 1984).

Standard O-B decomposition may also be affected by the sample selection bias explained by Heckman (1979). In order to overcome sample-selection bias in decomposition after the OLS, the decomposition method has been developed. After estimating the wage equations for both males and females , the selectivity corrected decomposition approach can be expressed as below

$$\left(\bar{W}_m - \bar{W}_f\right) = \hat{\beta}_m\left(\bar{X}_m - \bar{X}_f\right) + \bar{X}_f\left(\hat{\beta}_m - \hat{\beta}_f\right) + \left(\hat{\theta}_f\bar{\lambda}_f - \hat{\theta}_m\bar{\lambda}_m\right) \quad (3)$$

where represents the logarithmic monthly wages. contains the regressors explained in Equation 1, indicates the slope parameters and constant term, is the inverse Mills ratio explained above, and is an estimate of (Neuman and Oaxaca 2004)Heckit selectivity correction introduces some fundamental ambiguities in the context of wage decompositions. The ambiguities arise from group differences in the selection term which consists of a parameter

2 Mills ratio can be calculated as where indicates the matrix of the control variables in first stage model and and indicate the density and distribution functions. For more information, please see Heckman (1979).

3 For a detailed discussion for O-B decomposition, please see Appendix 1.

multiplied by the Inverse Mills Ratio (IMR. This study exploits the decomposition approach that takes into account the selection bias to overcome the bias that may occur in the standard O-B decomposition.

5. EMPIRICAL FINDINGS

This section is divided into three subsections. The first subsection contains the initial findings from the HBS data regarding the labor force participation and wage models explained above. The next subsections provide the estimation results of both OLS and Heckman's two-stage models. The last subsection contains the findings of selectivity corrected decomposition.

5.1. Initial Findings

Table 1 contains the descriptive statistics of the variables in the first and the second stage models explained in Equations 1 and 2.

Table 1. Initial Findings

	2009		2018	
	Male	**Female**	**Male**	**Female**
First stage model				
Labor force participation	0.5	0.16	0.52	0.2
Age categories				
Age < 30	0.35	0.38	0.32	0.31
30 ≤ Age < 45	0.34	0.33	0.33	0.34
45 ≤ Age ≤ 65	0.31	0.29	0.35	0.35
Education categories				
Illiterate or compulsory education	0.66	0.77	0.62	0.7
High school	0.22	0.15	0.22	0.17
Associate or bachelor's degree	0.11	0.07	0.15	0.12
Postgraduate degree	0.01	0.01	0.01	0.01
Marital status				
Married	0.69	0.69	0.66	0.68
Separated or widow	0.01	0.07	0.02	0.08
Single	0.3	0.24	0.32	0.24
Household size*	4.58	4.58	4.2	4.13
Presence of preschooler	0.3	0.3	0.26	0.26
Monthly nonlabor income* (*in Turkish Liras*)	376.03	148.13	512.29	216.04
No. of obs.	12,128	13,125	13,284	13,872
Second stage model				
Monthly wages* (*in Turkish Liras*)	930.82	645.03	2,452.39	1,978.89
Logarithmic monthly wages*	6.32	5.66	7.51	7.13
Human capital				
Illiterate or compulsory education	0.59	0.53	0.54	0.45
High school	0.25	0.22	0.24	0.2
Associate or bachelor's degree	0.15	0.23	0.2	0.32
Postgraduate degree	0.01	0.02	0.02	0.03
Experience	21.62	18.21	22.52	20.64

Occupation group				
ISCO1	0.06	0.03	0.04	0.04
ISCO2	0.08	0.14	0.09	0.19
ISCO3	0.08	0.1	0.07	0.06
ISCO4	0.06	0.14	0.06	0.12
ISCO5	0.15	0.15	0.19	0.25
ISCO6	0.07	0.07	0.05	0.03
ISCO7	0.19	0.08	0.19	0.06
ISCO8	0.15	0.05	0.15	0.04
ISCO9	0.16	0.24	0.16	0.21
No. of obs.	6,100	2,133	6,301	2,792

Notes: * denotes a continuous variable; other variables are dummies. The first stage model contains information on all individuals available in the data; the second stage model contains only employed individuals.

