

Paper prepared for the
EY International Congress on Economics II
"GROWTH, INEQUALITY AND POVERTY"
Ankara, November 5-6, 2015



EKONOMİK YAKLAŞIM
Quarterly Peer-Reviewed Scientific Journal
Department of Economics - Gazi University

Gender Based Wage Gap in Turkey

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Abstract

We know that equal people deserve to be acted equally from the traditional justice theory. This rule is generally violated and it is especially seen in labour market. Equally skilled labour is not faced the same wage or do not have same chance to work at the same position. In this study, we have investigated gender based wage discrimination in Turkey by using panel data set Income and Living Condition Survey for 2006-2009. This study offers very different perspective from the previous resembling research in many aspects. First, previous studies have extensively used cross-sectional or unbalanced/pseudo panel data. We have used fully balanced panel data in order to show differences from year to year. Second, we have used newly developed estimation technique which is called Recentered Influence Regression. Finally, we have presented additional estimation results from panel data and multilevel modelling. In accordance with the estimation results, some economic policy recommendations are given.

Keywords: Gender, Turkey, Wage Gap.

JEL classification: C13, J31, J71.

1. INTRODUCTION

We face a disturbing reality when we look at the labour economics literature: wage gap between genders, more or less, is seen in every political system, on all development levels and in different socio-cultural environment (Blau & Kahn, 2000, 2003; Nopo, Daza, & Ramos, 2012; Stanley & Jarrell, 1998; Weichselbaumer & Winter-Ebmer, 2005). Gender based wage gap is one of the most important research field in labour economics and there are some reasonable grounds for this fact. First of all, discrimination against female in the labour market causes inefficiency¹. The economy cannot benefit from human capital of discriminated female, because they are kept on the out of the labour force. These people work in jobs which their human capital cannot be used completely and this may be seen a loss of whole economy. Second, discrimination decreases the flexibility of labour market. Decreasing flexibility harms the adaptation capability of the economy to new situations. Third, in addition to the economic consequences that we stated above, discrimination against female causes long-time social problems. It affects female's status in society, income distribution in household, poverty and, even worse, the transmission of discrimination to the next generations. Taking into account all of these, discrimination research becomes inevitable.

¹This can be extended other discrimination types such as racial, religious or national discrimination.

We should distinguish discrimination against female as pre and post labour force participation decision in order to understand the issue clearly. In former, female are not supported for working in a job. Females are only responsible for household's regular works and child rearing or bearing. In such an environment, girls will be less educated than boys, because boys will be breadwinning. These attitudes towards to female and girls are affected from various factors. Religion and ideology are the most important once among them. Studies on this relationship give controversial results (Donno & Russett, 2004). Some studies (Göksel, 2013; Murphy, 1995; Norton & Tomal, 2009) support negative relationship between religious attitudes and education attainment of girls and labour force participation of female while others do not (Bayanpourtehrani & Sylwester, 2013; Korotayev, Issaev, & Shishkina, 2015; Tzannatos, 1999). In Latter, discrimination comes out after the labour force participation of female. It is seen in different forms such as not preferring to hire female or offering lower wages than male who have similar human capital characteristics with female².

There are some arguments on discrimination after the labour force participation. For example, employers do not prefer to hire female because female have low human capital accumulation than male. This is the result of the discrimination between children in households. Other is resulted from cost sensitivity of employers. These costs especially are emerged when female give a birth a child. Child care services, maternity leave, getting time off for child care, not working overtime are seen cost from employers' point of view. Thus, public supports for child care will increase female labour force participation and decrease cost burden of employers (Browning, 1992; Chevalier & Viitanen, 2002; Herr, 2015; Waddoups, 1997; Waldfoegel, 1997). It is also argued that female have higher average absenteeism rate than male. That is why employers do not prefer to hire female. However, several studies have demonstrated that there are no big differences between male's and female's absenteeism rates (Anker, 1997). Ichino and Moretti (2009) and Rockoff and Herrmann (2010) have sought explanation of absenteeism into biological differences but their results are not verified each other for even in two different countries and two different sectors.

Lastly, female earn lower average wage than male. This may be also seen as discrimination type. This situation occurs when male have higher human capital, work longer, occupational labour supply and demand disequilibrium or desire of work. If female and male have similar average human capital characteristics, work in the same occupation and same position same working hours there should be not be wage differences between male and female, but there is. In this study, we especially will be interested in the situation and try to demonstrate it by microeconomic determinants of gender based wage gap.

² Occupational discrimination is another form of the discrimination women face. We are not interested with it in this study. However, we know that occupational stereotypes and gender based wage gap affect mutually each other. Anker (1997) gives an excellent overview on this issue.

This paper is organized as follows. Section 2 gives previous studies. Data and methodology are given in section 3. Section 4 presents results and section 5 gives the conclusions.

2. PREVIOUS STUDIES

There is a vast literature on the gender wage gap. We only review previous studies which are studied on Turkey. Literature review on other countries except Turkey can be found in Gunderson (1989), Loutfi (2001), Heinze, Beninger, Beblo, and Laisney (2003) and Kunze (2000). We have heavily focused on methodological issues and differences in the study selection process. We will also focus not only on wage gap between genders but also between employment types and sectors, because we want to address methodological problems in the discrimination literature in Turkey.

Mengüç (1998) analysed the gender based wage gap between sales managers. His sample consists of 567 sales managers from top 500 businesses in Turkey. Indeed, this study did not use traditional regression based discrimination analysis. Mengüç (1998) estimated wage regressions using personal, industrial and firm characteristics as independent variable and test whether there is a statistical difference between gender's mean characteristics or not. The study results show that gender dummy variable is negative and statistically significant. Similarly, mean wage difference between genders is significant. Mengüç (1998) interprets these results as a discrimination between genders.

Tansel (1999) decomposed discrimination within male and within female who work in public administration, private and state owned enterprises by using Household Expenditure Survey for 1994. She used Blinder (1973)-R. Oaxaca (1973) (hereafter BO) decomposition method with sample selection correction. Her findings have illustrated that public administration workers earn less than private workers at university level. The reverse is valid for other education level. According to the decomposition results, %-56.70 of total wage gap consists of discrimination between public administration and private workers for male and %-9.09 for female. Discrimination rate between state owned enterprises is %3.21 for male and there is no discrimination result for female for these sectors because of lack of the data adequacy.

Özcan, Üçdoğruk, and Özcan (2003) focused employment types and BO method in order to decompose wage gap between genders by employment types. They used Household Income Survey for 1994 but estimation sample only consists of Istanbul. Wage regressions were corrected for sample selection bias in their estimation but selection parameter was not added to the decomposition equation. Decomposition results show that total gender wage gaps are .4320 and 1.6942 for wage-earners and self-employed, respectively. %22.11 (.0955) of total gap for wage-earners is consisted of discrimination. This rate is %-15.29 (-.2591) for self-employment.

Yamak and Topbaş (2004) analyses gender based wage gap with BO method and its extension suggested by Cotton (1988) for determining competitive wage by using Household Income and Consumption Survey for 1994. Findings suggest that %80 of total gap consists of

discrimination according to the BO while Cotton (1988)'s method says %78 of total gap consists of discrimination. But, they did not correct sample selection bias.

Kara (2006) studied gender based wage gap within occupations by using Household Income and Expenditure Survey for 1994. He also used BO methods in decomposition with sample selection correction. The biggest (%43.13) and smallest (%15.17) discriminations are found in services and scientific, technical, professional and related workers, respectively. There is advantage (%-33.7) for female in Administrative, executive and managerial occupation.

Unlike the previous studies, İlkkaracan and Selim (2007) presented segregation index of Duncan and Duncan (1955) and BO decomposition method by using Employment and Wage Structure Survey for 1995. Segregation index result shows that occupational and industrial segregation are %27.6 and %34, respectively. This means that male workers are dominant in occupations and industries. BO decomposition result shows that, for extended estimation, discrimination rate is %22.

Cudeville and Gürbüz (2010) analyse gender based wage discrimination in regional and sectoral levels by using Household Expenditure Survey for 2003. They used R. L. Oaxaca and Ransom (1994) methods in order to determinant competitive wage and corrected sample selection bias. Their study result shows that %62.7 of total pay gap consists of discrimination. At the regional levels, Aegean has the smallest discrimination rate with %43.9 but there are striking results when we look at the Central, East, South-East Anatolia. In these regions, all pay gaps consists of discrimination. Discrimination rates in sectors are very high. It is %75.5 in agricultural and services, %72 in industry, and %60.8 in private.

Başkaya and Hülügü (2011) investigate, differently from studies which we review above, wage discrimination between formal and informal workers by using Household Labour Force Survey for 2005-2009. More importantly, their study differs in terms of the methodology which they used. They uses propensity score matching which is semiparametric methodology. Findings show that discrimination rate between formal and informal workers varies between %10-%23 across years. The discrimination rates within male and female workers are %14 and %22, respectively.

Güenalp and Cilasun (2011) investigate gender based wage gap by using Household Budget Survey for 2003-2007 with cross-section and pseudo panel data sets. In addition to the standard R. Oaxaca (1973) methodology, they also used Juhn, Murphy, and Pierce (1993) methodology in order to demonstrate the discrimination across wage distribution with sample selection correction. For competitive wage structure, they adopted Cotton (1988) and Neumark (1988) methods. Discrimination rates vary across years between %54.66 and %63.33 for standard model, %61.23 and %64.12 for Cotton (1988) model and %48.61 and %52.74 for Neumark (1988) model. The contribution of discrimination component to the change of wage gap is .003938 across 2003-2007 according to the Juhn et al. (1993) methodology. Pseudo panel data results show that discrimination rate %49.51 for pooled estimation and %20.12 for BO. According to the Juhn et al. (1993) methodology, discrimination rates for 25., 50., and 75. quantiles are %48.92, %80, and %97.18, respectively.

Aktaş and Uysal (2011) decomposed gender wage gap across wage distribution using Wage Structure Survey for 2006. They use Machado and Mata (2005) methodology with no sample selection correction. However, Albrecht, van Vuuren, and Vroman (2009) developed selection correction method for Machado and Mata (2005). Estimation results show that gap on the bottom of distribution nearly zero but on the top of distribution female earn more than male.

3. DATA AND METHODOLOGY

3.1. Data

We use data from Income and Living Conditions Survey (ILCS) for 2006-2009. This survey is conducted annually by Turkish Statistical Institute (TurkStat) since 2006. It is nationally representative and, more importantly, has panel data structure. It is the only micro data set which has panel structure in Turkey. ILCS provides very detailed information about income, working, health status, household conditions, education, working history, and individual characteristics of persons who live in households. Probably one drawback of panel ILCS is that it does not have regional information of households. Only cross-section data have this information. ILCS collects information about households and individuals for previous year when survey is conducted. That is, the data set of 2006 has information of 2005.

We have two primary variables in this study. One is hourly wage and other is labour force participation indicator. These variables are our dependent variables for wage estimation and labour force participation equations, respectively. Hourly wage calculated from wage/salaries of full/part time workers and casual workers. We have excluded employer, self-employed and unpaid family workers, and people who are under 15 years old. We cannot restrict our wage variable in terms of working hours, because we lose so many observations. Labour force participation variable is a dummy variable which is equal to 1 if person is in labour force and 0 otherwise. TurkStat defines labour force as people who are wage-earner, salaried, casual worker, employer, self-employed, unpaid family worker, and unemployed who have searched job in last four weeks and can work in two weeks if there are vacancies (TurkStat, 2015).

We have used several independent variables for wage and labour force participation equations by following economic theory and previous studies (Heckman, Lochner, & Todd, 2003). Education, age, age squared, marital status, total household income except individual's wage/salary and child number in the household are traditional variables in labour force participation. We have used same variables except child number in household. Instead, we have used dependency ration which indicates ratio of people who are under 15 and above 65 years old in household. We have included experience, experience squared, formality status, firm size and occupation information to age, education and marital status for wage equation. Except age, age squared, other's income, experience, experience squared, dependency ratio, all other variables are dummy variables. Descriptive statistics of these variables are given in Table 1 and Table 2. In addition to the descriptive statistics, mean and raw gender wage gap for pooled data are given in Table 3.

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Table 1. Descriptive statistics for selection equation; mean (standard deviation).

