Öneri.C.8.S.31.
Ocak 2009.259-270.

EDUCATION, EXPERIENCE AND MALE-FEMALE WAGE DIFFERENTIALS AFTER 2001 CRISIS

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Abstract: ***This paper investigates the differentials in returns to education, returns to experience using the mincerian wage equation by using OLS and quantile regression after 2001 crisis in Turkey. The analysis is carried out using the 2002, 2003, 2005 and 2006 Turkish Household Labor Force Surveys to examine the effects of crisis on the wage differentials.***
The results show that returns to education for women is higher than for men. It is observed that men definitely have higher returns to experience than women in the years 2002 and 2003. When all data have been explored, obvious differences can be seen in wage structure after the crisis, especially in 2003. Consequently when wage structures in countries that have gone through economic crisis are explored, these periods needs to be taken into consideration so that more detailed information can be gathered about wage differentials.

Keywords: ***Educational Economics, Human Capital, Rate of Return, Wage Differentials, Quantile Regression***

2001 KRİZİ SONRASINDA EĞİTİM, TECRÜBE VE ERKEK- KADIN ÜCRET FARKLILIKLARI

Özet: ***Bu makale, 2001 yılında Türkiye' de yaşanan kriz sonrasında eğitimin ve tecrübenin getirisindeki farklılıkları Mincer Ücret Denklemleri kullanarak, En Küçük Kareler Tahmin Yöntemi ve Kantil Regresyon ile analiz etmektedir. Krizin ücret farklılıkları üzerindeki etkilerini incelemek için 2002, 2003, 2005 ve 2006 yıllarında yapılan Türkiye Hanehalkı İşgücü Anketleri kullanılmıştır.***
Analiz sonuçları kadınlar için eğitimin getirisinin erkekler için eğitimin getirisinden daha yüksek olduğunu göstermektedir. 2002 ve 2003 yıllarında erkeklerin tecrübe getirisinin kadınların tecrübe getirisinden kesinlikle daha yüksek olduğu gözlenmektedir. Araştırmanın tümü gözönüne alındığında kriz sonrasında özellikle 2003 yılında ücret yapısında ciddi farklılıklar bulunmaktadır. Makalede, ekonomik kriz yaşanan ülkelerde ücret yapısındaki farklılıklar araştırılırken özellikle kriz dönemleri dikkate alınarak ücret farklılıkları hakkında daha detaylı bilgi elde edilmesi gerektiği vurgulanmaktadır.

Anahtar Kelimeler: ***Eğitim Ekonomisi, Beşeri Sermaye, Getiri Oranı, Ücret Farklılıkları, Kantil Regresyon***

I. INTRODUCTION

Wage distribution is an important topic for not only developed countries but also developing countries. For this reason, wage equations are the most widely used to examine wage differentials in labor economics. Education is a major determinant of these equations. In studying wage inequality in various countries, its relationship with education has been explored. An increase in education influences the wage distribution through raising or lowering inequality. The importance of education for both individuals' prospects and economic growth is widely recognized. Education, and more generally, all investments in human capital are currently considered as one of the best tools to improve the long-run economic outlooks of nations. Consequently, many countries have been making substantial efforts to improve the quantity and quality of the skills acquired by their present and future workforce [1]. Returns to education have need thoroughly analyzed in the labor economics literature. Mincerian wage (earnings) equation is widely used as a vehicle for estimating "returns" to schooling quality, for measuring the impact of work experience on male-female wage differentials, and as a basis for economic studies of returns to education in countries.

Studies conducted using Mincerian wage equation to investigate wage differentials have provided the acquisition of important information. Most of the studies examine the relationship between education and wage inequality. In the literature, some of the studies that have focused on this relationship adressed public and private wage differentials in the countries, such as Mueller, Terrel, Nielsen and Rosholm [2-4], others focus on education levels and wage distribution such as Buchinsky, Hartog et al., Martins and Pereira [5-7].

Wage distribution, because of being an interesting subject for investigators, has been examined by using different econometric models and approaches. Among others, Heckman and Polachek estimate Box-Cox model, Dooley and Gottschalk use regression analysis, Fortin and

Lemieux use rank regression, Macpherson and Hirsch apply longitudinal analysis in their studies [8-11]. Recently, some authors have used the quantile regression to examine the wage differentials. For example, Buchinsky uses US data and shows the returns to education generally increase across quantiles [5]. Using the South African data, Mwabu and Schultz find that the returns increase as one goes up through the wage distribution for African white male at tertiary level [12]. Arias et al. find evidence of education and ability complementarities by using quantile regression [13]. Using the Chilean Data, Montenegro shows that systematic differences in the returns to education and to experience by gender along the conditional wage distribution [14]. He also finds that the unexplained wage differential is higher in the upper quantiles of the conditional wage distribution. Garcia et al. propose to use quantile regression in order to compare quantiles of male and female wage distributions using Spanish data [15]. While the part of the gender wage gap attributed to the different returns to characteristics increases across the wage distribution in their analysis, Gardezable and Ugidos find the opposite [16]. Harmon et al use British data and find evidence of complementarities based on quantile regression [17]. Girma and Kedir find that education is more beneficial to less able for Ethiopia [18,19]. Lee and Lee report quantile regression results for Korea, a high income East Asian country, and conclude that the returns to education in the Korean labor market are low and relatively stable across wage quantiles [20]. All of these studies in labor economics, the differentials in returns to education, returns to experience have been examined using standard mincerian wage equation.

When findings are interpreted in the studies that investigate wage distribution according to not only public and private sectors but also gender, the conditions of economy needs to be taken into consideration. Relying on the results of the analysis will not make it possible to gather information concerning the general wage structure of the country during the years when the economy experienced a crisis, for instance. It should not be forgotten that economic crisis can influence wage distribution in various ways. To illustrate, an increase in unemployment leads to lower income for the household. This implies that the increase in unemployment resulting from the crisis will worsen household income inequality by producing many households with zero labor earnings. Due to the fact that the crisis will have negative effects on a considerable number of sectors, it will have negative effects on wages, as well. The manufacturing sector has the most lost jobs, compressing the wage distribution among production workers. Production workers are most affected by the crisis. The percentage decrease in the wage share by far exceeds the rate of decline in production during the crisis. After a crisis, employers may push labor unions to accept dramatic wage cuts or compulsory unpaid leaves to avoid job losses. The wages of workers of a specific age or gender are more adversely affected during the economic crisis allows us to identify the groups that are more vulnerable. Young workers and less educated workers, which will increase the age differentials and thus inequality. The economic crisis also may be major factors that cause a decrease in educational returns.

