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GENDER EARNINGS GAP IN URBAN PAKISTAN: EVIDENCE FROM ORDINARY LEAST SQUARES AND QUANTILE REGRESSIONS

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ABSTRACT

The objective of this paper is to analyze the gender earning gaps existing in urban areas of Pakistan using data from a household survey. The earning functions have been estimated separately for males and females using Ordinary Least Squares (OLS) as well as quantile regressions including education, literacy, experience, employment related variables such as type of industry and occupation and age as explanatory variables. The earning gaps between males and females have also been analyzed using the Blinder-Oaxaca decomposition method. Results suggest higher mean earnings for males as compared to females but higher incremental returns to investment in human capital for females at all levels of education. Further, higher returns to schooling have also been noted in bottom part of the income distribution i.e. 5th& 25th quantiles for workers of both sexes as compared to those present in the top of the distribution i.e. 75th& 95th quantiles at all educational levels. Education, industry of employment and occupations has been emerged as the main determinants of income gap between male and female workers in urban Pakistan.

Keywords: Education, employment, gender earnings gap, quantile regression, Pakistan.

JEL Classification: I26, J16, C21

1. INTRODUCTION

Gender equality is treated as a fundamental human right (UNDP, 2014b) and is a necessary foundation for peaceful, prosperous and sustainable world (UN, 2016). It improves the prospects of families, communities and nations and cause improvement in productivity as well as increase in income (UNDP, 2014a). Gender equality is also included in the Sustainable Development Goals (SDGs) to be achieved by 2030 and adopted by the United Nation's member states at the Sustainable Development Summit on September, 2015 (UNDP, 2016). Despite being included in the United Nation's Millennium Development Goals (MDGs), adopted by the world leaders under Millennium Declaration at the turn of the century, as one of the goals (Malhotra, Pande, & Grown, 2003) and witnessing considerable reductions, gender disparities still exist in number of indicators of education and employment in developing countries (UN, 2014). Moreover, it is also a fact and widely observed consistent phenomenon that women earn less than men (Polachek & Xiang, 2014) in spite of implementation of anti-discrimination policies and increased participation of women in the labor force as well as acquisition of higher women's capital.

Gender equality has been an interesting area for labor economists as well as for policy makers (Jung, 2014). The earnings of workers have been at the core of empirical research in the field of economics and other social sciences for decades (Montenegro & Patrinos, 2014). The differences between earnings of male and female workers expressed as percentage of male earning is termed as gender wage gap (Taniguchi & Tuwo, 2014). In the context of Pakistan, major contributions in the field of gender earnings gap come from but not limited to Ashraf and Ashraf (1993); Nasir (1998); Ashraf (2001); Aslam (2005); Nasir (2005); Siddiqui (2007); Qureshi (2012); and Ali and Akhtar (2014). All of these studies are based on estimation of earning functions through

conventional method of Ordinary Least Squares (OLS). As OLS regression technique give summary estimates by calculating the average effects of explanatory variables on the dependent variable (Coad & Rao, 2007) and is based on the mean of the conditional distribution of dependent variable in the regression analysis (Martins & Pereira, 2004; Wu & Liu, 2009). A more complete picture can be obtained by computing several regression curves matching to different percentage points of each distribution through quantile regressions (Cade & Noon, 2003; Coad & Rao, 2007; Pham & Reilly, 2007). The results of quantile regression (QR) are typically robust even for skewed distributions containing outliers in the response variables (Coad & Rao, 2007; Pham & Reilly, 2007) and are considered a standard analytical tool in the income and wage studies (Yu, Lu, & Stander, 2003). The current study is different from the earlier ones in number of ways. First, it is based on data for urban paid employees only and second, earning functions have been estimated by applying QR in addition to OLS. Third, gender earning gaps have been decomposed using Oxaca-Blinder decompostion method.

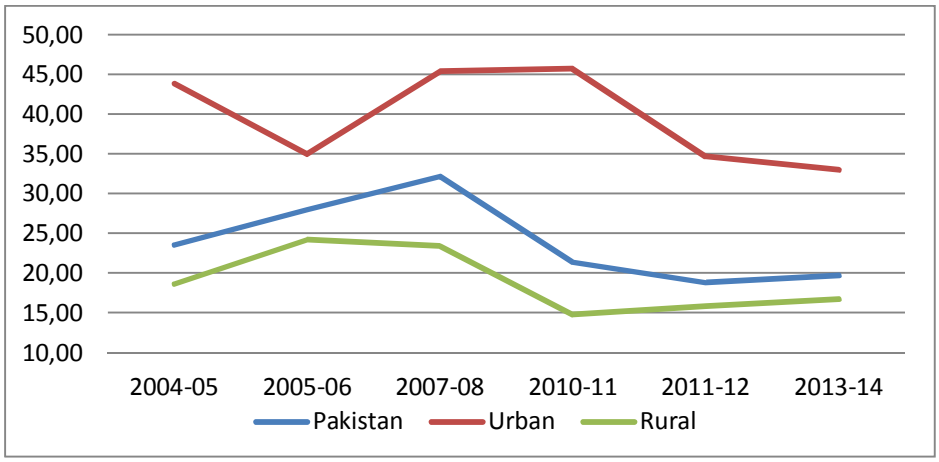
We have analyzed gender differences in income through Mincerian earning functions across various levels of education, experience, industry of employment, occupation and age for full-time paid employees residing in urban areas of Pakistan. In the context of Pakistan's labor market, the need of fresh study on gender earning gap arises on account of adverse law and order situation, increase in rate of inflation, growing energy crises tied with decreasing growth rate of economy. We have found higher mean earnings for males as compared to females but higher incremental returns to investment in human capital for females as compared to males at all levels of education. Our finding of higher incremental returns to education for females in comparison to males is in line with previous research done in Pakistan that includes Ashraf & Ashraf (1993), Nasir (1998), Ashraf (2001), Nasir (2005), Aslam (2005), Ali (2007), Siddiqui (2007), Qureshi (2012) and Ali & Akhtar (2014). While most of the previous studies on gender earnings differential in Pakistan are based on OLS, we have also estimated earning functions using QR.

According to results of QR, higher returns to schooling have been noted in bottom part of the income distribution i.e. 5^{th}& 25^{th} quantiles both for men and women as compared to those present in the top of the distribution i.e. 75^{th}& 95^{th} quantiles at all educational levels. Further, we have also found education, industry of employment and occupations as the main determinants of income gap between male and female workers in urban Pakistan. The rest of the paper is organized as follows. Some stylized facts in Pakistan's labor market are presented in the section II. Theoretical framework and data are discussed in section III whereas empirical results and findings are discussed in the section IV. Finally section V concludes the paper.

2. GENDER ISSUES IN PAKISTAN'S LABOR MARKET

Like other developing countries, substantial imbalances also exist in Pakistan's labor market and can be found in various socio-economic aspects such as labor force participation rate, employment and unemployment, enrolment and literacy rates, life expectancy and most importantly income of the male and female workers. Figure 1 shows the recent trend in gender wage gaps in terms of average monthly income of employees in Pakistan and its rural and urban areas from 2004-05 to 2014-15. The substantial differences in gender wage gap in urban and rural areas of Pakistan can be noticed. The downward trend in gender wage gap in urban areas is also visible.

Figure 1: Average Monthly Income of Female Employees as % Age of Males



Source: Authors' calculations based on HIES (Various issues)

2.1.Educational Attainment

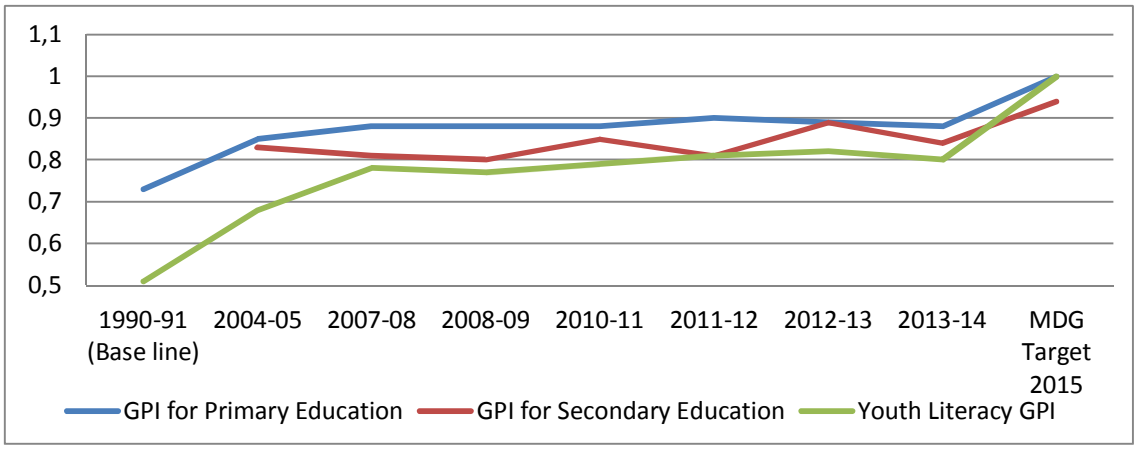
Investment in education is believed to bring justice, prosperity and opportunity (Brown, 2003) and improvement in social status (Bauer, Feng, Riley, & Xiaohua, 1992). Educational credentials are also considered to have strong bond with good jobs (Bauer, et al., 1992; Brown, 2003), higher rewards (Brown, 2003) and improved occupational status (Bauer, et al., 1992). In the words of Brown (2003) "Credentials are the currency of opportunity".

