Wage Differentials and Inequality in Managerial and Professional Jobs: Quantile Reression Analysis

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It is commonly observed that there is a great deal of disparity in wages received by men and women, irrespective public or private sectors. This paper analyses the factors determining the wage differentials in managerial and professional jobs, using the latest unit level data of periodical labour force survey (PLFS), published by the National Sample Survey Oganization (NSSO). The analysis is limited to workers aged between 15 and 65 years and are employed in managerial and professional occupations. Quantile regression model is applied to examine how a change in earnings of managerial and professional workers is influenced by factors such as years of schooling, work experience, gender, social group, marital status, enterprise type and job contract. The results suggest that both labour and non-labour market characteristics play a crucial role in determining the earnings of male and females in India. Based on the findings, the study suggests that the invigoration of business performance by a high degree of competitiveness, coupled with technological advancement and hiring of skilled labour, is essential for bridging the wage differential in India.

Keywords: Managers, Professionals, Gender, Wage gap
JEL Classifications:

Introduction

A plethora of empirical studies reported that there is a great deal of disparity in wages earnings across economic activities and occupations (Blau & Kahn, 2003). The wage differentials have been observed across developing and developed countries. However, what accounts for wage disparity has been debated extensively in the economics literature (Groshen 1990). According to the conventional wisdom, the characterstics that affect the differential in wage earnings may be classified into three ctaegories: social, economic, and labour market. More apt;y, the socio-economic and labour market characteristics such as gender, social group, educational level, work experience, type of economic activities, and type of enterprises, are attributable to a great part of the wage differentials. In the economics parlance, the term gender wage gap referes to

differentials in wages received by men and women. Among these factors, gender plays a key role in determining the wage differentials. In other words, men tend to earn more than women in the labour market. From a macroeconomic perspective, widening gender wage gap has significant implications for women's bargaining power and human capital investment.

The Indian economy has witnessed 'an impressive economic growth' coupled with 'an extraordinary failure' to deal with the millions of people who are suffering from poverty, hunger, malnutrition, and undernutrition. This is not a unique phenomenon. It is common to observe that a simultaneous increase in economic growth and inequality across several developing economies. There are two sources of inequality. First, workers in a market-oriented economy are paid according to their marginal productivity. An economy with efficient incentive system will always reward hard-working persons in the labour market. Therefore, inequality is a system-generated outcome. Second, inequality is an outcome of inequality of opportunities, which, in turn, result from the disparity in educational access, health facilities, technology and so on. Some of these dimensions of inequality motivated to carry out an empirical investigation in the field, particularly in the context of India.

The main purpose of this paper is to examine the role of various socio-economic and labour market factors that influence wages of make and females employed in managerial and professional occupations in India. The study also assess the gender wage gap across Indian states. Although the literature is replete with several studies, our study contributes to the extant literature in two ways. First, it expands the existing literature on male-female wage gap by presenting the case of workers employed in managerial and professional positions. Second, we employ quantile regression estimates to assess the gender gap across the earnings distribution.

The rest of the paper is segregated into the following five sections: The second section focuses on the review of previous studies in the literature, followed by the sources of data and econometric methods in section three. Section four presents the empirical results and discussions derived from the econometric analysis. The last section discusses the conclusion and policy implications.

Literature Review

There are several empirical studies on the gender wage inequality, predominantly based on three economic theories. These theories are human capital theory, occupational segregation and labour market structure (References). The human capital theory,which broadly encapsulates the role of work experience, educational level, and vocational training, is a

predomiant economic theory, explaining a great deal of disparity in the wage distribution. An analysis of labour market participation by gender shows that women workers predominantly concentrate in a few economics activities, termed occupational crowding. The economic activities in which women are highly concentrated are generally low-paid ccoupations. Interestingly, observable factors and unobservable factors. To what extent observable factors explain Literature review is presented in two parts: role of socio-economic variables in determining the wage rates, and second the role of gender is explored more explicitly in the regression model.

(Krishna & Bino, 2013) takes in to consideration many conventional independent variables that reflect upon market characteristics, along with HDI while formulating the wage function. (Krishna & Bino, 2013)identifies the central problem as the challenge to the conventional notions of a wage function as a significant portion of it depends on firm characteristics and not human capital variables. (Krishna & Bino, 2013)uses data based on Age, Sex, Education (general and technical), Type of occupation (formal and informal), Firm size number of workers), Structural changes in economy (human capital difference), Occupation (Classification of skill, PMT and so on), Caste (Affects Indian wage specifically) and HDI (health, income, education). Their analysis shows patterns indicating that wages seem to be directly related to HDI.