Turkey experienced a severe economic crisis in November 2000 and again in February 2001. Most of the unemployment occurred following the outbreak of the crisis, mostly due to the bankruptcy of small and medium size firms which suffer from the credit crunch arising from a tightened control of loans among highly scrutinized banking sector. In addition to the banking sector, all the other sectors experience the effects of the economic crisis and thus an increase in wage cut and layoff rates is observed. Wage inequality becomes the highest during the crisis. While evaluating the results of this study, which will focus on wage differentials according to gender and also returns to education and experience after the 2001 crisis.

There are some published study have been carried out to examine the wage differentials in Turkey. One of them is Tansel who examines the wage differentials for both men and women by using multinomial logit models [21,22]. Unfortunately, some of the existed studies are based on regional data which cover only part provinces and cities [23-25]. In most studies on Turkey, OLS and qualitative choice models have been used. Different from these studies, Bircan and Tansel investigate the wage inequality using for men workers using quantile regression model [26].

We investigate the wage differentials of male and female employees by using OLS and quantile regression. For this purpose, we use 2002, 2003, 2005 and 2006 Household Surveys conducted by Turkish Statistical Institute.

The aims of this study are: (a) to analyze the differentials in returns to education, returns to experience using standard mincerian wage equation, (b) to compare differences between post-crisis period (2002 and 2003) and more stable period (2005-2006) to determine the effect of crisis on the wage differentials for men and female employees, (c) to provide evidence whether education and experience attributes contribute to wage inequality.

The rest of the paper is organised as follows: The following section is including introduction. Section 2, Section 3 and Section 4 introduce empirical specification, Quantile Regression and data set used, respectively. Results of regressions are presented and discussed in Section 5. The final section provides conclusion.

II. EMPIRICAL SPECIFICATION

In this study, we will follow the human capital theory for wage determination, and adopt the standard Mincerian wage equation of schooling, experience and earnings [27]. Mincer pointed out in schooling, experience and wages that the experience – wages profiles were relatively parallel for different education group. Mincer modeled the natural logarithm of wages as the function of years of education and years of potential labour market experience (age minus year of schooling minus six). As mentioned earlier, the dependent variable in the standard mincerian wage equation is the log, as opposed to the level, of wages. While logs are typically used in econometric models for reason of convenience or fit. There is a strong theoretical rationale for using log wages in human capital earnings regression [10]. Furthermore, logarithmic specification of wages is almost used in these models.

The standard mincerian wage equation can be formulated as follows:

$$W_i = \alpha_0 + \alpha_1 NS_i + \alpha_2 EXP_i + \alpha_3 EXP_i^2 + u_i \quad (1)$$

where W_i is log of hourly wages, NS_i is the number of schooling years and EXP_i corresponds to Mincer experience was calculated as age minus schooling minus school starting age and u_i is a random iid. disturbance term that reflects unobserved characteristics. In common usage, the coefficient on number of schooling in a regression of log wages is often called a rate of return to education. This model also can include some other regressors that may affect earnings such as occupation, race, gender, marital status, region, race, number of children, firm size etc. Though a list of other regressors are typically added to the standard mincerian wage equation, the three key variables in equation still appear in most empirical estimates of wage regressions. The mincer equation remains a good approximation for the true wage equation. It is quite valuable to keep estimating the same equation for the sake of comparability across studies. This equation provides a parsimonious specification that fits the data remarkably well in most contexts.

III. QUANTILE REGRESSION

OLS and most estimation approaches focus on the mean effects. The quantile regression model introduced by Koenker and Basset is more flexible than OLS and allows for studying effects of covariates on the whole distribution of the dependent variable [28]. Quantile regression allows us to examine more comprehensive pictures for different quantile wage groups. In a wage equation setting, the Quantile regression model can be written as:

$$W_i = X_i \beta_\theta + \varepsilon_{\theta i}$$

$$\text{with } Quant_\theta(W_i|X_i) = X_i \beta_\theta \quad (2)$$

where W_i is the log of earnings or wages for individual i. X_i is the vector of exogenous variables and β_θ is the vector of parameters. $Quant_\theta(W_i|X_i)$ denotes the θth conditional quantile of W_i given X_i. The θth regression quantile , $0 < \theta < 1$, is defined as a solution to the problem:

$$min_{\beta \in R^k} \left\{ \sum_{i:W_i \geq X_i\beta} \theta |W_i - X_i\beta_\theta| + \sum_{i:W_i < X_i\beta} (1-\theta)|W_i - X_i\beta_\theta| \right\} \quad (3)$$

This above equation is usually written as:

$$min_{\beta \in R^k} \sum_i \rho_\theta (W_i - X_i\beta_\theta) \quad (4)$$

Where $\rho_\theta(\varepsilon)$ is the check function defined as $\rho_\theta(\varepsilon) = \theta\varepsilon$ if $\varepsilon > 0$ or $\rho_\theta(\varepsilon) = (\theta - 1)\varepsilon$ if $\varepsilon < 0$.

This problem is solved using linear programming methods. Standard errors for the vector of coefficient are obtainable by using the bootstrap method described in Buchinsky [29]. The quantile regression has a number of useful features, in addition to allowing the full characterization of the conditional distribution of the dependent variable, such as: the quantile regression objective function is a weighted sum of absolute deviations, resulting in a robust measure of location, so that the estimated coefficient vector is not sensitive to the outlier observation on the dependent variable and when the error term is non-gaussian, quantile regression estimators may be more efficient than OLS estimators [29]. Quantile regression estimates the regression function for different quantiles of the conditional wage distribution. This regression has several advantages over the typical mean regression estimation method. Since the quantile regression estimated by minimizing the sum of absolute values of residuals instead of the sum squared residuals, it is robust to heteroscedasticity, or a few extreme observations. Also it is possible to examine different conditional quantiles of the distribution, not just the conditional mean of the dependent variable.

IV. DATA

In this study, we examine the wage differentials separately for male and female employees in Turkey using the Turkish Household Labour Force Surveys conducted by Turkish Statistical Institute in the years 2002, 2003, 2005 and 2006. The surveys gathered a rich information set on the demographic of individuals. It is

obvious that the economic crisis in the countries have effected several sectors, the result of this, wage differentials will also have been affected negatively. Because of this reason, we analyze the years 2002 and 2003 in order to gather information about the effects of crisis on the wage differentials. We also examine the years 2005 and 2006 in which the economy was more stable to have general information about the wage differentials in Turkey. The results of the analysis will be evaluated for two different periods separately: Post crisis period (2002 and 2003) and stable period (2005 and 2006).

We divide the data into two group and examine the pattern wage differentials separately for men and women employees for each year. The employees who did not work in the survey year were deleted. Also the employees between the ages 15 and 65 are considered. The number of observations for each year used in the study can be seen in Table.1.

