

# Gender Wage Discrimination across Social and Religious Groups in India

## Estimates with Unit Level Data

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This paper focuses on gender wage discrimination across different social and religious groups by addressing the fact that the observed productivity differences between women and men are not only responsible for the huge gender wage gap in India, but for the same levels of productivity, women have been paid lower wages than men. Gender discrimination, superimposed on caste and religious discrimination, accentuates the social exclusion of women belonging to certain castes and religions. We try to reveal how the incidence of the gender pay gap among different religious and social groups changed during the first decade of economic reforms. The presence of substantial wage differentials between men and women workers in the Indian labour market cannot be explained simply by the gender gap of human capital. Discrimination was more severe for women workers in the backward ethnic groups as compared to other women workers.

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### 1 Introduction

Labour market flexibility with ever growing informalisation of work and feminisation of labour has been one of the most likely outcomes of the ongoing process of post-reform structural adjustment in India. An increasing proportion of women workers have been denied social security to which they are legally entitled even under the existing labour laws (Anker 1998; Standing 1999). The labour force participation rate of women in wage employment has been substantially low and concentrated mainly in the lower strata, even within the informal sector, with significant pay discrimination as compared to men both in rural and urban India (GoI 2010). Gender discrimination is omnipresent in the Indian labour market, and the discrimination is more serious when caste and religious discrimination are taken into account. In this paper we show that women workers are discriminated more, even in terms of wage, if they are in economically backward castes and religious minority groups.

Different aspects of wage discrimination in the labour market have been studied by a number of scholars by applying different methodologies and with data from different parts of the developing world (Oaxaca 1973; Cotton 1988; Oaxaca and Ransom 1994; Glick and Sahn 1997; Mishra and Kumar 2005; Madheswaran and Attewell 2007). There has, however, been a dearth of in-depth study on gender wage discrimination in India. Madheswaran and Attewell (2007) found that occupational discrimination was more pronounced than wage discrimination among workers in scheduled tribe (ST) and scheduled caste (SC) social groups. Das et al (2009), by using micro-level information from National Sample Survey (NSS) household surveys, observed that there had been no improvement in the status of women in the Indian labour market almost at all age groups during the 1990s.

The neo-liberal policy-oriented development process failed to register socio-economic progress that could reduce gender discrimination in public and private spaces of work. Furthermore, average wage rates per day in both rural and urban locations were found heavily biased against female workers in almost all the states. Das (2012), in a study with unit data from NSS 61st round examined wage inequality by decomposing Gini inequality index by sex of workers in the shape of “within” and “between” components. The analysis of gender wage discrimination, however, with the dimensions of social and religious groups as carried out in this study hopefully adds a new

dimension in understanding the outcome of the high-growth regime as observed in neo-liberal India.

Although the observed wage differences between men and women workers provide a gross idea about gender pay gap, it is worthwhile to analyse the factors affecting most the observed wage gap across gender. In human capital theory, accumulation of human capital through education and training enhances workers' skill, productive capacities and their life-cycle earnings. The relationship between wage and experience, education, etc, is well documented in the literature (Mincer 1958, 1974; Becker 1964). Based on the logic of human capital theory, it is often argued that the gender wage-gap persists because of differences in the level of education, technical skill and work experience between men and women workers. However, in reality, wage discrimination may exist between male and female workers with same levels of education, technical skill and experience because of other unobserved factors.

This paper focuses on gender wage discrimination not caused by productivity differences as such but by socio-economic factors by utilising the unit level data on employment and unemployment in India from 50th and 66th round survey conducted by the National Sample Survey Office (NSSO). The total wage gap is decomposed into the observed part (described by the differences in education, skill, work experience and social factors) and the unobserved part (explained by the unknown factors). The study also investigates the temporal effects on gender pay gap among different social and religious groups during 1993-94 to 2009-10. The neo-liberal reformers believed that gender wage gap would be reduced through labour market flexibility in the process of international competitiveness. In this study we observe that the gender wage gap increased significantly, particularly among workers with higher education during the post-reform period in India. As labour market participation is not likely to be random, we have estimated wage equations by applying Heckman's selection model with two-step estimation (Heckit) techniques with pooled data of two independent samples taken from the two rounds.<sup>1</sup>

In what follows, Section 2 describes the data and the samples used in this study. Observed wage differentials by gender across different education levels are examined in Section 3. Section 4 deals with methodological issues in estimating the wage equation after correcting for the sample selection bias. Empirical estimates are analysed in Section 5. Section 6 concludes.