Variables	2006		2007		2008		2009		Pooled	Panel
	Male	Female	Male	Female	Male	Female	Male	Female		
Labour Force Participation	.73 (.44)	.27 (.44)	.72 (.45)	.29 (.45)	.72 (.44)	.29 (.45)	.72 (.44)	.29 (.45)	.50 (.50)	.49 (.50)
Education										
Illiterate	.06 (.24)	.24 (.42)	.05 (.22)	.23 (.42)	.05 (.21)	.22 (.42)	.05 (.21)	.22 (.41)	.14 (.35)	.15 (.36)
No Diploma	.07 (.25)	.09 (.29)	.06 (.24)	.09 (.29)	.06 (.24)	.10 (.30)	.06 (.25)	.09 (.29)	.08 (.27)	.07 (.26)
Primary	.41 (.49)	.38 (.49)	.40 (.49)	.37 (.48)	.40 (.49)	.36 (.48)	.38 (.49)	.35 (.47)	.37 (.48)	.42 (.49)
Secondary	.17 (.38)	.11 (.31)	.18 (.38)	.11 (.32)	.18 (.39)	.12 (.33)	.20 (.40)	.13 (.34)	.15 (.36)	.11 (.31)
General High School	.10 (.31)	.08 (.27)	.11 (.32)	.09 (.28)	.11 (.32)	.09 (.29)	.11 (.31)	.08 (.27)	.09 (.29)	.08 (.28)
Vocational High School	.09 (.29)	.05 (.21)	.09 (.28)	.05 (.22)	.09 (.29)	.05 (.21)	.09 (.29)	.04 (.21)	.06 (.25)	.07 (.25)
College or More	.09 (.29)	.05 (.22)	.09 (.29)	.05 (.22)	.10 (.30)	.05 (.23)	.10 (.30)	.05 (.239)	.07 (.26)	.06 (.25)
Age	40.2 (16.7)	40 (17)	40.6 (16.8)	40.5 (17.3)	40.5 (16.7)	40.5 (17.3)	40.4 (16.9)	40.8 (17.3)	40.5 (17)	42.3 (16.1)
Age²	1894 (1524)	1886 (1567)	1931 (1538)	1937 (1600)	1921 (1533)	1939 (1605)	1919 (1548)	1968 (1622)	1931 (1574)	2058 (1518)
Other's Income	10,504 (11,112)	13,978 (13,487)	12,928 (14,856)	17,080 (18,440)	13,574 (14,218)	18,025 (16,575)	14,905 (15,536)	19,298 (18,806)	13,996 (15,976)	13,361 (16,938)
Dependency Ratio	.30 (.25)	.32 (.26)	.29 (.26)	.31 (.26)	.29 (.25)	.31 (.26)	.29 (.25)	.31 (.26)	.30 (.25)	.30 (.25)
Marital Status										
Never Married	.26 (.44)	.21 (.41)	.26 (.44)	.21 (.41)	.26 (.44)	.21 (.40)	.26 (.44)	.20 (.40)	.23 (.42)	.17 (.37)
Married	.71 (.45)	.66 (.47)	.71 (.45)	.66 (.47)	.71 (.45)	.68 (.47)	.70 (.46)	.67 (.46)	.68 (.46)	.74 (.43)
Separated	.00 (.05)	.00 (.07)	.00 (.05)	.00 (.07)	—	—	—	—	.00 (.03)	.00 (.04)
Widow	.02 (.14)	.10 (.30)	.02 (.14)	.10 (.30)	.02 (.13)	.09 (.29)	.02 (.14)	.10 (.30)	.06 (.23)	.06 (.24)
Divorced	.00 (.08)	.02 (.13)	.00 (.09)	.02 (.13)	.01 (.10)	.01 (.14)	.01 (.11)	.02 (.14)	.01 (.12)	.01 (.11)
Health Status										
Very Good	.14 (.35)	.11 (.31)	.15 (.36)	.12 (.32)	.13 (.33)	.09 (.29)	.14 (.35)	.10 (.30)	.12 (.32)	.10 (.30)
Good	.52 (.50)	.47 (.50)	.54 (.50)	.48 (.50)	.58 (.49)	.52 (.49)	.56 (.50)	.48 (.49)	.52 (.49)	.51 (.49)
Not Bad	.21 (.41)	.22 (.42)	.18 (.39)	.21 (.41)	.19 (.39)	.22 (.41)	.19 (.39)	.23 (.42)	.20 (.40)	.22 (.42)
Bad	.11 (.31)	.17 (.38)	.10 (.31)	.15 (.36)	.09 (.29)	.13 (.34)	.09 (.29)	.15 (.36)	.12 (.33)	.13 (.34)
Very Bad	.01 (.12)	.02 (.15)	.02 (.13)	.02 (.15)	.01 (.11)	.01 (.13)	.02 (.14)	.02 (.15)	.01 (.13)	.01 (.13)
Number of Observations	3,767	4,154	7,399	8,109	11,344	12,356	11,675	12,472	71,276	24,536

Source: Author's calculation by using LICs panel data, 2006-2009.

Notes: Base categories are chosen as follows: for education "illiterate", for marital status "never married-separated-widow" and for health status "bad".

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Table 2. Descriptive statistics for wage equation; mean (standard deviation).

Variables	2006		2007		2008		2009		Pooled	Panel
	Male	Female	Male	Female	Male	Female	Male	Female		
<i>Log Wage</i>	1.17 (.63)	1.30 (.65)	1.26 (.62)	1.32 (.67)	1.39 (.66)	1.42 (.69)	1.5 (.66)	1.54 (.73)	1.38 (.67)	1.33 (.65)
<i>Age</i>	36.5 (10.2)	33.3 (9.7)	36.7 (10.3)	33.6 (9.7)	36.5 (10.2)	33.1 (9.6)	36.5 (10.2)	33.3 (9.5)	35.8 (10.2)	37.2 (10)
<i>Age</i> ²	1436 (795)	1204 (726)	1458 (797)	1222 (733)	1438 (792)	1191 (709)	1437 (794)	1200 (698)	1390 (784)	1490 (797)
<i>Experience</i>	15.8 (10)	9.7 (8.3)	15.8 (10)	9.6 (8.6)	15.5 (10)	9.4 (8.2)	15.5 (10)	9.7 (8.1)	14.3 (10)	15.7 (10)
<i>Experience</i> ²	350 (401)	163 (257)	351 (390)	166 (301)	341 (386)	158 (293)	342 (386)	161 (265)	305 (376)	352 (403)
<i>Education</i>										
Illiterate	.02 (.14)	.03 (.18)	.02 (.14)	.04 (.20)	.01 (.12)	.05 (.22)	.01 (.12)	.03 (.01)	.02 (.15)	.01 (.10)
No Diploma	.04 (.20)	.03 (.18)	.03 (.17)	.02 (.159)	.03 (.18)	.03 (.18)	.03 (.18)	.02 (.16)	.03 (.18)	.03 (.15)
Primary	.41 (.49)	.27 (.44)	.39 (.48)	.25 (.43)	.37 (.48)	.23 (.42)	.35 (.47)	.22 (.41)	.34 (.47)	.39 (.47)
Secondary	.14 (.35)	.06 (.25)	.16 (.37)	.07 (.26)	.16 (.37)	.10 (.30)	.16 (.37)	.09 (.30)	.14 (.35)	.13 (.32)
General High School	.10 (.30)	.14 (.35)	.11 (.31)	.13 (.33)	.12 (.32)	.13 (.33)	.13 (.33)	.13 (.34)	.12 (.33)	.11 (.32)
Vocational High School	.12 (.32)	.10 (.31)	.11 (.32)	.13 (.34)	.11 (.32)	.11 (.32)	.12 (.33)	.12 (.32)	.12 (.32)	.12 (.33)
College or More	.15 (.35)	.33 (.47)	.15 (.36)	.34 (.47)	.16 (.37)	.32 (.46)	.17 (.37)	.35 (.47)	.20 (.39)	.18 (.42)
<i>Marital Status</i>										
Never Married	.18 (.38)	.37 (.48)	.18 (.39)	.35 (.48)	.18 (.39)	.36 (.48)	.18 (.39)	.34 (.47)	.22 (.42)	.18 (.34)
Married	.81 (.38)	.55 (.49)	.80 (.40)	.56 (.49)	.80 (.40)	.55 (.49)	.79 (.40)	.56 (.49)	.75 (.43)	.79 (.35)
Separated	–	.00 (.09)	.00 (.04)	.00 (.09)	–	–	–	–	.00 (.03)	.00 (.01)
Widow	.00 (.04)	.02 (.16)	.00 (.05)	.02 (.16)	.00 (.04)	.02 (.159)	.00 (.03)	.02 (.159)	.00 (.08)	.00 (.03)
Divorced	.00 (.08)	.04 (.19)	.00 (.08)	.04 (.19)	.00 (.09)	.05 (.23)	.01 (.10)	.06 (.23)	.02 (.13)	.01 (.10)
<i>Formality</i>										
Yes	.65 (.48)	.66 (.47)	.67 (.47)	.72 (.44)	.72 (.44)	.74 (.43)	.73 (.44)	.77 (.42)	.71 (.45)	.69 (.46)
No	.35 (.48)	.33 (.47)	.33 (.47)	.28 (.44)	.27 (.44)	.26 (.43)	.27 (.44)	.23 (.42)	.29 (.45)	.31 (.46)
<i>Firm Size</i>										
≤10	.41 (.49)	.32 (.47)	.40 (.49)	.33 (.47)	.38 (.48)	.31 (.46)	.38 (.48)	.30 (.46)	.37 (.48)	.39 (.48)
11-19	.11 (.31)	.12 (.33)	.12 (.32)	.12 (.33)	.12 (.33)	.14 (.35)	.13 (.33)	.13 (.34)	.13 (.33)	.12 (.32)
20-49	.13 (.34)	.15 (.36)	.14 (.34)	.17 (.37)	.15 (.35)	.17 (.38)	.15 (.35)	.17 (.38)	.15 (.36)	.14 (.35)
≥50	.33 (.47)	.39 (.49)	.34 (.47)	.37 (.48)	.34 (.47)	.36 (.48)	.35 (.47)	.39 (.49)	.35 (.48)	.33 (.47)
<i>Occupations (%)</i>										
Legislators, senior officials and managers	5.64	2.77	6.25	3.36	5.52	3.22	5.04	3.46	5.06	5.24
Professionals	9.9	20.92	9.18	21.46	9.34	19.96	9.35	21.23	11.81	11.09
Technicians and associate professionals	7.01	10.15	7.52	12.99	8.14	13.16	8.73	13.47	9.09	7.39
Clerks	5.79	17.23	5.55	16.93	6.74	16.11	7.3	16.65	8.69	8.34
Service workers and shop and market sales workers	13.79	13.54	14.11	12.85	14.42	13.16	15.26	13.66	14.29	13.65

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Table 2. (continued)

Variables	2006		2007		2008		2009		Pooled	Panel
	Male	Female	Male	Female	Male	Female	Male	Female		
Skilled agricultural and fishery workers	.84	.62	.81	–	.51	.09	.67	.28	.56	.71
Craft and related trade workers	23.31	3.69	22.83	5.84	21.26	5.46	20.10	4.21	17.97	19.61
Plans and machine operators and assemblers	16.15	7.69	15.43	5.99	15.84	7.25	15.44	5.99	13.73	13.38
Elementary occupations	17.59	23.38	18.32	20.58	18.24	21.58	18.10	21.05	18.82	20.60
Number of Observations	1,313	325	2,593	685	4,079	1,117	3,905	1,069	15,110	5,156

Source: Author's calculation by using LICS panel data, 2006-2009.

Notes: Base categories are chosen as follows: for education "illiterate", for marital status "never married-separated-widow", for health status "bad", for occupations "Skilled agricultural and fishery workers", for firm size " ≤ 10 ", for formality "Yes". Occupations represent the percentage of persons who work in corresponding occupation. We have taken social security registration as formality status. Firm size is defined using number of employers.