Table 1 shows that the labor force participation rates are 34 percent more for males in 2009 and the gap in the labor force participation has decreased only by 2 percent in a decade.

The common perception of society for females is such that they need to stay at home and take care of children. This perception may cause difficulties for females to be involved in the labor force. This perception may have been more common and acceptable in the past. However, it is expected to change over the years. Yet, interestingly, the labor force participation gap by gender has not been significantly changed over a decade in Turkey. According to the age categories, most of the individuals who take the survey are aged below 45. The education categories ratios of the first stage model (i.e., for both working and not working individuals) indicate that males are more educated than females for both 2009 and 2018. Most of the individuals are either illiterate or have only compulsory education set by the Turkish Ministry of National Education. However, this ratio is noticeably higher for females. Even though education degrees get higher in a decade, females are still less educated than males. Many papers have examined the girls' education in Turkey and most of them support that there is a significant gender gap in educational attainment because of the conservative attitudes in Turkey, especially in the east side (e.g., Tansel 2002; Rankin and Aytac 2006; Duman 2010; Caner et al. 2016). Marital status ratios show that most of the individuals are married and the ratios are similar for both genders. The ratios have modestly increased for the marital status of being separated or widow in a decade as a reason for the increase in divorce rates. The number of people in the household is around 4 and the rate of the presence of preschoolers is around 30 percent. Monthly nonlabor income has increased in a decade in Turkey and the monthly nonlabor income is higher for males in both 2009 and 2018.

According to the monthly wages, males earn more compared to females. In 2009, males earn more than the official minimum wage set by the Ministry of Labor and Social Security whereas females earn slightly less. Furthermore, the gap has not been narrowed in a decade and the females still earn slightly less than the minimum wage. Although the wage differences have been decreased over a decade, males still earn more compared to females. The ratios of education categories for the second stage model (i.e., only for employed individuals) indicate that employed individuals are more educated. Interestingly, employed females are more educated than employed males, especially in terms of associate, bachelors, and postgraduate degrees. As for the occupation groups, most of the female employees are employed in jobs without any qualification (ISCO9) in 2009. There has been a change in this ratio in a decade through an increase in education female employees are now mostly employed in the occupation group of service and sales workers (ISCO5) rather than the elementary jobs. Another interesting change that happened in a decade is that the ratio of the female managers (ISCO1) has become equal to the male managers and females are noticeably more employed in the occupation group of professionals (ISCO2) in 2018. Interestingly, the ratio of the male managers has decreased in a decade whereas the females' ratio has increased. Since some of the occupations are predominantly by males, males are significantly more employed in the occupation groups of craft and related trades workers and plant (ISCO7) and machine operators and assemblers (ISCO8), for both 2009 and 2018.

5.2. Heckman's Sample Selection Model Findings

Another advantage of the Heckman two-stage model is to provide information about wages and labor force participation decisions. Before analyzing the findings of the second stage Heckman's model, Table 2 provides information about the first stage labor force participation model of the Heckman procedure.