Wage distribution, because of being an interesting subject for investigators, has been examined by using econometric models. Many studies show that the wages mostly have non-gaussian distribution. In order to determine the distribution of wages, we report the descriptive statistics of the variables in sample for the years 2002, 2003, 2005 and 2006 for both male and female employees in Table.1.

Table 1. Descriptive Statistics

Log wages*	**Men**				**Women**			
	2002	**2003**	**2005**	**2006**	**2002**	**2003**	**2005**	**2006**
Mean	14.4814	6.4069	1.2081	1.3302	14.3389	6.2702	1.0961	1.2238
Median	14.4441	6.3979	1.1394	1.3217	14.4441	6.2730	1.0340	1.1394
Std. Dev.	0.7157	0.3109	0.5954	0.5305	0.8716	0.3942	0.6980	0.6302
Skewness	0.0474	0.0167	-0.1374	0.5429	-0.6944	-0.7335	-0.6152	0.0550
Kurtosis	4.6554	5.0007	4.8083	3.7037	4.7570	4.0555	4.9595	3.3047
Jarque-Bera (probability)	3624.535 (0.0000)	766.758 (0.0000)	1417.655 (0.0000)	3799.007 (0.0000)	1663.282 (0.0000)	133.655 (0.0000)	615.2934 (0.0000)	64.8787 (0.0000)
Number of schooling	**Men**				**Women**			
	2002	**2003**	**2005**	**2006**	**2002**	**2003**	**2005**	**2006**
Mean	8.3783	8.0842	8.7434	8.8224	9.9597	9.6985	10.3992	10.6396
Median	8.0000	8.0000	8.0000	8.0000	11.0000	11.0000	11.0000	11.0000
Std. Dev.	3.7330	3.5760	3.7051	3.6761	4.2748	4.0454	3.9901	3.9282
Skewness	0.6104	0.7797	0.4208	0.4151	-0.0085	0.1189	-0.1886	-0.2585
Kurtosis	1.9373	2.5571	1.8587	1.8311	1.3327	1.6869	1.5803	1.6024
Jarque-Bera (probability)	3453.682 (0.0000)	503.2672 (0.0000)	852.092 (0.0000)	4664.045 (0.0000)	921.8007 (0.0000)	72.8607 (0.0000)	247.9639 (0.0000)	1371.857 (0.0000)
Experience	**Men**				**Women**			
	2002	**2003**	**2005**	**2006**	**2002**	**2003**	**2005**	**2006**
Mean	16.5223	23.1305	20.1642	20.3189	11.9528	16.6517	14.9289	14.9073
Median	16.0000	22.0000	20.0000	21.0000	11.0000	15.0000	12.0000	11.0000
Std. Dev.	9.8458	12.0327	10.7421	10.6864	8.7414	10.7244	9.9090	9.9439
Skewness	0.4953	0.4728	0.3066	0.3331	0.7941	0.6378	0.7098	0.6701
Kurtosis	2.7952	2.9609	2.5442	2.5528	3.2339	2.7994	2.9955	2.8074
Jarque-Bera (probability)	1349.017 (0.0000)	171.5695 (0.0000)	247.447 (0.0000)	1460.601 (0.0000)	854.5909 (0.0000)	68.2298 (0.0000)	231.6210 (0.0000)	1132.745 (0.0000)
Number of observations	31639	4596	10170	54453	7958	982	2758	14826

*As of January 1, 2005, six zeroes were deleted from the Turkish currency, the Türk Lirası (TL—Turkish Lira), and the Yeni Türk Lirası (YTL—New Turkish Lira) became the new currency unit of Turkey. For this reason, there is a fall in the wage figures in the both years 2005 and 2006.

The male and female average wage differentials are 0.142, 0.136, 0.112 and 0.106 for the years 2002, 2003, 2005 and 2006, respectively. It is clear that, the average wage differentials are larger in the post crisis period than in the stable period.

Women's level of average schooling are below 10 years in the post crisis period, while they are above 10 years in the stable period. In the all years, men's level of average schooling are below 9 years. Generally, for all years women's average schooling are higher than the men, but when the compare to the post crisis and the stable period, men and women have more education in the stable period than in the post crisis period.

When average experience for all the years is examined, it is clear that men have more experience than women. For the men employees (for the female employees) average experiences are 17(12), 23(17), 20(15), 20(15) in the years 2002, 2003, 2005 and 2006, respectively. After examining the results concerning both male and female employees for all the years, it would not be wrong to state that the difference between average experience levels is 5 years. It is possible to state that the reason for difference between experience levels is that women tend to take a much longer period of parental leave than men. Moreover, this difference can result from the fact that women may want to be part time employed for a certain period of time after they give birth.

When the standard deviation of the logarithmic wages and number of schooling variables are studied, it is observed that female wage and education level differentials are higher in all the years. However, it is also observed that experience differentials for male are higher than female in all the years.

The results of Table.1 show that the distribution of logarithmic wages is non-gaussian. The Jarque Bera normality test rejects any reasonable level null hypothesis of normally distributed in the years 2002, 2003, 2005 and 2006 for the both male and female employees [30]. For this reason we use the Quantile regression beside OLS to estimate the standard mincerian wage equation.

We also calculate some ratios to determine the differentials of wages, education and experience between men and women. All the results of ratios are reported in the Table.2.

The wage ratios $\left(\frac{W^f}{W^m} * 100\right)$ are 99% , 98%, 91% and 92% for the years 2002, 2003, 2005 and 2006, respectively. Although the years 2002 and 2003 were the years just after the crisis, wage ratios are calculated to be very close to 100%. In fact, the expected wage rate could be lower during this period when the effects of the crisis were felt strongly. The earlier paper of the authors examines the wage differentials in public and private sectors in 2003 and finds some evidence about this result They found that the wage rate for employees was 99.8% and 96.8% in the public and private sectors, respectively [31]. It is argued that the reason why wage rate is approximately 100% in especially the year 2003 is that there are not considerable wage differentials between male and female employees working in the same position in the public sector. Wage cuts and layoffs were often encountered in the private sector during these periods and it became very common to work for low income. Public sector employees, on the other hand, were more able to keep their positions during this period.

We also define the experience ratio and education ratio (defined in a similar way). The education ratios are 131%, 120%, 126% and 125% and the experience ratios are 72%, 72%, 74% and 74% for the same years. Table 2 shows that women are more educated than men, but women have less experience and earn less than men for the all years.