According to Sarwar, et al., (2013) human capital formation is the only way to reverse the negative impacts of growing population for a developing country like Pakistan because it directly improve earning ability of the poor (Son, 2010; Yamauchi, 2010). Human capital is also a fundamental factor for the improvement of living standards of people in a country (Dougherty & Herd, 2008). But, a fundamental challenge in fostering human capital formation lies in promoting the educational capital (Guichard & Larre, 2006). Education being the most important element of human capital is two ways process (Afzal, Malik, Begum, Sarwar, & Fatima, 2011) which faster economic growth (Jehan, 2000) and productivity on one side and reduces poverty on the other side (Afzal, et al., 2011; Montenegro & Patrinos, 2014).

In Pakistan, the gender differences between males and females exist in educational attainment. For example, literacy rate for males was 71% as compared to 48% for females during 2012-13 (Finance, 2014). Similarly, gross enrolment rate was 98% for males as compared to 83% for females whereas as net enrolment rate was 61% males and 54% for females (Finance, 2014).

Development of education was also included in the MDG's adopted by the UN. Pakistan had to achieve 100% primary education and 88% literacy rate by 2015 with gender parity index (GPI) equal to one. However, Pakistan has missed the MDG's goals as the overall literacy rate was just 58% against the target of 88% during 2013-14. Further, gender disparity in terms of literacy also exist in Pakistan which is clear from the fact that 47% of female were literate against 70% of males (Pakistan Economic Survey, 2014-15). Pakistan could not achieve the goals set in the MDGs due to lack of sustained leadership, economic instability, political turmoil, insecurity and recurrent natural disasters (UNDP, 2015). Albeit having witnessed considerable improvement if compared with baseline scenario in 1990-91, gender disparities still prevail not only in primary and secondary education but also in literacy in Pakistan (Figure 2).

Figure 2: Pakistan's Educational Achievements towards MDG's Targets

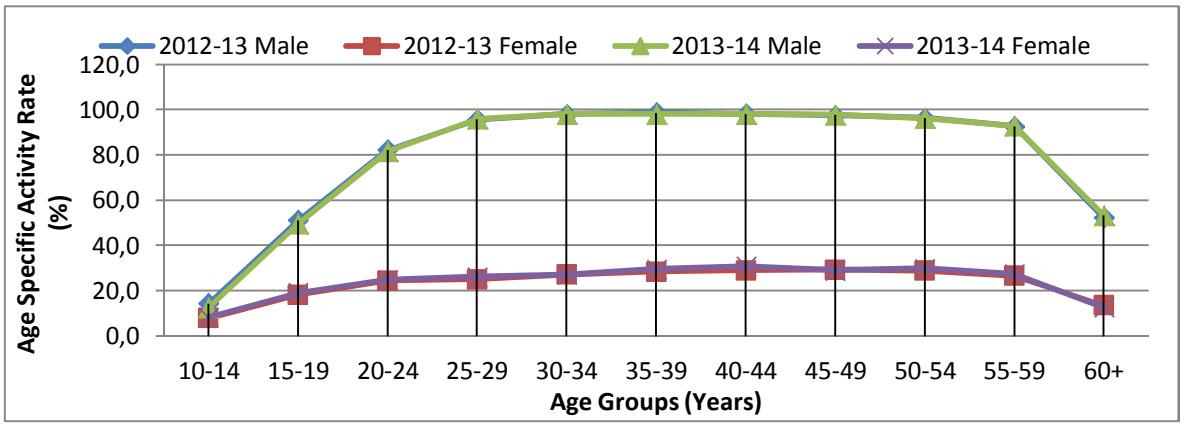


Source: Authors Elaborations upon data from PSLM 2013-14

2.2. Population and Employment

Currently, Pakistan is the 6th most populous country of the world (Sarwar, Fakher, Ali, & Mudassar, 2013) with total estimated population of 191.7 million in 2015 out of which 48.3 % were females (MOF, 2014). Whereas composition of population by sex has remained stagnant since last housing and population census in1998, the trend of growing urbanization is evident from the fact that proportion of urban population has increased from 32.5% in 1998 to 38% in 2013 (PBS, 2014). In the current study, we have restricted our analysis to a sample from urban areas of Pakistan in contrast to most of the previous studies which analysis both urban and rural areas.

Figure 3: Age Specific Activity Rate by Sex for Pakistan



Source: Compendium of Gender Statistics of Pakistan, 2014

According to Labor Force Survey (2012-13), the total civilian labor force in Pakistan was 45.69% of the total population comprising 35.08% of male and 10.60% of female. The labor force participation rates for males and females were 68.70% and 21.67% in 2012-13 respectively. The significant gender gaps exist in Pakistan in terms of labor force participation rates as is evident from figure 3. The participation of females in the labor force is drastically low as compared to their male counterpart across all age groups in Pakistan (Figure 3).

At global level, vulnerable employment rates, which is defined as proportion of contributing family workers and own account worker, are higher for women than for men. In developing regions, 60 per cent of women were in vulnerable employment in 2013, compared to 54 per cent of men (UN, 2014). In Pakistan, more than half of the female workers i.e. 55% were engaged as contributing family workers in contrast to 15% of males. Gender

differences also exist in the sector of employment and occupations. Females are generally engaged in low paid informal jobs in agriculture sector. For example, 75%, 11% and 14% of the employed women were engaged in the agriculture, industry and services sectors against 33%, 26% and 41% of males during 2012-13 in Pakistan respectively (PBS, 2014a). Like other researchers e.g. Ashraf & Ashraf (1993); Blau & Kahn (1992); Gornick & Jacobs (1998); Harkness (1996); Nasir (1998); Rice, (1999); Su & Heshmati (2013) and Taniguchi & Tuwo (2014), we have also used employment related characteristics like industry and occupation as explanatory variables in our estimated earning functions through dummy variables.

3. DATA AND METHODOLOGY

The returns to human capital and gender earning gaps can be estimated by following Mincerian approach as baseline framework (Pastore, Sattar, & Tiongson, 2013). According to Montenegro & Patrinos (2014), Mincerian model produce more stable results than one can expect. The basic earning function used in the current study in modified form can be written as under:-

$$lnw_i = \alpha + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \sum_{j=1}^{n} \delta Z_{ij} + u_i \quad (1)$$

where w_i is natural log of the monthly income for an i[th] individual. Dependent variable has been used in log-transformation form in order to correct for possible skew and heteroscedasticity (Vassil, Eamets, & Mõtsmees, 2014). S_i stands for the years of schooling, X_i is labor market experience of an individual in completed years. X_i^2 is the squared term of experience which has been included in the earning function in order to capture non-linearity in the earnings of individual throughout their life span (Pastore, et al., 2013; Willis, 1986). Z_{ij} is a vector of variables such as literacy, industry, occupation and age of individuals and u_i is error term representing other variables, not measured and assumed to be independent of the other explanatory variables.

The earning functions can also be used to estimate the returns to different levels of schooling by using the education dummies for each level (Montenegro & Patrinos, 2014). Keeping in view the education system of Pakistan five dummy variables for primary (D_p), middle (D_m), secondary (D_s), higher secondary (D_{hs}) and tertiary (D_t) levels have been defined. These dummy variables denote the fact that a person concerned has achieved that specific level of education (Montenegro & Patrinos, 2014). The dummy variable for individuals without formal schooling has been used as an omitted category and has not been included in the model in order to avoid the problem of singularity in the matrix. The extended model including these dummy variables takes the following form:-

$$\ln w_i = \alpha + \beta_p D_{pi} + \beta_m D_{mi} + \beta_s D_{si} + \beta_{hs} D_{hsi} + \beta_t D_{ti} + \beta_1 X_i + \beta_3 X_i^2 + \sum_{j=1}^{n} \delta Z_{ij} + u_i \quad (2)$$

OLS regression technique, presented in equation (1) and (2), give summary estimates by calculating the average effects of explanatory variables on the dependent variable (Coad & Rao, 2007) and is based on the mean of the conditional distribution of dependent variable in the regression analysis (Martins & Pereira, 2004; Wu & Liu, 2009). A more complete picture can be obtained by computing several regression curves matching to different percentage points of each distribution through quantile regressions (Cade & Noon, 2003; Coad & Rao, 2007; Pham & Reilly, 2007). QR has another advantage over OLS because it makes possible to obtain a complete conditional distribution of Y variable instead of focusing only on means as is the case in OLS (Fattouh, Scaramozzino, & Harris, 2001) and is considered a standard analytical tool in the income and wage studies (Yu, et al., 2003).

