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Gender Wage Gap in the Last Ten Years: A Case Study of India

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Abstract

The main aim of this paper is to examine changes in the gender wage gap in India between the years 1999-2000 and 2009-2010, and to analyse its determinants. Results of the Oaxaca-Blinder decomposition reveal that in the last ten years, the gender wage gap has decreased from 58.9% to 52.1%. In 1999, 35.56% of this gap was explained by differences in human capital endowments and job characteristics between men and women, and 60.44% of the gap was unexplained, or purely a result of gender discrimination. However, in 2009, the explained component decreased to 25.53% and the unexplained component increased to 74.47%. These results indicate that even after controlling for various explanatory variables, there is a gender wage gap in India which favors men – and that more than half of this gap is unexplained. It also proves that while the explained gap has decreased, the unexplained gap has increased. These results have important implications for policy-makers in India in terms of increasing educational opportunities for women, reducing social discrimination, reforming data collection methodologies, as well as increasing post-implementation accountability.

Introduction

Studies focusing on the gender wage gap have mainly been conducted by and on developed countries. However, gender wage differentials are an important concern in developing countries, where more often than not, women are considered inferior to men and therefore lack access to similar economic opportunities. Unlike developed nations, women in these countries not only suffer from differential wage rates, but also unequal access to wage employment (Yasin, Chaudhry and Afzal 2010). India is an important case study as it is poised to become a powerful global player in the coming years, and while women have largely contributed to the Indian miracle, the country is rated as one of the worst places in the world to be a woman (Baldwin 2012). Can India achieve its goal of becoming the next superpower without empowering half of its population?

Although Indian women are still far from achieving similar socio-economic status as their male counterparts, many laws have been passed to improve gender equality in the workplace. These laws include the Minimum Wages Act of 1948 and the Contract Labor Act of 1970. The former ensures equal pay for women by *fixing minimum wages for all employees regardless of their biological sex, while the latter provides provision for utilities such as bathrooms and childcare for women in workspaces.*

In 1976, the Indian Constitution recognised the principle of 'Equal Pay for Equal Work', which explicitly stated that women have the right to equal wages. However, legislation has not ensured the implementation of these laws; formal labour force participation rate of women is still very low, and women in many sectors of the economy receive lower wages than men.

This difference in wages can, to a large extent, be explained by the human capital theory, which states that *"other things being equal, personal incomes vary according to the amount of investment in human capital; that is, the education and training undertaken by individuals or groups of workers"* (Encyclopedia, 2012). This means that earnings are higher for people with more education and experience.

According to this theory, the higher education and experience level of men can account for gender wage differentials in India. Yet, studies show that even after controlling for all observable characteristics such as education, age, experience, marital status, occupation and industry, the wage gap between men and women

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cannot be fully explained. Researchers argue that discrimination against women still exists and that it accounts for the remaining part of the wage gap. They test the argument by applying the Oaxaca-Blinder decomposition technique, to compute the wage gap that is not explained by observable characteristics of male and female workers. The Oaxaca-Blinder decomposition splits the gender wage gap into two parts: the explained gap and the unexplained gap. The explained gap identifies gender differences due to different life circumstances and career choices: education, hours worked, childcare, marital status. These gender differences are responsible for the "nature and extent of participation in employment" (Gibb, Fergusson and Horwood 2009). On the contrary, the unexplained gap measures the extent of gender discrimination: it explains wage differences that arise when women with identical characteristics to men earn lower wages than men. By differentiating between the two segments, the decomposition technique determines the true discrimination coefficient.

Although the Oaxaca-Blinder method is a widely accepted and accurate method of calculating wage differentials, many previous studies examining the gender wage gap in India do not utilise it. Moreover, most of these studies use data prior to 1999. This paper addresses the lack of such research by using this particular decomposition technique on recent data. The aim of the study is to analyse the gender wage gap in India over the last ten years by comparing data from the National Sample Survey of 1999-2000 and 2009-2010. The paper is divided into four sections: Section 1 describes previous literature on gender wage differentials from developed and developing countries; Section 2 outlines the models and sample used in this study; Section 3 presents the empirical results; and Section 4 discusses the results and draws conclusions.

The study hopes to investigate the extent of progress made in improving the gender wage gap, and therefore gender equality in India, and provide a set of recommendations for policy-makers to bridge this gap.

I. Theoretical and Empirical Literature

1. Sources of the Gender Wage Gap in a New Zealand Birth Cohort (Gibb, Fergusson and Horwood, 2009)

This study examined the gender wage gap in a New Zealand birth cohort of 30-year olds. The study regressed log wages on productive

characteristics for males and females. It then dissected the wage gap into explained and unexplained parts, using the Blinder-Oaxaca technique. Results showed that male wages were 38% higher than female wages, before controlling for explanatory variables, which included human capital endowments and job and family characteristics. After adjustment for explanatory variables, they found that the unexplained component accounted for 11.5% (parameters) and 22.0% (intercept). The explained component, adjusted for productive characteristics of males and females, explained 66.4% of the gap.