V. EMPIRICAL RESULTS

In this study, we analyse the standard mincerian wage equation that includes years of schooling, years of experience, and the square of years of experience. The equations are estimated by OLS and quantile regression for the years 2002, 2003, 2005 and 2006 for the both male and female employees . The estimation results of the both OLS and quantile regression are reported in Table.3 and depicted in Figure.1 and 2 (figures not include the OLS estimates).

Table.2. Ratios of Wage, Education and Experience

Ratio	2002	2003	2005	2006
Wage Ratio = $\left(\frac{W^f}{W^m} * 100\right)$	99.02%	97.87 %	90.73%	92.00%
Education Ratio = $\left(\frac{ED^f}{ED^m} * 100\right)$	131.29%	119.97 %	125.81%	124.68%
Experience Ratio = $\left(\frac{EX^f}{EX^m} * 100\right)$	71.74%	71.99 %	74.04%	73,37%

Table.3a. The Results of Regression in 2002

dep var: log hourly wages										
OLS / Q.	Number of Schooling		Experience		Experience^2		Constant		R^2 / Pseudo-R^2	
	men	women	men	Women	men	Women	men	Women	men	women
OLS	0.1136***	0.1438***	0.0479***	0.0202***	-0.0008***	-0.0004***	13.0465***	12.7632***	0.3556	0.4816
	(0.0009)	(0.0017)	(0.0011)	(0.0024)	(0.00003)	(0.00007)	(0.0129)	(0.0252)		
Q10	0.1044***	0.1951***	0.0679***	0.0260***	-0.0015***	-0.0006***	12.4059***	11.4924***	0.1697	0.2891
	(0.0018)	(0.0030)	(0.0022)	(0.0042)	(0.00005)	(0.0001)	(0.0278)	(0.0401)		
Q15	0.1069***	0.1776***	0.0652***	0.0206***	-0.0014***	-0.0005***	12.5115***	11.9080***	0.1779	0.2891
	(0.0009)	(0.0017)	(0.0012)	(0.0026)	(0.00003)	(0.00008)	(0.0146)	(0.0244)		
Q20	0.1074***	0.1584***	0.0531***	0.0284***	-0.0011***	-0.0007***	12.7065***	12.1945***	0.1912	0.2873
	(0.0006)	(0.0015)	(0.0007)	(0.0022)	(0.00002)	(0.00007)	(0.0087)	(0.0213)		
Q25	0.1094***	0.1484***	0.0521***	0.0174***	-0.0010***	-0.0005***	12.7548***	12.4891***	0.2046	0.2975
	(0.0004)	(0.0015)	(0.0005)	(0.0023)	(0.00001)	(0.00007)	(0.0066)	(0.0227)		
Q30	0.1076***	0.1411***	0.0497***	0.0269***	-0.0010***	-0.0007***	12.8596***	12.5890***	0.2182	0.3142
	(0.0003)	(0.0002)	(0.0004)	(0.0004)	(0.000001)	(0.00001)	(0.0045)	(0.0036)		
Q35	0.1107***	0.1336***	0.0436***	0.0238***	-0.0008***	-0.0006***	12.9393***	12.7466***	0.2356	0.3313
	(1.90e-7)	(0.0016)	(2.30e-7)	(0.0023)	(5.71e-9)	(0.00007)	(2.80e-6)	(0.0231)		
Q40	0.1112***	0.1283***	0.0413***	0.0199***	-0.0008***	-0.0004***	13.0235***	12.8781***	0.2381	0.3507
	(0.0003)	(0.0015)	(0.0004)	(0.0022)	(0.00001)	(0.00007)	(0.0050)	(0.0230)		
Q45	0.1112***	0.1250***	0.0420***	0.0183***	-0.0007***	-0.0004***	13.0447***	12.9842***	0.2444	0.3663
	(0.0014)	(0.0007)	(0.0017)	(0.0010)	(0.00004)	(0.00003)	(0.0202)	(0.0101)		
Q50	0.1099***	0.1253***	0.0412***	0.0164***	-0.0007***	-0.0004***	13.1221***	13.0385***	0.2432	0.3741
	(3.39e-12)	(0.0012)	(4.08e-12)	(0.0017)	(1.02e-13)	(0.00005)	(4.84e-11)	(0.0183)		
Q55	0.1098***	0.1222***	0.0402***	0.0197***	-0.0007***	-0.0004***	13.1888***	13.1022***	0.2459	0.3765
	(0.0007)	(0.0001)	(0.0008)	(0.0002)	(0.00002)	(6.27e-6)	(0.0098)	(0.0021)		
Q60	0.1104***	0.1257***	0.0383***	0.0178***	-0.0006***	-0.0004***	13.2519***	13.1249***	0.2444	0.3719
	(0.0007)	(0.0014)	(0.0008)	(0.0019)	(0.00002)	(0.00006)	(0.0093)	(0.0199)		
Q65	0.1109***	0.1241***	0.0443***	0.0194***	-0.0007***	-0.0004***	13.2575***	13.1763***	0.2393	0.3624
	(0.0014)	(0.0013)	(0.0016)	(0.0019)	(0.00004)	(0.00006)	(0.0190)	(0.0196)		
Q70	0.1141***	0.1277***	0.0428***	0.0173***	-0.0006***	-0.0004***	13.2961***	13.2044***	0.2330	0.3490
	(0.0005)	(0.0009)	(0.0007)	(0.0012)	(0.00002)	(0.00004)	(0.0076)	(0.0124)		
Q75	0.1139***	0.1285***	0.0419***	0.0166***	-0.0006***	-0.0004***	13.3879***	13.2582***	0.2220	0.3283
	(0.0006)	(0.0012)	(0.0007)	(0.0017)	(0.00002)	(0.00005)	(0.0083)	(0.0177)		
Q80	0.1146***	0.1293***	0.0437***	0.0193***	-0.0006***	-0.0003***	13.4557***	13.2884***	0.2107	0.3070
	(0.0009)	(0.0018)	(0.0011)	(0.0025)	(0.00003)	(0.00008)	(0.0118)	(0.0257)		
Q85	0.1154***	0.1290***	0.0434***	0.0242***	-0.0005***	-0.0005***	13.5207***	13.3472***	0.1952	0.2796
	(0.0020)	(0.0022)	(0.0024)	(0.0031)	(0.00006)	(0.0001)	(0.0269)	(0.0309)		
Q90	0.1204***	0.1298***	0.0486***	0.0234***	-0.0006***	-0.0004***	13.5715***	13.4843***	0.1845	0.2475
	(0.0010)	(0.0023)	(0.0012)	(0.0035)	(0.00003)	(0.00001)	(0.0132)	(0.0327)		

(i) *, **, *** indicate significance at the 10% level, 5% level, at the 1% level, respectively.

