Population Review
Volume 62, Number 2, 2023
Type: Article pp. 60-78

Occupational Segregation and Gender Wage Gap in Pakistan: Do Occupational Classifications Matter?

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Abstract

This paper aims to quantify the relationship between occupational gender segregation and gender wage disparities in Pakistan. Non-parametric matching-based decomposition method and a detailed set of individual and labor market characteristics, especially the detailed occupations at a 3-digit level, are used to determine the gender wage gap for males and females in and out of the common support. The results show that even though the inclusion of a detailed set of human capital, labor market characteristics, and occupational segregation by gender helps in explaining most of the gender wage gap, a large proportion of the gender wage gap remained unexplained and can be attributed to gender discrimination. A comparison of rural and urban labor markets shows a high rate of the gender wage gap in rural areas compared to urban areas of the country.

Keywords: gender wage gap, occupational segregation, non-parametric, matching, labor market

JEL Codes: J16; D31; J3; J7.

Introduction

There is a consensus in the economic literature that women are subject to wage discrimination in almost all parts of the world. Pakistan is the epicenter of gender inequity. Women constitute 49% of the country's population. However, the labor market participation rate of female workers is only 22%, the lowest in the region after Afghanistan. According to labor force statistics, women hold around 25.3% of technical positions and only around 4.9% of managerial positions in the labor market. According to the Global Wage Report 2018-19 by ILO, Pakistani women constitute 90% of the country's bottom 1% of wage earners; the average earning of women in the labor market is around 30% less than men. The Global Gender Gap Report has also ranked 153 out of 156 countries in terms of gender parity. The country is ranked 152 in terms of economic participation and opportunities.

The gender wage gap is generally described as the difference between what women would earn if they were male with the same characteristics versus what they actually earn. Most of the existing literature on gender wage disparities attempt to explain the wages differentials by using observable human capital characteristics; for example, level of attained education, and years of experience, or other individual and demographic characteristics, such as age, household characteristics, or region of residence, any of which may also affect the gender wages differentials in the labor market. The portion of the wage gap that remains unexplained is often attributed to labor market discrimination. One of the important characteristics to explain at least some part of the unobserved wage differential across gender is occupational segregation (the unequal distribution of men and women across occupations). The existing empirical literature has shown that it can be challenging to ensure comparability when certain occupations are dominated by or even exclusively populated by members of one gender. In a number of countries, occupational segregation by gender has been recognized as a significant driver of gender wage differentials. (Ismail et al., 2017; Bayard et al., 2003; Groshen, 1991; Brynin and Perales, 2015; Amuedo-Dorantes and de la Rica, 2006).

Statistics obtained from a recent labor force survey shows that females continue to be employed disproportionately and only across specific occupational groups. Statistics also show that almost all the occupations in Pakistan are masculinized, i.e., a significantly larger number of men than women working in all the occupations. The most significant proportion of employed women is in the categories of elementary occupations (41%), followed by 28% in professionals and 19.48% in craft and related trades. Within each category, there is a tendency for both horizontal and vertical segregation. For example, most women are found to be in teaching occupations (56%), which encompasses the primary and secondary school sector and the vocational training sector. In craft and related trades, 89% of women work in food processing, woodworking, garments, and other craft-related trades, and 71% of women work in agriculture, forestry, and labor in elementary occupations.

Using the Duncan index of dissimilarity (Irfan, 2013; Ahmed and Hyder, 2008) has shown a significantly high level of occupational gender segregation in the country. Recently (Khan et al,

2023) have also confirmed a significant level of occupational segregation by gender in multi-group contexts in the country. A number of studies focused on the evolution of the gender wage gap and determined a significantly high degree of the gender wage gap in the labor market of Pakistan (Ashraf and Ashraf, 1996; Nazli, 2004; Ahmed and Hyder, 2008; Aslam and Kingdon, 2009). However, only a few studies have incorporated occupational and industry characteristics in analyzing the gender wage gap in Pakistan, and then only indirectly and at the most general level (major occupations at one-digit International Standard Classification (ISCO) (Nazli, 2004; Ahmed and Hyder, 2008). Therefore, it remains unresolved whether occupational gender segregation across different and incomparable occupations can be utilized to explain the gender wage disparity in Pakistan. Consequently, it has become increasingly important to assess the gender wage gap by taking into consideration the gender distribution across occupations. This research adds to the current literature on the gender pay gap in Pakistan by accounting for a detailed set of labor market characteristics, including detailed occupations based on 3-digit ISCO-08 classification and other important human capital and demographic factors to examine the extent to which the occupational distribution of male and female workers explains the gender wage gap in Pakistan.

Most of the previous studies have used the conventional (Oaxaca, 1973; Blinder, 1973) (OB) decomposition method. One of the important limitations of this conventional method is lack of common support" (Ñopo 2004; Ñopo 2008, Djurdjevic and Radyakin, 2007; Anspal, 2015). For a detailed discussion on the importance of common support in decomposition analysis, see Lechner, 2008). Ñopo (2004) has shown that the OB decomposition methods tend to overestimate the fraction of the unexplained wage gap owing to its limitations in accounting for the common support. The notion is largely supported by the existing literature available for Pakistan, where most studies have shown that a large portion of the wage gap between men and women in Pakistan has remained unexplained. The second contribution of this study to the existing literature is that it investigates the gender wage gap in Pakistan using the matching-based decomposition method proposed by Ñopo (2008).