## 2 Pooled Data and Construction of Variables

The household level data from the *Employment and Unemployment Survey in India* (schedule 10) of the 50th and 66th quinquennial rounds (for 1993-94 and 2009-2010) conducted by the NSSO have been used in this study. The sample consists of 42.3% and 48.4% women in the 50th and 66th rounds, respectively. Table 1 describes the share of women in the sample of both rounds in terms of different categories.

**Table 1: Share of Women in the Sample (%)**

	1993-94	2009-10
Total number	42.3	48.4
Wage earners	27.3	23.8
Illiterate	55.4	59.8
Education up to primary	36.6	45.4
Education up to higher secondary	30.0	40.0
Education up to graduate	12.4	32.4
Education with postgraduate and above	26.5	33.8
Technical education	23.0	33.0

Source: Authors' calculation based on unit data for NSS 50th and 66th Rounds on Employment and Unemployment Situation in India.

The data set covers geographical areas all over India, excepting for few regions.<sup>2</sup> The cross sectional survey is roughly representative of the national, state, and so-called "NSS region" level.

We have constructed independently pooled cross section<sup>3</sup> from two random samples from the same population over two different time periods. To capture the change in sampling distributions of a single random sample over time we allow the intercept to change over time by introducing time dummy variables in the estimating model. The year dummy can be interpreted as the change in the effect of control variables on the dependent variable. We also relate the year dummy with key explanatory variables to see if the effect of those variables has changed over a certain time period. In the NSSO schedule of both the rounds, wages of a particular worker have been recorded in the form of cash or in-kind on a weekly basis. The total wage of a person is calculated by taking the sum of them against their usual principal activity.<sup>4</sup> Workers' age is taken as a proxy for experience. Skill dummy for workers with technical knowledge, gender dummy for women, rural sector dummy for rural areas, religion dummy for certain religion, caste dummy for certain caste and education dummy for certain level of education have been constructed in carrying out the empirical work.

**Table 2: Mean Daily Wages (in Rs) for Regular Wage/Salaried Men and Women Employees by Level of Education**

Sector	Level of Education	1993-94		1999-2000		2004-05		2009-10	
		Men	Women	Men	Women	Men	Women	Men	Women
Rural	Illiterate	31.27	17.98	71.23	40.32	72.47	35.74	135.72	65.47
	Literate up to middle	45.87	23.92	91.63	50.18	98.59	47.75	160.04	80.32
	Secondary and higher secondary	72.31	57.61	148.23	126.09	158.04	100.19	267.14	151.54
	Graduate and above	97.71	72.16	220.93	159.92	270.02	172.7	403.05	285.98
Urban	Illiterate	46.28	26.75	87.63	51.83	98.79	48.7	156.6	92.56
	Literate up to middle	53.02	30.11	105.08	64.41	111.44	64.79	183.8	114.38
	Secondary and higher secondary	80.33	70.93	168.16	145.73	182.58	150.41	293.26	237.61
	Graduate and above	127.69	98.59	281.55	234.74	366.76	269.17	634.92	499.98

Source: NSS 50th, 55th, 61st and 66th rounds on "Employment and Unemployment Situation in India".

## 3 Observed Wage Gap by Gender

The estimates of relative wage gap by gender on the basis of observed data provide us with a gross idea about wage discrimination. Table 2 displays nominal mean daily wages (in rupees) for regular wage/salaried men and women workers in 1993-94, 1999-2000, 2004-05 and 2009-10 by level of education, both in the rural and the urban economy. Figures of mean daily wages are obtained from the 50th, 55th, 61st and 66th round survey reports of NSSO on "Employment and Unemployment Situation in India". The figures displayed in

Table 2 suggests that women workers got lower wages compared to their male counterparts at every educational standard, both in rural and urban India. The relative wage gaps of regular wage/salaried workers by gender across different educational standards are shown in Table 3. Figures shown in Table 3 indicate that while the gender gap increased at every educational standard in rural areas, there has been a decline in the gap for all educational levels in the urban areas, except the case of secondary and higher secondary level. Moreover, the gender gap remained very high among workers without formal education and with a lower educational standard and they engaged mostly in informal activities.