2. Changes in the Wage Gap of Gender and Caste Groups in India (Jacob 2006)

The study examined the changes in wage gaps of gender and caste groups over the years 1983, 1987-88, 1993-94 and 1999-2000, also using the Oaxaca-Blinder approach. The dependent variable was log wages, and independent variables included various demographic and institutional variables (occupation, industry and state), along with interaction terms between caste and gender. It was found that almost half of the gender wage gap in India could be attributed to unexplained differences between males and females. As a whole, the gender wage gap has reduced over time. The study further evaluated the causes for reduction in the wage gap by computing the effect of trade liberalisation on females and economically disadvantaged caste groups, which is outside the scope of this study.

3. The Gender Pay Gap and Trade Liberalisation: Evidence for India (Reilly and Dutta 2005)

The study estimated the gender wage gap and its relationship with trade liberalisation measures in India. It used data from the National Sample Survey of India (1983, 1993 and 1993), for individuals between the ages of 15 and 65, to compute endowment and treatment components: explained and unexplained gaps. Log hourly wages were regressed on various individual characteristics using the Oaxaca-Blinder methodology. It was found that the explained gap accounted for two-thirds of the overall wage gap, a quarter of which was due to gender differentials in industry affiliations. The unexplained gap comprised of

one-third of the overall gap and was found to be decreasing; however, the latter result was not statistically significant.

This research paper uses a very similar model to the New Zealand study on data from India. It adds significantly to data on developing countries, as previous studies are either unavailable, or do not use the Oaxaca-Blinder technique. It also focuses solely on the gender wage gap which literature on India usually does not. The study also uses nation-wide, recent data and includes factors such as religion and social group in the regressions, overcoming limitations of previous studies.

II. Economic Model

The Oaxaca-Blinder Decomposition Technique

The Oaxaca-Blinder Decomposition technique involves examining whether individuals with the same characteristics are paid differently, after controlling for difference in their productive characteristics. The model was outlined in 1973 in two papers by Oaxaca and Blinder, and has since become the standard approach for computing the gender wage gap. The first part includes formulating equations for male (M) and female (F) workers separately. In the regressions, log wages are modeled as a function of human capital endowments, and personal and job characteristics that may affect wages:

$$Lnwages_i^M = \beta_0^M + \Sigma\beta_k X_{ik}^M + \mu_i^M$$

$$Lnwages_i^F = ß_0^F + \Sigma\beta_k X_{ik}^F + \mu_i^F,$$

Where the dependent variable or lnwages are the natural logarithm of wages for individual i, X_{ik} includes the various productive characteristics (k=1,….n) for individual i, and u_i is the error term. *In this particular study, these productive characteristics include dummy variables for five educational levels, six dummy variables for occupations generated on the basis of NCO codes of 1968, age and age-squared for years of experience; controls for social group, religion, technical education and a dummy variable for being married.*

Combining the two equations, the Oaxaca-Blinder equation is as follows:

$$(Lnwages_i^M - Lnwages_i^F) = \Sigma(X_k^M - X_k^F)\beta_k^M + [(\Sigma\beta_{kM} - \beta_{kF})\, X_k^F + (\beta_0^M - \beta_0^F)]$$

The first term of the decomposition represents the *explained part* of the gender wage gap, resulting from the difference in productive characteristics between males and females. The second term represents the *unexplained part* of the gap, caused due to differential returns to males and females with the same characteristics.

Variables used in the Model and the Expected Coefficients

lnwages: log daily wages
noeduc—graduate: five dummy variables for educational level: no education, primary, middle, higher secondary and graduate or above
prof_tech—production: six dummy variables for occupation generated according to NCO codes of 1968. These include professionals and technical-related workers; administrative; executive and managerial workers; clerks; service and sales workers; agriculture and fishery workers; and production workers
age: control variable for age of the individual
age2: second order polynomial of age for years of experience
married: dummy for being married (1 = married, 0 = not married)
technical: dummy for having received technical education (1 = received technical education, 0 = did not receive)
sector: dummy for living in urban areas (1 = urban, 0 = rural)
religion, social_group: controls for different religions and social groups in India

The education level dummies are expected to be positive, as log wages should rise with an increase in educational level, given that the omitted group is 'no education'.

Age and Age2 are expected to be positive, as log wages should rise with an increase in age and experience.

Marriage is predicted to be either positive or negative. Marriage can lead to circumstances that may force people to abandon their education or work for fewer hours, leading to employment with lower wages. However, marriage can also affect wages in a positive way, as expenditures can be shared and responsibilities can be allocated more efficiently.

Technical Education is expected to be positive, as having technical education is an increase in the human capital endowment of an individual, and therefore, is correlated to an increase in log wages

Sector is expected to be positive, as individuals are more likely to gain higher wages in urban areas than rural areas due to the presence of more work opportunities and a higher standard of living.

Controlling for errors: The regressions were run controlling for heteroskedasticity and correlation of error terms by adding the robust and cluster(x) commands, in order to ensure that the standard errors are correct.