Table 3. Average wages and raw wage gap between genders by occupations

Occupations	Male		Female		M – F	F/M (%)
	N	wage	N	wage		
Legislators, senior officials and managers	659	1.87	105	2.11	-.24	112.8
Professionals	1117	2.13	667	2.09	.04	98.1
Technicians and associate professionals	960	1.74	413	1.70	.04	97.7
Clerks	781	1.58	532	1.36	.22	86
Service workers and shop and market sales workers	1732	1.17	427	.96	.21	82
Skilled agricultural and fishery workers	79	1.05	6	1.09	-.04	103.8
Craft and related trade workers	2556	1.20	159	1.02	.18	85
Plans and machine operators and assemblers	1861	1.27	213	1.14	.13	89.7
Elementary occupations	2159	1.06	684	1.02	.04	96.2

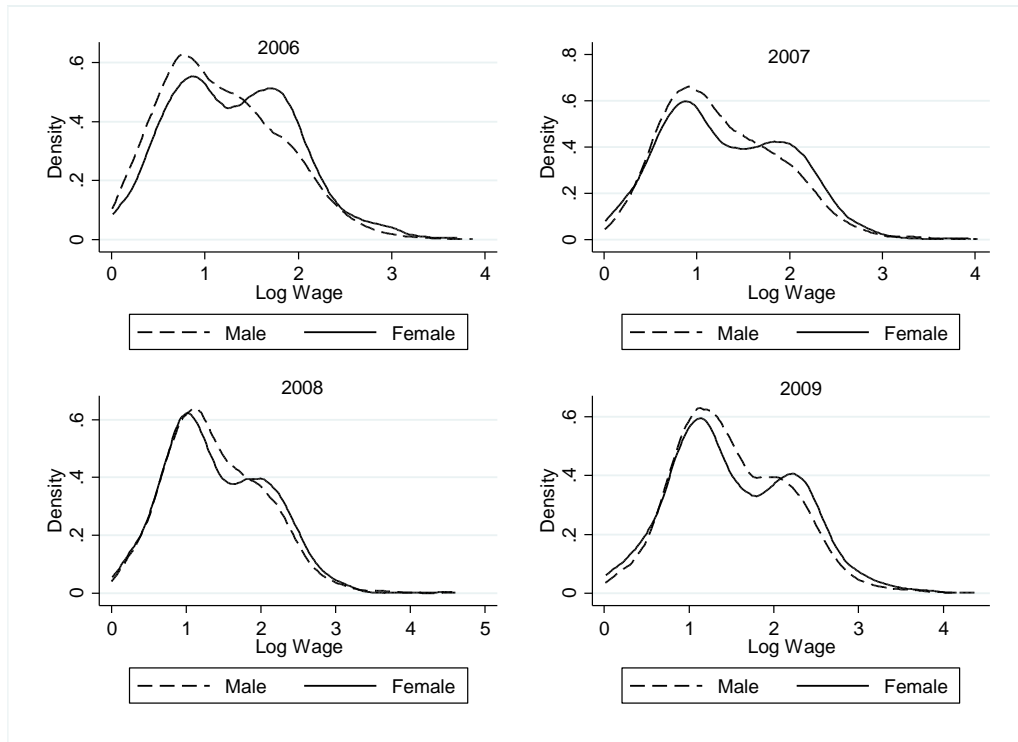
Source: Author's calculation by using LICS panel data, 2006-2009. Occupation classification is ISCO-88.

We expect that education has negative effect for low level of education and positive effect for high level of education. Individuals develop their human capital by educating them so more educated people will have greater probability of labour force participation. After the participation, generally more educated people earn more than their low educated counterparts. Second, age and age squared might have positive and negative effects, respectively. Younger individuals will have greater probability to participate in labour force but after some age this probability will decrease. Same thing might be said in earning education. Similar effects may be found in experience. Experience and age are very interrelated variables, but at the same time, they have different effects on wage. We expect that other's income and dependency ratio will have, especially for female, negative effect on labour force participation. If household has sufficient total income for household members than female tends to choose not to work. Actually, same effect may be valid for male, but male are still major breadwinner in developing countries. Dependency ratio affect labour force participation, again especially for female, negatively, because the major role of female in developing countries is the caring of household member and doing housework. Other important variable for participation equation is the health status of individuals. Healthier individuals will have positive participation probability then individuals who have bad health. For wage equation, formality status, firm size and occupations will have important effects. We expect that formal workers will earn more than informal workers. Again, we expect that bigger firms pay more than smaller firms. We cannot expect any sign for occupations, because beside the occupations, position in the occupations is very important element in wage determination. Nevertheless, we assume that the occupations which require high human capital will pay more than other occupations.

Table 3 gives basic gender based raw wage gap in Turkey. According to the Table 3, raw gap varies considerably across occupations. Positive sign indicates that male earn on average than female in these occupations. Higher gaps are seen in clerks and service workers and shop and market sales workers. Smaller gaps are seen in professionals, technicians and associated professionals and elementary occupations. In two occupation category, legislators, senior officials and managers and skilled agricultural and fishery workers, female earn on average than male. This gives sing of distributional differences of wage between and within genders. In Figure 1, we present Kernel densities of logarithm of wage of genders across years. Figure 1 clearly states that distribution of wage for male and female right skewed. In the bottom of distribution, except 2006, density of female and male are nearly equal. After the middle of distribution, female have higher density than male. Figure 1 gives also important information of the density of female workers. Females largely accumulate in the bottom and in the top of distribution relatively to middle of the distribution. This might be the sign of polarization within female worker. It is also seen slightly in 2009 for male workers.

Lastly, we have especially considered endogeneity in the variable selection process. We have chosen exogenous variable as far as possible.

Figure 1. Kernel density of log wage by gender and year.



Source: Author's calculation by using LICS, 2006-2009

3.2. Methodology

In this study, we mainly used Blinder (1973) and R. Oaxaca (1973) method. BO method is the standard technique in the labour economics. In the BO methodology, we should first estimate wage equations for female and male workers separately. After the estimation of these equations, predicted wage, coefficients and independent variables are used for decomposing total gap between two components. First part of the components is called “explained gap” which is related to the differences of individual characteristics between genders. Other part is called “unexplained gap” which is related to the differences of the returns of the variables between genders. Later is frequently called “discrimination” in the literature. We also mainly will be interested with this part of the decomposition like previous studies.

BO method starts with following equation

$$Y_i = X_i' \beta_i + \varepsilon_i, \quad E(\varepsilon_i) = 0 \quad i \in (M, F) \quad (1)$$

where Y is the vector containing covariates, β is vector of slopes and intercept, ε is the error term, i indicates gender for male, M , and female, F , respectively. $E(\varepsilon_i)$ denotes the expected value of error term. Mean difference between outcome variables will be total gender based wage gap and we are interested with how much of difference in it is accounted for by gender differences in covariates. Difference between mean outcomes can be written as

$$E(Y_M) - E(Y_F) = E(X_M)' \beta_M - E(X_F)' \beta_F \quad (2)$$

By adding and subtracting $E(X_F)' \beta_M$ to the equation 2, we obtain the equation 3

$$\bar{Y}_M - \bar{Y}_F = (\bar{X}'_M - \bar{X}'_F) \hat{\beta}_M + (\hat{\beta}_M - \hat{\beta}_F) \bar{X}'_F \quad (3)$$

where $E(Y_M) = \bar{Y}_M$, $E(Y_F) = \bar{Y}_F$, $E(X_M)' = \bar{X}'_M$, $E(X_F)' = \bar{X}'_F$, $\hat{\beta}_M$ and $\hat{\beta}_F$ represent mean outcomes, mean characteristics and least square estimates of slopes for male and female, respectively. First part of equation 3 is the difference between individual characteristics of male and female workers. This part, as we mentioned above, represents the “explained” side of the total mean gap. Second part is the difference between returns of male and female workers. This part represents the “unexplained” side of the total mean gap and seen as magnitude of “discrimination”. The main problem in this representation is that we do not know “non-discriminatory” wage coefficient. Several approaches have been developed in order to solve this problem (N. Fortin, Lemieux, & Firpo, 2011; Jann, 2008). Here, we use Neumark (1988)’s method. In Neumark (1988)’s method, pooled regression coefficient is used non-discriminatory wage coefficient. Other important point in the decomposition process is the choice of base category of categorical variables. Chosen base category is not problem for explained part. But, it is a real problem for unexplained part of the decomposition. Changing the base category alters the results of single category, and it also alters the effect of categorical variable as a whole (Gardeazabal & Ugidos, 2004; Yun, 2005). Categorical variables are normalized with Yun (2005)’s method upon suggestion of Jann (2008). We have corrected wage regression by using Heckman (1979)’ method in order to avoid sample selection bias. We applied BO method by using Jann (2008)’s *oaxaca* command for Stata.

BO methodology decomposes the mean of the outcome variable. But, we know that covariates might affect wage differently in the different part of wage distribution. That is why we should estimate wage gap by quantiles. Several method has been developed which taken into account decomposition of the distribution of outcome variable (Chernozhukov, Fernandez-Val, & Melly, 2013; DiNardo, Fortin, & Lemieux, 1996; Firpo, Fortin, & Lemieux, 2009; Juhn et al., 1993; Machado & Mata, 2005). Here, we use the “unconditional quantile regression” of Firpo et al. (2009). Unconditional quantile regression can be used for demonstrating the impact of the covariates on the corresponding quantiles of the outcome variable. This is not possible in the classical conditional quantile regression which is developed by Koenker and Bassett (1978). That is, coefficient from conditional quantile regression or quantile τ , $\beta_\tau = F_Y^{-1}(\tau | X = 1) - F_Y^{-1}(\tau | X = 0)$ will generally be different from $(\Pr(Y > q_\tau | X = 1) - \Pr(Y > q_\tau | X = 0)) / f_Y(q_\tau)$ (Firpo et al., 2009).

Unconditional quantile regression method of Firpo et al. (2009) relies on their “recentred influence function (*RIF*)”. In the *RIF*, dependent variable is replaced by the recentred influence function of statistics of interest such as quantile or variance. Let $IF(y; \nu)$ be the influence function of wage for the distributional statistic of $\nu(F_Y)$. *RIF* is defined as $RIF(y; \nu) = \nu(F_Y) + IF(y; \nu)$. That is, if we add the influence function to statistics of interest,

we obtain *RIF*. For quantiles, $IF(y; \nu)$ is $(\tau - I\{Y \leq q_\tau\})/f_Y(Q_\tau)$ where I is the indicator function, $f_Y(\cdot)$ is the density function, and Q_τ is the population τ -quantile of unconditional distribution of Y . $RIF(Y; Q_\tau)$ can be written as follows

$$RIF(y; Q_\tau) = Q_\tau + \frac{\tau - I\{y \leq Q_\tau\}}{f_Y(Q_\tau)} \quad (4)$$

Equation 3 can be rewritten by using *RIF* method

$$\hat{Q}_\tau(Y_M) - \hat{Q}_\tau(Y_F) = (\bar{X}_M - \bar{X}_F)\hat{\beta}_{M,\tau} + (\hat{\beta}_{M,\tau} - \hat{\beta}_{F,\tau})\bar{X}_F \quad (5)$$

We applied *RIF* by using N. M. Fortin (2015)'s *rifreg* command for Stata.

4. RESULTS

Decomposition results for 2006-2009 by using BO method are given in Table 4³. First panel in the Table 4 gives total wage gaps between genders. Total wage gaps between gender for 2006, 2007, 2008, and 2009 are 0.784, 0.626, 0.705, and 0.656, respectively. This means that male workers earn on average than female workers. Explained gaps for corresponding years are -0.0632 (%-8.06), -0.0759 (%-12.12), -0.0711 (%-10.08), and -0.106 (%-16.15). These overall results indicate that very big proportion of total gender wage gap constitute of discrimination: %108, %112.14, %110, and %116.15. All these values are statistically significant. Negative values indicate that female workers have advantage in the related variables. Explained part might be negative in two situations. If mean characteristics of male workers are lower than female workers' mean characteristics and corresponding coefficient of male worker is positive, then explained part will be negative, vice versa. Positive discrimination part demonstrates that male workers have bigger returns than female workers when male workers have mean characteristics of female workers.

When we look at the each covariate's role in the decomposition, we can see that especially in the unexplained part, age, experience and marital status have major roles in the explanation of discrimination. Marital status variables give remarkable information about discrimination. Widowed, divorced or separated coefficients are negative and statistically significant. This might be meant that married or single female workers earn less than their male counterparts. As we stated in the first section married female workers is not preferred by employers. Employers see female workers as cost increasing factor. Females' bargaining power decrease and they accept lower wages. Secondly, husbands play a crucial role in the traditional societies. Married women might accept lower wage because of husband's attitude toward working of the wife.

³Estimation results of selection and wage equations can be given upon request.