(ii) Standard errors are in the parenthesis

Table.3b. The Results of Regression in 2003

dep var: log hourly wages										
OLS / Q.	Number of Schooling		Experience		Experience^2		Constant		R^2 / Pseudo-R^2	
	men	women	men	women	men	Women	Men	women	men	women
OLS	0.0453***	0.0694***	0.0269***	0.0225***	-0.0004***	-0.0005***	5.6856***	5.4208***		
	(0.0012)	(0.0025)	(0.0011)	(0.0028)	(0.00002)	(0.00007)	(0.0190)	(0.0393)	0.2800	0.5033
Q10	0.0469***	0.0989***	0.0362***	0.0193***	-0.0007***	-0.0005***	5.3512***	4.8310***		
	(0.0020)	(0.0054)	(0.0020)	(0.0057)	(0.00003)	(0.0001)	(0.0348)	(0.0777)	0.1688	0.3544
Q15	0.0453***	0.0860***	0.0324***	0.0194***	-0.0006***	-0.0005***	5.4493***	5.0679***		
	(0.0014)	(0.0039)	(0.0014)	(0.0045)	(0.00002)	(0.0001)	(0.0249)	(0.0574)	0.1679	0.3510
Q20	0.0447***	0.0806***	0.0313***	0.0176***	-0.0005***	-0.0004***	5.4974***	5.1771***		
	(0.0011)	(0.0030)	(0.0011)	(0.0035)	(0.00002)	(0.0001)	(0.0189)	(0.0456)	0.1736	0.3416
Q25	0.0452***	0.0764***	0.0301***	0.0195***	-0.0005***	-0.0004***	5.5338***	5.2397***		
	(0.0010)	(0.0024)	(0.0010)	(0.0028)	(0.00002)	(0.0001)	(0.0170)	(0.0379)	0.1807	0.3281
Q30	0.0441***	0.0704***	0.0287***	0.0224***	-0.0005***	-0.0005***	5.5812***	5.3246***		
	(0.0012)	(0.0024)	(0.0012)	(0.0027)	(0.00002)	(0.0001)	(0.0198)	(0.0371)	0.1911	0.3150
Q35	0.0436***	0.0659***	0.0284***	0.0240***	-0.0005***	-0.0006***	5.6134***	5.3868***		
	(0.0007)	(0.0024)	(0.0007)	(0.0028)	(0.00001)	(0.0001)	(0.0120)	(0.0381)	0.1926	0.3132
Q40	0.0443***	0.0656***	0.0271***	0.0246***	-0.0004***	-0.0006***	5.6443***	5.4060***		
	(0.0012)	(0.0027)	(0.0011)	(0.0031)	(0.00002)	(0.0001)	(0.0193)	(0.0438)	0.2016	0.3180
Q45	0.0429***	0.0628***	0.0269***	0.0268***	-0.0004***	-0.0006***	5.6806***	5.4481***		
	(0.0013)	(0.0030)	(0.0013)	(0.0034)	(0.00002)	(0.0001)	(0.0214)	(0.0473)	0.2008	0.3296
Q50	0.0436***	0.0596***	0.0258***	0.0262***	-0.0004***	-0.0006***	5.7047***	5.5254***		
	(0.0014)	(0.0026)	(0.0013)	(0.0029)	(0.00002)	(0.0001)	(0.0218)	(0.0411)	0.1928	0.3378
Q55	0.0420***	0.0573***	0.0248***	0.0258***	-0.0004***	-0.0006***	5.7536***	5.5692***		
	(0.0011)	(0.0018)	(0.0010)	(0.0020)	(0.00002)	(0.00005)	(0.0173)	(0.0280)	0.1884	0.3468
Q60	0.0418***	0.0571***	0.0248***	0.0238***	-0.0004***	-0.0005***	5.7761***	5.6108***		
	(0.0012)	(0.0024)	(0.0011)	(0.0026)	(0.00002)	(0.00006)	(0.0191)	(0.0373)	0.1765	0.3459
Q65	0.0403***	0.0583***	0.0251***	0.0234***	-0.0004***	-0.0005***	5.8185***	5.6261***		
	(0.0015)	(0.0020)	(0.0014)	(0.0022)	(0.00003)	(0.00005)	(0.0228)	(0.0315)	0.1712	0.3400
Q70	0.0398***	0.0579***	0.0247***	0.0219***	-0.0003***	-0.0004***	5.8509***	5.6565***		
	(0.0011)	(0.0017)	(0.0010)	(0.0018)	(0.00002)	(0.00004)	(0.0168)	(0.0260)	0.1687	0.3320
Q75	0.0417***	0.0560***	0.0241***	0.0238***	-0.0003***	-0.0005***	5.8693***	5.6887***		
	(0.0016)	(0.0021)	(0.0015)	(0.0022)	(0.00003)	(0.00005)	(0.0245)	(0.0324)	0.1598	0.3210
Q80	0.0429***	0.0575***	0.0257***	0.0255***	-0.0003***	-0.0005***	5.8740***	5.6849***		
	(0.0014)	(0.0020)	(0.0014)	(0.0023)	(0.00003)	(0.0001)	(0.0217)	(0.0317)	0.1464	0.3096
Q85	0.0447***	0.0552***	0.0260***	0.0267***	-0.0003***	-0.0005***	5.8924***	5.7416***		
	(0.0021)	(0.0036)	(0.0020)	(0.0039)	(0.00004)	(0.0001)	(0.0314)	(0.0534)	0.1371	0.2971
Q90	0.0479***	0.0593***	0.0275***	0.0299***	-0.0003***	-0.0006***	5.9006***	5.7376***		
	(0.0022)	(0.0040)	(0.0020)	(0.0042)	(0.00004)	(0.0001)	(0.0310)	(0.0585)	0.1309	0.2914

(i) *, **, *** indicate significance at the 10% level, 5% level, at the 1% level, respectively.