The QR was first introduced by Koenker and Bassett in 1978 (Coad & Rao, 2007; Koenker & Hallock, 2001) and keeping in view the setting of wage equation (see Martins & Pereira, 2004; McGuinness & Doyle, 2004) can be written as under:-

$$lnw_i = x_i \beta_\theta + u_{\theta i} with Quant_\theta(lnw_i | x_i) = x_i \beta_\theta \quad (3)$$

where x_i and β_θ denote the vectors of exogenous variables and parameters respectively. $Quant_\theta(lnw_i|x_i)$is the θ^{th} conditional quantile of ln w given x. According to Matins & Pereira (2004), the θ^{th} quantile, which lies between '0' and '1', can be defined as under:-

$$\min_{\beta \in R^k} \{\sum_{i:lnw_i \geq x_i\beta} \theta |lnw_i - x_i\beta_\theta| + \sum_{i:lnw_i \geq x_i\beta} (1-\theta)|\, lnw_i - x_i\beta_\theta|\} \quad (4)$$

The above equation can be written as:

$$\min_{\beta \in R^k} \sum_i \rho_\theta\, (lnw_i - x_i\beta_\theta) \quad (5)$$

where $\rho_\theta(\varepsilon)$ is defined as check function which is written as $\rho_\theta(\varepsilon) = \theta\epsilon$ if $\boldsymbol{\varepsilon} \geq 0$ or $\rho_\theta(\varepsilon) = (\theta - 1)\epsilon$ if $\boldsymbol{\varepsilon}$<0. This problem can be solved through method of linear programming. The least absolute deviation (LAD) is the most common form of quantile regression (Melly, 2002) and estimator of $\boldsymbol{\beta}$ can be obtained by setting θ=0.5. The various quantiles can be obtained by setting the various values of θ. For example, first and third quartiles can be obtained by setting the values of θ equal to 0.25 and 0.75 respectively.

After fitting the regression model given in the equation (1) through equation (5), the private return to different levels of education can be obtained as under:-

$$r_p = (\beta_p)/(S_p) \quad (6)$$

$$r_m = (\beta_m - \beta_p)/(S_m - S_p) \quad (7)$$

$$r_s = (\beta_s - \beta_m)/(S_s - S_m) \quad (8)$$

$$r_{hs} = (\beta_{hs} - \beta_s)/(S_{hs} - S_s) \quad (9)$$

$$r_t = (\beta_t - \beta_{hs})/(S_t - S_{hs}) \quad (10)$$

where S_p, S_m, S_s, S_{hs} and S_t are years required to complete primary, middle, secondary, higher secondary and tertiary education.

Analysis of the decomposition of earnings gap between male and female workers is another objective of this paper. According to Oaxaca & Blinder (1973) decomposition method, also followed by Su & Heshmati (2013) and Taniguchi & Tuwo (2014), the gap in income is divided into two parts. The observable differences in productive characteristics of individuals generate the first part of the income gap whereas the remaining gap is due to differences in the returns to individual level attributes (Boraas & Rodgers, 2003; Jung, 2014; Pham & Reilly, 2007; Su & Heshmati, 2013; Taniguchi & Tuwo, 2014; Weichselbaumer & Winter-Ebmer, 2003).

Specifically, the overall gap in income between male and female workers is equal to:

$$\mathrm{D} = \frac{\mathrm{INC_m}}{\mathrm{INC_f}} - 1 \quad (11)$$

where, $\mathrm{INC_m}/\mathrm{INC_f}$ is the ratio of male to female income. Logarithm of equation (2) along with combination of estimated result in equation (1) yields the overall male-female gap in income as under:

$$\ln \mathrm{D} = \ln \overline{\mathrm{INC}}_\mathrm{m} - \ln \overline{\mathrm{INC}}_\mathrm{f} = \overline{\mathrm{X}}_\mathrm{m}\, \hat{\beta}_\mathrm{m} - \overline{\mathrm{X}}_\mathrm{f}\hat{\beta}_\mathrm{f} \quad (12)$$

where $\ln \overline{\mathrm{INC}}_\mathrm{m}$ and $\ln \overline{\mathrm{INC}}_\mathrm{f}$ represent average values of log yearly income of males and females respectively. $\overline{\mathrm{X}}_\mathrm{m}$ and $\overline{\mathrm{X}}_\mathrm{f}$ represent average values of productive attributes of the males and females. $\hat{\beta}_\mathrm{m}$ and $\hat{\beta}_\mathrm{f}$ stands for vectors of estimated coefficients obtained from separate regressions for males and females.

Following Su & Heshmati (2013) and Oaxaca (1973) the equation (3) can be expressed for purpose of decomposition as under:

$$\ln \mathrm{D} = (\overline{\mathrm{X}}_\mathrm{m} - \overline{\mathrm{X}}_\mathrm{f})\left[\Omega\hat{\beta}_\mathrm{m} + (\mathrm{I} - \Omega)\hat{\beta}_\mathrm{f}\right] + [\overline{\mathrm{X}}_\mathrm{m}(\mathrm{I} - \Omega) + \overline{\mathrm{X}}_\mathrm{f}\Omega](\hat{\beta}_\mathrm{m} - \hat{\beta}_\mathrm{f}) \quad (13)$$

where, I stand for an identity matrix and Ω stands for sloping matrix of weights. Both explained and un-explained variations in the earnings differentials are explained by the Blinder-Oaxaca decomposition method (Chzhen & Mumford, 2010; Jung, 2014; Kingdon, 2001; Taniguchi & Tuwo, 2014; Weichselbaumer & Winter-Ebmer, 2003).

The current study is based on the individual level data obtained from a household survey known as PSLM conducted by Pakistan Bureau of Statistics (PBS) in 2010-11. Under PSLM; two types of surveys at district and

provincial levels are conducted whereas each survey is repeated in the alternate year. The district level surveys covers only social indicators, the provincial level surveys also known as Household Integrated Economic Survey (HIES), provide information on number of social and economic indicators like demographics, enrolment rates, literacy, employment, household size, income and consumption, savings etc.(PBS, 2014b). The current study uses the data from HIES which was obtained from 16341 households during July, 2010 to June 2011 (PBS, 2011).

The demographic section of 2010-11 survey provides information about 109181 individuals comprising 51% of male and 49% of female. However, keeping in view the requirements of the study, only the data relating to urban and paid employees was used and our final sample was reduced to 7842 individuals out of which 6828 (87%) were males and 1014 (13%) were females.

The main variable of interest in our study is monthly earnings, which has been used as a dependent variable in the earning equation. For comparison purpose only those workers have been included in analysis who reports their incomes on monthly basis from their major and primary occupations. Two measures of literacy skills i.e. reading & writing and numeracy, have also been used as categorical variables denoting the value of "1" if a person holds the skill and "0" otherwise. HIES provide information on completed years of schooling which has been directly used in the estimation of earning functions in equation (1) as well as for defining the five different dummy variables, which have been used as explanatory variables in the estimation of equation (2). The information on labor market experience at individual level was not available in the survey and has been derived by deducting completed years of schooling less six from age by following the literature (e.g Ali, 2007; Grajek, 2001; Montenegro & Patrinos, 2014 and Willis, 1986). Type of industry, nature of occupation and age has also been included in the earning function by defining different categorical variables. Operational definitions of variables are presented in table 1.