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Table 4. Decomposition results by using BO method, 2006-2009

	2006	2007	2008	2009	Pooled	2006	2007	2008	2009	Pooled
Overall										
Male	1.171*** (0.0184)	1.266*** (0.0129)	1.394*** (0.0108)	1.504*** (0.0111)	1.378*** (0.0094)	1.171*** (0.0184)	1.266*** (0.0129)	1.394*** (0.0108)	1.504*** (0.0111)	1.378*** (0.0094)
Female	0.387* (0.161)	0.640*** (0.0913)	0.689*** (0.0942)	0.848*** (0.0935)	0.673*** (0.0667)	0.387* (0.161)	0.640*** (0.0913)	0.689*** (0.0942)	0.848*** (0.0935)	0.673*** (0.0667)
Difference	0.784*** (0.161)	0.626*** (0.0913)	0.705*** (0.0942)	0.656*** (0.0936)	0.705*** (0.0666)	0.784*** (0.161)	0.626*** (0.0913)	0.705*** (0.0942)	0.656*** (0.0936)	0.705*** (0.0666)
Explained	-0.0632 (0.0330)	-0.0759*** (0.0231)	-0.0711*** (0.0182)	-0.106*** (0.0194)	-0.0836*** (0.0160)	-0.0632 (0.0330)	-0.0759*** (0.0231)	-0.0711*** (0.0182)	-0.106*** (0.0194)	-0.0836*** (0.0160)
Unexplained	0.847*** (0.159)	0.702*** (0.0868)	0.776*** (0.0925)	0.762*** (0.0916)	0.788*** (0.0642)	0.847*** (0.159)	0.702*** (0.0868)	0.776*** (0.0925)	0.762*** (0.0916)	0.788*** (0.0642)
		Explained					Unexplained			
Age	0.116* (0.0453)	0.103*** (0.0296)	0.0764** (0.0263)	0.104*** (0.0260)	0.0903*** (0.0194)	-4.031*** (1.078)	-2.961*** (0.732)	-3.178*** (0.611)	-2.056** (0.761)	-3.184*** (0.490)
Age ²	-0.085* (0.042)	-0.0850** (0.0280)	-0.0477 (0.0250)	-0.0648** (0.0237)	-0.0608*** (0.0180)	2.122*** (0.524)	1.562*** (0.367)	1.705*** (0.300)	1.056** (0.380)	1.665*** (0.243)
Experience	0.099** (0.034)	0.106*** (0.0252)	0.0928*** (0.0213)	0.0681** (0.0222)	0.0923*** (0.0160)	0.222 (0.133)	-0.0059 (0.0859)	0.0214 (0.0771)	-0.0498 (0.0910)	0.0362 (0.0593)
Experience ²	-0.055* (0.026)	-0.0530** (0.0199)	-0.0658*** (0.0170)	-0.0567** (0.0173)	-0.0618*** (0.0126)	-0.144* (0.0674)	0.0023 (0.0426)	-0.0390 (0.0384)	0.0505 (0.0470)	-0.0220 (0.0301)
Illiterate	0.0052 (0.0036)	0.0050* (0.0021)	0.0058** (0.0018)	0.0045** (0.0016)	0.0054*** (0.00141)	0.0101 (0.0077)	0.0181*** (0.0047)	0.0120** (0.0041)	0.0121** (0.0038)	0.0138*** (0.0030)
No Diploma	-0.0012 (0.0018)	-0.0011 (0.0009)	0.0000 (0.0010)	-0.0014 (0.0011)	-0.0008 (0.0008)	0.0056 (0.0058)	0.0002 (0.0035)	0.0035 (0.0030)	0.0016 (0.0033)	0.0024 (0.0022)
Primary	-0.0263*** (0.0064)	-0.0240*** (0.0040)	-0.0196*** (0.0030)	-0.0186*** (0.0029)	-0.0217*** (0.0026)	0.0478 (0.0256)	0.0216 (0.0148)	0.0406** (0.0128)	0.0394** (0.0121)	0.0386*** (0.0096)
Secondary	-0.0027 (0.0026)	-0.0037 (0.0020)	-0.0046** (0.0014)	-0.0037** (0.0013)	-0.0039*** (0.0011)	0.0240** (0.0090)	0.0013 (0.0064)	0.0109 (0.0055)	0.0071 (0.0066)	0.0088 (0.0045)
General high School	-0.0058 (0.0034)	-0.0008 (0.0010)	-0.0007 (0.0008)	-0.0002 (0.0011)	-0.0009 (0.0009)	-0.0075 (0.0137)	-0.0007 (0.0077)	-0.0026 (0.0070)	-0.0010 (0.0069)	-0.0010 (0.0054)
Vocational High School	0.0019 (0.0023)	-0.0017 (0.0012)	-0.0001 (0.0012)	0.0001 (0.0013)	-0.0003 (0.0010)	-0.0151 (0.0121)	-0.0276** (0.0094)	-0.0148* (0.0069)	-0.0171* (0.0080)	-0.0203*** (0.0059)
College or More	-0.075*** (0.0134)	-0.0762*** (0.0096)	-0.0653*** (0.0072)	-0.0733*** (0.0076)	-0.0729*** (0.0066)	-0.239*** (0.0585)	-0.155*** (0.0333)	-0.155*** (0.0306)	-0.191*** (0.0327)	-0.180*** (0.0232)
Legislators, senior officials and managers	0.0058 (0.0029)	0.0074** (0.0025)	0.0045** (0.0016)	0.0039* (0.0017)	0.0050** (0.0015)	-0.0052 (0.0072)	-0.0083 (0.0043)	-0.0093* (0.0038)	-0.0020 (0.0033)	-0.0057 (0.0032)
Professionals	-0.0187** (0.0063)	-0.0330*** (0.0059)	-0.0306*** (0.0046)	-0.0413*** (0.0056)	-0.0324*** (0.0042)	0.0430* (0.0194)	-0.0281* (0.0131)	-0.0355*** (0.0105)	-0.0128 (0.0121)	-0.0140 (0.0116)

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Table 4. (continued)

	Explained					Unexplained				
Technicians and associate professionals	-0.0056 (0.0035)	-0.0066** (0.0022)	-0.0050** (0.0016)	-0.0056** (0.0017)	-0.0060** (0.0015)	0.0127 (0.0088)	-0.0018 (0.0072)	-0.0190** (0.0063)	-0.003 (0.0069)	-0.0021 (0.0065)
Clerks	0.0041 (0.0047)	0.0065 (0.0034)	0.0055* (0.0025)	0.0031 (0.0023)	0.0041* (0.0020)	0.0308* (0.0127)	0.0038 (0.0075)	-0.0099 (0.0068)	0.0015 (0.0079)	0.0065 (0.0079)
Service workers and shop and market sales workers	-0.00034 (0.0029)	-0.0019 (0.0022)	-0.0021 (0.0020)	-0.0026 (0.0019)	-0.0019 (0.0015)	0.0190 (0.0112)	0.0150* (0.0071)	-0.0013 (0.0066)	0.0049 (0.0076)	0.01 (0.007)
Skilled agricultural and fishery workers	-0.00055 (0.0012)	-0.0014* (0.0007)	-0.0002 (0.0003)	-0.00084 (0.0005)	-0.0008* (0.0004)	-0.0054 (0.0034)	0.0000 (0.0000)	0.00096 (0.0007)	-0.0001 (0.0008)	-0.0000 (0.0007)
Craft and related trade workers	0.0024 (0.0065)	-0.0040 (0.0041)	-0.0074* (0.0033)	-0.0040 (0.0033)	-0.0041 (0.0027)	0.0126 (0.0076)	0.0154** (0.0052)	0.0079* (0.0037)	0.0077 (0.0041)	0.0119** (0.0037)
Plans and machine operators and assemblers	-0.0061 (0.0033)	-0.0078** (0.0024)	-0.0100*** (0.0021)	-0.0099*** (0.0023)	-0.008*** (0.0017)	0.0125 (0.0083)	0.0010 (0.0042)	-0.0102* (0.0040)	0.0006 (0.0044)	0.0007 (0.004)
Elementary occupations	0.0040 (0.0027)	0.0036 (0.0028)	0.0046* (0.0020)	0.0049* (0.0024)	0.0044** (0.0016)	-0.0109 (0.0193)	-0.0026 (0.0105)	-0.0278** (0.0099)	-0.0017 (0.0118)	-0.0061 (0.109)
≤10	-0.0122** (0.0044)	-0.0089*** (0.0027)	-0.0111*** (0.0026)	-0.0121** (0.0040)	-0.013*** (0.0038)	-0.0090 (0.0170)	-0.0155 (0.0125)	-0.0258** (0.0099)	-0.0224 (0.0159)	-0.0307* (0.0155)
10-19	0.0010 (0.0016)	0.0004 (0.001)	0.0012 (0.0008)	0.0001 (0.0002)	0.0008 (0.0008)	0.0014 (0.0081)	-0.0008 (0.0047)	0.0045 (0.0048)	0.0014 (0.0079)	-0.0013 (0.007)
20-49	-0.0001 (0.0004)	-0.0001 (0.0007)	-0.0013 (0.0007)	-0.0015 (0.0014)	-0.0004 (0.0011)	-0.0119 (0.0082)	-0.0064 (0.0066)	-0.0108 (0.0056)	-0.0187* (0.0095)	-0.0178* (0.009)
≥50	-0.0127* (0.0062)	-0.0054 (0.0032)	-0.0043 (0.0027)	-0.0070* (0.0031)	-0.0050* (0.0024)	0.0372 (0.0193)	0.0339** (0.0108)	0.0399*** (0.0092)	-0.0025 (0.0192)	0.0109 (0.018)
Unknown, but < 11				-0.0001 (0.0003)	0.0000 (0.0001)				-0.0000 (0.0000)	-0.0000 (0.0000)
Unknown, but > 10				0.00003 (0.00018)	0.0000 (0.0000)				0.0002 (0.0003)	0.0000 (0.0000)
Formality: Yes	-0.0002 (0.0005)	-0.0034* (0.0014)	-0.0011 (0.0011)	-0.0034* (0.0014)	-0.0025* (0.0010)	-0.0000 (0.0282)	-0.0000 (0.0193)	0.0130 (0.0182)	0.0159 (0.0192)	0.0126 (0.0129)
Formality: No	-0.0002 (0.0005)	-0.0034* (0.0014)	-0.0011 (0.0011)	-0.0034* (0.0014)	-0.0025* (0.0010)	-0.0002 (0.0144)	0.0000 (0.0077)	-0.0047 (0.0064)	-0.00514 (0.0060)	-0.0047 (0.0047)
Never Married	0.0418 (0.0221)	0.0254** (0.0095)	0.0149** (0.0052)	0.0070 (0.0052)	0.0218** (0.0082)	-0.0016 (0.0286)	0.0177 (0.0311)	0.0239 (0.0173)	-0.0033 (0.0163)	0.0150 (0.0246)
Married	-0.0322 (0.0289)	-0.0102 (0.0123)	0.0020 (0.0067)	0.0068 (0.0071)	-0.0087 (0.0113)	0.218** (0.0834)	0.119 (0.0785)	0.145** (0.0476)	0.0523 (0.0473)	0.134 (0.0736)
Separated	-0.0026 (0.0039)	-0.00130 (0.0012)				0.0006 (0.0022)	-0.0009 (0.0017)			-0.0002 (0.0004)
Widow	-0.0031 (0.0050)	-0.0012 (0.0023)	-0.0028 (0.0016)	-0.0030 (0.0021)		-0.0053 (0.0038)	-0.0042 (0.0028)	-0.0021 (0.0016)	0.0017 (0.0015)	-0.0007 (0.002)
Divorced	0.0024 (0.0054)	0.0029 (0.0027)	0.0022 (0.0023)	0.0051* (0.0024)		-0.0007 (0.0067)	0.0004 (0.0042)	-0.0126** (0.0043)	-0.0158** (0.0043)	-0.0085* (0.0038)

Clustered robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. "Separated" was not asked after 2007. Last two firm size options were added in 2009.

BO methodology decomposes mean gap between genders. Determinants of wage might have different effects in different part of the wage distribution. To see the effects of covariates on the different part of wage distribution, we have estimated unconditional quantile regression by using recentred influence function for every single year and for 0.25, 0.50, and 0.75 quantiles of wage distribution. The percentage of total gap as explained, and unexplained gap for years and quantiles are given in Table 5. General results indicate that unexplained part of the total wage gap for each quantile and in each year is very high in Turkey. There are two exception of this situation. For .75 quantile, there is discrimination against male workers in 2006 and 2008. These results are also positive like others but, as we can see in Table 6, both explained and unexplained have negative sign. This means that female workers have higher average individual characteristics and higher returns from these characteristics than male workers. To understand it more clearly, we will give graphs (Figure 2 and Figure 3) of regression coefficients of education and occupation by quantiles.