Table 2. Probit Model Findings

Dependent variable: labor force participation				
	2009		**2018**	
	Male	**Female**	**Male**	**Female**
Age categories				
Age < 30	0.4195*** (0.047)	0.3926*** (0.0506)	0.2424*** (0.0474)	0.1269*** (0.0469)
30 ≤ Age < 45	0.5545*** (0.0344)	0.6965*** (0.0406)	0.4782*** (0.1728)	0.4814*** (0.0341)
45 ≤ Age ≤ 65 (reference)				
Education categories				
Illiterate or compulsory education (reference)				
High school	0.2317*** (0.03)	0.4204*** (0.0376)	0.1728*** (0.0291)	0.4178*** (0.0354)
Associate or bachelor's degree	0.6182*** (0.042)	1.3166*** (0.0489)	0.5241*** (0.0353)	1.1982*** (0.0379)
Postgraduate degree	0.966*** (0.1695)	1.857*** (0.1957)	1.0992*** (0.1509)	1.6598*** (0.1244)
Marital status				
Married	0.9058*** (0.042)	-0.1902*** (0.0447)	0.8471*** (0.0422)	0.0885** (0.0443)
Separated or widow	0.8412*** (0.1055)	0.5271*** (0.0736)	0.5691*** (0.0837)	0.5621*** (0.0665)
Single (reference)				
Household size	-0.0593*** (0.0063)	-0.0749*** (0.0087)	-0.0933*** (0.0071)	-0.0449*** (0.0087)
Presence of preschooler	0.0609* (0.0321)	-0.1657*** (0.0378)	0.1139*** (0.0336)	-0.3362*** (0.0366)
Logarithmic nonlabor income (*in Turkish Liras*)	-0.1057*** (0.0049)	-0.0561*** (0.0071)	-0.1292*** (0.0044)	-0.066*** (0.0061)
Constant	-0.5746*** (0.0583)	-1.0955*** (0.0692)	-0.1628*** (0.0561)	-1.1092*** (0.0618)
Diagnostics statistics				
Mills ratio	0.6949*** (0.0547)	-0.4386*** (0.1141)	-0.4513*** (0.0331)	-0.4645*** (0.0825)
Wald Chi square	1675.98 [0.000]	552.66 [0.000]	2204.3 [0.000]	577.23 [0.000]
No. of obs selected	6,100	2,133	6,983	2,792
No. of obs nonselected	6,028	10,992	6,301	11,080

Notes: ***p<0.01, **p<0.05, *p<0.1. The numbers in brackets indicate the standard errors; the numbers in square brackets are the probabilities of the test statistics.

The labor force participation model of the Heckman two-stage estimator contains the aforementioned inverse Mills ratio and it is significant for both males and females for 2009 and 2018. This may indicate a sample-selection bias for both males and females in those years.

All age categories increase the probability of being involved in the labor force, according to those aged between 45 and 65. The individuals aged between 30 and 45 tend to take place in the labor force more for both males and females. The probability of labor force participation for males aged below 30 is more likely than females and this difference has increased in a decade. Females enter the labor market at a later age than males as a possible result of marriage and motherhood. Education is one of the most significant factors in obtaining jobs and individuals that are more educated are expected to have a higher probability to work. One of the most significant factors of females' labor force participation is education in Turkey and the labor force participation increases with the increase in educational attainment (Dayioglu and Kırdar 2010). In line with the other studies in the literature, all the education degrees have a positive impact on the labor force participation for both males and females, and education has noticeably more contribution on females' labor force participation. Marital status dummies show that married males tend to take place in the labor force more because of the idea of being the breadwinner of the household. Similar to the other labor markets (e.g. Sheran 2007; Lee et al. 2008), married females' probability of labor force participation is less. Although the impact of marriage is still significantly more for the likelihood of males' labor force participation, this structure has changed in a decade in favor of females and marriage does not decrease females' likelihood of working in 2018. According to the household structures, the increase in the number of people in the household has a negative contribution to the labor force participation for both genders.

The presence of children aged below 6 is one of the most significant factors in females' labor force participation. The presence of preschoolers dummy is significant for both males and females in 2009 and 2018. However, the contribution of it is positive on males' labor force participation whereas it is significantly negative on females'. Furthermore, these positive and negative effects have been increased in a decade instead of decreasing. Parallel to the literature, more monthly nonlabor income reduces the likelihood of working in 2009 and 2018 for males and females and this decrease is higher for the males.

Table 3 presents further estimation results of the extended Mincer wage equation via both OLS and Heckman's two-stage estimators.