Table 1: Operational Definitions of Variables

Name of Variables	Description
ln_y	Logarithm of the monthly income earned from major employment
Education	
S	Completed years of schooling
Edu0	Without formal education; Reference group
Edu1	5 or less years of schooling
Edu2	8 or less but greater than 5 years of schooling
Edu3	9 or 10 years of schooling (secondary)
Edu4	11 or 12 years of schooling (higher secondary/college)
Edu5	13 or more years of schooling graduates, masters and professional degrees (university education)
Literacy	
Lit1	Reading and writing ability (Reference group) No ability to read and write
Lit2	Ability to solve simple arithmetic questions (Reference group) No ability to solve simple arithmetic questions
Experience	
Exp.	Experience in years calculated as age - completed years of schooling – 6
Exp_Sq	Exp. * Exp.
Industry	
Ind1	Agriculture, hunting, forestry, logging and Fishing
Ind2	Mining and Manufacturing
Ind3	Electricity, and gas
Ind4	Construction
Ind5	Trade & restaurants and hotels (Reference group)
Ind6	Transport, storage and communication

Ind7	Financing, insurance, real estate and other services
Occupation	
Occu1	Senior professionals and managers
Occu2	Technicians and associate professionals
Occu3	Clerks, service & sales workers (reference group)
Occu4	Skilled fishery & agricultural workers
Occu5	Trade & craft workers
Occu6	Assemblers, plant & machine operators
Occu7	Other elementary occupations
Age:	Age in completed years
age1	Under 20
age2	20-29
age3	30-39
age4	40-49
age5	50-59
age6	60 & Above

4. FINDINGS AND DISCUSSIONS

The average monthly earnings of male and female paid employees in urban areas along with mean earning gap are presented in table 2. In the overall sample, male and female monthly earnings stand at Rs.10807 and Rs.7702 showing a gap of Rs.3105. Female earnings stand at 71% of the male earnings and this finding corroborates the observations of Polachek & Xiang, (2014) and Blau & Kahn, (2007) that female earn consistently less than men on average. Monthly earnings of females having reading & writing skills (Lit1) are 84% of male's earnings as compared to 41% for those without these skills (Table 2). Females without having ability to solve simple arithmetic (lit2) earn 44% of male earnings whereas those having these skills earn 73% of male's earnings. The wider gender wage gap in earnings exist for women without education (60%) or having lower levels of education such as primary (Edu1) (64%), middle (Edu2) (50%) and secondary (Edu3) (34%). The lowest wage gap between male and female workers i.e. 33% exist when females have tertiary education (Edu5) (Table 2).

Table 2: Average Monthly Earnings of Paid Employees in Urban Areas by Gender (Rupees)

Variables		Male (M)	Female (F)	Gap (M-F)	F/M
Overall		10807	7702	3105	0.71
Lit1	No	6743	2737	4006	0.41
	Yes	12245	10319	1926	0.84
Lit2	No	7039	3095	3944	0.44
	Yes	11158	8178	2980	0.73
Levels of Education	Edu0	6833	2722	4111	0.40
	Edu1	6845	2492	4353	0.36
	Edu2	7550	3808	3742	0.50
	Edu3	9641	6396	3245	0.66
	Edu4	12421	7017	5404	0.56
	Edu5	23459	15685	7774	0.67
Type of industry	Ind1	8863	5693	3170	0.64
	Ind2	9461	2997	6464	0.32
	Ind3	15585	2860	12725	0.18
	Ind4	7452	4900	2552	0.66
	Ind5	7280	3765	3515	0.52
	Ind6	10579	8812	1767	0.82
	Ind7	14336	8640	5696	0.60

Occupation	Occu1	26179	13828	12351	0.53
	Occu2	17833	10520	7313	0.59
	Occu3	10389	4997	5392	0.48
	Occu4	8456	1725	6731	0.20
	Occu5	7944	2438	5506	0.31
	Occu6	8944	4375	4569	0.49
	Occu7	6831	3231	3600	0.47
Age	Under 20	4217	2565	1652	0.61
	20-29	7589	6436	1153	0.85
	30-39	11986	7725	4261	0.64
	40-49	14641	10861	3780	0.74
	50-59	16637	11502	5135	0.69
	60 & Above	10180	4168	6012	0.41
Marital status	Unmarried	6492	6067	425	0.93
	Married	13119	9114	4005	0.69
	Widow	9957	7575	2382	0.76
	Divorced	6027	4691	1336	0.78

Source: HIES, 2010-11, Author's Calculations

The monthly earnings of female paid employees belonging to urban areas as percentage of male's earning in various industries such as Ind1, Ind2, Ind3, Ind4, Ind5 (see table 1) were 64%, 32%, 18%, 66% and 52% respectively (Table 2). The highest mean wage gap between male and female worker was found in Ind3 and lowest in Ind6. Among occupations, the highest wage gap between male and female paid employees i.e. 80% was found in Occu4 (see table 1) because agriculture is traditionally a mail dominant occupation while the lowest i.e. 41% was found in Occu2. The difference in monthly earnings between male and female employees in the age group between 20-29 years was lowest i.e. 15% and was highest i.e. 59% for those in the upper age group of 60 years & above. Further, the mean difference in monthly income between unmarried men and women was only 7% for paid employees belonging to urban areas of Pakistan as against the 31% for those who are married (Table 2).

Table 3: Average of Variables

Variables	Both Sexes	Males	Females
ln_y	8.92	9.006	8.34
S	7.39	7.86	7.32
Lit1	0.728	0.739	0.655
Lit2	0.914	0.915	0.906
Edu1	0.139	0.149	0.067
Edu2	0.119	0.127	0.064
Edu3	0.192	0.204	0.109
Edu4	0.098	0.102	0.097
Edu5	0.186	0.316	0.166
Exp	20.972	21.192	19.493
Exp_Sq	630.25	635.59	594.28
Ind1	0.028	0.028	0.029
Ind2	0.164	0.169	0.129
Ind3	0.023	0.026	0.005
Ind4	0.132	0.15	0.01
Ind6	0.092	0.103	0.017
Ind7	0.416	0.36	0.791
Occu1	0.131	0.102	0.325
Occu2	0.08	0.074	0.122

Occu4	0.007	0.007	0.004
Occu5	0.142	0.142	0.14
Occu6	0.082	0.093	0.008
Occu7	0.34	0.352	0.26
Age1	0.104	0.105	0.096
Age2	0.319	0.314	0.353
Age3	0.224	0.223	0.231
Age4	0.199	0.2	0.196
Age5	0.118	0.12	0.103
Age6	0.036	0.038	0.022
Valid N	7842	6828	1014

Source: Authors calculations based on data from HIES 2010-11

The averages of variables used in the study are presented separately for males and females in Table 3. The standard deviations of the variables by the same categories have not been presented in the table in order to save the space and same are available with the authors. The difference in log-monthly income, the response variable in our model, between male and female workers was 0.666. Although, gender gap in primary and secondary education has considerably reduced during recent decades but still prevails in poor countries (Bertocchi & Bozzano, 2014). The same is true in case of our sample where the difference in average years of schooling between males and females stands at 0.540 (Table 3). According to Aslam (2005), the gender gap in education in Pakistan exists due to difference in labor market returns to education. The current study focuses on education as the main determinant of income because education is an important and popular policy levers in many countries (Emran & Shilpi, 2014). Women also lag behind than men in both measure of literacy i.e. lit1 & lit2 as well as across various levels of education from edu1 through edu5 (Table 3). According to Blau and Kahn, (2007) and Vassil, et al., (2014), women usually have less labor market experience as compared to men following the traditional division in the labor market and family considerations. The same is true in case of our sample where women having mean experience of 19.5 years fall short of men having average experience of 21.2 years (Table 3). As far as industry of the employment is concerned, majority of both men and women i.e. 36% and 79% were engaged in Ind7 followed by 17% and 13% in Ind2 (Table 3). The lowest proportion of urban workers of males and females were employed in Ind3 and Ind1 (Table 3).

Gender differences in occupation are expected due to labor market preferences of females who prefer to choose that occupation requiring less on the job training (Blau & Kahn, 2007). In our sample, highest proportions of males i.e. 35% and females i.e. 26% were engaged in Occu7 followed by 14% in Occu5. The lowest numbers of males and females workers in urban areas were engaged Occu4 (Table 3). Majority of both men and women employees i.e. 31% and 35% were in the age group 20-29 years (Age2) followed by 22% and 23% in Age3 respectively. The lowest proportions of employees of either sex were found in Age6 (Table 3).

The practice of estimation of rates of returns to investment in education is continuing since the late 1950s and estimates of the returns to schooling and to potential experience are a useful indicator of an individual's productivity (Montenegro & Patrinos, 2014). In a model with log-transformed response variables, like equation (1), the estimated parameters are interpreted as a percent change on wage when independent variable increases by one unit (Vassil, et al., 2014) and $\beta_1$in the wage equation can be viewed as the average rate of return to years of schooling to wage employment (Montenegro & Patrinos, 2014; Willis, 1986). The size of private returns to education is of great significance because it is the price an individual investor of education receives on his/her own investment (Psacharopoulos, 1985) and also explains personal income distribution (Psacharopoulos, 1985; Willis, 1986). The earning functions estimated separately for males and females through OLS method both for completed years of schooling as well as education dummies are presented in table 4. Education has been used as an explanatory variable in two distinct ways i.e. i) as completed years of schooling and ii) as education dummies representing different levels of education while treating no formal education as a reference category.

