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## MEASURING THE CHANGES IN INCOME DISTRIBUTION OF PAKISTAN

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### ABSTRACT

A continuous rise in income inequality is a highly debated theme as many changes in the structure of income distribution have happened in Pakistan. This study explores the changes in income distribution during 1998-2018 in Pakistan. The study has used PIHS 1998-99 Pakistan Social and Living Standard Measurement survey data for 2007-08, and 2018-19, collected and administrated by the Pakistan Bureau of Statistics (PBS). Oaxaca-Blinder decomposition methodology is used for estimation. The findings of the study show that education and experience significantly increase the average income. Oaxaca-Blinder decomposition indicates that the wage gaps are; 0.172 between 1998-2007, -0.062 between 2007-2018, and 0.110 between 1998-2018, and significant at a 1% significance level. The wage gap was positive between 1998-2017 and 1998-2018, implying that the wage inequality increased in that period mainly due to the coefficient component, while the wage gap was negative between 2007-2018, showing the decrease in wage inequality due to the endowment component. Moreover, the endowment component of decomposition is negative for all years of interest and highly significant except for the wage gap during 1998-2007. The coefficients component is highly significant and positive for all the years, meaning that applying the coefficients of the labor force in 2007 and 2018 to the characteristics of the labor force in 1998. The interaction component is negative during 1998-2007 and 1998-2018 whereas positive during 2007-2018 and has a high p-value, except for 1998-2018. It is recommended that government policies should ensure an equitable distribution of income.

*Keywords: Income distribution; Income inequality; Oaxaca-Blinder decomposition; Pakistan.*

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### INTRODUCTION

Economic structure, production method, factors of production, and prices of goods and services change over time, and their dynamics involve both long-term trends and short-term shocks and fluctuations. These factors influence the population's socio-demographic characteristics for example, pattern of economic behaviour, family size, labour force participation, education of children, savings, and investment (Bourguignon et al., 2004). Family's economic and demographic changes contribute to society's income inequality patterns (Druker and Stier, 2019; Alvaredo and Gasparini, 2015; Garcia-Penalosa and Orgiazzi, 2013; Breen and Salazar, 2011). Reducing poverty and unjust inequalities is a matter of concern in developing countries. The United Nations, famous Sustainable Development Goals (MDGs), proposed goal 10 to reduce household inequalities between household inequalities and regional and global inequalities up to 2030. After the financial crisis (2008), the concentration of income at the top of the income distribution increased sharply throughout the world. The number of billionaires has doubled, and the gap between the top and bottom 20% has widened. An increase in the income shares of the top 20% (the

richest) adversely affects the GDP growth because of no trickle-down effect; on the other hand, an increase in the income share of the bottom 20 percent (the poor) causes a rise in GDP growth.

The distribution of income is a social phenomenon that engages social commentators and policy-makers. The income of individuals differs due to the personal characteristics of the population (education, gender, household size, ethnicity, locality, race), distribution of assets (physical and financial assets) wage structure, employment structure, and prices (Bourguignon and Platteau, 2014). After World War II, the economy's main focus was to achieve efficiency and economic growth, but in the late 1980s and onward, income distribution became the policy interest in developing and developed economies (Alvaredo et al., 2018). This study's primary purpose is to understand the changes in income distribution during 1998-2018 in Pakistan. Income distribution changes can be measured by applying different parametric and non-parametric methods (Cowell, 2011). This study uses Oaxaca Blinder's (1973) counterfactual decomposition method which is a widely used parametric tool for decomposing earning differences; it decomposes the difference between the means of two sub-populations into counterfactual components based on the observed characteristics (Garcia-Penalosa and Orgiazzi, 2013). Oaxaca Blinder's approach gives information regarding the average wage gap among the two groups (Nopo et al., 2010).

## **REVIEW OF LITERATURE**

Dang and Nguyen (2021) decomposed the gender inequality during the Covid-19 pandemic in 06 countries (USA, UK, China, Italy, South Korea, and Japan). The study used the primary data of 6089 respondents from the Creative-Pioneering Researchers Program. The study used the Oaxaca-Blinder method to evaluate the determinants of the gender wage gap (income, expenditures, savings, job loss) during the pandemic. Findings showed that the decline in income of females was 50% more than the male counterparts. Women's Participation rate in the economy and infection rate were the significant determinants of the gender wage gap. Yang and Wang (2021) examined decomposed the changes in China's urban and rural household saving rates. The study used the Chinese Household Income Project Survey (CHIPS) data from 1995 to 2013 (04 data sets). Oaxaca-Blinder method was applied to decompose the effect of Household characteristics (income, health insurance, family size, marital status of household head, age, and education of household head) on the saving rate of the household. Findings showed that a permanent increase in household income significantly increases the household saving primarily to bear the unwanted health shocks.