(ii) Standard errors are in the parenthesis

Table.3c. The Results of Regression in 2005

dep var: log hourly wages										
OLS / Q.	Number of Schooling		Experience		Experience^2		Constant		R^2 / Pseudo-R^2	
	men	women	Men	women	men	Women	men	women	men	women
OLS	0.0911***	0.1183***	0.0583***	0.0495***	-0.0009***	-0.0010***	-0.2780***	-0.5581***		
	(0.0014)	(0.0027)	(0.0016)	(0.0033)	(0.00003)	(0.00008)	(0.0231)	(0.0430)	0.3265	0.4317
Q10	0.0819***	0.1523***	0.0754***	0.0658***	-0.0014***	-0.0015***	-0.8477***	-1.5665***		
	(0.0030)	(0.0053)	(0.0038)	(0.0070)	(0.00008)	(0.0002)	(0.0558)	(0.0821)	0.1371	0.2330
Q15	0.0761***	0.1331***	0.0635***	0.0740***	-0.0012***	-0.0017***	-0.5754***	-1.2858***		
	(0.0009)	(0.0032)	(0.0012)	(0.0042)	(0.00002)	(0.0001)	(0.0161)	(0.0518)	0.1251	0.2395
Q20	0.0811***	0.1270***	0.0645***	0.0637***	-0.0011***	-0.0014***	-0.5285***	-1.0763***		
	(0.0001)	(0.0036)	(0.0001)	(0.0048)	(0.000003)	(0.0001)	(0.0019)	(0.0572)	0.1270	0.2180
Q25	0.0848***	0.1191***	0.0618***	0.0637***	-0.0011***	-0.0014***	-0.4735***	-0.9088***		
	(0.0018)	(0.0015)	(0.0022)	(0.0020)	(0.00005)	(0.00005)	(0.0304)	(0.0242)	0.1470	0.2064
Q30	0.0875***	0.1138***	0.0614***	0.0582***	-0.0011***	-0.0012***	-0.4606***	-0.7292***		
	(0.0014)	(0.0019)	(0.0016)	(0.0024)	(0.00004)	(0.00006)	(0.0231)	(0.0309)	0.1697	0.2138
Q35	0.0837***	0.1082***	0.0575***	0.0633***	-0.0010***	-0.0013***	-0.3274***	-0.6630***		
	(0.0013)	(0.0028)	(0.0016)	(0.0035)	(0.00003)	(0.00009)	(0.0224)	(0.0459)	0.1830	0.2351
Q40	0.0888***	0.0994***	0.0563***	0.0576***	-0.0010***	-0.0012***	-0.3178***	-0.4346***		
	(0.00007)	(0.0027)	(0.00008)	(0.0033)	(1.78e-6)	(0.00009)	(0.0012)	(0.0433)	0.2046	0.2592
Q45	0.0908***	0.1005***	0.0559***	0.0583***	-0.0009***	-0.0012***	-0.3268***	-0.4258***		
	(0.0016)	(0.0002)	(0.0018)	(0.0003)	(0.00004)	(6.59e-7)	(0.0259)	(0.0034)	0.2118	0.2838
Q50	0.0833***	0.1032***	0.0514***	0.0462***	-0.0008***	-0.0009***	-0.1201***	-0.3281***		
	(0.0017)	(0.0008)	(0.0019)	(0.0009)	(0.00004)	(0.00002)	(0.0269)	(0.0121)	0.2158	0.3064
Q55	0.0878***	0.1030***	0.0500***	0.0457***	-0.0008***	-0.0009***	-0.1132***	-0.2679***		
	(0.0009)	(0.0026)	(0.0011)	(0.0031)	(0.00002)	(0.00008)	(0.0154)	(0.0410)	0.2248	0.3192
Q60	0.0899***	0.1014***	0.0491***	0.0400***	-0.0008***	-0.0008***	-0.0771***	-0.1569***		
	(0.0004)	(0.0017)	(0.0005)	(0.0020)	(0.00001)	(0.00005)	(0.0067)	(0.0264)	0.2221	0.3304
Q65	0.0915***	0.1009***	0.0525***	0.0469***	-0.0008***	-0.0010***	-0.0996***	-0.1567***		
	(0.0022)	(0.0016)	(0.0024)	(0.0018)	(0.00005)	(0.00005)	(0.0347)	(0.0242)	0.2222	0.3308
Q70	0.0911***	0.1027***	0.0527***	0.0420***	-0.0008***	-0.0008***	-0.0202***	-0.0922***		
	(0.0014)	(0.0011)	(0.0016)	(0.0014)	(0.00003)	(0.00004)	(0.0221)	(0.0175)	0.2189	0.3232
Q75	0.0910***	0.1048***	0.0506***	0.0390***	-0.0007***	-0.0007***	0.0606***	-0.0528***		
	(0.0010)	(0.0028)	(0.0011)	(0.0033)	(0.00002)	(0.00009)	(0.0151)	(0.0425)	0.2120	0.3084
Q80	0.0932***	0.1096***	0.0473***	0.0408***	-0.0006***	-0.0007***	0.1218***	-0.0662***		
	(0.0016)	(0.0037)	(0.0017)	(0.0042)	(0.00004)	(0.0001)	(0.0237)	(0.0556)	0.2017	0.2922
Q85	0.0891***	0.1114***	0.0490***	0.0384***	-0.0006***	-0.0006***	0.2325***	0.0184***		
	(0.0015)	(0.0025)	(0.0016)	(0.0030)	(0.00004)	(0.00008)	(0.0220)	(0.0381)	0.1854	0.2716
Q90	0.0982***	0.1155***	0.0496***	0.0434***	-0.0006***	-0.0007***	0.2587***	0.0570***		
	(0.0026)	(0.0044)	(0.0026)	(0.0050)	(0.00006)	(0.0001)	(0.0371)	(0.0661)	0.1800	0.2558

(iii) *, **, *** indicate significance at the 10% level, 5% level, at the 1% level, respectively.