Table 3. OLS and Heckman's Sample Selection Model Findings

Dependent variable: logarithmic monthly wages

	2009				2018			
	Male		Female		Male		Female	
	OLS	**Heckman**	**OLS**	**Heckman**	**OLS**	**Heckman**	**OLS**	**Heckman**
Human capital								
Illiterate or compulsory education (reference)								
High school	0.6363*** (0.0357)	0.5317*** (0.0382)	0.6328*** (0.0984)	0.4843*** (0.0967)	0.1964*** (0.0226)	0.1484*** (0.0236)	0.4626*** (0.0614)	0.3096*** (0.062)
Associate or bachelor's degree	1.0902*** (0.0524)	0.8523*** (0.0575)	1.3379*** (0.113)	0.9205*** (0.1597)	0.5382*** (0.032)	0.4023*** (0.0327)	0.8761*** (0.0703)	0.4806*** (0.0987)
Postgraduate degree	1.6841*** (0.1015)	1.3411*** (0.1466)	1.8068*** (0.1495)	1.2673*** (0.2714)	0.9695*** (0.0746)	0.7361*** (0.0784)	1.4491*** (0.0943)	0.9289*** (0.1552)
Experience	0.1077*** (0.0039)	0.081*** (0.0041)	0.0658*** (0.0073)	0.0588*** (0.0072)	0.0848*** (0.0029)	0.0676*** (0.0026)	0.0671*** (0.0047)	0.0582*** (0.0047)
Experience^2	-0.0017*** (0.00007)	-0.0012*** (0.0001)	-0.0011*** (0.0001)	-0.0009*** (0.0001)	-0.0015*** (0.00005)	-0.0012*** (0.00005)	-0.0011*** (0.0001)	-0.0009*** (0.00009)
Occupation group								
ISCO1	0.3908*** (0.0687)	0.4195*** (0.0639)	1.3167*** (0.1881)	1.31*** (0.1904)	0.6694*** (0.0558)	0.6886*** (0.0501)	1.0979*** (0.0869)	1.1016*** (0.1074)
ISCO2	0.6509*** (0.0701)	0.6477*** (0.0714)	1.0221*** (0.1342)	1.0286*** (0.1386)	0.6555*** (0.04459	0.6408*** (0.0427)	0.7253*** (0.0793)	0.7332*** (0.0776)
ISCO3	0.5096*** (0.0596)	0.4932*** (0.0603)	1.1055*** (0.1236)	1.1074*** (0.1199)	0.5054*** (0.0375)	0.4874*** (0.0406)	0.5806*** (0.0895)	0.5905*** (0.09)
ISCO4	0.4455*** (0.0599)	0.4533*** (0.0624)	0.9856*** (0.1128)	0.9731*** (0.1088)	0.3637*** (0.0368)	0.3535*** (0.04)	0.5446*** (0.0762)	0.5469*** (0.0737)
ISCO5	0.2718*** (0.0522)	0.2724*** (0.0468)	0.4455*** (0.0996)	0.4291*** (0.0909)	0.1586*** (0.0306)	0.1558*** (0.028)	0.1925*** (0.0574)	0.2116*** (0.0512)
ISCO6	-0.873*** (0.0662)	-0.8583*** (0.0572)	-1.0193*** (0.1278)	-1.007*** (0.1142)	-0.7249*** (0.0579)	-0.6914*** (0.0412)	-1.029*** (0.1244)	-0.9736*** (0.0981)
ISCO7	0.3288*** (0.0465)	0.3207*** (0.043)	-0.1541 (0.1424)	-0.1439 (0.1059)	0.2174*** (0.0297)	0.2015*** (0.0277)	-0.0047 (0.1084)	-0.0053 (0.0765)
ISCO8	0.4379*** (0.0472)	0.417*** (0.0456)	1.1181*** (0.1303)	1.1309*** (0.1341)	0.3145*** (0.0288)	0.2991*** (0.0295)	0.6536*** (0.0777)	0.6567*** (0.0919)
ISCO9 (reference)								
Constant	4.507*** (0.0594)	5.2661*** (0.0791)	4.04*** (0.1019)	4.7768*** (0.215)	6.2521*** (0.0421)	6.7333*** (0.0485)	5.6843*** (0.0802)	6.4738*** (0.1567)
R^2		-		-		-		-

Notes: ***p<0.01, **p<0.05, *p<0.1. The OLS results are only for the employed individuals. The numbers in brackets are the robust standard errors for the OLS.