Detailed decomposition results for unconditional quantile regression are given in Table 6. Unconditional regression results demonstrate that, for explained part of total gap, experience gets bigger positive values when we go through to the top of the wage distribution. Female workers generally have less experience than male workers, because female worker's leave their work because of marriage, child bearing or rearing. Education has generally negative contributions. Like experience, higher education gets more weight in explained gap when it goes through to top of the wage distribution. Female workers also have advantage in all occupation categories except legislators, senior officials and managers and elementary occupations. This might be a sign of that female workers have less human capital characteristics than male workers on average or male workers have bigger returns for these occupations than female workers. When we look at the marital status for explained part, all advantages of women that we have stated above almost totally disappears. Female workers have disadvantage in all marital status except the widows. In the explained part of the decomposition, we see that so many variables have similar signs as in the explained gap. Experience has its higher value in the top of the wage distribution. Females have advantages in all education categories. In occupations and marital statuses, advantageous or disadvantageous situations vary considerably not only year to year but also through wage distribution.

Table 5. Percentage of explained and unexplained gap (%)

	2006			2007			2008			2009		
	.25	.50	.75	.25	.50	.75	.25	.50	.75	.25	.50	.75
Explained	-178	-24	11	-23	-45	-32	-1.7	-23	28	-64	-45	-54
Unexplained	278	124	89	123	145	132	101.7	123	72	164	145	154
Total	100	100	100	100	100	100	100	100	100	100	100	100

Source: Author's calculations by using LICS, 2006-2009.

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Table 6. Decomposition results by using RIF across quantiles and years.

	2006			2007			2008			2009		
	.25	.50	.75	.25	.50	.75	.25	.50	.75	.25	.50	.75
Male	0.643*** (0.0215)	1.059*** (0.0272)	1.597*** (0.0310)	0.750*** (0.0148)	1.159*** (0.0174)	1.685*** (0.0217)	0.899*** (0.0124)	1.291*** (0.0142)	1.841*** (0.0177)	1.001*** (0.0123)	1.413*** (0.0149)	1.983*** (0.0181)
Female	0.622*** (0.0736)	0.701* (0.310)	2.641*** (0.148)	0.649*** (0.0604)	0.981*** (0.116)	1.240* (0.527)	0.814*** (0.0442)	0.985*** (0.0883)	2.320*** (0.243)	0.944*** (0.0428)	1.160*** (0.0972)	1.836* (0.824)
Difference	0.0213 (0.0751)	0.357 (0.311)	-1.04*** (0.152)	0.100 (0.0617)	0.178 (0.117)	0.444 (0.527)	0.0855 (0.0453)	0.307*** (0.0887)	-0.478* (0.243)	0.0573 (0.0439)	0.253** (0.0978)	0.147 (0.824)
Explained	-0.0379 (0.0332)	-0.0816 (0.0454)	-0.113* (0.0492)	-0.0225 (0.0211)	-0.0800** (0.0296)	-0.14*** (0.0376)	-0.00148 (0.0172)	-0.072** (0.0227)	-0.134*** (0.0290)	-0.0369* (0.0179)	-0.114*** (0.0240)	-0.175*** (0.0289)
Unexplained	0.0593 (0.0733)	0.439 (0.305)	-0.93*** (0.154)	0.123* (0.0594)	0.258* (0.113)	0.583 (0.527)	0.0870* (0.0440)	0.379*** (0.0861)	-0.345 (0.244)	0.0942* (0.0416)	0.367*** (0.0952)	0.322 (0.823)
Explained												
Age	0.280*** (0.0730)	0.232*** (0.0703)	-0.0163 (0.0570)	0.176*** (0.0448)	0.217*** (0.0488)	0.0788 (0.0425)	0.185*** (0.0372)	0.138*** (0.0358)	0.0177 (0.0356)	0.163*** (0.0349)	0.155*** (0.0365)	-0.0009 (0.0354)
Age ²	-0.25*** (0.0670)	-0.198** (0.0631)	0.0511 (0.0551)	-0.153*** (0.041)	-0.191*** (0.0451)	-0.0528 (0.0406)	-0.167*** (0.0346)	-0.110*** (0.0328)	0.0351 (0.0351)	-0.141*** (0.0324)	-0.108** (0.0336)	0.0551 (0.0354)
Experience	-0.101* (0.0481)	0.0925 (0.0561)	0.269*** (0.0593)	-0.005 (0.0356)	0.0597 (0.0385)	0.204*** (0.0415)	0.0317 (0.0296)	0.0964** (0.0306)	0.179*** (0.0350)	0.00840 (0.0294)	0.0479 (0.0307)	0.207*** (0.0347)
Experience ²	0.0963** (0.0355)	-0.0372 (0.0413)	-0.19*** (0.0451)	0.0114 (0.0263)	-0.0095 (0.0281)	-0.11*** (0.0310)	-0.0160 (0.0232)	-0.059** (0.0229)	-0.144*** (0.0274)	-0.0072 (0.0230)	-0.0382 (0.0242)	-0.162*** (0.0279)
Illiterate	0.0073 (0.0045)	0.0086 (0.0051)	0.0058 (0.0037)	0.0033 (0.0023)	0.00935** (0.0035)	0.0077** (0.0029)	0.0066* (0.0028)	0.0092*** (0.0027)	0.0071** (0.0023)	0.00513* (0.0022)	0.0073** (0.0024)	0.00563** (0.0018)
No Diploma	-0.0004 (0.0009)	-0.0015 (0.0024)	-0.0019 (0.0024)	-0.0000 (0.0005)	-0.0012 (0.0012)	-0.0017 (0.0017)	0.0002 (0.0010)	0.0003 (0.0013)	0.0003 (0.0014)	-0.0007 (0.0007)	-0.0021 (0.0017)	-0.0018 (0.0015)
Primary	-0.015** (0.0060)	-0.040*** (0.0105)	-0.03*** (0.0097)	-0.0099* (0.004)	-0.025*** (0.0053)	-0.04*** (0.0067)	-0.006 (0.0034)	-0.021*** (0.0039)	-0.041*** (0.0053)	-0.0045 (0.0031)	-0.027*** (0.0043)	-0.033*** (0.0048)
Secondary	-0.0054 (0.0042)	-0.0029 (0.0044)	-0.0091 (0.0049)	-0.0043 (0.0029)	-0.0055 (0.0031)	-0.0022 (0.0033)	-0.0035 (0.0019)	-0.006** (0.0020)	-0.0047* (0.0019)	-0.0022 (0.0018)	-0.0040* (0.002)	-0.0048* (0.0020)
General High School	-0.0061 (0.0037)	-0.0066 (0.0042)	-0.0079 (0.0049)	-0.0008 (0.001)	-0.002 (0.0024)	-0.0008 (0.0011)	-0.0008 (0.0011)	-0.0009 (0.0012)	-0.0005 (0.0007)	-0.0002 (0.0011)	-0.0005 (0.0021)	-0.0002 (0.0010)
Vocational High School	0.0020 (0.0025)	0.0032 (0.0040)	0.0007 (0.0014)	-0.0013 (0.0012)	-0.0027 (0.0022)	-0.0007 (0.001)	0.0000 (0.0014)	0.0000 (0.0016)	0.0000 (0.0006)	0.00044 (0.0014)	0.0006 (0.0021)	0.0002 (0.0008)
College or More	-0.04*** (0.0102)	-0.09*** (0.017)	-0.15*** (0.0214)	-0.022*** (0.0062)	-0.081*** (0.0111)	-0.13*** (0.0172)	-0.033*** (0.0053)	-0.070*** (0.0082)	-0.105*** (0.0123)	-0.029*** (0.0055)	-0.087*** (0.0096)	-0.116*** (0.0133)
Legislators, senior officials and managers	0.0010 (0.0017)	0.002 (0.0023)	0.0052 (0.0036)	0.0016 (0.0012)	0.0031 (0.0016)	0.0090* (0.0032)	-0.0011 (0.0009)	0.0021 (0.0011)	0.0077** (0.0025)	0.0009 (0.0006)	0.0020 (0.0010)	0.0066* (0.0028)
Professionals	-0.0038 (0.0046)	-0.027** (0.0089)	-0.041** (0.0132)	-0.017*** (0.0043)	-0.039*** (0.0071)	-0.06*** (0.0115)	-0.009** (0.003)	-0.030 (0.0051)	-0.065*** (0.0096)	-0.014*** (0.0035)	-0.037*** (0.0058)	-0.072*** (0.0103)
Technicians and associate professionals	-0.0031 (0.0023)	-0.0062 (0.0043)	-0.0079 (0.0054)	-0.0052* (0.0021)	-0.0117** (0.0037)	-0.0083* (0.0036)	-0.0037* (0.0016)	-0.011*** (0.0030)	-0.0033 (0.0023)	-0.005** (0.0018)	-0.009*** (0.0029)	-0.0057* (0.0025)

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Table 6. (continued)

	2006			2007			2008			2009		
	.25	.50	.75	.25	.50	.75	.25	.50	.75	.25	.50	.75
Clerks	-0.0097 (0.0058)	-0.0077 (0.0079)	0.0067 (0.0095)	-0.0061 (0.0041)	-0.0030 (0.0051)	0.0086 (0.0067)	-0.0036 (0.0029)	0.0000 (0.0036)	0.0133** (0.0047)	-0.0050 (0.0029)	0.00032 (0.0036)	0.0041 (0.0044)
Service workers and shop and market sales workers	0.0004 (0.0037)	0.0002 (0.0021)	0.0002 (0.0025)	-0.0012 (0.0015)	-0.0021 (0.0026)	-0.0017 (0.0021)	-0.0027 (0.002)	-0.0036 (0.0027)	-0.0024 (0.0019)	-0.0026 (0.0019)	-0.0033 (0.0024)	-0.002 (0.0015)
Skilled agricultural and fishery workers	-0.0003 (0.0008)	-0.0018 (0.0024)	-0.0012 (0.0017)	-0.0022 (0.0013)	-0.0030* (0.0012)	-0.0023* (0.0010)	0.0005 (0.0006)	-0.0000 (0.0006)	-0.0009 (0.0005)	-0.0002 (0.0005)	-0.0006 (0.0006)	-0.0014 (0.0008)
Craft and related trade workers	0.0075 (0.0089)	0.0147 (0.0101)	-0.0100 (0.0105)	0.0071 (0.0056)	0.0026 (0.0059)	-0.014* (0.0063)	0.0027 (0.0045)	-0.009 (0.0051)	-0.015** (0.0051)	0.005 (0.0046)	-0.0007 (0.0050)	-0.018*** (0.0053)
Plans and machine operators and assemblers	0.0029 (0.0044)	-0.0083 (0.0052)	-0.0096 (0.0057)	0.0068* (0.0034)	-0.0044 (0.0040)	-0.02*** (0.0049)	0.00047 (0.0027)	-0.012*** (0.0034)	-0.021*** (0.0039)	-0.0031 (0.0031)	-0.0102** (0.0036)	-0.027*** (0.0042)
Elementary occupations	0.0057 (0.0041)	0.0019 (0.0038)	0.0113 (0.0058)	0.0046 (0.0027)	0.0056 (0.0031)	0.0077 (0.0041)	0.0057* (0.0023)	0.0065* (0.0026)	0.0068* (0.0026)	0.0045* (0.0022)	0.00570* (0.0026)	0.0072* (0.0032)
≤10	-0.0111* (0.0048)	-0.0119* (0.0053)	-0.0145* (0.0059)	-0.008** (0.0029)	-0.0089** (0.0030)	-0.011** (0.0037)	-0.008*** (0.0024)	-0.011*** (0.0029)	-0.014*** (0.0036)	-0.0111* (0.0046)	-0.0112* (0.0046)	-0.0125** (0.0045)
10-19	0.0011 (0.0017)	0.0020 (0.0029)	0.0015 (0.0021)	0.0007 (0.0008)	0.00171 (0.0015)	0.0018 (0.0017)	0.0017 (0.0010)	0.0028* (0.0014)	0.0027 (0.0014)	0.0000 (0.0002)	-0.0001 (0.0002)	0.0002 (0.0006)
20-49	-0.0004 (0.0008)	-0.0002 (0.0006)	0.0003 (0.0008)	-0.0007 (0.0008)	-0.00141 (0.0011)	-0.0052 (0.0009)	-0.0012 (0.0007)	-0.0019 (0.0011)	-0.0015 (0.001)	-0.0012 (0.0017)	-0.0020 (0.0018)	-0.0028 (0.0020)
≥50	-0.0099 (0.0053)	-0.0144 (0.0078)	-0.0171 (0.0092)	-0.0037 (0.0027)	-0.0050 (0.0036)	-0.0070 (0.0051)	-0.0025 (0.0023)	-0.0034 (0.003)	-0.0046 (0.0041)	-0.0043 (0.0028)	-0.0079* (0.0038)	-0.0107* (0.0047)
Unknown, but < 11										-0.0000 (0.0004)	-0.00042 (0.00048)	-0.0003 (0.0003)
Unknown, but > 10										0.00004 (0.0002)	0.00017 (0.00027)	0.0001 (0.0003)
Formality: Yes	-0.0000 (0.0021)	-0.00002 (0.0018)	0.0000 (0.0011)	-0.0045 (0.0030)	-0.0028 (0.0019)	-0.0011 (0.0009)	-0.0000 (0.0020)	-0.0000 (0.0013)	-0.0000 (0.0004)	-0.0054 (0.0029)	-0.0027 (0.0015)	-0.0000 (0.0004)
Formality: No	-0.0000 (0.0021)	-0.0000 (0.0018)	0.0000 (0.0011)	-0.0045 (0.0030)	-0.0028 (0.0019)	-0.0011 (0.0009)	-0.0000 (0.002)	-0.0000 (0.0013)	-0.0000 (0.0004)	-0.0054 (0.0029)	-0.0027 (0.0015)	-0.0000 (0.0004)
Never Married	0.0335* (0.0161)	0.0338 (0.0247)	0.0229 (0.0154)	0.0076 (0.010)	0.0114 (0.0123)	0.0132 (0.0104)	0.0118* (0.0055)	0.0100 (0.0057)	0.0120 (0.0083)	0.0103 (0.0066)	0.0070 (0.0072)	0.0033 (0.0076)
Married	-0.009 (0.0188)	-0.0126 (0.0326)	-0.0066 (0.0191)	0.011 (0.013)	0.0111 (0.0165)	0.0031 (0.0134)	0.0108 (0.0077)	0.0099 (0.0082)	0.0078 (0.011)	0.0064 (0.0091)	0.0128 (0.0099)	0.0047 (0.0099)
Separated	-0.0019 (0.0019)	0.0000 (0.0039)	0.0014 (0.0017)	0.0008 (0.0014)	-0.0002 (0.0018)	0.0000 (0.0013)						
Widow	-0.0094 (0.0064)	-0.0071 (0.0074)	-0.0018 (0.0047)	-0.0031 (0.0035)	-0.0024 (0.0039)	-0.0054 (0.0038)	-0.0047* (0.0023)	-0.0055* (0.0025)	-0.0027 (0.0026)	-0.0056* (0.0028)	-0.0032 (0.0029)	-0.0024 (0.003)
Divorced	0.0117 (0.0061)	0.0002 (0.0059)	-0.0086 (0.0067)	0.0005 (0.0033)	0.0036 (0.0043)	0.0045 (0.0033)	0.0059 (0.0032)	0.0088* (0.0035)	0.0044 (0.0037)	0.0089** (0.0033)	0.0067 (0.0034)	0.0047 (0.0033)