**Table 3: Relative Wage Gap between Regular Wage/Salaried Men and Women**

Level of Education	Rural				Urban			
	1993-94	1999-2000	2004-05	2009-10	1993-94	1999-2000	2004-05	2009-10
Illiterate	42.5	43.4	50.7	51.8	73.0	40.9	50.7	40.9
Literate up to middle	47.9	45.2	51.6	49.8	76.1	38.7	41.9	37.8
Secondary and higher secondary	20.3	14.9	36.6	43.3	13.3	13.3	17.6	19.0
Graduate and above	26.1	27.6	36.0	29.0	29.5	16.6	26.6	21.3

Relative wage gap = [(male wage – female wage)/male wage]\*100.

Source: As for Table 2.

#### 4 Estimating Wage Equation: Methodological Issues

A more flexible way to look into the gender wage gap is to estimate a Mincerian wage regression model with education and work experience as explanatory variables (Mincer 1974).<sup>5</sup> We have utilised human capital theory in estimating gender wage discrimination in the Indian labour market. By following Mincer (1974), we have constructed our wage equation in the frame of pooled data from two independent random samples. (The detailed construction of the wage equation is shown in equation (1) in the Appendix, pp 75-76.) A complicated statistical problem will arise in estimating the wage equation with household level information provided by the NSSO because some households within the sample and some members within a household receive no wage income. If we carry out empirical estimation by ignoring the households with no earning in the form of wage, the sample becomes non-random or incidentally truncated and the problem of sample selection bias will arise. Heckman (1976, 1979) proposed two estimation techniques to overcome the selection bias problem. First is the maximum likelihood (ML) estimation of a selection model assuming bivariate normality of the error terms in the wage and participation equations. Second is the two-step estimation (Heckit) procedure, ML probit estimation of the participation equation, and ordinary least squares (OLS) (or generalised least squares – GLS) estimation of the wage equation using participants only and the normal hazard (the inverse Mills ratio  $\hat{\lambda}$ )<sup>6</sup> estimated from the first step as additional regressor. In this study, the Heckit method is used in estimating the gender gap in wage. The equation used for correcting sample selection bias is specified in equation (2) in the Appendix.

#### 5 Changes in Wage Gap: Empirical Results

The sample used in this study includes 35,57,455 persons after excluding children up to the age of 15 and the elderly above 60 years in the pooled sample<sup>7</sup> in which 29,15,671 data points are

censored and the rest are uncensored. As the wage for non-working people is unobserved we need to estimate a probit model for labour force participation to test and correct for sample selection bias. The estimated results are shown in Table 4.<sup>8</sup> The estimated value of the inverse Mill's ratio ( $\lambda$ ) as shown in the last row of Table 4 is statistically significant implying the presence of selection bias. Thus the wage equation is to be estimated after correcting for sample selection bias. In addition to education variables, we include household size and dummy variables to capture the effects relating to religious and ethnic groups as explanatory variables. Household size is in the selection equation but it is not included in the wage equation. We assume that, given the productivity factors, the household size has a bearing on the employment decision, but no effect on wage. On the other hand, age as a proxy to experience is in the wage equation but it is not included in the selection equation because it has no significant effect on the participation of the economically active population in the job market.

The empirical results, based on unit level information, are presented in Table 4. Household size has a negative effect on labour force participation. Larger the family size, lower is the chance to participate in wage employment, particularly in the countryside. A household with large family size is likely to engage in unpaid family work and self-employment activities, both on the farm and in the non-farm sectors. We have incorporated a female dummy as one of the explanatory variables to capture the gender differential effect in the labour market. Its negative coefficient in the probit estimation suggests that the participation rate in the labour market was significantly lower for women as compared to men with roughly similar characteristics. This finding is not surprising because, even today, the majority of women in India are forced to remain outside wage employment for social and other reasons.