The signs of the coefficients estimated with the OLS and two-stage estimators are the same; however, the impacts vary regarding the sample selection bias. In general, the OLS estimates the impacts of human capital and occupation groups higher than the selectivity corrected model. The OLS calculates the coefficients greater than they should be in the case of sample selection bias.

Concerning the education categories of Heckman's model, all education categories are significant and have a positive contribution to the wages of both males and females. Parallel to the previous studies in the literature (e.g., Kara 2006; Tansel and Daoud 2011; the returns to the education degrees on the wages are greater for the females whereas the returns to the experience are greater for males in 2018. Nevertheless, the contribution of high school and postgraduate degrees are slightly higher for males in 2009. The postgraduate degree has the highest incremental effect on the wages for both males and females. Table 3 also reveals that the returns to education have been decreased for both males and females over a decade. The coefficients of the occupation groups indicate that being employed as managers (ISCO1) has the most incremental effect on females' wages, according to being employed in elementary occupations (ISCO9), in 2009 and 2018 whereas males earn more as professionals (ISCO2) in 2009. Both male and female individuals employed as skilled agricultural, forestry, and fishery workers (ISCO6) earn less than the individuals employed in the elementary occupations.

5.3. Decomposition Findings

In order to examine the gender disparity in wages and its variation in a decade, this study adopts the selectivity corrected decomposition method, aforementioned above. Table 4 reveals the overall selectivity corrected decomposition results in 2009 and 2018. This study also calculates the standard O-B decomposition after the OLS for employed individuals to compare the results. The results are available in Appendix 2 and 3.

Table 4. Overall Selectivity Corrected Decomposition Results

	2009			2018		
	Coef.	**S.E.**	**%**	**Coef.**	**S.E.**	**%**
Male	6.7919***	0.0412		7.8027***	0.0238	
Female	0.9199***	0.0191		1.7066***	0.0257	
Difference	5.8718***	0.0454	100	6.0961***	0.0351	100
Endowments	1.199***	0.0458	20	0.7993***	0.0277	13
Coefficients	4.6728***	0.0712	80	5.2967***	0.0466	87

Notes: ***p<0.01, **p<0.05, *p<0.1. Coef. denotes the coefficients; S.E. denotes the standard errors.

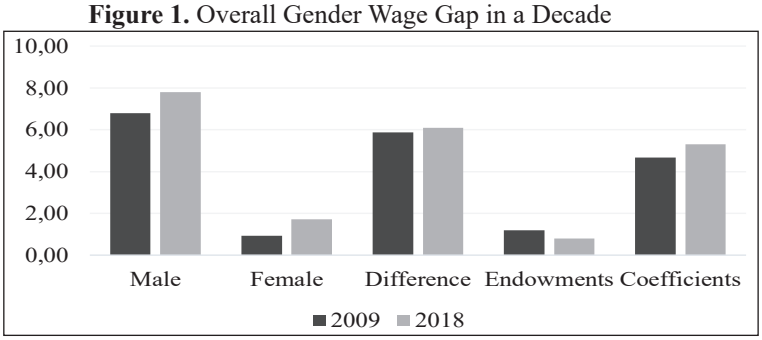
Table 4 shows that the mean logarithmic monthly wage is 6.79 and 0.92 for males and females in 2009 whereas it is 7.8 and 1.71 in 2018. Males' wages have increased by 1.01 in a decade whereas females' have increased only by 0.79. There is a gap of 0.22 in increase between males' and females' wages in the favor of males. The results provide evidence that there is a significant raw gender difference in wages for both 2009 and 2018. More interestingly, the gender wage gap has been increased from 5.87 to 6.1 in a decade, rather than decreasing.

One might compare the standard O-B decomposition results after OLS with the selectivity corrected decomposition results. Appendix 2 indicates that standard O-B decomposition measures the gender wage gap narrower than it actually is. After calculating the selectivity corrected decomposition, Table 4 indicates that the raw gender wage differential is wider in the Turkish labor market.