III. Data

The gender wage gap is calculated using data from the Indian National Sample Survey (NSS) for two years, 1999-2000 and 2009-2010. The study uses a cross-sectional design for each year to make comparisons between the two years. The sample consists of 50,000 regular-and casual-wage workers between the ages of 15 and 64. The unit of measurement is daily wages adjusted for inflation and expressed in 1999 rupees. It was found that more than 75% of the sample in both years was male; the average age of respondents was 35-36; more than half the individuals were from rural areas; and about 70% of them were married.

Table 1: Summary Statistics

	1999-2000		2009-2010	
	Male	Female	Male	Female
Percentage in Sample	75.97	24.03	78.36	21.64
LFPR (Population)	82.73	30.36	81.01	26.26
Unemployment Rate (Population)	7.34	7.43	6.15	8.27
Real Daily Wage	116.84	72.23	143.48	96.27
Log Wages	4.34	3.74	4.59	4.06

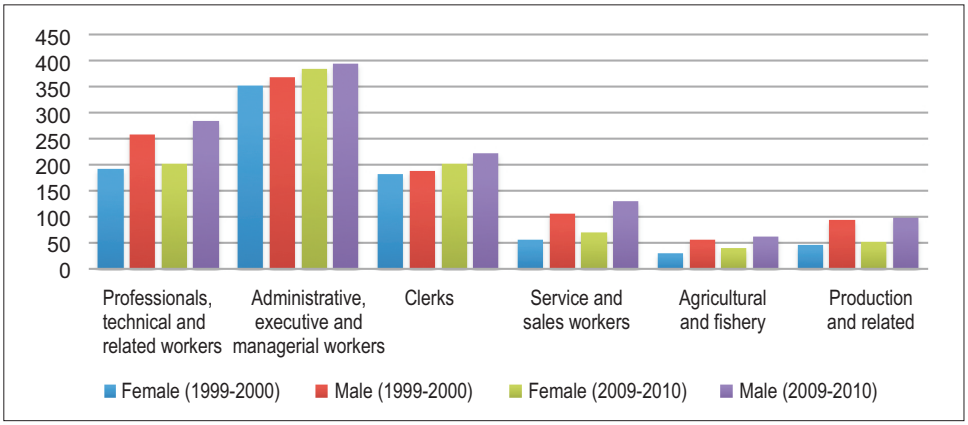
Percentage of individuals in each education group:				
Education (continuous)	1.43	0.94	2.00	1.49
No Education	38.3	64.15	17.69	41.67
Primary	12.17	6.22	14.64	12.16
Middle	29.63	12.82	36.19	18.96
Higher Secondary	7.12	5.03	12.67	9.05
Graduate and Above	12.76	11.77	18.82	18.15
Other Control Variables				
Age	35.15	34.62	36.16	36.35
Married	76.62	70.92	76.17	67.17
Technical	6.61	5.29	5.81	5.31
Sector	47.37	34.76	47.84	40.89
Percentage of individuals in each occupation compared to other occupations:				
Professionals and Technical	9.6	16.22	16.37	23.85
Administrative, Executive and Managerial	2.3	0.62	2.67	0.94

Table 1 shows that the Labour Force Participation Rate (LFPR) is much higher for men than women in both 1999-2000 and 2009-2010. About 82.73% and 81% males participated in the labour force in 1999 and 2009 respectively, as compared to 30.36% and 26.26% women.[1] Although the LFPR for both the sexes decreased in 2009, more women than men left the workforce. The decrease in LFPR for women may indicate that more women in 2009-10 pursued higher education; the decrease could also suggest that employment opportunities for women have decreased. The increase in the Unemployment Rate (UR) for women from 7.43% to 8.27% suggests the latter, especially because the UR for men actually decreased from 7.34% to 6.15%.

Table 1 also shows that men earn significantly higher wages than women in the two samples. The difference in daily wages was 44.61 in 1999-2000 and 47.21 in 2009-2010. However, the difference can be attributed to the difference in job characteristics for males and females. In 1999, 64.15% of women were uneducated, compared to 38.3% of men. Similarly, 12.76% of men were graduates, as compared to 11.77% of women. In 2009, the uneducated figure reduced for both men and women by around 20% each, but 41.67% of women still remained illiterate as opposed to 17.69% of men. *Treating education as a continuous variable, from a scale of no education to graduate and above, the average educational level for a man in 1999 was 'primary' and for a woman was 'no education'. In 2009, the level increased to 'middle' for men, and 'primary' for women.*

These figures show that the average educational level of males is greater than females in both the years. Moreover, more males received technical education than females in 1999 and 2009: 6.61% males as compared to 5.29% females in 1999, and 5.81% males versus 5.31% females in 2009.

Chart 1: Wages by Occupation



Another reason why men may earn more than women is occupational segregation. From Chart 1, it is seen that the mean real wage for women is lower than men in all occupations for both years. Administrative, executive and managerial workers are paid the highest amount of wages, whereas agricultural workers are paid the lowest.