This type of gender gap in labour market participation, however, reduced significantly in 2009-10 as compared to 1993-94 partly because of the higher incidence of feminisation of work during the post-reform period. While the women's participation rate was significantly higher among Hindus, the

**Table 4: Probit Estimates of Labour Force Participation**

Variables	Coefficients	z-statistic	P>z
intercept	0.083436	28.26	0
hhs	-0.10	-273.07	0
female	-0.79	-77.47	0
y09	-0.43	-183.83	0
y09_female	0.54	46.7	0
female_hindu	0.16	16.1	0
female_muslim	-0.04	-2.57	0.01
female_st	0.27	30.68	0
female_sc	0.40	53.97	0
female_primary	-0.34	-32.92	0
female_HS	-0.19	-22.17	0
female_graduate	0.46	7.76	0
female_PG	0.65	46.5	0
female_tech	0.73	35.63	0
rural	-0.19	-115.04	0
female_hindu_09	-0.08	-7.24	0
female_muslim_09	0.07	4.49	0
female_st_09	-0.05	-5.29	0
female_sc_09	-0.10	-11.63	0
female_primary_09	0.31	27.7	0
female_HS_09	0.12	13.09	0
female_graduate_09	-0.28	-4.7	0
female_PG_09	-0.31	-17.8	0
female_tech_09	-0.48	-20.87	0
Inverse Mill's ratio ( $\lambda$ )	-0.07	-9.65	0
rho	-0.07		
sigma	0.95		

Source: Authors' calculation based on data as for Table 1.

participation rate increased for Muslim women over the years. There had also been an increasing trend in labour market participation for women in dalit and other backward social groups during this period. The creation of informal work in the post-reform period, perhaps, helped to improve the economic conditions for women in religious and social minorities.

The estimated results in Table 4 also reveal that women's participation rate was lower at lower levels of education, while the situation was reversed at the higher education level during the early 1990s. However, the rate of participation of women with lower education increased and that of women with higher education declined in 2009-10. Women with technical skills had a higher chance of joining the labour market since it is obvious that these women acquired skills with the intention of joining the labour market. Ironically, the rate of participation of skilled women declined in 2009-10. We have derived such results from our analysis, perhaps, because of the increased availability of low-educated, low-skilled and low-salaried jobs for women during the post-reform period.

The Wald chi-square test<sup>9</sup> indicates that the correlation is very significant between error terms in the selection equation and the wage equation suggesting that Heckman's technique will provide a better result. The estimated results of the wage equation, specified in equation (1) by OLS using participants in the labour market only and the normal hazard (the inverse Mill's ratio) estimated from the first step as additional regressor are shown in Table 5.<sup>10</sup>

In the wage equation, the intercept for 1993-94 is 10.07 and the intercept for 2009-10 is (10.07-2.92). The weekly wage used here is in nominal rupees in logarithmic form. The negative coefficient on the year dummy,  $D^{y09}$ , indicates a deflationary factor for the nominal wage in 2009-10.<sup>11</sup> On average, women workers got a significantly lower wage than their male counterparts in 1993-94, but the gender wage gap decreased notably in 2009-10. This implies that the situation of women in terms of overall gender wage-gap improved over the years. The rural-urban wage gap was significant irrespective of the gender dimension and the negative coefficient of rural dummy suggests that rural workers earned a lower wage than urban workers. The wage rate for women both in the Hindu and Muslim communities was