The raw differential in wages is divided into two categories as endowment and coefficient. All the categories are statistically significant and the coefficient component is larger than other categories in both 2009 and 2018. Endowment effects explain the 20 and 13 percent of the raw gender wage differentials whereas coefficient effects explain 80 and 87 percent of it. In other words, the gender wage gap attributable to the labor market discrimination has been increased in a decade whereas the wage gap attributable to the gender differences in human capital and occupation groups has been decreased.

Endowment effects have decreased from 1.2 to 0.8 in a decade and the difference in characteristics of employed males and females decreased by 0.4. Yet, employed males have better characteristics than employed females. If females had the same characteristics as males, their mean wages would increase by 1.2 and 0.8 in 2009 and 2018, respectively. Coefficients effects indicate the change in females' wages are 4.67 and 5.3 in 2009 and 2018 in the case of applying males' coefficients to females' coefficients. This result indicates that the gender wage gap arises from the discrimination in the labor market and the discrimination still increases. Figure 1 illustrates the statistics from Table 4.

Figure 1. Overall Gender Wage Gap in a Decade



Source: Authors' own calculation from the HBS data.

Figure 1 shows the mean wage differences among males and females and the widening gender wage gap in a decade. The presence of the gender wage gap is consistent with the results of other studies for both Turkish and other labor markets. However, there is a wider difference in wages in favor of males in the Turkish labor market than the others. Furthermore, while some of the developed and emerging economies may achieve to narrow the gender wage gap over the years, the gender wage gap has widened in a decade in the Turkish labor market. In order to evaluate the possible reasons for the determined gender wage gap, Table 5 presents the results of detailed selectivity corrected decomposition.

Table 5. Detailed Selectivity Corrected Decomposition Results

	2009		2018	
	Endowments	**Coefficients**	**Endowments**	**Coefficients**
Human capital				
Illiterate or compulsory education (reference)				
High school	0.0505*** (0.0049)	0.0609*** (0.0064)	0.0106*** (0.0019)	-0.0311*** (0.0069)
Associate or bachelor's degree	0.0692*** (0.0063)	0.0322*** (0.0045)	0.0308*** (0.0033)	-0.0471*** (0.0071)
Postgraduate degree	0.0094*** (0.0022)	0.0015** (0.0007)	0.0059*** (0.0014)	-0.0047*** (0.0015)
Experience	1.5127*** (0.0781)	-0.5563*** (0.0204)	1.2433*** (0.0498)	-1.0105*** (0.0325)
Experience^2	-0.6487*** (0.0468)	0.2496*** (0.0121)	-0.6544*** (0.0308)	0.4347*** (0.0205)
Occupation group				
ISCO1	0.0254*** (0.0041)	-0.0139*** (0.0019)	0.022*** (0.0023)	-0.0219*** (0.0024)
ISCO2	0.0348*** (0.0045)	-0.0863*** (0.0053)	0.0311*** (0.0032)	-0.1294*** (0.0066)
ISCO3	0.0289*** (0.0039)	-0.0578*** (0.0041)	0.0263*** (0.0027)	-0.0405*** (0.0035)
ISCO4	0.0189*** (0.003)	-0.0781*** (0.0048)	0.0146*** (0.002)	-0.0766*** (0.0048)
ISCO5	0.0329*** (0.0058)	-0.0552*** (0.0034)	0.0223*** (0.0041)	-0.1265*** (0.006)
ISCO6	-0.0513*** (0.0045)	-0.0154*** (0.0016)	-0.0307*** (0.0026)	-0.0113*** (0.0016)
ISCO7	0.0562*** (0.0077)	-0.0169*** (0.0016)	0.0356*** (0.0049)	-0.0259*** (0.0024)
ISCO8	0.0597*** (0.0068)	-0.0191*** (0.002)	0.0415*** (0.0043)	-0.0213*** (0.0023)
ISCO9 (reference)				
Constant	-	5.2277*** (0.0795)	-	6.4092*** (0.0509)

Notes: ***p<0.01, **p<0.05, *p<0.1. The numbers in brackets are the standard errors.