From Table 1, a higher percentage of men (2.3/2.67)[2] than women (0.62/0.94) are concentrated in the administrative sector, while a higher percentage of women (52.25/33.75) than men (28.10/16.83) are part of the agricultural sector. This is evidence of occupational segregation—*"wages in women-dominated sectors and occupations are lower than those in male-dominated sectors and occupations."* (World Bank 2011) This difference in wages is attributed to: (a) employer bias in selection of males and females in certain occupations, and (b) women are more likely to choose jobs that provide them flexible work hours and easier options for entry and exit.[3]

IV. Empirical Results

The first part of the model includes regressions for males and females in both 1999-2000 and 2009-2010 where log wages are regressed on explanatory variables such as education, occupation and sector.

Regression Equation:

$$lnwages_i^G = ß_0 + ß_1 noeduc_i^G + ß_2 primary_i^G + ß_3 middle_i^G + ß_4 higher\_sec_i^G + ß_5 graduate_i^G + ß_6 prof\_tech_i^G + ß_7 admin\_exec\_mangerial_i^G + ß_8 clerks_i^G + ß_9 service\_sales_i^G + ß_{10} agri\_fish5_i^G + ß_{11} production_i^G + ß_{12} age_i^G + ß_{13} age2_i^G + ß_{14} married_i^G + ß_{15} technical_i^G + ß_{16} sector_i^G + ß_{17} social\_group_i^G + ß_{18} religion_i^G + \varepsilon i,$$

Where lnwages is the natural logarithm of real wages, and independent variables include educational levels, occupations, marital status, technical education, sector, age, years of experience, social group and religion. The superscript G represents the two genders, male and female, since the regression was run twice, once for each gender.

Table 2: Regression Parameters 1999-2000

Variables	Males (Regression 1)	Females (Regression 2)
Intercept/Constant	3.013(0.0284)	3.401(0.0595)
Primary	0.180(0.00760)	0.159(0.0192)
Middle	0.340(0.00649)	0.362(0.0211)
Higher Secondary	0.523(0.0115)	0.593(0.0389)
Graduate	0.772(0.0116)	0.855(0.0350)
Technical Education	0.266(0.0117)	0.247(0.0328)
Age	0.0463(0.00157)	0.0267(0.00246)
Age-squared	-0.000398(2.03e-05)	-0.000223(3.30e-05)
Marriage	0.114(0.00756)	0.0747(0.0119)
Sector	0.174(0.00607)	0.178(0.0154)
Observations	75,606	22,592
R-squared	0.557	0.549

*Robust standard errors are in parenthesis
All values in the table are significant at p<0.01

Interpretation of the constant: expected lnwages for unmarried men/women with no education; with no technical education; employed as clerks; and belonging to rural households

Table 2 reports that in 1999, there was a significant difference between the intercepts of wage functions for men and women. However, contrary to expectations, the intercept for women was 38.8% higher than the intercept for men: after controlling for explanatory variables, women earn higher wages than men. Moreover, this difference was found to be statistically significant using a Wald chi-squared test. This result may not be incorrect due to reasons mentioned later in the section.

Other control variables were also found to be statistically significant ($p<0.01$) in predicting the model. The expected percentage difference in wages for an individual with a primary, middle, higher secondary and graduate level education compared to an individual with no education was positive, holding all the other variables constant. This difference increased with an increase in educational level, showing that wages increase with a corresponding increase in education. Similarly, there was a positive effect on log wages for those with technical education, although the effect was larger for men than women (26.6% for males, 24.7% for females).

The expected difference in wages for married men and women relative to unmarried men and women, holding all else constant, was 11.4% and 7.47% respectively. The expected percentage increase in wages for a year's increase in age, holding all else constant, was 4.6% for men and 2.7% for women. Both these variables also affect wages more positively for men than for women.

Table 3: Regression Parameters 2009-2010

Variables	Males (Regression 3)	Females (Regression 4)
Intercept/Constant	3.336(0.0349)	3.246(0.0758)
Primary	0.174(0.00839)	0.117(0.0166)
Middle	0.351(0.00744)	0.253(0.0175)
Higher Secondary	0.548(0.0117)	0.691(0.0362)
Graduate	0.784(0.0130)	1.016(0.0360)
Technical Education	0.274(0.0146)	0.210(0.0350)
Age	0.0348(0.00186)	0.0373(0.00333)
Age-squared	-0.000229(2.36e-05)	-0.000321(4.32e-05)
Marriage	0.0899(0.00866)	0.0417(0.0134)
Sector	0.0470(0.00598)	0.0162(0.0142)*
Observations	52,476	14,495
R-squared	0.480	0.471

Robust standard errors are in parenthesis
*This value is not significant. All values in the table are significant at $p<0.01$

Interpretation of the constant: expected lnwages for unmarried men/women with no education; with no technical education; employed as clerks; and belonging to rural households

From Table 3, it can be seen that the intercept for males is 9% higher than the intercept for females, after controlling for productive characteristics of men and women. However, the difference in intercepts was found to be statistically insignificant using a Wald Chi-squared test.