(iv) Standard errors are in the parenthesis

Table.3d. The Results of Regression in 2006

dep var: log hourly wages										
OLS / Q.	Number of Schooling		Experience		Experience^2		Constant		R^2 / Pseudo-R^2	
	men	women	Men	women	men	Women	men	women	men	women
OLS	0.0862***	0.1149***	0.0509***	0.0515***	-0.0008***	-0.0010***	-0.0498***	-0.4608***		
	(0.0005)	(0.0010)	(0.0006)	(0.0013)	(0.00001)	(0.00003)	(0.0091)	(0.0169)	0.3441	0.4630
Q10	0.0684***	0.1322***	0.0552***	0.0603***	-0.0010***	-0.0012***	-0.3744***	-1.2654***		
	(0.0010)	(0.0022)	(0.0013)	(0.0026)	(0.00003)	(0.00006)	(0.0188)	(0.0359)	0.1279	0.2489
Q15	0.0698***	0.1252***	0.0552***	0.0620***	-0.0009***	-0.0013***	-0.3099***	-1.0744***		
	(0.0007)	(0.0009)	(0.0009)	(0.0011)	(0.00002)	(0.00003)	(0.0126)	(0.0148)	0.1135	0.2394
Q20	0.0757***	0.1161***	0.0544***	0.0614***	-0.0009***	-0.0012***	-0.2986***	-0.8859***		
	(0.0004)	(0.0010)	(0.0005)	(0.0013)	(0.00001)	(0.00003)	(0.0075)	(0.0163)	0.1311	0.2248
Q25	0.0792***	0.1134***	0.0529***	0.0674***	-0.0009***	-0.0014***	-0.2484***	-0.8213***		
	(6.35e-20)	(0.0018)	(7.92e-20)	(0.0023)	(1.69e-21)	(0.00006)	(1.11e-18)	(0.0302)	0.1530	0.2143
Q30	0.0850***	0.1099***	0.0513***	0.0571***	-0.0008***	-0.0011***	-0.2540***	-0.6287***		
	(0.00002)	(0.0008)	(0.00003)	(0.0010)	(5.87e-7)	(0.00003)	(0.0004)	(0.0138)	0.1803	0.2285
Q35	0.0813***	0.1064***	0.0532***	0.0605***	-0.0009***	-0.0012***	-0.1734***	-0.5762***		
	(0.0006)	(0.0007)	(0.0007)	(0.0008)	(0.00002)	(0.00002)	(0.0103)	(0.0107)	0.1956	0.2477
Q40	0.0862***	0.1050***	0.0525***	0.0590***	-0.0008***	-0.0011***	-0.1910***	-0.4932***		
	(0.0003)	(0.0005)	(0.0004)	(0.0006)	(8.31e-6)	(0.00001)	(0.0056)	(0.0076)	0.2042	0.2749
Q45	0.0855***	0.1010***	0.0540***	0.0525***	-0.0009***	-0.0010***	-0.1438***	-0.3279***		
	(0.00002)	(0.0003)	(0.00003)	(0.0004)	(5.96e-7)	(0.00001)	(0.0004)	(0.0052)	0.2162	0.2952
Q50	0.0859***	0.1050***	0.0479***	0.0537***	-0.0008***	-0.0010***	-0.0255***	-0.3389***		
	(0.00008)	(0.0001)	(0.00009)	(0.0001)	(1.93e-06)	(3.89e-6)	(0.0013)	(0.0020)	0.2260	0.3108
Q55	0.0864***	0.1044***	0.0513***	0.0436***	-0.0008***	-0.0008***	-0.0269***	-0.2075***		
	(0.0006)	(0.0010)	(0.0007)	(0.0012)	(0.00001)	(0.00003)	(0.0097)	(0.0165)	0.2260	0.3267
Q60	0.0881***	0.1062***	0.0494***	0.0459***	-0.0008***	-0.0009***	0.0189***	-0.1964***		
	(0.0004)	(0.0010)	(0.0004)	(0.0012)	(8.49e-6)	(0.00003)	(0.0058)	(0.0162)	0.2299	0.3324
Q65	0.0879***	0.1063***	0.0516***	0.0417***	-0.0008***	-0.0008***	0.0653***	-0.1242***		
	(3.19e-13)	(0.0009)	(3.54e-13)	(0.0011)	(7.71e-15)	(0.00003)	(5.10e-12)	(0.0147)	0.2287	0.3324
Q70	0.0930***	0.1099***	0.0510***	0.0428***	-0.0008***	-0.0008***	0.0539***	-0.1164***		
	(0.0005)	(0.0013)	(0.0006)	(0.0015)	(0.00001)	(0.00004)	(0.0080)	(0.0194)	0.2220	0.3247
Q75	0.0916***	0.1106***	0.0465***	0.0453***	-0.0006***	-0.0008***	0.1672***	-0.0878***		
	(0.0005)	(0.0008)	(0.0005)	(0.0009)	(0.00001)	(0.00002)	(0.0075)	(0.00002)	0.2173	0.3144
Q80	0.0916***	0.1125***	0.0475***	0.0460***	-0.0006***	-0.0008***	0.2370***	-0.0525***		
	(0.0002)	(0.0011)	(0.0002)	(0.0012)	(4.73e-6)	(0.00003)	(0.0031)	(0.0160)	0.2050	0.2962
Q85	0.0953***	0.1171***	0.0494***	0.0433***	-0.0007***	-0.0008***	0.2508***	-0.0165		
	(0.0008)	(0.0018)	(0.0008)	(0.0021)	(0.00002)	(0.00006)	(0.0120)	(0.0269)	0.1962	0.2764
Q90	0.0921***	0.1204***	0.0473***	0.0467***	-0.0006***	-0.0008***	0.4060***	0.0295		
	(0.0003)	(0.0021)	(0.0003)	(0.0025)	(5.64e-6)	(0.00007)	(0.0039)	(0.0316)	0.1894	0.2561

(i) *, **, *** indicate significance at the 10% level, 5% level, at the 1% level, respectively.
(ii) Standard errors are in the parenthesis

Firstly, we estimate the Mincerian equation (1) by using OLS. A glance to the OLS estimates reveals that all coefficients are highly statistically significant. The individual variables have the expected effect on the wages for both male and female employees. The wage increases with the number of schooling and experience. The comparison of the male and female employees OLS coefficients show that the effects of the number of schooling are smaller for men employees while the effects of experience are smaller for female employees except in the year 2006.

Secondly, mincerian equations are estimated separately for male and female employees using quantile regression to examine how the return to schooling varies across the conditional distribution of wages. For quantile regression, the standard mincerian wage equation is formally written as follows:

$$W_i = \alpha_\theta + \beta_\theta NS_i + \delta_{\theta 1} EXP_i + \delta_{\theta 2} EXP_i^2 + u_i \quad (5)$$

where i=1.....N (N being the number of observations). θ is the quantile being analyzed. Wage, experience and number of schooling are calculated in the same way as standard mincerian wage equation (1). Our main purpose is to characterize the whole distribution of the wage structure and so we analyse OLS wage returns as well as conditional wage returns at 17 representative quantiles (θ = 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.55, 0.60, 0.65, 0.70, 0.75, 0.80, 0.85, 0.90) which we will denote by Q10... Q50...Q75 and Q90, henceforth.

The results of quantile regression show differences in the returns to education and to experience by gender along the conditional wage distribution. The estimated quantile regression coefficients for the variables generally vary across distribution and differ from the OLS estimates regarding the sizes but not regarding the signs.

For all years, the coefficients on the number of schooling are statistically significant in the OLS and quantile regressions. When the coefficients are examined, it is observed that returns to education for women in all the years are higher than that for men. Results of the returns to education of quantile regression are depicted on Figure.1.