Lozano-Alcantara and Vogel (2021) evaluated the effect of an increase in housing prices on income inequality in the elderly of Germany. The study used the household data set, the German Socio-Economic Panel (GSOEP) survey from 1996 to 2017. Oaxaca-Blinder method was used to decompose the Old-age income poverty determined by the household characteristics (region, tenure, dwelling, occupancy duration, income, rent of house). Findings showed that housing costs were the major contributor among the other determinants to old-age poverty. Novignon et al. (2018) evaluated the relationship between poverty and expenditure inequality in Ghana. The study used the Ghana Living Standards Survey (GLSS) for 2012-13. Marginal elasticities and marginal effect were measured within and between components of inequality. Household expenditures were divided into four parts; food, non-food, education, and health. Findings showed that reduction within inequalities had a significant effect on the reduction in overall inequality, poverty headcount, and poverty gap. The association between poverty and inequality was not consistent. Expenditures on human capital development (Health & Education) were lower than food and non-food expenditures.

Tobden (2017) examined the dynamics and sources of expenditure inequality in Bhutan. The study used the Bhutan Living Standard Survey's household data, undertaken by the National Statistics Bureau (NSB) for 2007 & 2012. Theil decomposition and Oaxaca-Blinder decomposition methods were used to

decompose the expenditure inequality based on the location of the household, districts, age of household head, education of household head, household size, and household head gender. The per-capita household expenditure was used as a dependent variable. In contrast, household head characteristics (age, education, gender, marital status) and household size were used as independent variables in the Blinder-Oaxaca decomposition model. Findings showed that the average monthly household expenditure for urban households was more than twice of rural households. Age and level of education of household head had a positive effect on the spending of households. Mean expenditures for the male-headed family were lower than for the female-headed family. Household size had a positive impact on household expenditures. Inequality was the primary factor of overall inequality in Bhutan. Amjad and Akbar (2022) decomposed the effect of socio-economic factors on the consumption of micronutrients in Pakistan. The study used the Household Integrated Economic Survey (HIES) data for 2005-06 and 2015-16. The study used the Oaxaca-Blinder method to decompose the effect of Household characteristics (income, education of household head, gender of household head, family size, locality) and social factors (Urbanization, Province) on the intake of micronutrients (calcium, iron, iodine, and zinc). Findings showed that household income, urbanization, and family size were the critical determinants of the decrease in consumption of micronutrients.

## **METHODOLOGY**

The study tried to evaluate the income distribution in Pakistan by using the different factors and characteristics of workers. The study has used PIHS 1998-99 Pakistan Social and Living Standard Measurement survey data for 2007-08, 2018-19, collected and administrated by the Pakistan Bureau of Statistics (PBS).

Economists widely use the Oaxaca Blinder Decomposition Method to measure the differences and changes in income of groups accounted for exogenous variables. Oaxaca Blinder decomposition refers to the differences in means rather than the whole distribution of income. Oaxaca (1973) and Blinder (1973) found the following way of comparing the mean differences in two different populations of time  $t$  and  $t_1$ . Suppose there are two different earning functions based on different populations of two different time  $t$  and  $t_1$  as:

$$Y_{it} = \beta_t X_{it} + \mu_{it} \quad (1)$$

$$Y_{kt_1} = \beta_{t_1} X_{kt_1} + \mu_{kt_1} \quad (2)$$

$Y_{it}$	The income of Individual $i$ in time $t$
$X_{it}$	Observed characteristics of individual $i$ in time $t$ (i.e. Gender, Experience, Experience Square, Education, Occupation, Remittances, etc. of individual $i$ in time $t$ )
$Y_{kt_1}$	The income of Individual $k$ in time $t_1$
$X_{kt_1}$	Observed characteristics of individual $k$ in time $t_1$ (i.e. Gender, Experience, Experience Square, Education, Occupation, Remittances, etc. of $k$ in time $t_1$ )
$\beta_t$ & $\beta_{t_1}$	Coefficient measure the returns of related factors in time $t$ & $t_1$
$\mu_{it}$ & $\mu_{kt_1}$	Error terms in time $t$ & $t_1$ (which are the unexplained parts and measure the labour market discrimination)