The effect of control variables on the dependent variables was similar to the 1999 data: education, marital status and age controls were significant predictors of log wages. An increase in educational level had a positive effect on log wages, as did being older and being married. However, the expected increase in log wages with a year's increase in age was 0.03% higher for females than males.

It can be said that these variables were suitable independent variables, as the **R-squared** is relatively high in all four regressions—the model explains 55.7% of the variation in log wages in the Regression 1; 54.9% of the variation in Regression 2; 48% in Regression 3; and 47.1% in Regression 4. However, it does not explain 100% of the variation, and therefore, one of the limitations of the model is Omitted Variable Bias.

Omitted Variable Bias or OVB implies that one or more independent variables that may influence the dependent variable were not included in the model. This is a violation of the assumptions of the OLS model followed by the study, and may cause bias in other estimated parameters of the regressions. For example, if age is removed from the model, the coefficients of the intercept as well as all the other variables will change, deeming the regression biased and inaccurate. OVB is one of the most common and biggest problems in econometric analysis; however, it is nearly impossible to remove.

Omitted Variable Bias is not the only shortcoming of this model. *The results of the four regressions depend on the omitted category of the categorical variables* (education and occupation), and are liable to change if another reference group is selected (Jones 1983). Therefore, even though the intercept in the regression for 1999 indicated that the gender wage gap favors women, the opposite result may be encountered if the omitted occupational category is production, instead of clerks.

Most importantly, using this method, *the extent to which control variables account for the gender wage differentials* cannot be determined. For these reasons, the regression analysis is analysed by the Oaxaca-Blinder decomposition technique. The approach separates the gender wage gap into two categories: "gender differences in the means of independent variables" or difference explanatory variables (explained), and "gender differences in the regression parameters" (Gibb, Fergusson and Horwood 2009) or difference in returns to same characteristics of males and females (unexplained).

The Oaxaca-Blinder Decomposition Results

Table 5: Oaxaca-Blinder Decomposition

Year	Log Wage Gap	Std. Error of Wage Gap	Explained Gap			Unexplained Gap	Std. Error UG
			Total	Education	Occ		
1999	0.589	0.008	0.233	0.098	0.085	0.356	0.006
2009	0.521	0.008	0.133	0.089	0.029	0.388	0.007

All values are statistically significant at $p<0.01$
The model included 5 dummy variables for educational levels; 6 dummies for occupation and controls for age/years of experience, social group, religion, being married, having technical education and sector.

1999: The total wage gap is split into two parts: the explained gap is 0.233 and the unexplained gap is 0.356. Education only accounts for 42.06% of the explained gap, whereas occupation explains 36.48% of the gap. On the other hand, the unexplained gap shows the difference between males and females due to discrimination. As it can be seen, the gender wage gap is largely due to unexplained differences.

2009: The gender wage gap can be decomposed into explained differences (0.133) and unexplained differences (0.388) between men and women. The explained part can further be divided into gap caused by education (66.92%) and by occupation (21.80%).

In summary, the gender wage gap decreased from 0.589 to 0.521 in the last 10 years. The explained part of the gap reduced from 35.56% to 25.53%, whereas the unexplained part increased from 60.44% to 74.47%.

Limitations of the Study

Omitted Variable Bias: As mentioned earlier, OVB is a problem as it results in biased coefficients of dependent variables included in the model. However, as the study is a comparative analysis of two years, OVB should not affect the results, given the omitted variables are time-invariant. OVB also affects the results of the Oaxaca-Blinder decomposition, as the absence of certain variables in the regression may overstate the unexplained component of the gender wage gap (explained later). This problem can be reduced by including

other explanatory variables in the regression such as hours worked, number of children, an actual variable for years of experience, time in job and job seniority.

Missing and/or Unreliable Data: This leads to the second problem of the regression—missing data. These variables were not included in the regression because the NSS does not include questions regarding these variables. Many researchers have raised concerns about the quality and credibility of the NSS data. According to a report by the National Statistical Commission in 2012, the data collection methodology has several problems such as: unavailability of trained field officers and consequent inaccurate data collection by inexperienced and uninterested contract workers; reduction in the sample size over the last few years due to unavailability of investigators, causing high standard errors; "deficient sample frame" which may not be representative of the population; and "large scale estimates", rather than actual figures. These inaccuracies are an example of measurement error in X, which leads to biased coefficients, undermining the results and purpose of this study. Another important concern is the sex of the survey respondent: most respondents of the NSS are males, who, due to their discriminatory attitudes, may try to underestimate the wages of the female household members (See Appendix: Table 5). This underestimation will make female wages appear less than they actually are, and result in a false increase in the gender wage gap. Future researchers are recommended to conduct individual surveys for their research for more comprehensive information although this may be time-consuming and expensive. They should also make sure that females form a larger share of the respondents.

Overstatement of the Unexplained Gap: The unexplained gap may be overstated due to unobserved or immeasurable differences in male and female employees, and/or the difference in the jobs done by men and women (occupational segregation). For example, in a study conducted by Gosse and Ganesh (2004), it was found that including job seniority in the list of independent variables reduced the unexplained gap by a considerable amount. Although this is a comparative study and the analysis should therefore not be affected if these characteristics are time invariant, the results may be different if these unobserved differences do change over time. Time-variant changes could include immeasurable changes in political and economic circumstances. Future researchers could include instrumental variables for IQ (individual ability) and other unobservable characteristics to reduce the OVB.