Endowment effects in Table 5 provide insights into how much the gender differences in characteristics of the individuals affect the gender wage gap. The gender differences in human capital explain 83 percent of the endowment effects whereas the gender differences in occupation groups explain 17 percent of it in 2009. As for 2018, the gender differences in human capital and occupation groups explain 80 and 20 percent of the endowment effects, respectively.

Males have better educational characteristics for both 2009 and 2018 and the gender differences in all education degrees contribute to the gender wage gap, as expected. Associate or bachelor's degree has the highest impact on widening gender wage gap. Moreover, the contributions of the education degrees to the gender wage gap have been decreased in a decade along with the increase in females' education. The gender differences in the experience of males and females wider the gender wage gap in 2009 and 2018, however, the contribution has slightly decreased in 2018. The endowment effects of occupation groups indicate that the gender differences in occupation groups wider the gender wage gap, except for the occupation group of skilled agricultural, forestry, and fishery workers (ISCO6). The gender differences in occupation groups that mostly male-dominated such as craft and related trades workers (ISCO7) and plant and machine operators and assemblers have (ISCO8) the highest contribution to the gender wage gap both for both 2009 and 2018.

6. CONCLUSION AND DISCUSSION

The principal aims of this study are to determine the variation in the wage disparities in the last decade of the Turkish economy and examine the possible reasons females earning less in the Turkish labor market. First stage results indicate that females need to be supported in participating in the labor market at early ages, especially before 30. Since the presence of preschoolers prevents females to work, nursery and financial supports may be provided. Education is one of the most crucial factors for females to be employed. Policymakers should specifically continue to attach more importance to girls' education in Turkey. The second stage findings determine that return to the education degrees on the wages have been decreased for both males and females in a decade. Recently, employers started to give less weight to education degrees with the noticeable increase in education degrees. Interestingly, the selectivity corrected decomposition results claim a widening the gender wage gap in favor of males around 0.23 over a decade, rather than a decrease. The findings indicate that the gender wage gap attributable to the labor market discrimination has been increased over a decade whereas the wage gap attributable to the gender differences in characteristics has been decreased. Another finding is that although the difference in characteristics of employed males and females is decreased by 0.4, male employees still have better characteristics than female employees. If the female employees had the same characteristics in human capital and occupation groups as males, their mean wages would be about 0.8 higher in 2018. Moreover, the gender wage gap attributable to the gender discrimination against females in the labor market continues to increase after a decade.

In order to prevent the wage disparities in terms of gender and to achieve equality in payments, new policies, campaigns, and acts may be organized by the authorities. This may help to reduce the effects of this serious socio-economic problem. Recently, some universities in Turkey have been started to add mandatory social gender equality lectures to the bachelor's degree curriculum. Expanding these kinds of lectures and educate the children and the younger individuals in a way of gender equality may help to lower the socio-economic disadvantages in the long term. Supporting the young females to take place in the labor force, ensuring the companies, especially in the private sector, hiring a similar rate of male and female employees may be another effective anti-discrimination policy recommendations. Some of the countries have been established specific ministries to help to reduce gender inequalities in terms of improving females' status across all social and economic areas. One of the first countries that established such a ministry is Indonesia. The Indonesia Ministry of Women Empowerment and Child Protection was established in 1978. South Korea established the Ministry of Gender Equality and Family in 2001. Another country that established a Gender Equality ministry is Spain. The Spain Ministry of Equality was established in 2010. Canada and Argentina established the Ministry of Women and Gender Equality and the Ministry of Women, Genders and Diversity in 2018 and 2019, respectively. The main objective of the Ministries is to improve the females' social and economic status through the enhancement of females' rights over the country. By following the leading countries, establishing a Ministry of Gender Equality may help to reduce the disadvantages that females are facing in Turkey.

This study could provide a clear understanding for policymakers by determining the change of the gender wage gap and the factors that wider it on how to design efficacious gender equality policies in terms of wages.

Funding

The authors declare that this study has no financial support.

Conflict of Interest

Metehan Yılgör and Fulden Kömüryakan declare that they have no conflict of interest.

Submission declaration statement

We confirm that this work is original and has not been published elsewhere, nor is it currently under consideration for publication elsewhere.