The average rates of returns to extra year of schooling in urban areas were 8.6% for males and 20.7% for females and were significant at 1% level (Table 4). The higher rate of return to schooling for females as

compared to males in all specifications of estimated earning functions have been found in our study which confirms the finding of other studies e.g. Ashraf & Ashraf (1993); Aslam (2005); Montenegro & Patrinos (2014) and Siddiqui & Siddiqui (1998). All education levels have been emerged as significant and positive determinants of income except for edu1 for males and edu1 & edu2 for females. Further, variation in estimated parameters is more for women which range from 0.07 to 1.86 than for men which range from -0.02 to 0.89 (Table 4). Lit1 is significant in all estimated specification except for females in education dummies whereas lit2 is significant for women but not for men. The average returns to extra year of experience which are significant for both males and females but are higher for females (9.2% & 7.3%) as compared to men (5.7% & 5.3%) in both specifications education years and education dummies. The coefficient of experience square is negative in the earning functions for both males and females (Table 4), which exhibits concavity of the earning functions and decreasing returns to the investment in human capital (Pastore, et al., 2013).

All industries of employment have been emerged as significant determinants of earnings of male workers but for females only two industries i.e. Ind3 & Ind6 are significant in OLS equations. Similarly, Occu2 & Occu7 are significant determinant of income for both males and females but Occu4 & Occu6 are insignificant. Further, returns to Occu2 & Occu7 are higher for females as compared to those engaged in the Occu3, the reference category. Age1 has been used as a reference category in the estimated earning functions. Males in the age groups 20-29, 30-30 and 40-49 earn more than those in the Age1 while females in these groups earn less. However, earnings of female in Age6 are higher as compared to those in the reference group but are significant in education dummies specification only as compared to male workers who earn less if compared with the reference category (Table 4).

Table 4: Results of OLS estimation for Males and Females

Dependent Variable: ln_y

	Males		**Females**	
Variables	**Edu Years**	**Edu Levels**	**Edu Years**	**Edu Levels**
S	0.086***		0.207***	
edu1		-0.022		0.074
edu2		0.107**		0.489
edu3		0.281***		0.909**
edu4		0.460***		1.054***
edu5		0.893***		1.855***
lit1	-0.261***	0.184***	-0.856***	0.085
lit2	-0.035	-0.025	-0.183**	-0.175*
Exp	0.057***	0.053***	0.092***	0.073***
exp_sq	-0.001***	-0.001***	-0.001***	-0.001***
ind1	0.097**	0.070*	-0.093	-0.037
ind2	0.157***	0.147***	-0.181	-0.137
ind3	0.325***	0.305***	-0.734**	-0.695*
ind4	0.203***	0.188***	0.13	0.253
ind6	0.225***	0.212***	0.550**	0.627**
ind7	0.116***	0.107***	-0.159	-0.113
occu1	0.432***	0.405***	0.13	0.234**
occu2	0.252***	0.239***	0.173*	0.249**
occu4	0.012	0.041	-0.228	-0.261
occu5	-0.094***	-0.071***	-0.095	-0.115

occu6	-0.039	-0.006	0.256	0.213
occu7	-0.126***	-0.115***	0.247***	0.216***
age1	-	-	-	-
age2	0.122***	0.165***	-0.314***	-0.176
age3	0.102**	0.183***	-0.527***	-0.216
age4	0.064	0.182***	-0.376	0.095
age5	-0.034	0.126	-0.278	0.356
age6	-0.322***	-0.1	0.223	0.975**
Cons	7.605***	7.647***	6.793***	6.936***
F Statistics	380.7	328.08	56.71	42.53
Adj. R^2	0.55	0.555	0.548	0.516
N	6828	6828	1014	1014

***significant at 1% level; **significant at 5% level; *significant at 10% level
Source: Authors Calculations

OLS estimates which are based on the mean of the conditional distribution of dependent variable in the regression analysis and are subject to be affected by the outliers present in a cross-sectional data. This is evident from the fact that mean earnings of both male and female workers having tertiary education were more than double of respective averages in the sample. Due to wide variation in the earnings of individuals, QR has been estimated for males and females and results are presented in Appendix (1) and (2) respectively. The results of QR at 5^{th}, 25^{th}, 50^{th}, 75^{th} and 95^{th} quantiles for male urban employees are presented in the appendix 1. The return to additional year of schooling at 5^{th} quantile for male workers stands at 9.1% and tends to decline from lower to upper quantiles and is 8.1% at 95^{th} quantile (Appendix 1). The lower levels of education like edu1 and edu2 are insignificant for urban male wage-earners at all levels of quantiles except 25^{th} and 75^{th} quantiles. However, higher levels of education like edu3, edu4 and edu5, have been emerged as significant and positive determinants of income for urban male employees at all levels of income distribution (Appendix 1).

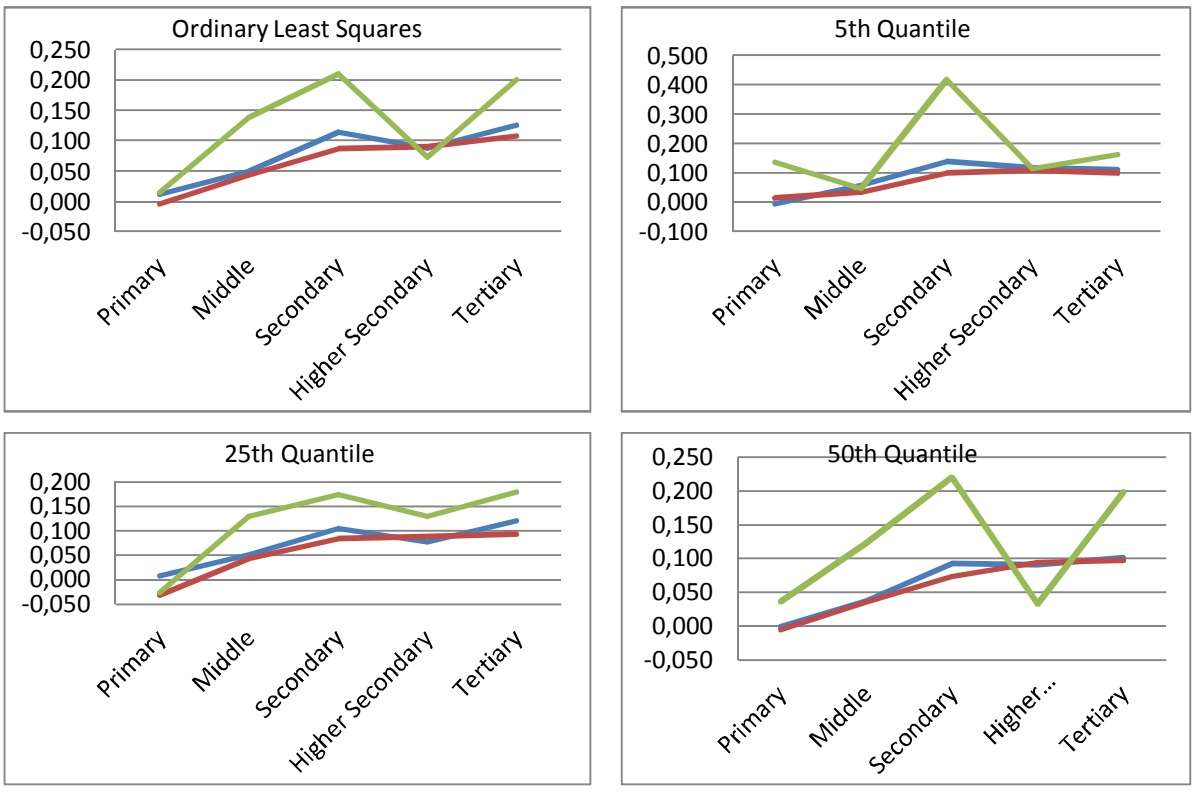
Moreover, the returns to additional year of experience for male employees in urban areas decline along with movement from bottom towards top of the distribution and stands at 7.9% and 3.6% at 5^{th} and 95^{th} quantiles in education years specifications. The concavity of the earning functions is also confirmed for male wage earners and is evident from the negative and highly significant values of the squared term of experience. All levels of industry have been emerged as significant determinant of income for male urban employees except for Ind1 at all quantiles. Occu1, Occu2 and Occu7 are significant determinant of income at all parts of the distribution against Occu4 and Occu6 which are insignificant. Further, males in the younger age groups in urban areas earn significantly more than older workers in Age6 (Appendix 1).