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Table 6. (continued)

	2006			2007			2008			2009		
	.25	.50	.75	.25	.50	.75	.25	.50	.75	.25	.50	.75
	Unexplained											
Age	0.208 (1.257)	-2.444 (1.651)	0.985 (1.282)	-0.736 (0.952)	-2.152 (1.149)	-1.653 (1.507)	0.574 (0.758)	-2.182** (0.847)	-0.133 (1.266)	2.109** (0.805)	0.111 (1.044)	-2.387 (4.171)
Age ²	0.0695 (0.587)	1.212 (0.781)	-0.299 (0.614)	0.466 (0.468)	1.190* (0.574)	0.939 (0.730)	-0.155 (0.367)	1.165** (0.408)	0.204 (0.625)	-1.128** (0.389)	0.0047 (0.525)	1.273 (2.091)
Experience	0.0666 (0.223)	0.0796 (0.255)	0.478* (0.214)	-0.115 (0.147)	-0.0586 (0.168)	0.113 (0.158)	-0.0325 (0.119)	0.0280 (0.123)	0.358** (0.136)	-0.0794 (0.128)	-0.155 (0.144)	0.252 (0.145)
Experience ²	-0.0443 (0.107)	-0.0805 (0.120)	-0.218* (0.0999)	0.0789 (0.0738)	-0.0074 (0.0856)	-0.0484 (0.0738)	-0.0169 (0.0615)	-0.0277 (0.0591)	-0.231*** (0.0676)	0.118 (0.0627)	0.0866 (0.0749)	-0.123 (0.0727)
Illiterate	-0.0033 (0.0101)	-0.0010 (0.0118)	-0.0197* (0.0092)	0.0188* (0.0073)	0.0089 (0.0062)	0.0007 (0.0041)	-0.0008 (0.0054)	-0.0004 (0.0052)	-0.0037 (0.0044)	-0.0039 (0.0046)	0.0081 (0.0044)	0.0006 (0.0032)
No Diploma	0.0025 (0.0097)	0.0010 (0.0086)	-0.0215* (0.0093)	-0.0107* (0.0053)	-0.00481 (0.0057)	-0.0039 (0.0046)	-0.0103* (0.0048)	-0.0001 (0.0047)	-0.0049 (0.0034)	-0.0061 (0.0052)	-0.0004 (0.0042)	-0.004 (0.0036)
Primary	0.0087 (0.0394)	0.0959* (0.0476)	-0.0826* (0.0328)	-0.0127 (0.0241)	0.0368 (0.0273)	-0.0093 (0.0223)	-0.0038 (0.017)	0.0370 (0.0197)	-0.048** (0.0170)	0.0167 (0.0172)	0.0227 (0.0193)	-0.0065 (0.0502)
Secondary	0.0215 (0.0141)	0.0283* (0.0138)	-0.0141 (0.0102)	-0.0119 (0.0090)	-0.0024 (0.0102)	0.0026 (0.0140)	0.0046 (0.0088)	0.0128 (0.0086)	-0.0081 (0.0075)	0.0085 (0.0102)	0.0055 (0.0099)	-0.0120 (0.0138)
General High School	-0.0049 (0.0196)	-0.0227 (0.0239)	0.0492* (0.0218)	-0.0008 (0.0111)	0.0057 (0.0143)	0.0380* (0.0159)	0.00458 (0.0091)	0.0000 (0.0109)	-0.0068 (0.0108)	0.0057 (0.0098)	0.0030 (0.0118)	0.0105 (0.0111)
Vocational High School	-0.0082 (0.0154)	-0.0107 (0.0198)	0.0264 (0.0178)	-0.0070 (0.0113)	-0.0034 (0.0143)	0.0052 (0.0148)	0.0195* (0.0083)	0.0035 (0.0100)	0.0022 (0.0103)	0.0113 (0.0094)	-0.0110 (0.0127)	0.0148 (0.0232)
College or More	-0.0499 (0.0375)	-0.114 (0.0876)	0.281*** (0.0613)	0.0195 (0.0294)	-0.0587 (0.0426)	-0.0808 (0.110)	0.0195 (0.0211)	-0.0706* (0.0310)	0.154*** (0.0436)	0.0160 (0.0246)	-0.103** (0.0388)	0.0134 (0.0498)
Legislators, senior officials and managers	0.0028 (0.0032)	0.0083 (0.0081)	-0.0064 (0.0084)	-0.0073* (0.0028)	-0.0155** (0.0048)	-0.0115 (0.0080)	-0.011*** (0.0031)	-0.0101* (0.0047)	-0.0151* (0.0069)	-0.007** (0.0029)	-0.0012 (0.0054)	-0.00511 (0.00719)
Professionals	0.0092 (0.0183)	0.0347 (0.0301)	0.0195 (0.0351)	-0.0111 (0.0118)	-0.0342* (0.0162)	-0.0376 (0.0245)	-0.041*** (0.0110)	-0.054*** (0.0152)	-0.059** (0.0211)	-0.0174 (0.0135)	-0.0416* (0.0174)	-0.0142 (0.0244)
Technicians and associate professionals	0.0071 (0.0103)	0.0184 (0.0141)	0.0058 (0.0178)	0.0077 (0.0082)	-0.00322 (0.0114)	0.0059 (0.0136)	-0.026*** (0.0079)	-0.041*** (0.0104)	0.0015 (0.0124)	-0.0074 (0.0087)	-0.0258* (0.0122)	0.0211 (0.0143)
Clerks	0.0079 (0.0165)	0.0815*** (0.0241)	0.0314 (0.0242)	-0.0002 (0.0094)	0.0333* (0.0140)	0.0115 (0.0147)	-0.027** (0.0093)	-0.0005 (0.0120)	0.00525 (0.0129)	-0.0057 (0.0107)	0.0104 (0.0136)	0.0437** (0.0166)
Service workers and shop and market sales workers	0.0410* (0.0182)	0.0559* (0.0220)	0.0040 (0.02)	0.0381** (0.0127)	0.0310* (0.0144)	0.0049 (0.0114)	0.0034 (0.0103)	-0.0144 (0.0109)	-0.0033 (0.0106)	0.0172 (0.0121)	0.0117 (0.0128)	0.0190 (0.0140)
Skilled agricultural and fishery workers	-0.006 (0.0038)	-0.0143 (0.0083)	-0.0066 (0.0054)	-0.0001 (0.0002)	-0.0000 (0.0001)	0.0000 (0.0001)	0.0013 (0.0010)	0.0009 (0.0007)	0.0006 (0.0005)	-0.0006 (0.0012)	-0.00040 (0.0011)	-0.0021 (0.0019)
Craft and related trade workers	0.0382* (0.0150)	0.0233 (0.0158)	0.0219 (0.0138)	0.0417*** (0.0120)	0.0464*** (0.0122)	0.0147 (0.0091)	0.0195** (0.0075)	0.0240** (0.0079)	0.0152* (0.0071)	0.0245** (0.0075)	0.0252** (0.0077)	0.0117 (0.0081)
Plans and machine operators and assemblers	0.0058 (0.0143)	0.0313* (0.0143)	0.0214 (0.0131)	-0.0000 (0.006)	0.0192 (0.0110)	0.0016 (0.0068)	-0.019** (0.0067)	-0.00591 (0.0085)	- (0.00153)	0.00714 (0.0078)	0.0045 (0.0086)	0.0019 (0.0077)

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Table 6. (continued)