**Table 5: Sample Selection Bias Corrected OLS Estimates of the Wage Equation**

Variables	Coefficients	z-statistic	P>z
Intercept	10.07	995.15	0
Age	0.01	27.84	0
Agesq	0.00	-14.33	0
D <sup>f</sup>	-0.58	-33.61	0
D <sup>y09</sup>	-2.92	-828.57	0
D <sup>y09</sup> D <sup>f</sup>	0.66	34.89	0
D <sup>hindu</sup> D <sup>f</sup>	-0.27	-16.74	0
D <sup>muslim</sup> D <sup>f</sup>	-0.30	-12.62	0
D <sup>ST</sup> D <sup>f</sup>	0.08	5.95	0
D <sup>SC</sup> D <sup>f</sup>	-0.06	-5.21	0
D <sup>primary</sup> D <sup>f</sup>	0.00	-0.22	0.823
D <sup>HS</sup> D <sup>f</sup>	0.61	40.02	0
D <sup>graduate</sup> D <sup>f</sup>	1.55	22.8	0
D <sup>PG</sup> D <sup>f</sup>	1.27	70.59	0
D <sup>IS</sup> D <sup>f</sup>	0.59	24.42	0
D <sup>f</sup>	-0.49	-181.36	0
D <sup>hindu</sup> D <sup>f</sup> D <sup>y09</sup>	0.03	1.58	0.114
D <sup>muslim</sup> D <sup>f</sup> D <sup>y09</sup>	-0.05	-1.79	0.073
D <sup>ST</sup> D <sup>f</sup> D <sup>y09</sup>	-0.30	-19.07	0
D <sup>SC</sup> D <sup>f</sup> D <sup>y09</sup>	-0.33	-25.44	0
D <sup>primary</sup> D <sup>f</sup> D <sup>y09</sup>	0.14	6.77	0
D <sup>HS</sup> D <sup>f</sup> D <sup>y09</sup>	-0.12	-7.5	0
D <sup>graduate</sup> D <sup>f</sup> D <sup>y09</sup>	-0.65	-9.49	0
D <sup>PG</sup> D <sup>f</sup> D <sup>y09</sup>	-0.14	-6.19	0
D <sup>IS</sup> D <sup>f</sup> D <sup>y09</sup>	-0.66	-23.56	0

Source: As for Table 4.

less than that for the male workers for roughly similar type of work, but the gap was more prominent, although it decreased over time, for Muslim workers. While women workers among the STs earned a better wage, the wage for women workers among the SCs was marginally low.

During 1993-94, the wage difference between men and women workers was insignificant at a lower education level, but the returns to education for women were more than men for higher levels of education irrespective of the religious and social groups. However, the gender wage gap in favour of women diminished over the years and at a higher rate for higher levels of education. Interestingly enough, the skill premium for women workers was nearly 60% more than that for male workers during 1993-94 in the Indian labour market. But such positive wage gap for women due to skill premium reduced sharply and in 2009-10 women workers lagged behind men workers in terms of the skill premium. Precisely, our results indicate that higher premiums for women from higher education and technical skill declined over the years during the period of our analysis irrespective of religious and social groups.

### 6 Conclusions

This study analyses the gender wage gap at different levels of education by taking social and religious dimensions into account by following human capital theory with NSS 50th and 66th rounds unit level information during the first two decades of economic reforms. It examines the returns to education as a possible determining factor of gender gap in wages both in the rural and urban economy in India. As labour market participation is not likely to be random, we have estimated wage equations by applying Heckman's selection model with two-step estimation techniques with pooled data of two independent samples taken from the two rounds.

The effects of different factors in entering into the labour market have been different for men and women. The study observes that the probability of women's participation rate in wage employment was lower as compared to the probability of men's participation. But according to our results, the difference has reduced over time. The gender gap in wage employment participation varied widely across the social and religious groups. Hindu women workers were in a better position than Muslim women, partly because of religious customs and partly due to religious discrimination. Among women of the socially backward classes, women workers in SC were in a superior position than those in the ST. This study also observes that job opportunities for women increased during the post-reform period, but mainly for low-educated and low-skilled women.

A substantial wage differential between men and women has been found to exist in the Indian labour market. Although the overall gender wage gap has reduced over the years, women workers, both Hindu and Muslim, have got significantly lower wages than their male counterparts during the post-reform period. Although the rate of return for Hindu women workers was more than that for their male counterparts, such positive gap declined over time. Poignantly, Muslim women workers got a significantly lower return than the men workers

in this religious group and the gap increased over the years. While there was no significant wage gap between men and women workers with primary education in the early 1990s, the return for primary education was more for women workers in 2009-10. During the early 1990s, returns to higher education and skill for women were more than men for higher levels of education. Ironically, such higher premiums for

women declined over the years during the period of our analysis irrespective of religious and social groups. Precisely, our study shows that female workers were subject to stark discrimination in terms of participation in the regular/salaried job market as well as wages, and furthermore, discrimination was more severe for women workers both from minority-religious and tribal-social groups.