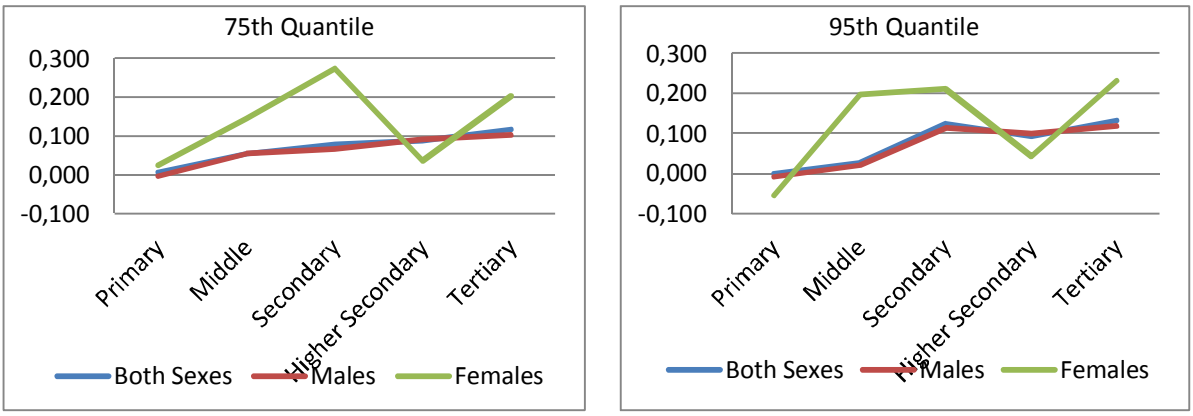
The earning functions for females estimated through QR at various levels of quantiles are presented in appendix 2. The average return to additional year of schooling for female workers in urban areas at 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} quantiles stands at 21.9%, 21.2%, 20.2%, 20.1% and 19.3% respectively (Appendix 2). Edu1 and edu2 are not significant factors of income at all estimated quantiles for female workers. But edu3 is significant factor of income for female employees belonging to middle and higher middle income groups. Likewise, edu4 is significant for females at 5^{th}, 50^{th}, and 75^{th} quantiles (Appendix 2). However, edu5 has been emerged as significant factor for determination of income of female employees irrespective of their position in the income distribution. Experience has also been emerged as positive and significant determinant for females at all levels of income distribution except for those in the 95^{th} quantile under education at levels specification (Appendix 2). Earning functions for females have also been found to be non-linear as is evident from negative and significant values of exp_sq term at all levels of estimated quantiles. This is consistent with finding of Aslam (2005), who found more convex education-earning profiles for women than men. Ind3 and Ind6 have been found as significant factor for income determination of female workers only in the lower-middle, middle, and upper-middle part of the income distribution. According to Blau and Kahn (2007), these gender differences in industry are also responsible for creating gender differences in income. Occu1 is significant for female workers in education levels specification at 25^{th}, 50^{th} and 75 quantiles whereas Occu2 is significant at 1% and 10% levels at 25^{th} and 95^{th} quantiles respectively. While Occu4 is insignificant at all quantile, the Occu6 and Occu5 are

significant at 5th (5% level) and 95th (10% level) quantiles respectively (Appendix 2). The Occu7 is mainly significant factor for the determination of income of female workers falling in the lower and lower-middle parts of the income distribution (Appendix 2). The gender differences in occupation account for considerable portion of gender earnings gap (Blau & Kahn, 2007). Moreover, age used in different groups has been found as significant determinant of income for females belonging to lower-middle and middle class only. Age has not been found as significant factor of income determination for females in the 75th and 95th quantiles (Appendix 2).

The private return to different levels of education for both male and female workers belonging to urban Pakistan have been calculated by using equations (6) through (10) and are presented in the figure 4. The private incremental returns to education for females are higher as compared to males in OLS estimates as well as in various quantiles at all levels of education except for 50th, 75th and 95th quantiles at higher secondary levels (Figure 4). For female workers, lower levels of education yield higher returns at bottom part of the income distribution while higher level of education give more returns at uppor part of the income distribution. For example, average returns to an additional year of schooling for female workers having primary and secondary education at 5th quantile were 14% and 42% as compared to 1% and 10% for their male counterparts respectively (Figure 4).

Figure 4: Returns to Education by Level of Education and Sex in Urban Pakistan





Another important objective of the current study is to decompose the gender income gap using Blinder-Oaxaca decomposition method whose results are presented in table 5. The log income difference between male and female workers in urban areas of Pakistan stands at 0.666 (Table 5). This gap has been decomposed into various constituents such as education, literacy, experience, industry as well occupations of employment and age of individuals. According to the results about 43% of the income gap between male and female employees arises due to difference in education as compared to 8.1% from the literacy rate but former being the positive and later is negative. The gaps in wages by gender exist due to difference in experience (Polachek & Xiang, 2014; Taniguchi & Tuwo, 2014). Women usually tend to have shorter experience of work due to exit and entry into the labor market following family reasons (Blau & Kahn, 2007; Pastore, et al., 2013; Polachek & Xiang, 2014; Taniguchi & Tuwo, 2014). Our decomposition suggests that differences in labor market experience constitute about 2% of income differences between male and female workers. Industry of employment has been found as positive contributor towards income gap between male and female paid employees in urban areas of Pakistan and its share stands at about 17%. Income gaps between male and female workers arising due to difference in occupation and age stand at -10.4% and 13.2% respectively (Table 5). In aggregates terms, our decomposition analysis is able to explain about 0.62 (93%) of total log income difference of 0.666 between males and females.

Table 5: Decomposition of Gender Income Gap

Variables	Attributable to differences in characteristics
log income difference	0.666
Education:	-42.519
Edu1	-0.008
Edu2	-0.018
Edu3	-0.041
Edu4	-0.062
Edu5	-0.437
Literacy:	8.109
Lit1	0.080
Lit2	0.136
Experience:	1.768
Experience	-0.298
Exp_sq	0.345
Industry	16.653
Ind1	0.003
Ind2	0.042
Ind3	0.011
Ind4	0.026

Ind5	0.011
Ind7	0.128
Occupation:	-10.419
Occu1	-0.035
Occu2	-0.013
Occu4	0.001
Occu5	0.006
Occu6	-0.002
Occu7	-0.097
Age:	13.201
Age1	0.000
Age2	0.114
Age3	0.091
Age4	0.018
Age5	-0.021
Age6	-0.025
Total Explained	0.617
Total Explained (%)	92.668

Source: Author's Calculations

5. CONCLUSION

The objective of this paper was to analyze the gender earning gaps existing in urban areas of Pakistan using data from a household survey known as Household Integrated Economic Survey (HIES). The earnings functions have been estimated separately for males and females using Ordinary Least Squares (OLS) as well as quantile regressions including education, literacy, experience, employment related variables such type of industry and occupation and age as explanatory variables. The earnings gap between males and females has also been analyzed using the Blinder-Oaxaca decomposition method. Results suggest higher mean years of schooling and experience as well as monetary earnings for males as compared to females. However, higher incremental returns to investment in human capital for females have been observed at all levels of education in both OLS and quantiles regression performed at 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} quantiles. Further, higher returns to schooling have also been noted in bottom part of the income distribution i.e. 5^{th}& 25^{th} quantiles both for male and female workers as compared to those present in the top of the distribution i.e. 75^{th}& 95^{th} quantiles at all educational levels. Further, according to decomposition analysis conducted through Blinder-Oaxaca method, education, industry of employment and occupations has been emerged as the main determinants of income gap between male and female workers in urban Pakistan. Private rates of return estimated through OLS and quantile regressions are used to explain the behavior of individuals in seeking different levels of education and are a useful indicator for the assessment of level of productivity of an individual. Policy makers can use the evidence provided through these estimates to design the programs aiming at the promotion of investment in education in order to reduce the gender differences in income. The findings also suggest offering incentive to low-income families for making investment in human capital through education.

REFERENCES

Afzal, M., Malik, M. E., Begum, I., Sarwar, K., & Fatima, H. (2011). Relationship among Education, Poverty and Economic Growth in Pakistan: An Econometric Analysis. Journal of Elementary Education, Vol.22, No. 1 pp.23-45.

Ali, L. (2007). Returns to Education in Pakistan. Master of Philosophy in Economics Dissertation, International Islamic University (IIU), Islamabad, Pakistan, Islamabad.

Ali, L., & Akhtar, N. (2014). An Analysis of the Gender Earning Differentials in Pakistan. Research Journal of Applied Sciences, Engineering and Technology. Volume 7, Issue 13, April 2014

Ashraf, B. (2001). An Intertemporal Comparison of the Gender-Wage Gap in Pakistan and a Comparison with Other Countries. Doctor of Philosophy Dissertation, University of Karachi, Karachi.

Ashraf, J., & Ashraf, B. (1993). An Analysis of the Male-Female Earnings Differentials in Pakistan. The Pakistan Development Review 32 : 4 Part-II (Winter 1993) pp. 895–904.