Literature Review

Studies on Gender Wage Gap, International Evidence

The magnitude and sources of the gender wage gap have been extensively researched since Becker (1957) published his seminal work on the economics of discrimination. A large number of empirical studies on the labor markets have focused on issues such as wage structure, wage differentials, labor force participation, unemployment, discrimination, and segregation in relation to the gender wage gap, and most of the existing empirical literature shows that significant evidence of a persistent gender wage difference exists in the labor markets of both developed and developing nations. Mincer (1974) provides an analytical framework for investigating the determinants of wages, and thus monetary returns associated with the factors such as schooling quality, education, experience, age, and occupation were estimated. Human capital theories have

been used extensively by (Polachek 1975, 1976, 1979; Bergmann, 1974, 2005, 1997; Polachek and Kim, 1994), and many others to explain the gender wage gap.

The Oaxaca-Blinder (OB) decomposition technique is a popular method for studying labor market outcomes based on factors such as gender, race, and ethnic origin, among others. To decompose the (gender, racial or ethnic) wage gap, Oaxaca (1973) and Blinder (1973) disentangled the contributions of differences between two groups: components of the explained gap and the components of the unexplained gap mainly due to individual, social or demographic characteristics and gender discrimination, respectively (Jann, 2008). Since then, many studies have been conducted to estimate the returns to human capital characteristics such as education, quality of schooling, and experience or to quantify the extent to which a labor market is discriminatory due to factors such as race and gender. Oaxaca (1973) focuses on the wage disparity between men and women, Blinder (1973) on the wage disparity between races, and Reimers (1983) on the wage disparity between ethnic groups (Hispanic and Black). These decompositions, which focus on the mean and are based on simple counterfactuals, are now accepted in economics as standard practice.

Many studies have shown that occupational segregation accounts for a significant portion of the gender wage gap. For instance, several researchers (Goldin, 1990; Petersen and Morgan, 1995; Sorensen, 1990; Macpherson and Hirsch, 1995; Bayard et al., 2003; Groshen, 1991) showed that the segregation of female labor into specific occupations, industrial groups, and establishment divisions explains the entire gender pay disparity in the United States. Suh (2010) performed the decomposition analysis to determine the changing gender wage gap between 1989-2005 also in the US. The result of the decomposition showed a decline in the wage gap since women in the labor market had increased their education, hours of work, and experience. Another critical factor in closing the gender wage gap was reducing discrimination. After a brief pause in the mid-1990s, the wage gap between men and women has recently started to narrow again.

The findings from Scandinavian labor markets also support the argument that sex segregation is an essential factor in explaining the gender wage gap. In an analysis of the Danish labor market, Gupta and Rothstein (2001) stated that gender segregation accounts for roughly half of the wage gap in the Danish private sector. In a similar study, Reimer and Schroder (2006) determined that Women in Germany earned less than men, which cannot be entirely attributed to differences in human capital or women being assigned to less attractive jobs. Discrimination in the workplace was cited as the main reason for this discrepancy. Hansen and Wahlberg (2000); Meyerson-Milgrom et al. (2001), using data from Sweden and Norway, show a negative association between occupational gender segregation and female wage.

Watson (2010), Using the Blinder–Oaxaca decomposition technique, examined the gender wage gap among full-time managers in Australia for the period 2001–2008. The paper also explored the role of work experience and parenthood in labor market discrimination. The findings show that female managers earn around 27% less than men, and the main reason for this gender wage gap is gender discrimination. Zajkowska (2013) investigated the factors contributing to wage disparities

between women and men of comparable human capital characteristics in the Polish labor market. Using the Blinder–Oaxaca decomposition methods, the author found a significant gender wage gap for matching productivity factors; however, the significantly large gender wage gap remained unexplained. In a more recent study, Strawinski et al. (2018), Investigated the gender wage gap for each occupation across 98 occupations based on 3-digit classifications to determine a substantial gender wage gap between men and women employed in the same occupational groups.

Sophie and Dominique (2005) used the Heckman two-step procedure to control selectivity bias and performed Oaxaca and Ransom decomposition analysis to estimate the gender wage gap for 10 EU countries. The analysis mainly focused on the extent of the wage gap that can be explained by differences in occupational and individual characteristics. Results show a low level of wage differential for women in the public sector. The findings also revealed that the differences in occupational characteristics play a significant role in elucidating the gender wage gap in all countries.

Ismail et al. (2017) used Malaysian household data to investigate occupational segregation and wage differentials by gender in Malaysia using the decomposition procedure presented by Brown et al. (1980). The study found Wage discrimination rather than occupational gender segregation as the primary determinant of the wage gap between male and female workers in Malaysia. Biltagy (2014) used the Blinder–Oaxaca Decomposition method to identify the determinants of the gender wage gap to explain the wage differences between male and female workers in the Egyptian labor market. The results of the decomposition analysis show that almost all of the gender wage disparity can be attributed to gender discrimination against women during 2006-12.

Ñopo (2008), in analyzing gender wage disparity using the matching procedure in Peru for 1986-2000, proposed a non-parametric technique for creating comparable synthetic gender pairs without replacement by sampling within a common range of supports. The application of the procedure identified that around 30% of women and 23% of men in the sample were out of common support (characteristics not matching). The component identified as the proportion of unexplained proved to be statistically significant. Over the year, several studies have used this method to decompose the gender wage gap.