## NOTES

- 1 In estimating the wage differential between the public and private sectors, Glinskaya and Lokshin (2005) also used the same estimation technique, but for the two cross sections from the 50th and 61st rounds of the consumer expenditure survey in India separately.
- 2 (i) Leh (Ladakh) and Kargil districts of Jammu and Kashmir, (ii) interior villages of Nagaland situated beyond 5 kilometres of the bus route, and (iii) villages in Andaman and Nicobar Islands, which remain inaccessible throughout the year.
- 3 If a random sample is drawn at different time periods, pooling of the random samples forms an independently pooled cross section. From a statistical standpoint, this kind of data set consists of independently sampled observations. By pooling random samples drawn from the same population, but at different points in time, we can get more precise estimators and test statistics with more power (Wooldridge 2009).
- 4 In NSS, the activity status determined on the basis of the reference period of one year is known as the usual activity status of a person, that determined on the basis of a reference period of one week is known as the current weekly status of the person and the activity status determined on the basis of a reference period of one day is known as the current daily status of the person. The activity status on which a person spent relatively longer time during the 365 days preceding the date of survey is considered the usual principal activity status of a person.
- 5 The Mincerian wage regression, however, disregards the endogeneity of post-schooling human capital accumulation and treats schooling and training symmetrically. Griliches (1977) pointed out several econometric problems that arise in estimating the returns to schooling and, in particular, those pertaining to the measurement of both schooling and ability.
- 6 Inverse Mills Ratio, named after John P Mills, is the ratio of the probability density function to the cumulative distribution function of a distribution.
- 7 In the pooled sample 6,39,416 persons come from the 50th round (1993-94) and 29,18,039 persons come from the 66th round (2009-10).
- 8 Table A1, explaining the variable names used in Table 4, is given in the Appendix.
- 9 Wald  $\chi^2(21)=1240000$ , Prob >  $\chi^2 = 0.0000$ .
- 10 Table A2, explaining the variable names used in Table 5, is given in the Appendix.
- 11 Let  $P_{09}$  be the deflationary factor for nominal wage in 2009-10. Then, the log of the real wage for each person in the 2009-10 sample is  $\log(\text{wage}/P_{09}) = \log(\text{wage}) - \log(P_{09})$ . While wage differs across people,  $P_{09}$  does not and  $\log(P_{09})$  will be absorbed into the intercept for the year 2009-10. Thus the negative coefficient on the year dummy,  $y_{09}$ , measures the deflationary effect on nominal wage in 2009-10.

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## Appendix

## Construction of the Wage Equation

By following Mincer (1974), the wage equation in the frame of pooled data from two independent random samples is specified as

$$\ln w = \alpha_0 + \alpha_1 D^{y09} + \alpha_2 D^f + \eta_1 D^f D^{y09} + \theta_1 D^r + \lambda_1 x + \lambda_2 x^2 + \sum_{i=1}^2 \beta_i D_i^{religion} D^f + \sum_{i=1}^2 \rho_i D_i^{religion} D^f D^{y09} + \sum_{i=1}^2 \chi_i D_i^{caste} D^f + \sum_{i=1}^2 \phi_i D_i^{caste} D^f D^{y09} + \sum_{i=1}^4 \gamma_i D_i^{edu} D^f + \sum_{i=1}^4 \delta_i D_i^{edu} D^f D^{y09} + \eta_2 D^{ts} D^f + \eta_3 D^{ts} D^f D^{y09} + \varepsilon \quad \dots(1)$$