Aslam, M. (2005). Rates of Return to Education by Gender in Pakistan. Global Poverty Research Group, GPRG-WPS-064.

Bauer, J., Feng, W., Riley, N. E., & Xiaohua, Z. (1992). Gender Inequality in Urban China: Education and Employment. Modem China, Vol. 18, No. 3. (Jul., 1992), pp. 333-370.

Bertocchi, G., & Bozzano, M. (2014). Family Structure and the Education Gender Gap: Evidence from Italian Provinces. DEMB Working Paper Series N. 36, July 2014.

Blau, F. D., & Kahn, L. M. (2007). The Gender Pay Gap: Have Women Gone as Far as They Can? Academy of Management Perspectives, 2007, pp 7-23.

Boraas, S., & Rodgers, W. M. (2003). How does gender play a role in the earnings gap? an update. Monthly Labor Review, March 2003, pp 9-15.

Brown, P. (2003). The Opportunity Trap: Education and Employment in a global economy. European Educational Research Journal, Volume 2, Number 1, 2003.

Cade, B. S., & Noon, B. R. (2003). A Gentle Introduction to Quantile Regression for Ecologists. Front Ecol Environ 2003; 1(8): 412–420.

Chzhen, Y., & Mumford, K. (2010). Gender Gaps across The Earnings Distribution For Full-Time Employees in Britain: Allowing For Sample Selection. Online article accessed on 05-11-2014 from the link: .

Coad, A., & Rao, R. (2007). Innovation and Firm Growth in High-Tech Sectors: A Quantile Regression Approach. LEM Working Paper Series, No. 2006/18.

Dougherty, S., & Herd, R. (2008). Improving Human Capital Formation in India. OECD Economics Department Working Papers, No. 625, , OECD Publishing. Avaiable on the link: http://dx.doi.org/10.1787/241005853765. doi: 10.1787/241005853765

Emran, M. S., & Shilpi, F. (2014). Gender, Geography and Generations: Intergenerational Educational Mobility in Post-reform India. MPRA Paper No. 58316, September 2014 URL: http://mpra.ub.uni-muenchen.de/58316/. Accessed on 23-11-2014

Fattouh, B., Scaramozzino, P., & Harris, L. (2001). Capital Structure in South Korea: A Quantile Regression Approach. Centre for Financial and Management Studies at SOAS, the University of London, Discussion Paper August 2001. Accessed from the link http://www.cefims.ac.uk/documents/research-12.pdf on 31-12-2014.

Finance, M. o. (2014). Pakistan Economic Survey, 2013-14. Finance Division, Government of Pakistan, Chapter 10, Education, pp 147-165

Gornick, J. C., & Jacobs, J. A. (1998). Gender, the Welfare State, and Public Employment: A Comparative Study of

Seven Industrialized Countries. American Sociological Review, Vol. 63, No. 5 (Oct., 1998), 688-710.

Grajek, M. (2001). Gender Pay Gap in Poland. WZB Discussion Paper, No. FS IV 01-13, URL: http://hdl.handle.net/10419/50954.

Guichard, S., & Larre, B. (2006). Enhancing Portugal's Human Capital. OECD Economics Department Working Papers, No. 505, , OECD Publishing. Available on the link: http://dx.doi.org/10.1787/871641300584. doi: 10.1787/871641300584

Harkness, S. (1996). The Gender Earnings Gap: Evidence from the UK. Fiscal Studies (1996) Vol. 17, No. 2, pp. 1-36.

Jehan, Q. (2000). Role of Women in Economic Development of Pakistan. Doctor of Philosophy Dissertation, University of Balochistan, Quetta, Pakistan.

Jung, S. (2014). "The Gender Wage Gap and Sample Selection via Risk Attitudes". Thema Working Paper No. 2014-25, Université de Cergy Pontoise, France, October, 2014.

Kingdon, G. G. (2001). The gender gap in educational attainment in India: How much can be explained? Department of Economics, University of Oxford, Oxford OX1 3UQ, August, 2001.

Koenker, R., & Hallock, K. F. (2001). Quantile Regression. Journal of Economic Perspectives, 15(4), 143-156.

Malhotra, A., Pande, R., & Grown, C. (2003). Impact of Investments in Female Education on Gender Equality International Center for Research on Women, Working Paper, August 2003

Martins, P. S., & Pereira, P. T. (2004). Does Education Reduce Wage Inequality? Quantile Regression Evidence from 16 Countries. Labour Economics 11 (2004) 355– 371. doi: 10.1016/j.labeco.2003.05.003

Melly, B. (2002). Public-Private Sector Wage Differentials in Germany: Evidence From Quantile Regression. An online article accessed from the link file:///C:/Users/Dell1/Downloads/2002.pdf on 31-12-2014.

MOF. (2014). Pakistan Economic Survey 2013-14. Islamabad: Ministry of Finance, Government of Pakistan.

Montenegro, C. E., & Patrinos, H. A. (2014). Comparable Estimates of Returns to Schooling Around the World. World Bank Education Global Practice Group, Policy Research Working Paper 7020, September 2014.

Nasir, Z. M. (1998). Determinants of Personal Earnings in Pakistan: Findings from the Labour Force Survey 1993-94. The Pakistan Development Review 37 : 3 (Autumn 1998) pp. 251–274.

Nasir, Z. M. (2005). An Analysis of Occupational Choice in Pakistan: A Multinomial Approach. The Pakistan Development Review 44 : 1 (Spring 2005) pp. 57–79.

Pastore, F., Sattar, S., & Tiongson, E. R. (2013). Gender Differences in Earnings and Labor Supply in Early Career: Evidence from Kosovo's School-to-Work Transition Survey. IZA Journal of Labor & Development, 2013.

PBS. (2011). Household Integrated Economic Survey 2010-11. Pakistan Bureau of Statistics, Statistics Division, Government of Pakistan, Islamabad. Accessed from the link: http://www.pbs.gov.pk/sites/default/files/pslm/publications/hies10_11/complete_report.pdf on 31-12-2014.

PBS. (2014a). Pakistan Employment Trends 2013. Islamabad: Pakistan Bureau of Statistics (PBS), Statistics Division, Government of Pakistan.

PBS. (2014b). Pakistan Social & Living Standards Measurement Survey (PSLM). Pakistan Bureau of Statistics (PBS), Statistics Division, Government of Pakistan, Islamabad. Accessed from the link: http://www.pbs.gov.pk/content/pakistan-social-and-living-standards-measurement accessed on 31-12-2014.

Pham, T.-H., & Reilly, B. (2007). The Gender Pay Gap in Vietnam, 1993-2002: A Quantile Regression Approach. MPRA Paper No. 6475, posted 29. December 2007 07:09 UTC. Online at http://mpra.ub.uni-muenchen.de/6475/.

Polachek, S. W., & Xiang, J. (2014). The Gender Pay Gap Across Countries: A Human Capital Approach. IZA DP No. 8603, October 2014.

Psacharopoulos, G. (1985). Returns to Education: A Further International Update and Implications. The Journal of Human Resources, Volume XX, No. 4, pp 583-604.

Qureshi, M. G. (2012). The Gender Differences in School Enrolment and Returns to Education in Pakistan. Pakistan Institute of Development Economics, Islamabad, PIDE Working Papers 2012: 84.

Rice, P. (1999). Gender Earnings Differentials: The European Experience. The World Bank, Policy Research Report on Gender and Development Working Paper Series No.8.

Sarwar, F., Fakher, A., Ali, S., & Mudassar, K. (2013). Human Capital, Population and Economic Growth: A Cointegration Approach. Universal Journal of Management and Social Sciences Vol. 3, No.10; October 2013.

Siddiqui, R. (2007). Modeling Gender Dimensions of the Impact of Economic Reforms in Pakistan. Poverty and Economic Policy Research Network, MPIA Working Paper 2007:13.

Siddiqui, R., & Siddiqui, R. (1998). A Decomposition of Male-Female Earnings Differentials. The Pakistan Development Review 37 : 4 Part II (Winter 1998) pp. 37:4, 885–898.

Son, H. H. (2010). Human Capital Development. Asian Development Bank (ADB) Economics Working Paper Series No. 225, Manila, Philippines., URL: www.adb.org/economics.

Su, B., & Heshmati, A. (2013). Analysis of the Determinants of Income and Income Gap between Urban and Rural China. IZA Discussion Paper Series, Discussion Paper No. 7162 January 2013.

Taniguchi, K., & Tuwo, A. (2014). New Evidence on the Gender Wage Gap in Indonesia. Asian Development Bank (ADB) Economics Working Paper Series, No. 404, 2014.

UN. (2016). An online content accessed from the link http://www.un.org/sustainabledevelopment/gender-equality/ on 17-05-2016

UN. (2014). The Millennium Development Goals Report 2014. United Nations, New York, 2014.