Atal et al. (2009) assessed the gender and ethnic pay gap using the Ñopo (2008) decomposition method across 18 countries in Latin America in 2005. Studies found that Latin American men earn around 10% more than women, even with a low level of education. Chakraborty (2018) used traditional Blinder–Oaxaca decomposition and non-parametric decomposition by Ñopo (2008) to investigate the impact of socio-religious and gender discrimination on the gender wage gap in India. Findings from both methods confirmed the key role of gender discrimination in explaining the gender wage gap. While the parametric decomposition also identifies that most of the socioreligious gaps in earnings can be described due to differences in human capital. Furthermore, the nonparametric method provided a better and more meaningful full distribution of inequality in earnings due to endowment and gender discrimination.

Goraus and Tyrowicz (2014) used both the Blinder–Oaxaca decomposition technique decomposition and non-parametric decomposition by Ñopo (2008) to analyze the gender wage gap in Poland. Both methods show a significant gender wage gap in the country. The results also show that most observable characteristics cannot account for the gender wage disparity. Agrawal (2014) used the Indian human development survey 2005 to examine wage discrimination in India by social groups and gender. The analysis revealed that the wage disparity between men and women was primarily due to labor-market discrimination. However, in the case of social groups, this disparity was primarily due to inequalities in endowments. Anspal (2015) also used the matching decomposition procedure by Ñopo (2008) to show that the proportion of the gender wage gap remains unexplained in Estonia.

Studies on Gender Wage Gap, Evidence from Pakistan

Over the years, several studies have focused on determining the gender wage gap in Pakistan. Ashraf and Ashraf (1996) used the estimations procedures proposed by Oaxaca (1973), Cotton (1988), and Neumark (1988) to determine the extent of the gender wage gap in Pakistan using the data obtained from Household Integrated Economic Surveys (HIES) for the years 1979 and 1985-86. The results showed a significant decline in the gender wage gap from 63.27% to 33.09% between 1979 to 1985-86. Siddique et al. (1998), using the standard Oaxaca-Blanchard (1973) decomposition method, also found evidence for around 55% to 77% of the wage gap due to gender discrimination in the labor market of Pakistan. Sathar and Kazi (2000) examined the factors contributing to the empowerment of rural women in Pakistan. The research realized that women's status might vary across communities and regions, with particular attention paid to the backward areas.

Sabir and Aftab (2007) provide temporal decomposition of gender wage gap estimates using the mean and quantile regression methods. The study found the unobservable characteristic as the critical factor affecting the wage gap with a rise in the gender wage gap with increased female labor force participation during the estimation period. Ahmed And Hyder (2008) used data from the labor force survey for 2005-2006 to determine the extent of occupational gender segregation and gender wage gap using the standard Mincer wage function. The results show a high degree of occupational segregation by gender and concentration of females in a few specific occupations. Results also revealed a significant gender wage gap at the bottom of the distribution. In a recent study, Mahmood et al. (2020) used Oaxaca-Blinder decomposition methods to determine the wage disparity for labor forces in Punjab and Sindh Province. The study also incorporated an occupational dummy categorizing occupations in white-collar and blue-collar jobs. The study also controlled for the cost of living. The results show a high wage gap in Punjab province compared to Sindh. In another recent study, Sarwar and Abid (2020) investigated the wage between public and private sector employees using the Oaxaca-Blinder decomposition method. Even though this study also found a low gender wage gap in the public sector compared to the private sector in

Pakistan, as with other studies, this study also did not consider the occupational distribution of males and females in determining the wage gap.

Methodology

Data Description

This study is based on microdata from the Pakistan labor force survey 2013-2018. The labor force survey is a cross-sectional, nationally representative survey conducted by the Pakistan Bureau of Statistics. The sample used for the analysis in this study is based on a formally waged civilian labor force (aged 15-65) working across different occupations and sectors of the economy. The information about earnings, distribution of employed labor force by industry division, and occupation is particularly important for this study. The sample is limited to the paid employees only; own account workers and contributing family workers are excluded from the sample. After excluding the observation with missing values, the total sample is 64,946. A large majority of the labor force is male (86.46%). Table 1 presents the summary statistics of variables used in this study. The statistics show that the percentage of female laborers with tertiary education is higher than in the male labor force. Women with postsecondary education comprise 13.80% compared to 9.80% for men. The occupational and industrial structure shows that women only cluster around specific occupations and industrial groups. Our sample based on paid employees shows mainly occupational categories with a large percentage of female workers, including professionals, Craft and related trades workers, and elementary occupations with shares of 18.25%, 19.8%, and 54.3% respectively. The high percentage in elementary occupations is not surprising because most females have a very low level of education in Pakistan.

Similarly, the gender distribution across industrial groups shows only three industrial groups with a high share compared to others. The industrial groups include; ‘Agriculture, forestry and fishing, Manufacturing, and Education, with the percentage of 40.8%, 22 %, and 17.7%.