The variable  $D^{y09}$  is a time dummy equal to 1 if the person comes from the 66th round (2009-10) and 0 if it comes from the 50th round (1993-94). The intercept for 1993-94 is  $\alpha_0$  and the intercept for 2009-10 is  $(\alpha_0 + \alpha_1)$ . The variable  $D^f$  is a gender dummy variable equal to 1 for women and 0 for men;  $D^r$  is the rural dummy variable equal to 1 for rural areas and 0 for urban areas. The coefficients  $\lambda_1$  and  $\lambda_2$  are those that correspond to the return to experience and reflect concavity of the age earnings profile when  $\lambda_2$  is negative. We assume that experience has the same effect on wage for both men and women workers in both time periods.  $D^{religion}$  is the dummy variable for a specific religious group, equal to 1 for a certain religious group and 0 otherwise. The coefficients  $\beta_i$ 's act as coefficient for religion  $i$ , among women ( $i=1$  for Hindu and  $i=2$  for Muslim women) in 1993-94 and  $(\beta_i + \rho_i)$  for them in 2009-10. Similarly, coefficients  $\chi_i$ 's represent the coefficients for women's caste dummy in 1993-94 and  $(\chi_i + \phi_i)$  in 2009-10.  $D^{edu}$  is the education dummy and the coefficient  $\gamma_i$  measures return to education at level  $i$  in 1993-94 for women, and  $(\gamma_i + \delta_i)$  in 2009-10. We have taken four different education dummies to represent different level of education ( $i=1, 2, 3, 4$ ).  $D^{ts}$  is used to incorporate technical skill, and is equal to 1 for a person having technical skill and 0 otherwise;  $\varepsilon$  is an i.i.d. idiosyncratic error term

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with mean zero and constant variance  $\sigma^2_{\epsilon}$  measuring the effects of unobservable random factors.

**Two-Step Estimation (Heckit) Procedure**

By following Heckman (1979), we assume the equation for entering into the labour market as

$$w_i^* = z_i \gamma + u_i \quad \dots(2)$$

$w_i^*$  is the difference between the market wage

and the reservation wage. The reservation wage is the minimum wage at which the  $i^{th}$  individual is prepared to work. If the wage is below that level nobody will choose to work. We don't actually observe  $w_i^*$ . What we can observe is a dichotomous variable  $w_i$  with a value of 1 if a person enters into the labour market and 0 otherwise:

$$w_i = \begin{cases} 1 & \text{if } w_i^* > 0 \\ 0 & \text{if } w_i^* \leq 0 \end{cases}$$

The wage equation specified in (1) is relevant only if  $w_i^*$  is positive.

The Heckit procedure is the maximum likelihood probit estimation of the participation equation shown in (2) to obtain estimates of  $\gamma$  by assuming  $u_i \sim N(0,1)$ .

**Table A1: Explanation of Variable Names Used in Table 4**

Name of the Variable	Explanation
Hhs	Householdsize
Female	Gender dummy variable, equal to 1 for women and 0 for men
y09	Time dummy variable, equal to 1 if the person comes from the 66th round (2009-10) and 0 if he/she comes from the 50th round (1993-94).
y09_female	Gender dummy interacted with time dummy, indicating the change of the effect of gender dummy variable over the years
female_hindu	Gender dummy variable for Hindus, equal to 1 for Hindu women and 0 otherwise
female_muslim	Gender dummy variable for Muslims, equal to 1 for Muslim women and 0 otherwise
female_st	Gender dummy variable for STs, equal to 1 for ST women and 0 otherwise
female_sc	Gender dummy variable for SCs, equal to 1 for SC women and 0 otherwise
female_primary	Gender dummy variable for primary level of education, equal to 1 for women with primary level of education and 0 otherwise
female_HS	Gender dummy variable for higher secondary level of education, equal to 1 for women with higher secondary level of education and 0 otherwise
female_graduate	Gender dummy variable for graduation level of education, equal to 1 for women with graduation level of education and 0 otherwise
female_PG	Gender dummy variable for postgraduation level of education, equal to 1 for women with postgraduation level of education and 0 otherwise
female_tech	Gender dummy variable for technical skill, equal to 1 for women with technical skill and 0 otherwise.
Rural	Dummy variable for rural area, equal to 1 if the person comes from rural area and 0 if he/she comes from urban area.
female_hindu_09	Hindu gender dummy interacted with time dummy, indicating the change of the effect of Hindu women over the years
female_muslim_09	Muslim gender dummy interacted with time dummy, indicating the change of the effect of Muslim women over the years
female_st_09	ST gender dummy interacted with time dummy, indicating the change of the effect of ST women over the years
female_sc_09	SC gender dummy interacted with time dummy, indicating the change of the effect of SC women over the years
female_primary_09	Gender dummy with primary level of education interacted with time dummy, indicating the change of the effect of women with primary level of education over the years
female_HS_09	Gender dummy with higher secondary level of education interacted with time dummy, indicating the change of the effect of women with higher secondary level of education over the years
female_graduate_09	Gender dummy with graduation level of education interacted with time dummy, indicating the change of the effect of women with graduation level of education over the years
female_PG_09	Gender dummy with postgraduation level of education interacted with time dummy, indicating the change of the effect of women with postgraduation level of education over the years
female_tech_09	Gender dummy with technical skill interacted with time dummy, indicating the change of the effect of women with technical skill over the years