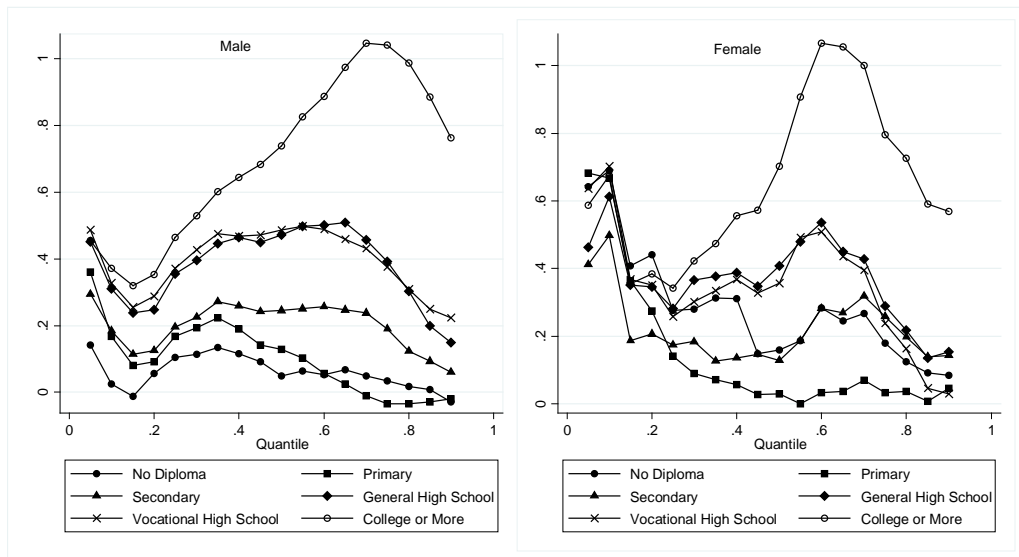
	2006			2007			2008			2009		
	.25	.50	.75	.25	.50	.75	.25	.50	.75	.25	.50	.75
Elementary occupations	-0.0518 (0.0337)	-0.0165 (0.0391)	0.0576 (0.0314)	-0.0000 (0.0221)	0.0437 (0.0250)	0.0169 (0.0158)	-0.063*** (0.0166)	-0.0097 (0.0182)	0.0003 (0.0171)	0.0091 (0.0192)	0.00072 (0.0201)	0.0144 (0.0202)
≤10	-0.0076 (0.0351)	0.0262 (0.0384)	-0.0362 (0.0290)	-0.059** (0.0218)	-0.0178 (0.0233)	0.005 (0.0214)	-0.061*** (0.0162)	-0.0325 (0.0171)	-0.0161 (0.0173)	-0.0111 (0.0233)	0.00866 (0.0256)	-0.0405 (0.0461)
10-19	0.0013 (0.0130)	-0.0093 (0.0149)	-0.0210 (0.0123)	0.0097 (0.0087)	-0.0114 (0.0091)	-0.0032 (0.0096)	0.0175* (0.0075)	-0.0043 (0.0079)	0.0081 (0.0083)	0.0057 (0.0104)	0.00268 (0.0120)	0.00766 (0.0198)
20-49	-0.0056 (0.0129)	-0.0123 (0.0165)	0.0115 (0.0152)	0.0099 (0.0086)	-0.00157 (0.0112)	-0.0142 (0.0121)	0.0013 (0.0069)	-0.00331 (0.0086)	-0.0153 (0.0109)	0.0034 (0.0119)	0.0128 (0.0142)	-0.0319 (0.0255)
≥50	0.0184 (0.0264)	0.0328 (0.0356)	0.0685* (0.0326)	0.0107 (0.0150)	0.0530* (0.0212)	0.0364 (0.0223)	0.0201 (0.0121)	0.0514** (0.0159)	0.0297 (0.0188)	0.0014 (0.0241)	0.0503 (0.0297)	-0.0120 (0.0539)
Unknown, but < 11										-0.0000 (0.0000)	0.0000 (0.0000)	-0.0000 (0.0000)
Unknown, but > 10										-0.0003 (0.0003)	-0.0005 (0.0004)	0.0008 (0.0013)
Formality: Yes	-0.0864 (0.0483)	0.0024 (0.0498)	0.0749* (0.0377)	-0.139*** (0.0358)	0.0103 (0.0355)	0.119*** (0.0277)	-0.127*** (0.0313)	0.0431 (0.0308)	0.122*** (0.0286)	-0.0425 (0.0336)	0.0331 (0.0338)	0.108*** (0.0272)
Formality: No	0.0508 (0.0285)	-0.0014 (0.0293)	-0.0441* (0.0223)	0.0651*** (0.0170)	-0.0046 (0.0166)	-0.055*** (0.0132)	0.0501*** (0.0125)	-0.0170 (0.0122)	-0.048*** (0.0114)	0.0150 (0.0117)	-0.0114 (0.0118)	-0.037*** (0.0096)
Never Married	0.0286 (0.0420)	-0.0007 (0.0545)	0.0545 (0.0430)	0.0465 (0.0321)	0.0820* (0.0376)	0.0726* (0.0354)	0.0271 (0.0176)	0.0341 (0.0195)	0.0116 (0.0296)	-0.0108 (0.0215)	0.0268 (0.0286)	0.0053 (0.0313)
Married	0.124 (0.109)	0.135 (0.157)	-0.161 (0.101)	0.0774 (0.0779)	0.150 (0.0915)	0.102 (0.0912)	0.0382 (0.0433)	0.0289 (0.0498)	-0.164 (0.0866)	-0.110* (0.0542)	0.0168 (0.0792)	-0.0180 (0.159)
Separated	-0.0005 (0.001)	-0.0014 (0.0013)	0.001 (0.0012)	0.0004 (0.0017)	-0.0026 (0.0021)	-0.0036 (0.0019)						
Widow	-0.005 (0.005)	-0.0004 (0.0059)	-0.0065 (0.0053)	-0.0109* (0.0044)	-0.0019 (0.0037)	0.0014 (0.0037)	-0.0016 (0.0021)	-0.0011 (0.0022)	0.0035 (0.0027)	0.0041* (0.0019)	-0.0006 (0.0022)	0.0022 (0.0022)
Divorced	0.0042 (0.0056)	0.0014 (0.0057)	0.0121 (0.0085)	0.0019 (0.0037)	-0.0014 (0.0042)	0.0020 (0.0041)	-0.0045 (0.0036)	-0.011** (0.0039)	0.0019 (0.0054)	-0.0089* (0.0039)	-0.0058 (0.0046)	-0.0079 (0.0145)

Clustered robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. "Separated" was not asked after 2007. Last two firm size options were added in 2009.

Now, we want to present coefficient of education and occupation categories by quantiles (.5-.95). These graphs give very important information about the effect of education and occupation on wage in the different part of wage distribution. We start with education.

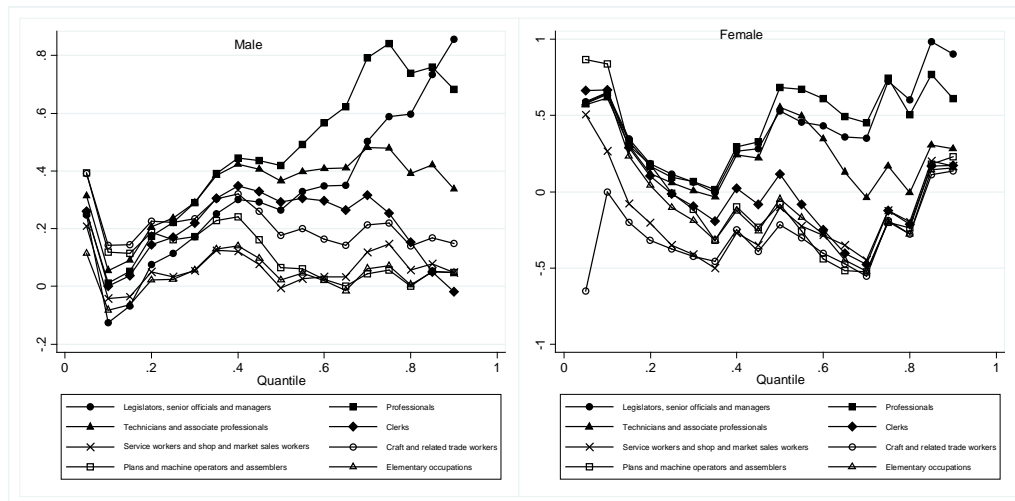
In Figure 2, first of all, we see that education has positive effects on wage in all quantiles, as we expected. The coefficient of each education category follows same path for male and female. Moreover, the orders of the coefficients are also as we expected: the higher education category also has bigger effect on wage. There is an inverted-U road of education categories through quantiles for male workers. Coefficients of education categories decrease until the .2 quantile. After the .2 quantile, they increase until to the middle of distribution and decrease continuously until the end of distribution. This means that education has not same power in the determination process of wage for male workers. It has the least power on the bottom and on the top of the wage distribution. There are more effective and important variables than education in these part of the wage distribution, such as experience, ability, IQ, firms characteristics, etc. Education coefficients of female workers have similar behaviour with male workers. There are two differences from male's coefficients. First, coefficients of all education categories increase rapidly in the first quantile. After that point, effect of education decrease rapidly. Unlike the coefficients of male workers, coefficients of female workers decrease until the middle of the distribution. Secondly, female workers who do not have diploma have bigger coefficient nearly all quantiles than female workers who are primary and secondary educated.

Figure 2. The effects of education categories on wage by quantiles from pooled data.



Source: Author's calculation by using LICS, 2006-2009.

Figure 3. The effects of occupation categories on wage by quantiles from pooled data



Source: Author's calculation using LICS, 2006-2009.

Figure 3 gives coefficients of occupations for pooled unconditional regression estimation for male and female workers. Coefficients of occupations of male workers decrease rigorously in first quantile range. Three occupations category have negative coefficients between .10 and .20 quantiles. Two occupations have nearly zero coefficients at .10 quantile. After the .15 quantile, coefficients of occupations begin increasing and increase steadily until to the .40 quantile. After that point, only two occupations' coefficients, legislators, senior officials and managers and professionals, continue to increase. Other occupations' coefficients vary between 0 and .4. That might be meant that, except from those two occupations, occupations affect wage of male workers between particular ranges. Again, we see that education is very important in the effects of occupations. Actually, education determines the occupation that people choose. This correlation should be kept in mind when evaluating these graphs.

Coefficients of occupations graph of female workers gives very interesting picture. First, coefficients of female workers are similar with male's coefficients for some occupations. Even some coefficients are bigger in some occupations. Coefficients decrease until the .35 quantile for all occupation. After that point, we witness second interesting point for female workers' coefficient behaviour. After the .35 quantile, occupations simply are distinguished two parts: one continuous its road with increasingly positive, other continuous its road steadily and decreasingly first and increasingly after the .60 quantile but negative in all situations until the .85 quantile. Third, the magnitudes of coefficients are very close each other for corresponding groups and part of the distribution. Other difference of female workers occupation coefficients from unconditional quantile regression is that for all occupations, coefficients follow U-shaped road across the quantiles. This is the result of this situation that occupations have similar effect on the wage in the bottom and top of the distribution. This might be meant that some occupations reward more female workers in the bottom and in the top of the wage distribution.

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Table 7. Decomposition results by using BO method with panel data, 2006-2009

	2006	2007	2008	2009	2006	2007	2008	2009
Male	1.185*** (0.0205)	1.257*** (0.0197)	1.376*** (0.0203)	1.493*** (0.0211)	1.185*** (0.0205)	1.257*** (0.0197)	1.376*** (0.0203)	1.493*** (0.0211)
Female	1.074** (0.350)	1.202 (1.026)	0.488* (0.221)	0.668*** (0.190)	1.074** (0.350)	1.202 (1.026)	0.488* (0.221)	0.668*** (0.190)
Difference	0.111 (0.350)	0.0544 (1.027)	0.888** (0.221)	0.825*** (0.190)	0.111 (0.350)	0.0544 (1.027)	0.888** (0.221)	0.825*** (0.190)
Explained	-0.0104 (0.0388)	-0.00012 (0.0371)	0.00496 (0.0356)	-0.0495 (0.0388)	-0.0104 (0.0388)	-0.0001 (0.0371)	0.00496 (0.0356)	-0.0495 (0.0388)
Unexplained	0.122 (0.347)	0.0546 (1.027)	0.883*** (0.220)	0.875*** (0.187)	0.122 (0.347)	0.0546 (1.027)	0.883*** (0.220)	0.875*** (0.187)
	Explained				Unexplained			
Age	0.116* (0.0570)	0.154** (0.0576)	0.182* (0.0714)	0.191* (0.0804)	-1.284 (1.464)	-0.596 (3.625)	-3.973** (1.219)	-2.307 (1.524)
Age ²	-0.0827 (0.0521)	-0.124* (0.0524)	-0.144* (0.0656)	-0.137 (0.0746)	0.917 (0.687)	0.389 (1.867)	2.213*** (0.587)	1.511* (0.752)
Experience	0.133** (0.0410)	0.146*** (0.0426)	0.167*** (0.0475)	0.158** (0.0612)	0.0921 (0.164)	-0.0508 (0.164)	0.227 (0.133)	-0.0854 (0.204)
Experience ²	-0.0649* (0.0318)	-0.08* (0.0342)	-0.0955** (0.0359)	-0.118* (0.0465)	-0.121 (0.0844)	0.0222 (0.0857)	-0.153* (0.0634)	-0.0528 (0.109)
Illiterate	0.00477 (0.0041)	0.0022 (0.0024)	0.0025 (0.0021)	0.0019 (0.0023)	0.0033 (0.0082)	0.0085 (0.0049)	0.0151* (0.0074)	0.00754 (0.0054)
No Diploma	-0.0038 (0.0026)	-0.0001 (0.0023)	-0.0018 (0.0022)	-0.0029 (0.0026)	0.0019 (0.0052)	-0.0046 (0.0095)	0.0086 (0.0058)	0.0029 (0.0043)
Primary	-0.024*** (0.0069)	-0.027*** (0.007)	-0.031*** (0.0072)	-0.034*** (0.0086)	-0.0408 (0.0391)	-0.0025 (0.0482)	0.0452 (0.0283)	0.0712** (0.0257)
Secondary	-0.0024 (0.0024)	0.0005 (0.0022)	-0.0004 (0.0015)	0.0003 (0.0021)	0.0111 (0.0104)	-0.0033 (0.0157)	0.0129 (0.0130)	0.0038 (0.0132)
General High School	-0.0035 (0.0040)	-0.0017 (0.0017)	-0.0012 (0.0015)	-0.0004 (0.0019)	-0.0023 (0.0151)	-0.0195 (0.0163)	-0.0260 (0.0146)	0.0032 (0.0136)
Vocational High School	-0.0003 (0.0033)	-0.0011 (0.002)	-0.0014 (0.0025)	-0.002 (0.0034)	-0.0071 (0.0174)	-0.0035 (0.0375)	-0.0257 (0.0154)	-0.0336 (0.0180)
College or More	-0.078*** (0.0160)	-0.071*** (0.0156)	-0.066*** (0.0145)	-0.082*** (0.0165)	-0.0442 (0.101)	0.0059 (0.0679)	-0.24*** (0.0714)	-0.19*** (0.0548)
Legislators, senior officials and managers	0.0045 (0.0034)	0.0053 (0.0036)	0.0034 (0.0027)	0.0009 (0.0018)	-0.0142 (0.0089)	-0.0120 (0.0077)	-0.0074 (0.0137)	-0.0086 (0.0095)
Professionals	-0.0221** (0.0081)	-0.0214** (0.008)	-0.0171** (0.0065)	-0.0240** (0.0081)	0.0338 (0.0230)	0.0118 (0.0214)	-0.0006 (0.0168)	-0.0172 (0.0202)
Technicians and associate professionals	-0.0017 (0.0032)	-0.0012 (0.0024)	-0.0066 (0.0037)	-0.003 (0.0024)	0.009 (0.0087)	0.0187 (0.0098)	0.0034 (0.0104)	0.0145 (0.0083)
Clerks	0.0136 (0.0069)	0.0138 (0.0072)	0.0068 (0.0053)	0.0032 (0.0052)	0.0340* (0.0163)	0.0368 (0.0200)	0.007 (0.0157)	0.0254* (0.0127)
Service workers and shop market sales workers	-0.0005 (0.0028)	0.0002 (0.0035)	0.0037 (0.004)	0.0038 (0.0045)	0.0208 (0.0145)	0.0301* (0.0145)	0.0039 (0.0165)	0.0370* (0.0148)
Skilled agricultural and fishery workers	-0.0000 (0.0017)	-0.0007 (0.0008)	-0.0002 (0.0007)	-0.0004 (0.0007)	-0.0061 (0.0037)	-0.0000 (0.0001)	0.0000 (0.000)	-0.0024 (0.0021)
Craft and related trade workers	0.0081 (0.0074)	0.001 (0.0077)	-0.0028 (0.007)	0.0105 (0.0071)	0.0114 (0.0094)	0.0022 (0.0135)	0.0047 (0.0057)	0.0084 (0.006)
Plans and machine operators and assemblers	-0.0056 (0.0039)	-0.0071 (0.0036)	-0.0058 (0.003)	-0.0079* (0.0038)	0.0244* (0.0098)	0.0074 (0.0092)	-0.0109 (0.0086)	0.0032 (0.0066)