Table 1: Summary Statistics

	Total	Man	Women
Age	33.3	33.4	33.1
experience	19.6	19.44	20.5
Education			
No formal education	0.406	0.374	0.610
Primary	0.169	0.182	0.089
Middle	0.121	0.133	0.044
Secondary	0.131	0.141	0.068
Higher Secondary	0.065	0.068	0.48
Tertiary education	0.103	0.098	0.138
Major Occupation			
Managers	0.151	0.164	0.066
Professionals	0.881	0.733	0.182
Technicians and associate professionals	0.462	0.477	0.357
Clerical support workers	0.335	0.379	0.053
Services and sales workers	0.115	0.130	0.188
Skilled agricultural, forestry and fish	0.062	0.070	0.006
Craft and related trades workers	0.196	0.196	0.198
Plant and machine operators and assembler	0.9.43	0.107	0.086
Elementary occupations	0.405	0.383	0.543
Industry			
Agriculture, forestry and fishing	0.143	0.101	0.408
Mining and quarrying	0.006	0.007	0.0002
Manufacturing	0.212	0.210	0.224
Electricity, gas	0.010	0.011	0.0005
Water supply	0.008	0.009	0.002
Construction	0.222	0.255	0.012
Wholesale and retail trade	0.077	0.088	0.005
Transportation and storage	0.064	0.073	0.002
Accommodation and food service activities	0.018	0.021	0.001
Information and communication	0.007	0.008	0.0006
Financial and insurance activities	0.009	0.010	0.002
Real estate activities	0.001	0.001	0.0003
Professional, scientific and technical activities	0.005	0.006	0.001
Administrative and support service activities	0.006	0.006	0.001
Public administration and defense	0.061	0.070	0.007
Education	0.078	0.063	0.177
Human health and social work activities	0.023	0.020	0.048
Arts, entertainment and recreation	0.001	0.001	0.0005
Other service activities	0.173	0.018	0.010
Activities of households as employers	0.021	0.010	0.090
Activities of extraterritorial organizations	0.0004	0.0004	0.0002
Ownership			
Public	0.170	0.823	0.864
Private	0.829	0.176	0.13.5
Region			
Urban	0.387	0.600	0.687
Rural	0.612	0.399	0.312

Decomposing the Gender Wage Gap

The Blinder-Oaxaca (BA) decomposition (1973) is one of the most commonly used methods in the literature on economic inequality. However, the procedure is subject to several criticisms. One criticism is that it provides information about the mean wage gap and ignores the difference in the distribution of this gap among individuals in a specific group (Atal et al., 2009). Another issue highlighted by (Madden 2000; Ñopo, 2008) is that it does not consider the possibility of differences in common support. To account for the limitations in conventional OB decomposition methods, Ñopo (2008) presented a nonparametric decomposition approach based on matching that incorporates the common support among the individuals and provides a more robust estimate of the wage gap. This study investigates the wage disparities between male and female workers in Pakistan using the decomposition method proposed by Ñopo (2008). The decomposition expression can be written as:

$$\Delta = (\Delta_X + \Delta_M + \Delta_F) + \Delta_0 \ldots. (1)$$

According to the matching method by Ñopo (2008), The total gap Δ can be decomposed into four components. Two of them (Δ_0, Δ_X) are similar to conventional Oaxaca-Blanchard decomposition presenting the unexplained and explained proportion of the wage gap but captured for only those who fall within common support. The other two components (Δ_F, Δ_M) account for those outside the common support. In addition, this study has also used the conventional OB decomposition test to confirm the robustness of the estimates obtained from the matching-based non-parametric decomposition procedure proposed by Ñopo (2008).

Results and Discussion

Figure 1 presents the kernel densities of log hourly wages for male and female employed labor force based on the sample used in this study. Figure 1 plots the kernel estimate of the wage density for men and women. The density plot shows a significant wage gap between men and women. The wage distribution of females is on the left of the men's wage distribution. In the lower-wage region, women's wages are more densely distributed than men's wages. It implies that women's wage is skewed toward the lower range throughout the wage spectrum. Women's wages are denser than men's wages at around log wage 8.1, while men's wages are denser than women's wages around the mean wage. Men's wages are denser than women's wages around log wage 9.1. This also implies that men's wages are clustered around the mean with low variance.

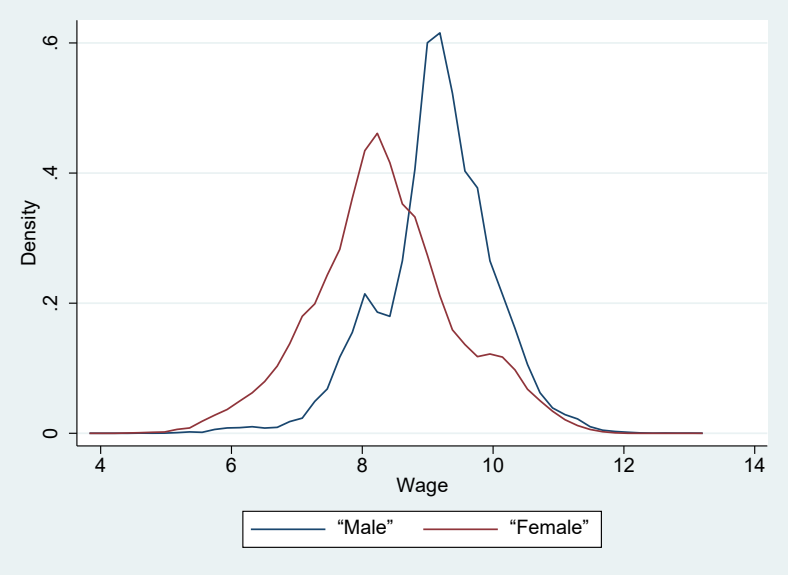

Figure 1: Wage Distribution by Gender: figure presents the wage distribution of Male and female workers

To confirm the persistence of occupational segregation by gender in the labor market of Pakistan, the Duncan index of dissimilarity is used to calculate the level of gender segregation by using the 3-digit occupations based on the ISCO-08 classification. The estimated value of the dissimilarity index shows that around 70% of women need to change their occupations to bring gender equality across professions in the labor market of Pakistan.