Figure.1 shows the returns to education for men and female employees for the years 2002, 2003, 2005 and 2006. In the year 2002, the returns to education for women decline to the 55th quantile, but an increase is observed from the 55th quantile to the higher quantiles. Returns to education for men show an increase towards higher quantiles. However, these increases are in small values. In the year 2003, returns to education for women show a decrease towards higher quantiles, whereas in all the quantiles for men, the values are close. In the year 2005, returns to education for women show a decrease towards the 65th quantile and an increase above this quantile. In the same year, returns to education for men show an increase towards high quantiles. The results of the year 2006 are similar to those of 2005. When all the years are examined, the results are found to be different in the year 2003, especially for women. Returns to education have shown a decline from lower quantiles to higher quantiles. When evaluated in general terms, the returns to education are higher for women than for men in all quantiles.

For all years, the coefficient on the experience are statistically significant in the OLS and quantile regressions. Results of the returns to experience of quantile regression is depicted on Figure.2.

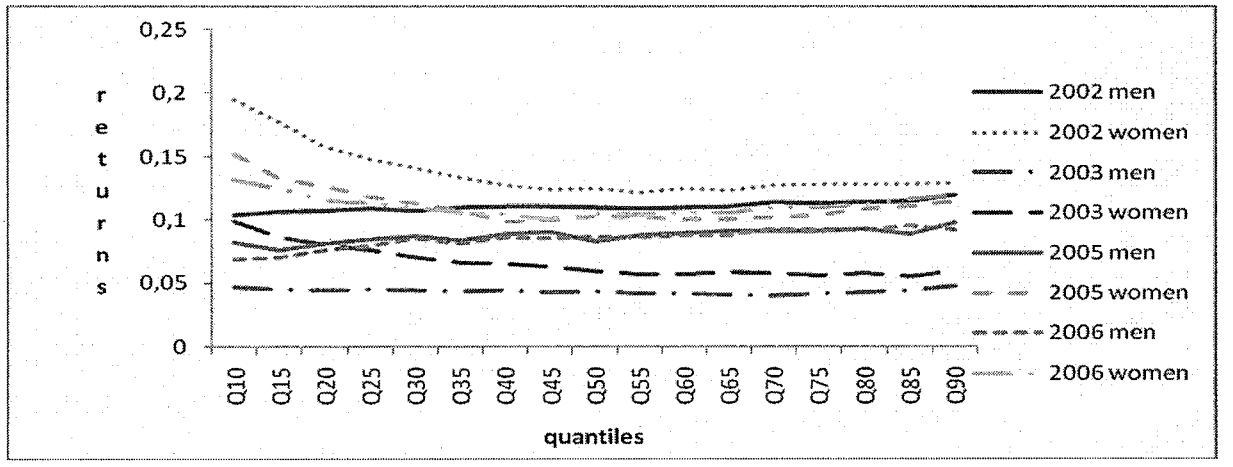

Figure.1. Returns to education

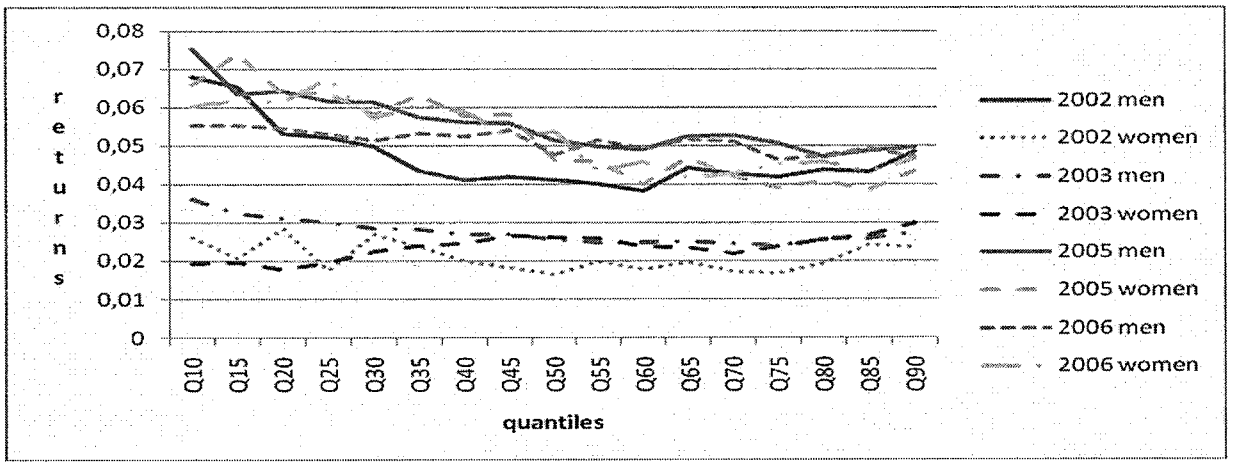

Figure 2. Returns to experience

Figure.2 shows the returns to experience for male and female employees for the years 2002, 2003, 2005 and 2006. When the years 2002 and 2003 are examined, in all the quantiles, men definitely have higher returns than women. In the years 2005 and 2006, however, the case is different. In both of the years, at low quantiles (approximately to the 45th quantile) returns to experience for women are generally higher than those for men. This is most obvious in the year 2006. In both of the years, men have a higher return than women at high quantiles. Looking at the Figure 2, when returns to experience for men are compared with those for women in the year 2002, it can be observed that the difference is drastic.

VI. CONCLUSION

This paper analyses the gender differentials in returns to education, returns to experience and gender wage gap by estimating the standard mincerian wage equation by using OLS and quantile regression in Turkey in the years 2002, 2003, 2005 and 2006. In this study, post-crisis period (2002 and 2003) and a more stable period (2005 and 2006) are compared to determine whether the economic crisis has had an effect on wage distribution.

In the years 2002 and 2003, wage rates have been calculated to be very close to 100% although this was a period after the crisis. The reason for this result seems to be that there are not considerable wage differentials between male and female employees working in the same position in the public sector. During these periods, wage cuts and layoffs were often encountered in the private sector and it became very common to work for lower income.

This study provides evidence for the fact that returns to education for women in all the years are higher than those for men. While returns to education for women show an increase at higher quantiles in the years 2002, 2005 and 2006, a decrease is observed at higher quantiles in the year 2003.

When the results of returns to experience are examined, it is seen that men definitely have higher returns than women in the years 2002 and 2003. However, the case is different in the years 2005 and 2006. In both years, returns to experience for women are generally higher at lower quantiles than those for men. This is most obvious in the year 2006. In both of the years, men have higher returns than women at high quantiles.

When all the results are examined, obvious changes are seen in Turkish wage structure after crisis, in especially the year 2003. The results in the years 2005 and 2006 give more general information about the wage differentials in Turkey because of the economy is more stable in these years.

In brief, the authors believe that when wage structures in countries that have gone through economic crisis are explored, these periods need to be taken into consideration so that more detailed information can be gathered about wage differentials in those countries.

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