Data Availability Statement

This study adopts secondary data containing no identifying information for any of the individuals in the survey. The data that support the findings of this study are used under the license and not publicly available due to the privacy restrictions of TURKSTAT. However, data are available with the permission of the TURKSTAT.

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APPENDIX

Appendix 1. Standard O-B decomposition

After estimating the wage equations for both males and females , standard O-B decomposition can be expressed below:

$$R = E(W_m) - E(W_f) = E(W_m)'\beta_m - E(W_f)'\beta_f \quad (1)$$

where represents the logarithmic monthly wages; represents the raw differential and indicates the slope parameters and constant term. In order to apply decomposition, O-B decomposition can be explained as below:

$$R = Endowment\ (E) + Coefficient\ (C) \quad (2)$$

$$E = \beta_f[E(X_m) - E(X_f)]' \quad (3)$$

$$C = E(X_f)'(\beta_m - \beta_f) \quad (4)$$

where contains the regressors explained in Equation 1 and also contains the unexplained portion of the difference (Blinder 1973).

Appendix 2. Overall Standard O-B Decomposition Findings Only for Employed Individuals

	2009		2018	
	Coef.	**S.E.**	**Coef.**	**S.E.**
Male	6.3157***	0.0158	7.5132***	0.0104
Female	5.6609***	0.0344	7.1315***	0.0215
Difference	0.6548***	0.0379	0.3817***	0.0239
Endowments	0.0399**	0.0201	-0.0661***	0.0132
Coefficients	0.6149***	0.0326	0.4479***	0.0201

Notes: ***p<0.01, **p<0.05, *p<0.1. Coef. denotes the coefficients; S.E. denotes the standard errors.

Appendix 3. Detailed Standard O-B Decomposition Findings Only for Employed Individuals

	2009		2018	
	Endowments	**Coefficients**	**Endowments**	**Coefficients**
Human capital				
Illiterate or compulsory education (reference)				
High school	0.0155** (0.0067)	0.0007 (0.0209)	0.008*** (0.002)	-0.0522*** (0.0118)
Associate or bachelor's degree	-0.0933*** (0.012)	-0.0579* (0.03)	-0.0655*** (0.0065)	-0.1083*** (0.0241)
Postgraduate degree	-0.0143** (0.0056)	-0.0024 (0.0052)	-0.0147*** (0.0037)	-0.0154*** (0.0047)
Experience	0.3674*** (0.0361)	0.7632*** (0.144)	0.1599*** (0.0259)	0.3639*** (0.1031)
Experience^2	-0.2371*** (0.0274)	-0.3356*** (0.0829)	-0.11*** (0.0227)	-0.2551*** (0.0616)
Occupation group				
ISCO1	0.0153*** (0.0031)	-0.0238*** (0.0061)	0.0016 (0.0028)	-0.0158*** (0.0046)
ISCO2	-0.0442*** (0.0073)	-0.0539** (0.0228)	-0.0698*** (0.0071)	-0.0135 (0.0172)
ISCO3	-0.0125*** (0.004)	-0.0592*** (0.0139)	0.0035 (0.0027)	-0.0044 (0.0058)
ISCO4	-0.0338*** (0.006)	-0.0759*** (0.0182)	-0.0186*** (0.0032)	-0.021** (0.0098)
ISCO5	-0.0005 (0.0024)	-0.0254* (0.0152)	-0.0089*** (0.0022)	-0.0084 (0.0148)
ISCO6	-0.0022 (0.0055)	0.01 (0.0089)	-0.0127*** (0.0032)	0.0102*** (0.0038)
ISCO7	0.0344*** (0.0052)	0.0407*** (0.0101)	0.0274*** (0.0038)	0.014*** (0.0053)
ISCO8	0.0453*** (0.0056)	-0.0322*** (0.0074)	0.0336*** (0.0036)	-0.0136*** (0.0041)
ISCO9 (reference)				
Constant	-	0.4667*** (0.1107)	-	0.5677*** (0.0767)

Notes: ***p<0.01, **p<0.05, *p<0.1. The numbers in brackets are the standard errors.