The estimated value of the dissimilarity index confirms that females suffer significantly high occupational segregation; therefore, it is imperative to test whether this unequal distribution across occupations plays any significant role in explaining the gender wage gap in the labor market of Pakistan. For this purpose, this study has used the matching-based nonparametric decomposition test presented by Ñopo (2008). The analysis is based on different specifications, including different sets of control variables, detailed as follows:

1. Age
2. Specification-1 + Education + Experience.
3. Specification-2 + Occupational groups based on ISCO-08 + industry (Three-Digit Code)
4. Specification-4 + Ownership + Hours of Work
5. all variables with I-digit occupational categories

The results are presented in Table 2. The raw wage gap, 'Δ', is presented in the first column for each specification, and 'Δ_0'denotes the unexplained wage gap presented in Column 2. Column 3 presents the wage gap of out of common support male workers, denoted by 'Δ_M', and Column 4

presents the components of the wage gap due to outside the common support female workers, denoted by 'Δ_F', and 'Δ_X' denotes the wage gap due to differences in observable characteristics for males and females within common support and reported in Column 5. For each specification, column 7 presents the proportions of male and female workers within common support for each set of specifications. It is also worth noting that the percentages drop precipitously as more control variables are added in different specifications.

The first specification includes the age in years. The results of specification 1 show a total wage gap of 29.15%. The negative sign indicates that women earn 29.15% less than men in the labor market. The first specification offers 28.86% of the unexplained wage gap. Specification 2 includes the attained level of education and years of experience in the model specified in set 1. The inclusion of human capital indicators in the model results in reducing the unexplained gap to 20%. Observable characteristics can explain 8.64% of the total wage gap. However, it also takes a significantly large number of female workers out of common support.

Specification 3 shows that the inclusion of occupational categories results in a significant change in all components of the model. After controlling for occupation and industry variables, specification 3 shows a significant rise in the explained gap (13.7%) based on matched characteristics. However, there is also a considerable decline in the percentage of females with matched characteristics, with only 33.6% in the common support. The unexplained gap declined to 15.9%. The males explain 1.2% of the wage gap out of common support and 1.76% by the females who are out of common support. Specification 3 also indicates significant gender segregation.

Controlling for hours of work and ownership of the firm (specification 4) also shows a statistically significant change in all four components. The explained portion of the wage gap, Δ_X, due to matched characteristics is still considerable (12.86%). However, a further decline of females' percentage matched characteristics (29.41.2% in the common support) is observed. Δ_f and Δ_M provide details of the wage gap due to males and females lacking common support. The proportion of Δ_f shows around 8.1% of wages can be explained because women in the labor market of Pakistan concentrate on only a few specific occupations.

Similarly, Δ_M shows that men earn at least 5.77% more wage due to different occupational distribution and concentration than females in the labor market. It can be seen that as the percentage of those in common support declined, the wage gap due explained by the workers out of common support increased significantly. These findings align with several previous studies, such as Anspal (2015) for Estonia; Agrawal (2020) for India. Who also found a significant impact of occupational gender s segregation on the wage gap.

Finally, specification 5 describes a potential issue regarding the importance of detailed occupational data in wage gap decompositions. The results of specification five are based on the full model as in specification 4, except that specification 5 replaces the 3-digit occupational categories with 1-digit major occupations. As discussed earlier, it is expected that the use of one-digit occupational classification in explaining the effect of the gender wage gap will be less useful

because the 1-digit classifications provide less comprehensive and limited information about the gender distribution across occupational groups. This specification often does not provide the actual situation of the gender wage gap in the labor market. Specification 5 shows a high proportion of unexplained and relatively low wage gaps due to matched characteristics, even though the ratio of male and female workers in the common support is much higher than a camper to specification 4.

It is worth mentioning that the primary purpose of this decomposition analysis is to determine how much of the gender wage gap can be explained by controlling for different occupational characteristics. Moreover, findings based on Ñopo (2008) decomposition show that the inclusion of 3-digit occupational classification does play a significant role in explaining the explained gender wage gap. However, a significantly large proportion of the wage gap (13.9%) remains unexplained, which can be attributed to gender discrimination against females in the labor market.

Table 2: Ñopo Decomposing (Aggregate Data)

set	Name	Δ %	Δ0 %	Δm %	Δf %	Δx %	PerM	PerF
1	age	-29.15	-28.86	-	-	-0.29	100	100
2	1+ education and exp	-29.15	-20.03	0.33	-0.81	-8.64	95.16	67.09
3	2+ ISCO-3-digit Occupations	-29.15	-15.93	1.23	-1.76	-13.7	73.59	33.6
4	3+ Ownership + Hours of work	-29.1	-13.93	5.77	-8.1	-12.86	70.22	22.41
5	with 1-digit ISCO- Code	-29.15	-16.5	3.43	-4.44	11.6	75.54	29.38

Source: Authors; own calculation.

Rural and Urban Comparison

The same set of specifications is used for the rural and urban comparison. In the first specification, only age is used as a matching characteristic. The total gender wage gap (Δ) is 40.24% in rural areas and 14.97% in urban areas. The wage gap indicates a significant difference in rural and urban areas, where females earn 40% less than male laborers compared to only 14.97% in urban areas. While controlling only for age (specification 1) for urban and rural areas, a large proportion of wage inequality remains unexplained. In specification 2, the portion of the explained wage gap, $\Delta_{X,}$ in both regions increased significantly compared to specification 1. However, the explained proportion of the wage gap, $\Delta_{X,}$ appears to be significantly higher (12.86%) as compared to urban areas (4.98%).