**Table A2: Explanation of Variable Names Used in Table 5**

Name of the Variable	Explanation
Age	Age of the worker as a proxy of experience.
Agesq	Age squared of the worker used to capture the effect of change of experience over time.
D <sup>f</sup>	Gender dummy variable, equal to 1 for women and 0 for men
D <sup>y09</sup>	Time dummy variable, equal to 1 if the person comes from the 66th round (2009-10) and 0 if he/she comes from the 50th round (1993-94).
D <sup>y09D<sup>f</sup></sup>	Gender dummy interacted with time dummy, indicating the change of the effect of gender dummy variable over the years
D <sup>hinduD<sup>f</sup></sup>	Gender dummy variable for Hindus, equal to 1 for Hindu women and 0 otherwise
D <sup>muslimD<sup>f</sup></sup>	Gender dummy variable for Muslims, equal to 1 for Muslim women and 0 otherwise
D <sup>STD<sup>f</sup></sup>	Gender dummy variable for STs, equal to 1 for ST women and 0 otherwise
D <sup>SCD<sup>f</sup></sup>	Gender dummy variable for SCs, equal to 1 for SC women and 0 otherwise
D <sup>primaryD<sup>f</sup></sup>	Gender dummy variable for primary level of education, equal to 1 for women with primary level of education and 0 otherwise
D <sup>HS<sup>f</sup></sup>	Gender dummy variable for higher secondary level of education, equal to 1 for women with higher secondary level of education and 0 otherwise
D <sup>graduateD<sup>f</sup></sup>	Gender dummy variable for graduation level of education, equal to 1 for women with graduation level of education and 0 otherwise
D <sup>PG<sup>f</sup></sup>	Gender dummy variable for postgraduation level of education, equal to 1 for women with postgraduation level of education and 0 otherwise
D <sup>TD<sup>f</sup></sup>	Gender dummy variable for technical skill, equal to 1 for women with technical skill and 0 otherwise
D <sup>r</sup>	Dummy variable for rural area, equal to 1 if the person comes from rural area and 0 if he/she comes from urban area.
D <sup>hindu D<sup>f</sup> D<sup>y09</sup></sup>	Hindu gender dummy interacted with time dummy, indicating the change of the effect of Hindu women over the years
D <sup>muslim D<sup>f</sup> D<sup>y09</sup></sup>	Muslim gender dummy interacted with time dummy, indicating the change of the effect of Muslim women over the years
D <sup>ST D<sup>f</sup> D<sup>y09</sup></sup>	ST gender dummy interacted with time dummy, indicating the change of the effect of ST women over the years
D <sup>SC D<sup>f</sup> D<sup>y09</sup></sup>	SC gender dummy interacted with time dummy, indicating the change of the effect of SC women over the years
D <sup>primaryD<sup>f</sup> D<sup>y09</sup></sup>	Gender dummy with primary level of education interacted with time dummy, indicating the change of the effect of women with primary level of education over the years
D <sup>HS<sup>f</sup> D<sup>y09</sup></sup>	Gender dummy with higher secondary level of education interacted with time dummy, indicating the change of the effect of women with higher secondary level of education over the years
D <sup>graduateD<sup>f</sup> D<sup>y09</sup></sup>	Gender dummy with graduation level of education interacted with time dummy, indicating the change of the effect of women with graduation level of education over the years
D <sup>PG<sup>f</sup> D<sup>y09</sup></sup>	Gender dummy with postgraduation level of education interacted with time dummy, indicating the change of the effect of women with postgraduation level of education over the years
D <sup>TD<sup>f</sup> D<sup>y09</sup></sup>	Gender dummy with technical skill interacted with time dummy, indicating the change of the effect of women with technical skill over the years