Selection Bias: This bias can arise in studies calculating the gender wage gap given that wages can only be observed for individuals who are selected into paid employment. These individuals may have one or more similar characteristics that may be responsible for their choice to become employed. For example, married women in India may be less likely to join work as traditional marital roles define the man to be the wage earner. These characteristics may be correlated to other dependent variables in the regression, and consequently, skew the results. This study tries to control for selection bias by including variables for marriage, social group and religion.

Conclusion

This paper examined the gender wage gap in India for individuals between the age groups of 15 to 64, using data from 1999-2000 and 2009-2010. The gap reduced by 7.8%; however, this decrease can be attributed to reduction in explained differences between men and women seeing as the unexplained gap (as a proportion of the total gap) increased by 14.03%.

This result is consistent with the Gibb, Fergusson and Horwood (2009) study and the Jacob (2006) study, as they both show that the gender wage gap exists even after controlling for various human capital endowments, and that it favors males. The gender wage differentials recorded in this study are much higher than the Gibb's study. One reason for this inconsistency may be that there is a smaller wage gap in developed countries because these countries experience much less social discrimination against women than in countries like India. Another reason may be that the range of control factors used by their study is much larger.[4]

Other results show that the unexplained gap accounts for a larger portion of the wage gap, which is similar to the Jacob's study. The unexplained gap increases over the ten years, which is inconsistent with their data from 1993-94 to 1999-2000, but consistent with the data from 1987-88 to 1993-94.

One of the most important findings of this study is that the unexplained gap is actually growing. Although the gender wage gap has reduced as a whole, the narrowing of the gap can almost exclusively be attributed to lowering of the explained gap. The unexplained gap has actually increased from explaining 60.44% of the wage gap to accounting for 74.47% of it. This means that

difference in wages due to discrimination has actually risen in the past ten years, and that the conditions of working women have become worse rather than becoming better.

The increase in the unexplained component could be partially attributed to the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), which came into force in 2005. MGNREGA guarantees 100 days of employment to adult members of every rural household, willing to do unskilled labour, at a minimum wage of Rs 120. Although, the legislation does not specify the sex of the adult member, in practice, most often, a male member of the household is entitled to the position. Single women are not even considered as potential job-earners for the family. Women who are allowed to work suffer from absence of crèche facilities for their children and, in most places, are only allowed to do "soft work",[5] which gives them fewer days of work due to the nature of the job. (Homes and Jones 2010) In some cases, "no Job Cards (are) were issued to any woman, even in women-headed households" (Parivar 2007), even though MNREGA states that one-third of the individuals employed should be women. Moreover, in most cases, women are paid much less than men. (Homes and Jones 2010) MNREGA has caused a marked increase in the country's minimum wage. States like Jammu and Kashmir have raised the minimum wage from Rs. 66 to Rs. 110 for unskilled workers after the enforcement of MNREGA (Samu, 2009).

However, as the act has provided employment mainly to men, they have been the main beneficiaries of the raised minimum wage and men's wages have consequently increased much more than women's wages. Therefore, the gender bias in MNREGA could be responsible for the rise in the unexplained differences in the gender wage gap.

Similarly, although the explained part of the gender pay gap has reduced, the difference in job characteristics between males and females has not diminished in all areas. It can also be seen that occupation accounts for a smaller percentage of the gap compared to the data of 1999. This implies that improvements have been made in decreasing occupational segregation and increasing women's access to better occupational opportunities.

On the contrary, the percentage difference explained by education has increased in the last ten years, even though women are more educated in 2009

(Table 1). This result suggests that Indian women are still not at par with Indian men in terms of educational attainment and that the nation needs to invest heavily in women's education to decrease the gender wage gap.

These changes in the unexplained and explained gap, along with its determinants, reveal the nature and extent of gender inequality in workplaces in the Indian context and how this inequality can be overcome. Thus, the results provide potential solutions to some of the key issues for policy-makers, which are outlined in the next section.

Recommendations for Policy Makers

Increasing Educational Opportunities for Women: The study shows that the average educational level of an Indian woman in 2009 was 'primary'. This low educational level is responsible for the low labour force participation rate of women and the increase in unemployment found in the study. Investments in the education for women will not only be beneficial for women as individuals, but also for India's future as a superpower because they will increase the amount of skilled labour in the economy, which is necessary for economic growth. Here are three suggestions that could lead to higher educational attainments among women:

1. The government should collaborate and financially support successful NGO initiatives that encourage women's education in India. One such initiative is Barefoot College, which offers evening classes to girls from poor households in Rajasthan so that they can avoid the opportunity cost of going to school during the day instead of working. The government can provide financial assistance to such NGOs for recruiting more teachers and expanding their activities to other states. It can also complement their work by incentivising parents to send their daughters to these classes by giving them semi-annual or annual monetary awards for regular attendance.