Specification 2 shows that the inclusion of occupational and industrial categories results in a significant change in all components of the model. There is a rise in the proportion of explained gaps based on matched characteristics in both regions. In rural areas, the explained proportion of the wage gap increased to 14.5%, while in urban areas, the explained proportion of the gender wage gap increased to 12%. However, there is also a significant decline in the percentage of females with matched characteristics in the common support. The unexplained gap declined to 17% in urban areas and 15.70% in rural areas. Due to a significant decline in the proportion of

male and female workers in common support, the percentage of wage gap explained by out-of-common-support works also increased significantly in specification 3. Specification 4 shows that after the inclusion of ownership of the firm and hours of work with the variables from specification 3, there is a further increase in the explained proportion of the gender wage gap. Similarly, a decline in the unexplained proportion of the gender wage gap can also be seen in specification 4. However, the proportion of females in common support declined to 10.55 in urban and 31% in rural areas.

Finally, similar to specification 5 in Table 2, specification 5 in Table 3 describes the potential importance of detailed occupational categories in wage gap decompositions. The results of specification 5 include the 1-digit major occupations with a complete list of other variables. It is evident that the inclusion of occupational categories at the one digit level results in a high level of unexplained gender wage gap in both the urban and rural areas of the country. Therefore, the inclusion of 3 or 4-digit occupational categories in gender wage gap analysis is important. It is worth mentioning that the Ñopo (2008) decomposition also has some limitations, since the purpose here is to highlight the significance of occupational segregation in the gender wage gap, the methodology fulfills the main requirements.

Table 3: Ñopo Decomposing by Region

Urban Region								
set	Name	Δ %	Δ0 %	Δm %	Δf %	Δx %	PerM	PerF
1	age	-14.97	-7.10	-	-10.72	2.85	100	80.63
2	1+ education and exp	-14.97	-19.30	0.46	11.12	-4.98	99.78	80.23
3	2+ ISCO-3-digit Occupations	-14.97	-17.23	0.02	8.75	12.02	87.00	18.05
4	3+ Ownership + Hours of work	-14.97	-10.24	-10.35	7.47	12.66	57.80	10.52
5	with 1-digit ISCO- Code	-14.97	-23.65	2.06	7.16	-2.4	89.73	54.04
Rural Region								
set	Name	Δ %	Δ0 %	Δm %	Δf %	Δx %	PerM	PerF
1	age	-40.24	-40.01	-	-	0.22	100	100
2	1+ education and exp	-40.24	-24.52	0.02	-2.88	-12.86	99.94	97.55
3	2+ ISCO-3-digit Occupations	-40.24	-19.70	2.08	-12.06	15.19	95.22	40.55
4	3+ Ownership + Hours of work	-40.24	-18.91	2.25	-10.38	-14.55	85.82	31.11
5	with 1-digit ISCO- Code	-40.24	-22.80	1.83	-14.98	-21.82	93.64	38.08

Source: Authors; own calculation.

Finally, for robustness check, the conventional Blinder-Oaxaca (BA) decomposition is also estimated for the overall data and rural and urban samples. The findings are reported in Table 4.

Table 4: Blinder-Oaxaca Decomposition (Aggregate Data)

Set No		Difference	Explained	Unexplained
		Δ %	Δ0 %	Δm %
1	Age	1.11	-	1.11
2	1+ education and Exp	90.93	-21.51	69.42
3	2+ ISCO-3-digit Occupations	90.93	-20.43	70.50
4	3+ Ownership + Hours of work	90.93	-43.25	47.68
5	with 1-digit ISCO- Code	65.38	-19.25	84.64
Blinder-Oaxaca Decomposition (Rural Areas)				
Set No		Difference	Explained	Unexplained
		Δ %	Δ0 %	Δm %
1	Age	1.08	-	1.08
2	1+ education and Exp	90.81	-29.91	60.90
3	2+ ISCO-3-digit Occupations	90.81	-36.91	54.50
4	3+ Ownership + Hours of work	90.81	-39.14	51.45
5	with 1-digit ISCO- Code	90.81	-13.29	77.52
Blinder-Oaxaca Decomposition (Urban Areas)				
Set No		Difference	Explained	Unexplained
		Δ %	Δ0 %	Δm %
1	Age	41.53	-	41.53
2	1+ education and Exp	41.53	-43.35	84.88
3	2+ ISCO-3-digit Occupations	41.53	-58.41	99.95
4	3+ Ownership + Hours of work	41.53	-11.25	52.68
5	with 1-digit ISCO- Code	41.53	-9.29	50.82

Source: Author's Own Calculations

The model is estimated for all specifications separately. Results show that the BA decomposition ignores the effect of common support, resulting in the overestimation of the unexplained gap and the unexplained gap remained significantly high for all specifications. These findings are also supported by a number of previous studies, such as Urquidi et al. (2020; Strawiński et al., 2018).

Conclusion

This paper investigates the gender wage gap in Pakistan, accounting for detailed human capital, demographic, and labor market characteristics. The method considers the differences in the common supports (matched characteristics), such as differences in individual, demographic, and labor market characteristics for the whole sample and separately for rural and urban samples. To summarize, detailed labor market characteristics explain a significant proportion of the gender

wage gap; however, even after incorporating detailed occupational classifications in the model to account for occupational segregation, a little than half of the raw wage gap (10.66% of the overall gap of 29.15%) still remains unexplained. Similar findings are also obtained while comparing the gender wage gap in urban and rural areas.