Oaxaca decomposition divides the mean earning gap into two parts. First, a separate earning function for different time periods is estimated with the explanatory variable that indicates sectoral choice.

$$\bar{Y}_t = \beta_t \bar{X}_t \quad (3)$$

$$\bar{Y}_{t_1} = \beta_{t_1} \bar{X}_{t_1} \quad (4)$$

The earning gap between two earning equations of different time periods is measured by elementary transformation, which leads change in means:

$$\Delta \bar{Y} = \bar{Y}_{t_1} - \bar{y}_t = \beta_t (\bar{X}_{t_1} - \bar{X}_t) + \bar{X}_{t_1} (\beta_{t_1} - \beta_t) \quad (5)$$

The change in mean earning of the population between time period *t* and *t*<sub>1</sub> is a combination of change in mean endowments at constant prices (endowment effect, which is also called characteristic effect) and change in prices at constant endowments (Price effect, which is also called a change in returns to characteristics). The former aprt is called explained, which shows earning gap due to the difference in endowments between time period *t* and *t*<sub>1</sub>. The latter part is called unexplained, indicating the earning gap is due to market discrimination.

**RESULTS AND DISCUSSION**

Table 1 shows the OLS results in all the 03 time periods. All the variables are statistically significant at a 0.05 confidence interval except the KPK and Baluchistan in 2007/08 and Sindh in 2018/19. Education and experience significantly increase the average income. Female average income is lower than their male counterparts. A married person’s income is higher than their unmarried counterparts. Urban people earn higher than rural people.

Table 1. Ordinary Least Square (OLS) Results.

Variables	Variable Explanation	1998-99	2007-08	2018-19
Education	Education	0.0602***	0.066***	0.0678***
Experience	Experience	0.049***	0.051***	0.0581***
Expsq	Experience Square	-0.00658***	-0.0006***	-0.000706***
Gender				
Female	Female	-0.756***	-1.148***	-1.403***
Province				
Sind	Sind	0.139***	-0.052***	-0.0156
KPK	Khyber Pakhtunkhwa	0.0299*	-0.0207	0.0914***
Bal	Baluchistan	0.342***	0.00151	0.194***
Locality				
Urban	Urban	0.226***	0.186***	0.226***
Marital Status				
Married	Married	0.171***	0.166***	0.0956***
Profession				
Leg_sen_man		1.083***	1.442***	0.860***
Professional		0.705***	0.974***	0.960***
Tech_a_proff		0.647***	0.859***	0.682***
Clerk		0.514***	0.654***	0.560***
service_sale		0.531***	0.605***	0.419***
Agri_fishery		-0.148***	0.542***	0.488***
Craft		0.363***	0.452***	0.300***
Plant_machin		0.576***	0.607***	0.502***
_cons		6.586***	6.676***	6.759***

Note: \* p<0.10, \*\* p<0.05, & \*\*\* p<0.01.

Table 2 presents the results of the Oaxaca-Blinder decomposition for the labour force between 1998-2018. The results are divided into two main components: difference and decomposition. The mean of the log

wages is 8.251 in 1998/99, 8.423 in 2007/08, and 8.361 in 2018/19. The wage gaps are; 0.172 between 1998-2017, -0.062 between 2017-2018, and 0.110 between 1998-2018, which are significant at a 1% significance level. The wage gap was positive between 1998-2017 and 1998-2018, implying that the wage inequality increased in that period mainly due to the coefficient component, while the wage gap was negative between 2007-2018, showing the decrease in wage inequality due to the endowment component. The wage gap is divided into endowments, coefficients and interaction. The endowment component of decomposition is negative for all years of interest and highly significant except for the wage gap between 1998/99 and 2007/08, which implies that if the labour force working in 2007/08 and 2018/19 have characteristics of the labour force of 1998/99, their wages would be lower. The coefficients component is highly significant and positive for all the years, meaning that applying the coefficients of the labour force in 2007/08 and 2018/19 to the characteristics of the labour force in 1998/99, their wages would, on average, increase. The interaction component accounts for both the endowments and the coefficients effect simultaneously between the two groups affects the difference in outcome to a small degree. The interaction component is negative between 1998-2007 and 1998-2018, whereas positive between 2007-2018 and has a high p-value, except for 1998-2019.