Table 7. (continued)

	2006	2007	2008	2009	2006	2007	2008	2009
	Explained				Unexplained			
Elementary occupations	0.004	0.0086	0.0051	0.0022	-0.004	0.0256	0.0155	0.0196
≤10	(0.0031)	(0.0048)	(0.0038)	(0.0035)	(0.0270)	(0.0260)	(0.0203)	(0.0201)
11-19	-0.0094	-0.0057	-0.0098	-0.0041	-0.0031	-0.0139	-0.0089	-0.001
	(0.0051)	(0.0036)	(0.0056)	(0.0035)	(0.0232)	(0.0241)	(0.0172)	(0.0156)
20-49	0.0018	0.0011	0.0022	-0.0013	-0.0027	0.0041	0.007	-0.0094
	(0.0018)	(0.0012)	(0.0019)	(0.0018)	(0.0113)	(0.0105)	(0.0111)	(0.0114)
≥50	-0.0000	0.0001	0.0009	0.0009	-0.0132	-0.01	-0.0189	-0.0068
	(0.0003)	(0.0004)	(0.0016)	(0.0026)	(0.0106)	(0.0118)	(0.011)	(0.0110)
Unknown, but < 11	-0.0055	-0.0025	-0.0035	-0.0067	0.0431*	0.0255	0.0364*	0.0397*
	(0.0069)	(0.0049)	(0.0048)	(0.0062)	(0.0219)	(0.0174)	(0.0168)	(0.0192)
Unknown, but > 10				-0.0008				0.0000
				(0.0006)				(0.0000)
Formality: Yes				0.0006				0.00005
				(0.0004)				(0.0000)
Formality: No	-0.0000	-0.0001	0.0002	-0.0045	0.0277	0.0332	0.0646*	-0.0279
	(0.0005)	(0.002)	(0.002)	(0.0026)	(0.0401)	(0.0336)	(0.031)	(0.0398)
Never Married	-0.0000	-0.0001	0.0002	-0.0045	-0.0138	-0.0169	-0.0251*	0.0074
	(0.0005)	(0.002)	(0.002)	(0.0026)	(0.0200)	(0.0172)	(0.0122)	(0.0120)
Married	0.0248	-0.0032	0.0029	-0.00332	-0.0087	0.0092	0.0273	-0.0119
	(0.0196)	(0.0095)	(0.012)	(0.0133)	(0.0368)	(0.0287)	(0.0338)	(0.0404)
Separated	-0.0104	0.0216*	0.0138	0.0139	0.0904	0.0347	0.180*	0.0642
	(0.0232)	(0.0106)	(0.0127)	(0.0144)	(0.0995)	(0.160)	(0.0804)	(0.105)
Widow	0.002	-0.0004			-0.0007	0.0000		
	(0.0019)	(0.0003)			(0.0012)	(0.0000)		
Divorced	-0.0063	0.0005	-0.0012	-0.0008	-0.0046	-0.0012	-0.0045	0.0015
	(0.0067)	(0.0019)	(0.0018)	(0.0025)	(0.0045)	(0.0033)	(0.0038)	(0.0043)
	-0.0015	-0.0073	0.0033	0.0025	0.0059	0.0084	-0.0043	-0.0105
	(0.003)	(0.004)	(0.0028)	(0.0026)	(0.0053)	(0.0087)	(0.0062)	(0.0065)

Source: Auhor's calculations by using LICs, 2006-2009. Clustered robust standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7 gives decomposition results by using BO method with panel data. We decompose total wage for every years. In this panel data, we have allowed changing of labor force participation status of individuals. Total decomposition and its parts represent similar signs but considerable differences from cross section estimation. First, nearly %100 of total differences constitute of discrimination. This might be seen problematic and further research should be done. Detailed decomposition results are also similar with cross section results.

Lastly, we estimated wage regression only with multilevel modelling, and estimation results are given in Table 8. Multilevel modelling allows the intra level correlation. This correlation occurs when subjects are observed more than ones or subject which is nested in the same higher cluster. Individuals are nested within household in our data. Individuals who live in same households will have similar characteristics. This occurs in panel data as well. We have treated households and individuals are random variables. We restrict number of our variables so that we can see effects of human capital and labor demand side of wage determination process. Multilevel modelling results demonstrate that human capital theory is valid for our sample for all periods and panel data. We see that bigness if important in the wage determination process.

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Table 8. Estimation results of wage regressions with multilevel modelling

	2006	2007	2008	2009	Panel
Age	0.0463*** (0.0112)	0.0476*** (0.0079)	0.0370*** (0.0069)	0.0466*** (0.0071)	0.101*** (0.0130)
Age ²	-0.0005** (0.0001)	-0.0005*** (0.0001)	-0.0004*** (0.0001)	-0.0004*** (0.0001)	-0.0009*** (0.0002)
Experience	0.0161** (0.0052)	0.0163*** (0.0039)	0.0174*** (0.0034)	0.0145*** (0.0037)	0.0104* (0.0043)
Experience ²	-0.0003* (0.0001)	-0.0003** (0.0001)	-0.0004*** (0.0001)	-0.0003*** (0.0001)	-0.0002 (0.0001)
Illiterate	-0.250** (0.0925)	-0.230*** (0.0593)	-0.170** (0.0536)	-0.249*** (0.0596)	-0.229 (0.129)
No Diploma	-0.131 (0.0729)	-0.109* (0.0482)	-0.153*** (0.0382)	-0.181*** (0.0403)	-0.372*** (0.100)
Primary	-0.154*** (0.0407)	-0.137*** (0.0268)	-0.0757*** (0.0226)	-0.0979*** (0.0224)	-0.205*** (0.0474)
General high School	0.181** (0.0517)	0.122*** (0.0328)	0.152*** (0.0278)	0.164*** (0.0275)	0.165** (0.0546)
Vocational High School	0.159** (0.0492)	0.137*** (0.0334)	0.202*** (0.0276)	0.200*** (0.0277)	0.277*** (0.0569)
College or More	0.461*** (0.0593)	0.463*** (0.0423)	0.475*** (0.0342)	0.456*** (0.0336)	0.511*** (0.0601)
Legislators, senior officials and managers	0.442** (0.151)	0.420*** (0.102)	0.233* (0.108)	0.435*** (0.0997)	0.200 (0.172)
Professionals	0.397** (0.143)	0.439*** (0.0951)	0.318** (0.101)	0.514*** (0.0949)	0.227 (0.169)
Technicians and associate professionals	0.420** (0.142)	0.293** (0.0914)	0.139 (0.0986)	0.298** (0.0917)	0.192 (0.165)
Clerks	0.192 (0.139)	0.102 (0.0919)	-0.0274 (0.0990)	0.141 (0.0924)	0.0663 (0.168)
Service workers and shop and market sales workers	0.0894 (0.134)	0.0180 (0.0875)	-0.142 (0.0963)	0.00740 (0.0900)	0.0305 (0.165)
Craft and related trade workers	0.251 (0.132)	0.131 (0.0862)	-0.0109 (0.0960)	0.150 (0.0900)	0.144 (0.164)
Plans and machine operators and assemblers	0.173 (0.134)	0.0937 (0.0874)	-0.0701 (0.0965)	0.0826 (0.0905)	0.0262 (0.166)
Elementary occupations	0.159 (0.133)	0.00849 (0.0862)	-0.120 (0.0962)	-0.0207 (0.0900)	-0.0550 (0.164)
≤ 10	-0.160*** (0.0369)	-0.198*** (0.0258)	-0.253*** (0.0211)	-0.265*** (0.0213)	-0.155*** (0.0342)
11-19	-0.108* (0.0459)	-0.120*** (0.0308)	-0.134*** (0.0254)	-0.0877*** (0.0265)	-0.0849* (0.0371)
≥ 50	0.194*** (0.0370)	0.136*** (0.0249)	0.130*** (0.0203)	0.111*** (0.0200)	0.164*** (0.0339)
Constant	-0.245 (0.225)	-0.0102 (0.151)	-1.387*** (0.0689)	-1.484*** (0.0834)	-1.457*** (0.181)
Household Constant	-1.301*** (0.115)	-1.438*** (0.0816)	-0.902*** (0.0312)	-0.904*** (0.0220)	-1.105*** (0.0936)
Individual Constant	-1.062*** (0.0592)	-1.064*** (0.0249)	-2.062 (.)	-2.009*** (0.0676)	-1.371*** (0.0158)
<i>N</i>	1638	3278	5196	4974	2956

Source: Auhor's calculations by using LICS, 2006-2009. Clustered robust standard errors are in parentheses. Base categories are chosen as follows: for education; "secondary", for occupation; "skilled agricultural and fishery", for firm size; "20-49 and others". * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5. CONCLUSIONS

Even it is undesirable, gender based wage gap is seen in all over the world. Countries develop policies to fight with discrimination which is seen underemployment of resources between female and male workers. The study results demonstrate that there is also necessity for effective policy development for Turkey. We think that following policy recommendations will help reducing the discrimination between female and male workers.

Education is the key policy tool in the fighting discrimination against females as in the other social problems. We know that discrimination between genders begins within family. Equal education opportunity for girls and boys will reduce discrimination which arises from human capital accumulation inequality of genders. We need to state another dimension of education at this point. It should not be understood only academic education when we talk about education. Long life education should not be ignored which tries to change perception of people about females' role in the society. If academic education is supported with this kind of education, main aim of the education will be reached.

Child bearing and rearing are main determinants of female labour force participation especially for married females. We know that legal reforms have brought several affirmative regulations. Child care especially might be a problem after the end of maternity leave. Encouraging firms to open kindergarten for its employee's children declines the cost of the being "mother" employee, at least in the long run, or cash transfers may be given to female workers for their special child care services.

Lastly, firms as demand side of wage determination process should be supported for female employment, punished if they discriminate, in-company training courses for employees against discrimination will be effective tools in the fight with discrimination. There is an important thing that should be kept in mind that we should avoid from discriminative behaviours when we fight we discrimination.

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