In analyzing the gender wage gap, several studies indicated that the gender wage gap did not arise as a result of differences in wages between men and women in the same detailed occupational groups (see, for example, Barth-Dale-Olsen 2009); many studies have also highlighted the importance of including the detailed occupational categories in analyzing the gender wage gap (see for instance (Anspal, 2015). In existing literature related to the gender wage gap in Pakistan, the question of whether labor market characteristics, especially the detailed occupational distribution across genders, remained unanswered. This study shows that the inclusion of occupational categories at a 3-digit level highlights the importance of occupational gender segregation in explaining a large proportion of the gender wage gap in Pakistan. It is also evident that women only cluster in specific occupations as the introduction of occupational categories in the decompositions specification results in the exclusion of a substantially large proportion of women from the common support, negatively affecting the wage rate for women both in and out of the common support. The analysis of rural and urban samples shows a significantly high wage gap in the rural setting compared to the urban areas.

Based on the findings of this study some important recommendations to cope with the gender wage gap in Pakistan are evident. The labor force participation rate can have a strong positive effect on gender parity; therefore, important policy reforms are required to make the job market more inclusive for workers, irrespective of gender. Results also show that the gender wage gap is significantly higher in rural areas compared to urban areas; therefore, access to better education and job opportunities for women in rural areas should be central policy considerations. The findings of this study also show that there is a significant proportion of the gender wage gap that remains unexplained, which can be attributed to gender discrimination in the labor market. Several steps can be taken to reduce this gender bias; for instance, the government might encourage employers to create a female-friendly work environment by offering tax relaxations or other subsidies. Similarly, skill enhancement activities such as job-specific training might also help reduce gender discrimination in the labor market.

Finally, the scope of this study was limited to understanding how much of the gender wage gap can be explained by accounting for occupational segregation in the model and our model includes serval important variables. We would want to incorporate a couple of other important factors, such as non-cognitive skills and the time allocated to unpaid care work; however, this is impossible due to a lack of data ability. Subject to data availability, future studies might look to extend the gender wage gap analysis by incorporating these factors.

References

Agrawal, T. (2014). Gender and caste-based wage discrimination in India: some recent evidence. *Journal for Labour Market Research*, *47*(4), 329-340.

Ahmed, A. M., & Hyder, A. (2008). Sticky floors and occupational segregation: Evidence from Pakistan. *The Pakistan Development Review*, 837-849.

Anspal, S. (2015). Gender wage gap in Estonia: a non-parametric decomposition. *Baltic Journal of Economics*, *15*(1), 1-16.

Ashraf, B., & ASHRAF, J. (1996). Evidence on gender wage discrimination from the 1984-85 HIES: a Note. *Pakistan Journal of Applied Economics*, *12*(1), 85-94.

Aslam, M., & Kingdon, G. (2009). Public–private sector segmentation in the Pakistani labour market. *Journal of Asian Economics*, *20*(1), 34-49.

Atal, J., Ñopo, H., & Winder, N. (2009). New Century, Old Disparities: Gender and Ethnic Wage Gaps in Latin America. Washington, D.C.: Inter-American Development Bank.

Barth, E., & Dale-Olsen, H. (2009). Monopsonistic discrimination, worker turnover, and the gender wage gap. *Labour Economics*, *16*(5), 589-597.

Bayard, K., Hellerstein, J., Neumark, D., & Troske, K. (2003). New evidence on sex segregation and sex differences in wages from matched employee-employer data. *Journal of labor Economics*, *21*(4), 887-922.

Becker, G. (1957). *The Economics of Discrimination.* Chicago: University of Chicago Press.

Bergmann, B. (2005). *The Economic Emergence of Women*. New York: Springer.

Bergmann, B. R. (1974). Occupational segregation, wages and profits when employers discriminate by race or sex. *Eastern Economic Journal*, *1*(2), 103-110.

Bergmann, B. R. (1996). *In Defense of Affirmative Action*. New York: Basic Books.

Biltagy, M. (2014). Estimation of gender wage differentials in Egypt using Oaxaca decomposition technique. *Topics in Middle Eastern and African Economies*, *16*(1), 17-42.

Blinder, A. S. (1973). Wage discrimination: reduced form and structural estimates. *Journal of Human Resources*, 436-455.

Brown, R. S., Moon, M., & Zoloth, B. S. (1980). Incorporating occupational attainment in studies of male-female earnings differentials. *Journal of Human Resources*, 3-28.

Chakraborty, S. (2021). Gender and socio-religious discrimination in Indian labor market: Analyses using parametric and non-parametric methods. Unpublished doctoral paper, https://gps-temp.unm.edu/conference/sites/default/files/full-paper/Soumyajit_Chakraborty_final_paper.pdf

Cotton, J. (1988). On the decomposition of wage differentials. *The Review of Economics and Statistics*, 236-243.

Djurdjevic, D., & Radyakin, S. (2007). Decomposition of the gender wage gap using matching: an application for Switzerland. *Swiss Journal of Economics and Statistics*, *143*(4), 365-396.

Goldin, C. (1990). *Understanding the gender gap: An economic history of American women* (No. gold90-1). Oxford: University of Oxford Press.

Goraus, K., & Tyrowicz, J. (2014). Gender wage gap in Poland–can it be explained by differences in observable characteristics. *Ekonomia*, *36*(1), 125-148.