2. Girls should be given vocational training along with academic education, so that even if they drop out of school, they can earn a living through other means. As 47% of Indian women between the age of 20 and 24 were married before attaining the legal age of 18, of which 56% belonged to the rural areas (UNICEF 2009), such an initiative is

essential for increasing employment opportunities for women, especially in rural households.

3. Often, girls do not attend school due to the lack of sanitation facilities. It has been corroborated by a UNICEF study that the dropout rate of girls decreases significantly if schools invest in clean bathrooms for girls.

Reduce Social Discrimination: Social barriers play an important role in sustaining or increasing the gender wage gap. In India, discrimination begins at an early stage: parents do not consider education necessary for their daughters, as they are not the breadwinners of the family. In many cases, girls are married off at an early age, as that is seen as their role in society, hindering further educational or occupational opportunities. These result in the large explained gap between men and women, as women remain less qualified. Women, who do work, regularly face discrimination at workplaces for having a 'lesser intellect', resulting in the unexplained gap. Many women have to drop out of the workforce because workplaces do not offer appropriate maternity leaves. Temporary unemployment, or even demanding flexible working hours to take care of their children, results in women having less work experience. The lack of experience also results in a larger explained wage gap.

Reducing social discrimination is necessary to overcome the explained and the unexplained gap. Social barriers can be overcome by implementing certain laws: education must be made compulsory for girls till the tenth standard; marrying girls before the age of 18 should be made a federal offence and families that partake in child marriages should be fined and prosecuted; and employers should be required to provide paid maternity leaves for women, along with paid child-care facilities for women with children.

However, social discrimination cannot be reduced solely through the creation and implementation of laws. India needs a shift in social attitudes towards women and their role in society. This can be done at the household level, where parents need to treat their male and female children similarly in their behavior and expectations; at the school level, where education can incorporate ideas of gender equality and condemn sexual discrimination; and at the larger societal level, where people who partake in sexual discrimination are ostracised.

A successful method for changing social attitudes towards women is affirmative action. In India, one-third of the seats in Gram Panchayats or village councils are reserved for women. In a study by Duflo and Chattopadhyay (2004) on rural India, it was found that although exposure to a female leader does not change people's preference for male leaders, it does reduce stereotypes about the role of women in public and domestic spheres, altering discriminatory social attitudes towards women. In another study by the team, it was also shown that women leaders invest in infrastructure that is relevant to the needs of other women to empower them. Recently, a bill was introduced to extend the reservation of women to the parliament and state legislative assemblies. If the bill is passed, it will provide women an opportunity to prove their effectiveness as leaders and implement policies that empower other women.

Data Collection: The lack of robust and reliable data undermines the accuracy of research and prevents the formulation and implementation of legitimate laws. For this reason, the Indian government should consider a revaluation of the National Sample Survey. The survey should choose a better sample that represents the diverse population of the country. It should include more variables such as hours worked and number of children in each family or household (in case of gender related surveys), to make research easier and more reliable. The government should make sure that individuals collecting the data are well trained and fluent in the language of the respondents. It should also take care that not all respondents are male, or of a certain age, to avoid gender bias in the data. The data should be collected regularly and be easily accessible to local and international researchers, thus addressing the lack of literature in this area.

Accountability: As mentioned in the introduction, India has formulated many laws to enforce gender equality but these laws are far from being implemented. Even where they are implemented, there are no follow-ups to evaluate the success or failure of the policy. Even though marital laws clearly state that marital age is 18, many girls are forced into child marriages all over the country. Similarly, although MNREGA mandates equal pay for equal work, women all over the country are paid less than men for the same amount of work done. (Homes and Jones 2010) The lack of accountability seriously undermines any attempts at improving social conditions for women, including decreasing the gender wage gap. Policy-makers need to set up committees that oversee the

process of implementation in order to ensure that the policy is reaching and benefitting the targeted people. These committees should include local men and women to make sure the feedback is accurate. Regular surveys can also be conducted to check the status of the implementation, and corrupt individuals that stall this process should be penalised.

This is the most important recommendation of the paper given that attempts at bridging the gender gap can only be successful if appropriate laws are made and practically implemented.

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Appendix

Table 1: Regression Analysis 1999

	(1)	(2)
	reg1	reg2
VARIABLES	lnwage	lnwage
Primary	0.180***	0.159***
	(0.00760)	(0.0192)
Middle	0.340***	0.362***
	(0.00649)	(0.0211)
higher_sec	0.523***	0.593***
	(0.0115)	(0.0389)
graduate_above	0.772***	0.855***
	(0.0116)	(0.0350)
prof_tech	0.103***	-0.130***
	(0.0123)	(0.0293)
admin_exec_manager	0.361***	0.301***
	(0.0197)	(0.0896)
service_sales	-0.304***	-0.784***
	(0.0112)	(0.0371)
agri_fish	-0.662***	-0.860***
	(0.0108)	(0.0357)
production	-0.279***	-0.655***
	(0.00959)	(0.0349)
age	0.0463***	0.0267***
	(0.00157)	(0.00246)
age2	-	-
	0.000398***	0.000223***
	(2.03e-05)	(3.30e-05)
married	0.114***	0.0747***
	(0.00756)	(0.0119)
social_group	0.0104***	0.00370**
	(0.000775)	(0.00186)
religion	0.0419***	0.0323***
	(0.00242)	(0.00507)
technical	0.266***	0.247***
	(0.0117)	(0.0328)
sector	0.174***	0.178***
	(0.00607)	(0.0154)
Constant	3.013***	3.401***
	(0.0284)	(0.0595)
Observations	75,606	22,592
R-squared	0.557	0.549