Table 2. Oaxaca-Blinder Decomposition between 1998/99 and 2018/19.

Time	▲ From 1998-2007		▲ From 2007-2018		▲ From 1998-2018	
	1998/99	2007/08	2007/08	2018/19	1998/99	2018/19
Mean Wage	8.251*** (1245.34)	8.423*** (1404.57)	8.423*** (1404.57)	8.361*** (1315.59)	8.251*** (1245.34)	8.361*** (1315.59)
Value	Mean Share	▲ % Share	Mean Share	▲ % Share	Mean Share	▲ % Share
Difference	0.172 *** (-19.26)	↑ 2.08%	-0.062*** (7.11)	↓ 0.74%	0.110*** (11.98)	↑ 1.33%
Endowments	-0.008 (-0.28)	↓ 8.74%	-0.119*** (17.10)	↓ 191.63%	-0.131*** (-17.46)	↓ 210.95%
Coefficients	0.229 *** (-31.49)	↑ 262.31%	0.013* (1.97)	↑ 20.45%	0.249*** (32.61)	↑ 400.97%
Interaction	-0.049 *** (13.54)	↓ 55.90%	0.045*** (13.39)	↑ 71.66%	-0.008 (-1.47)	↓ 12.82%
Number of Observations	39197		50488		43685	

Note: \* p<0.10, \*\* p<0.05, & \*\*\* p<0.01.

Table 3 presents the results of the Oaxaca-Blinder decomposition for the male labour force between 1998-2018. The results are divided into two main components: difference and decomposition. The mean of the log wages is 8.328 in 1998/99, 8.560 in 2007/08, and 8.645 in 2018/19. The wage gaps are; 0.232 between 1998-2017, 0.085 between 2007-2018, and 0.317 between 1998-2018, which are significant at a 1% significance level. The wage gap was positive between 1998-2018, implying that the male wage inequality increased in that period mainly due to the increase in endowment and coefficient components. The wage gaps are further divided into endowments, coefficients and interaction. The endowment component of decomposition is positive and statistically significant for all years of interest, which implies that if the male labour force working in 2007/08 and 2018/19 have characteristics of the male labour force of 1998/99, their wages would, on average increase. The coefficients component is positive and statistically significant for all the years, meaning that applying the coefficients of the male labour force in 2007/08 and 2018/19 to the characteristics of the male labour force in 1998/99, their wages would, on average, increase. The interaction component accounts for both the endowments and the coefficients effect simultaneously

between the two groups and have a small effect on the difference in the outcome. The interaction component has a high p-value and is negative between 1998-2007 and 1998-2018, whereas positive between 2007-2018.

Table 3. Oaxaca-Blinder Decomposition of Males between 1998/99 and 2018/19.

Time	▲ From 1998-2007		▲ From 2007-2018		▲ From 1998-2018	
	1998/99	2007/08	2007/08	2018/19	1998/99	2018/19
Mean Wage	8.328*** (1263.94)	8.560*** (1571.19)	8.560*** (1571.19)	8.645*** (1671.81)	8.328*** (1263.94)	8.645*** (1671.81)
Value	Mean Share	▲ % Share	Mean Share	▲ % Share	Mean Share	▲ % Share
Difference	0.232 *** (27.17)	↑ 2.79%	0.085*** (11.29)	↑ 0.99%	0.317*** (37.86)	↑ 3.81%
Endowments	0.013 * (2.36)	↑ 5.47%	0.011* (2.25)	↑ 13.21%	0.024*** (4.33)	↑ 7.51%
Coefficients	0.276 *** (38.71)	↑ 118.97%	0.041*** (6.40)	↑ 48.70%	0.360*** (47.49)	↑ 113.56%
Interaction	-0.056 *** (-15.32)	↓ 24.27%	0.032*** (9.93)	↑ 38.09%	-0.066*** (-13.37)	↓ 20.95%
Number of Observations	35048		43077		37347	

Note: \* p<0.10, \*\* p<0.05, & \*\*\* p<0.01.