Groshen, E. L. (1991). The structure of the female/male wage differential: Is it who you are, what you do, or where you work? *Journal of Human Resources*, 457-472.

Gupta, N. D., & Rothstein, D. S. (2005). The Impact of Worker and Establishment-level Characteristics on Male–Female Wage Differentials: Evidence from Danish Matched Employee–Employer Data. *Labour*, *19*(1), 1-34.

Hansen, J., & Wahlberg, R. (2000). Occupational gender composition and wages in Sweden. *Available at SSRN 252024*.

Ismail, R., Farhadi, M., & Wye, C. K. (2017). Occupational segregation and gender wage differentials: evidence from Malaysia. *Asian Economic Journal*, *31*(4), 381-401.

Jann, B. (2008). The Blinder–Oaxaca decomposition for linear regression models. *The Stata Journal*, *8*(4), 453-479.

Khan, M. Z., Said, R., Mazlan, N. S., & Nor, N. M. (2023). Occupational Gender Segregation in the Rural and Urban Labor Market of Pakistan. *Population Review*, *62*(1), 86-105.

Lechner, M. (2008). A note on the common support problem in applied evaluation studies. *Annales d'Économie et de Statistique*, 217-235.

Macpherson, D. A., & Hirsch, B. T. (1995). Wages and gender composition: why do women's jobs pay less? *Journal of Labor Economics*, *13*(3), 426-471.

Madden, D. (2000). Towards a broader explanation of male-female wage differences. *Applied Economics Letters*, *7*(12), 765-770.

Mahmood, F., Hashim, S., Iram, U., & Chishti, M. Z. (2020). Wage disparities between high and low wage cities with and without the cost of living within Punjab and Sindh: An application of Oaxaca-Blinder using PSLM with HIES. *Journal of Applied Economics and Business Studies*, *4*(4), 1-14.

Meyersson Milgrom, E. M., Petersen, T., & Snartland, V. (2001). Equal pay for equal work? Evidence from Sweden and a comparison with Norway and the US. *Scandinavian Journal of Economics*, *103*(4), 559-583.

Mincer, J. (1974). Schooling, Experience, and Earnings. Human Behavior & Social Institutions No. 2. Cambridge, MA: National Bureau of Economic Research.

Nazli, H. (2004). The effect of education, experience and occupation on earnings: Evidence from Pakistan. *Lahore Journal of Economics*, 9, 1-30.

Neumark, D. (2004). Employers' discriminatory behavior and the estimation of wage discrimination. In *Sex Differences in Labor Markets* (pp. 163-177). New York: Routledge.

Ñopo, H. (2008). Matching as a tool to decompose wage gaps. *The Review of Economics and Statistics*, *90*(2), 290-299.

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review*, 693-709.

Petersen, T., & Morgan, L. A. (1995). Separate and unequal: Occupation-establishment sex segregation and the gender wage gap. *American Journal of Sociology*, *101*(2), 329-365.

Polachek, S. W. (1975). Potential biases in measuring male-female discrimination. *Journal of Human Resources*, 205-229.

Polachek, S. W. (1976). Occupational segregation-alternative hypothesis. *Journal of Contemporary Business*, *5*(1), 1-12.

Polachek, S. W. (1979). 9. Occupational Segregation Among Women: Theory, Evidence, and a Prognosis. In *Women in the Labor Market* (pp. 137-157). New York: Columbia University Press.

Polachek, S. W., & Kim, M. K. (1994). Panel estimates of the gender earnings gap: individual-specific intercept and individual-specific slope models. *Journal of Econometrics*, *61*(1), 23-42.

Ponthieux, S., & Meurs, D. (2005). *The gender wage gap in Europe: women, men and the public sector* (No. 0504). ERMES, University Paris 2.

Reimer, D., & Schröder, J. (2006). Tracing the gender wage gap: Income differences between male and female university graduates in Germany. *Zeitschrift für ArbeitsmarktForschung-Journal for Labour Market Research*, *39*(2), 235-253.

Reimers, C. W. (1983). Labor market discrimination against Hispanic and black men. *The Review of Economics and Statistics*, 570-579.

Sabir, M., & Aftab, Z. (2006). Province-wise growth patterns in human capital accumulation. *The Pakistan Development Review*, 873-890.

Sarwar, G., & Abid, B. (2020). Public-private sector wage differentials in Pakistan. *Applied Economic Review*, *1*(1), 46-64.

Sathar, Z. A., & Kazi, S. (2000). Women's autonomy in the context of rural Pakistan. *The Pakistan Development Review*, 89-110.

Siddiqui, R., Siddiqui, R., & Akhtar, M. R. (1998). A decomposition of male-female earnings differentials [with comments]. *The Pakistan Development Review*, 885-898.

Sorensen, E. (1989). The wage effects of occupational sex segregation: review and new findings. In *Comparable worth: analysis and evidence*. ILR Press Ithaca, NY.

Strawinski, P., Majchrowska, A., & Broniatowska, P. (2018). Occupational segregation and wage differences: the case of Poland. *International Journal of Manpower*.

Suh, J. (2010). Decomposition of the change in the gender wage gap. *Research in Business and Economics Journal*, *1*, (1).

Watson, I. (2010). Decomposing the gender pay gap in the Australian managerial labour market. *Australian Journal of Labour Economics*, *13*(1), 49-79.

Zajkowska, O. (2013). Gender pay gap in Poland–Blinder-Oaxaca Decomposition. *Metody Ilościowe w Badaniach Ekonomicznych*, *14*(2), 272-278.