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 2: Regression Analysis 2009

	(1)	(2)
	reg1	reg2
VARIABLES	lnwage	lnwage
Primary	0.174***	0.117***
	(0.00839)	(0.0166)
Middle	0.351***	0.253***
	(0.00744)	(0.0175)
higher_sec	0.548***	0.691***
	(0.0117)	(0.0362)
graduate_above	0.784***	1.016***
	(0.0130)	(0.0360)
prof_tech	0.0951***	-0.195***
	(0.0132)	(0.0321)
admin_exec_manager	0.305***	0.342***
	(0.0228)	(0.0804)
service_sales	-0.306***	-0.670***
	(0.0147)	(0.0443)
agri_fish	-0.643***	-0.692***
	(0.0141)	(0.0397)
production	-0.361***	-0.578***
	(0.0129)	(0.0396)
age	0.0348***	0.0373***
	(0.00186)	(0.00333)
age2	-	-
	0.000229***	0.000321***
	(2.36e-05)	(4.32e-05)
married	0.0899***	0.0417***
	(0.00866)	(0.0134)
social_group	0.0135***	0.00380
	(0.000915)	(0.00238)
religion	0.0468***	0.0362***
	(0.00267)	(0.00602)
technical	0.274***	0.210***
	(0.0146)	(0.0350)
sector	0.0470***	0.0162
	(0.00598)	(0.0142)
Constant	3.336***	3.246***
	(0.0349)	(0.0758)
Observations	52,476	14,495
R-squared	0.480	0.471

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: Oaxaca-Blinder Decomposition Results 1999

	(1)	(2)	(3)
	reg2		
VARIABLES	overall	explained	unexplained
educ		0.0986***	0.0502
		(0.00290)	(0.0348)
occupation		0.0853***	0.188**
		(0.00302)	(0.0909)
ages		0.00509***	0.449***
		(0.00147)	(0.0513)
married		0.00744***	0.0269***
		(0.000601)	(0.0102)
social_group		0.00847***	0.0277***
		(0.000684)	(0.00849)
religion		0.000893**	0.0131*
		(0.000351)	(0.00766)
technical		0.00328***	0.00102
		(0.000580)	(0.00190)
sector		0.0240***	-0.00176
		(0.00107)	(0.00652)
group_1	4.367***		
	(0.00355)		
group_2	3.778***		
	(0.00713)		
difference	0.589***		
	(0.00797)		
explained	0.233***		
	(0.00617)		
unexplained	0.356***		
	(0.00569)		
Constant			-0.398***
			(0.109)
Observations	98,198	98,198	98,198

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Oaxaca-Blinder Decomposition Results 2009

	(1)	(2)	(3)
	reg2		
VARIABLES	overall	explained	unexplained
educ		0.0886***	-0.0843***
		(0.00333)	(0.0172)
occupation		0.0296***	-0.490***
		(0.00289)	(0.0292)
ages		-	0.0435
		0.00496***	
		(0.00179)	(0.0694)
married		0.00822***	0.0322***
		(0.000763)	(0.0112)
social_group		0.00602***	0.0386***
		(0.000557)	(0.0102)
religion		0.00110**	0.0152
		(0.000480)	(0.00944)
technical		0.00131**	0.00342*
		(0.000587)	(0.00206)
sector		0.00305***	0.0128**
		(0.000442)	(0.00647)
group_1	4.587***		
	(0.00375)		
group_2	4.066***		
	(0.00786)		
difference	0.521***		
	(0.00871)		
explained	0.133***		
	(0.00625)		
unexplained	0.388***		
	(0.00687)		
Constant			0.817***
			(0.0761)
Observations	66,971	66,971	66,971

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Informant Serial Number

Year	Female	Male
1999-2000	Not Available	Not Available
2009-2010	21.64	78.36

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Endnotes:

1. The LFPR figures have been weighted (population) to make a more accurate comparison between the two years.
2. (1999 figure/2009 figure)
3. It can be argued that occupational segregation is not responsible for the wage gap by looking at the data for professional and technical-related workers: even though this occupation is more popular among women than men, women receive lower wages. The argument is faulty: although women choose to be professionals over other occupations, the occupation is still dominated by male workers. A lower percentage of men in the field indicates that fewer men choose to be in this field than other fields; however, by no means does it prove that the occupation has less men than women.
4. See Limitations: Missing and/or Unreliable Data
5. One example of soft work provided by the study is removing soil from digging wells.

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