UNDP (2016). An online content accessed from the link http://www.pk.undp.org/content/pakistan/en/home/post-2015/sdg-overview.html on 17-05-2016

UNDP. (2015). United Nations Development Programme (UNDP) Pakistan Annual Report, 2015.

UNDP. (2014a). Fast Facts: Gender Equality and UNDP. United Nations Development Programme, New York, February, 2014.

UNDP. (2014b). Gender Equality Strategy 2014-17. United Nations Development Programme, New York, 2014.

Vassil, K., Eamets, R., & Mõtsmees, P. (2014). Socio-demographic Model of Gender Gap in Expected and Actual Wages in Estonia. IZA DP No. 8604, October 2014.

Weichselbaumer, D., & Winter-Ebmer, R. (2003). A Meta-Analysis of the International Gender Wage Gap, . IZA Discussion paper series, No. 906 URL: http://hdl.handle.net/10419/20143.

Willis, R. J. (1986). Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Functions. In O. Ashenfelter & R. Layard (Eds.), Handbook of Labor Economics (Vol. L, pp. 525-602): Elsevier Science Publishers BV.

Wu, Y., & Liu, Y. (2009). Variable Selection in Quantile Regression. Statistica Sinica 19 (2009), pp. 801-817.

Yamauchi, F. (2010). Human Capital Formation: History, Expectations, and Challenges in South Africa. International Food Policy Research Institute, Washington, D.C. U.S.A. URL: www.ifpri.org DOI: 10.2499/9780896291805.

Yu, K., Lu, Z., & Stander, J. (2003). Quantile Regression: Applications and Current Research Areas. The Statistician (2003) 52, Part 3, pp. 331-350.

Appendix 1: Results of Quantile Regression for Males

Dependent Variable: ln_y

Variables	Q5		Q25		Q50		Q75		Q95	
	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels
S	.091***		.0797***		.080***		.076***		.081***	
edu1		0.072		-.154**		-0.024		-0.019		-0.043
edu2		0.172		-0.021		0.084		.146**		*0.021*
edu3		.371**		.149**		.231***		.279***		*.248****
edu4		.589***		.327***		.420***		.460***		.446***
edu5		.984***		.699***		.809***		.872***		.921***
lit1	-.297***	0.088	-.256***	.281***	-.239***	.199***	-.221***	.162***	-.194***	.221***
lit2	-0.026	0.022	0.000	0.013	-0.023	-0.032	.-.048*	-0.039	-0.077	-.100**
Exp	.079***	.072***	.061***	.061***	.052***	.050***	.043***	.040***	.036***	.033***
exp_sq	-.001***	-.001***	-.001***	-.001***	-.001***	-.001***	-.000***	-.000***	-.000***	-.000***
ind1	0.174	0.136	0.087	0.063	0.064	0.037	0.074	.099**	0.013	0.017
ind2	.201***	.241***	.186***	.173***	.156***	.144***	.102***	.104***	.089*	.068*
ind3	.421***	.398***	.409***	.366***	.386***	.337***	.280***	.309***	.179*	.213***
ind4	.201***	.235***	.186***	.186***	.201***	.180***	.160***	.162***	.165***	0.134***
ind6	.253***	.290***	.197***	.203***	.247***	.244***	.210***	.214***	.119**	.128***
ind7	0.063	0.093	.135***	.134***	.167***	.161***	.143***	.152***	.101***	.063**
occu1	.240***	0.131*	.348***	.306***	.435***	.443***	.575***	.510***	.684***	.601***
occu2	0.132	0.079	.278***	.216***	.255***	.262***	.263***	.257***	.295***	.299***
occu4	0.067	0.229	0.069	0.110	0.013	0.066	0.006	0.024	-0.041	-0.039
occu5	-.314***	-.332***	-.100***	-.088***	-.049**	-0.020	0.007	0.029	-0.003	0.047
occu6	-0.085	-0.042	-0.013	-0.012	-0.040	-0.007	-0.004	0.020	-0.074	-0.023
occu7	-.118*	-.134**	-.134***	-.127***	.131***	-.115***	-.133***	-.115***	-.213***	-.169***
age1	0.234	0.266	.271**	0.135	.240**	0.059	.223*	0.123	0.249	0.011
age2	.660**	.709***	.446***	.313***	.314***	.173*	.275***	.195*	0.246	0.047
age3	.593**	.698***	.418***	.297***	.278***	.164**	.313***	.239***	.303**	0.158
age4	.624***	.748***	.382***	.270***	.266***	.169***	.295***	.256***	.275**	.165*
age5	.416***	.529***	.268***	.197***	.193***	.149***	.272***	.221***	.238***	.190**
age6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cons	6.126***	6.135	6.988***	7.172***	7.494***	7.699***	7.922***	8.029***	8.431***	8.717***
Pseudo R2	0.287	0.288	0.294	0.296	0.337	0.342	0.396	0.402	0.451	0.462
N	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000	6828.000

***significant at 1% level; **significant at 5% level; *significant at 10% level

Source: Authors Calculations

Appendix 2: Result of Quantile Regression for Females

Dependent Variable: ln_y

Variables	Q5		Q25		Q50		Q75		Q95	
	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels	Edu Years	Edu Levels
S	.219***		.212***		.202***		.201***		.193***	
edu1		0.685		-0.131		0.183		0.124		-0.268
edu2		0.823		0.262		0.551		0.562		0.322
edu3		1.657		0.612		.992**		1.109**		0.743
edu4		1.887*		0.872		1.059**		1.182**		0.830
edu5		2.534**		1.595**		1.853***		1.994***		1.755**
lit1	-1.054***	-0.5284	-1.046***	0.318	-.726***	0.0335	-.793***	0.045	-.838***	0.117
lit2	-.471**	-.470**	-0.053	-0.098	-0.121	-0.0991	-0.152	-0.143	-.413***	-.363*
Exp	.129***	.102**	.107***	.104***	.104***	.089***	.0788***	.065***	.054***	0.0257
exp_sq	-.002***	-.002***	-.002***	-.002***	-.002***	-.002***	-.001***	-.001***	-.001***	0.000
ind1	.965*	0.956	-0.068	-0.093	-0.336	-0.336	-.498*	-0.334	-0.067	-0.098
ind2	0.0373	-0.217	-0.14	-0.085	-0.231	-0.181	-.369*	-0.242	0.114	0.139
ind3	0.113	0.107	-0.800	-0.798	-.967**	-.938**	-1.674***	-1.565***	-0.379	-0.343
ind4	0.374	0.430	-0.282	-0.277	0.125	0.552	0.064	0.336	0.191	0.314
ind6	-0.618	-0.591	.821**	.887***	.644**	.556*	0.301	0.463	-0.014	0.119
ind7	0.583	0.577	-0.211	-0.244	-0.225	-0.251	.-0.343*	-0.242	-0.242	-0.223
occu1	0.198	0.204	0.200	.348***	0.133	.334***	0.092	.284**	0.156	0.218
occu2	0.361	0.287	.353***	.399***	0.133	.372***	0.147	0.184	.310*	.383*
occu4	-0.271	-0.098	-0.413	-0.414	0.191	0.191	-0.381	-0.439	-0.342	-0.317
occu5	0.035	0.241	-0.075	-0.078	-0.116	-0.156	-0.173	-0.182	-.279*	-0.332
occu6	0.954	1.591**	0.619	0.594	0.301	0.267	0.023	-0.034	0.188	-0.073
occu7	.354*	.427*	.293***	.307***	.193*	0.141	0.108	0.078	.232*	0.182
age1	-0.148	-1.072	-0.571	-0.992	-0.449	-1.274**	0.178	0.145	-0.041	-0.722
age2	-0.621	-1.489	-0.852	-1.255**	-0.72	-1.342***	-0.184	-0.132	-0.177	-0.722
age3	-1.103	-1.693*	-1.000**	-1.338***	-.937**	-1.419***	-0.357	-0.289	-0.247	-0.571
age4	-0.937	-1.341*	-.814*	-1.052***	-.814**	-1.168***	-0.278	-0.11	-0.225	-0.376
age5	-0.954	.-1.066*	-.673**	-.759**	-.774***	-.818***	-0.193	-0.064	-0.212	-0.273
age6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cons	5.133***	6.220***	6.703***	7.243***	7.140***	8.099***	7.482***	7.516***	8.441***	9.361***
Pseudo R^2	0.2304	0.2123	0.2728	0.2581	0.3684	0.3528	0.4294	0.4092	0.4103	0.3892
N	1014	1014	1014	1014	1014	1014	1014	1014	1014	1014

***significant at 1% level; **significant at 5% level; *significant at 10% level

Source: Authors Calculations