Table 4. Oaxaca-Blinder Decomposition of Female between 1998/99 and 2018/19.

Time	▲ From 1998-2007		▲ From 2007-2018		▲ From 1998-2018	
	1998/99	2007/08	2007/08	2018/19	1998/99	2018/19
Mean Wage	7.517 *** (322.79)	7.352 *** (333.14)	7.352 *** (333.14)	7.018*** (424.95)	7.517 *** (322.79)	7.018*** (424.95)
Value	Mean Share	▲ % Share	Mean Share	▲ % Share	Mean Share	▲ % Share
Difference	-0.165*** (-5.15)	↓ 2.20%	-0.334*** (-12.11)	↓ 4.54%	-0.499*** (-17.48)	↓ 6.64%
Endowments	-0.029 (-1.08)	↓ 17.45%	-0.294*** (-12.57)	↓ 88.02%	-0.348*** (-12.34)	↓ 69.74%
Coefficients	-0.153*** (-6.14)	↓ 92.73%	-0.067** (-3.18)	↓ 19.97%	-0.279*** (-10.30)	↓ 55.91%
Interaction	0.017 (1.20)	↑ 10.06%	0.027* (1.97)	↑ 8.02%	0.128*** (5.34)	↑ 25.65%
Number of Observations	4149		7411		6338	

Note: \* p<0.10, \*\* p<0.05, & \*\*\* p<0.01.

Table 4 presents the results of the Oaxaca-Blinder decomposition for the female labour force between 1998-2018. The results are divided into two main components: difference and decomposition. The mean of the log wages is 7.517 in 1998/99, 7.352 in 2007/08, and 7.018 in 2018/19. The wage gaps are; -0.165 between 1998-2017, -0.334 between 2007-2018, and -0.499 between 1998-2018, which are significant at a 1% significance level. The wage gaps were negative between 1998-2018, implying that the female wage

inequality decreased in that period mainly due to the decrease in endowment and coefficient components. The wage gaps are further divided into endowments, coefficients and interaction. The endowment component of decomposition is negative for the all-data set and statistically significant except for 1998-2007, which implies that if the female labour force working in 2007/08 and 2018/19 have characteristics of the female labour force of 1998/99, their wages would on the average decrease. The coefficients component is also negative and statistically significant for all the years, meaning that applying the coefficients of the female labour force in 2007/08 and 2018/19 to the characteristics of the female labour force in 1998/99, their wages would, on average, decrease. The interaction component accounts for both the endowments and the coefficients effect simultaneously between the two groups and have a small effect on the difference in the outcome. The interaction component is positive for all time periods and is significant for the difference between 2007-2018 and 1998-2018 while insignificant for the difference between 1998-2007.

## **CONCLUSIONS**

This study's primary purpose is to understand the changes in income distribution during 1998-2018 in Pakistan. The findings of the study show that education and experience significantly increase the average income. Female average income is lower than their male counterparts. A married person's income is higher than their unmarried counterparts. Urban people earn higher than rural people. The results of Oaxaca-Blinder decomposition are divided into two main components: difference and decomposition. The mean of the log wages is 8.251 in 1998/99, 8.423 in 2007/08, and 8.361 in 2018/19. The wage gaps are; 0.172 between 1998-2017, -0.062 between 2017-2018, and 0.110 between 1998-2018 are significant at a 1% significance level. The wage gap was positive between 1998-2017 and 1998-2018, implying that the wage inequality increased in that period mainly due to the coefficient component, while the wage gap was negative between 2007-2018, showing the decrease in wage inequality due to the endowment component. The wage gap is divided into endowments, coefficients and interaction. The endowment component of decomposition is negative for all years of interest and highly significant except for the wage gap between 1998/99 and 2007/08, which implies that if the labour force working in 2007/08 and 2018/19 have characteristics of the labour force of 1998/99, their wages would be lower. The coefficients component is highly significant and positive for all the years, meaning that applying the coefficients of the labour force in 2007/08 and 2018/19 to the characteristics of the labour force in 1998/99, their wages would, on average, increase. The interaction component accounts for both the endowments and the coefficients effect simultaneously between the two groups affects the difference in outcome to a small degree. The interaction component is negative between 1998-2007 and 1998-2018, whereas positive between 2007-2018 and has a high p-value, except for 1998-2019.

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