Gender plays a crucial role in determining the wages in the labour markets across the world. Several empirical studies have highlighted the role of gender in the wage determination (Blau & Kahn, 2017; Kapsos, 2008; Kunze, 2006; Poddar & Mukhopadhyay, 2018; Antonie et al., 2020). (Blau & Kahn, 2017) provides new empirical estimates in understanding the extent of and trends in the gender wage gap and their probable explanations in the United States. The unexplained wage gap in the United States remains stable after a dramatic narrowing over the 1980s. (Kapsos, 2008) investigates determinants of earnings and estimates gender wage differentials in a large sample of non-agricultural workers. The study finds that gender gaps are observed in every sector, across all levels of education and in every establishment size class, with the most significant gaps seen in the hotels, restaurants and construction industries where the workers have primary education or less, and in mid-sized establishments. (Kunze, 2006) reviews the literature on the gender wage gap, mainly focusing on identifying the critical parameters in human capital wage regression models. (Poddar & Mukhopadhyay, 2018) describes the outcomes of the estimation of gender wage gap in the Indian labour market. (Antonie, Gatto, & Plesca, 2020) uses hourly and weekly wages from the Canadian Labour Force Survey from 2000 until 2018 to separate workers into full-time and part-time. (Casado-

Díaz, Driha, & Simón, 2020) examines the gender wage gap in the Spanish hospitality industry versus the rest of the economy. (Seneviratne, 2020) investigates gender wage inequality in Sri Lanka during the 1992–2014 period. Sri Lanka saw many pro-market reforms and a rise in economic growth during this period. (Wu, Pieters, & Heerink, 2020) provides empirical evidence on gender wage differences among rural–urban migrants in China.

One page review of other determinants of wages

See how the size and type of firm matter in determining wage

Caste and wage differentials

Work experience

Methodology

Data Source and variables

The data for this study are sourced from the unit records of the recent periodical labour force survey (PLFS) published in 2020-21 by the National Sample Survey Office (NSSO). The sample survey convers about 4567823 indivuals residing in 103456 households. We limit our analysis primarily to regular wage and salaried workers[1]. Within regular wage and salaried workers, we consider those who reported their occupation as managers and professionals according to the national classification of occupation (NCO) 2004. As per the NCO 2004, managers consist of both corporate and general managers. In addition, we limit our analysis to only workers aged between 15 and 65 for the analysis.

To identify the major determinants of regular wage earned by the managers and profewssionals in India, we consider the following independent variables: sector, sex, years of schooling, age (proxy for years of work experience), technical education, vocational training, marital status, religion, social group, job contract, size of the workforce in the enterpirse, and type of enterprise. While years of schooling, and work experience are continuous variables, the remaining are dummy variables. Table 1, which depicts the earning function of managerial and professional workers at an aggregate level, presents the description of the independent variables, which broadly cover demographic, socio-economic, and labour market characteristics, used in the regression model.

[1] Regular wage or salaried workers include those who are employed in farm or non-farm enterprises and receive wages on a regular basis, excluding those who receive wage on daily basis (NSS Report No. 537: 2009-10).

Table 1

Description of the independent variables used in the quantile regression model

Name of the variable	**Acronym**	Variable type	Expected relationship with the dependent variable	Descripion of the variable type	Category of the variable
Sector	SECT	Binary	-	Rural=1, Urban=0	Demographic
Sex	SEX	Binary	+	Female =1, Male=0	Demographic
Marital staus	MAR_STA	Binary	-	Married =1, 0=others	Demographic
General education	GEN_EDU	Continuous	+	Years of schooling in general education	Socio-economic
Technical education	TECH_EDU	Binary	+	Yes = 1, No =0	Socio-economic
Vocational Training	VOC_TRNG	Binary	+	Yes = 1, No =0	Socio-economic
Religion	REL	Binary	+	Hindu =1, 0=Others	Socio-economic
Social group	SOCIAL_GRP	Binary	+	Upper caste =1, 0=Others	Socio-economic
Work experience	WORK_EXP	Continuous	+	Years of work experience	Labour market
Job contract	JOB_CNTRCT	Binary	-	Yes =1, No=0	Labour market
Type of enterprise	TYPE_ENT	Binary	+	Government/public sector =1, otherwise =0	Labour market
Workforce in the enterprise	SIZE_ENT	Binary	-	Less than 20 =1, 20 and above =0	Labour market

Source: Authors' own

The basic model used in this study is specified as follows:

$$\text{In } RW = \alpha + \beta_1 \text{ SECT} + \beta_2 \text{ SEX} + \beta_3 \text{ MAR\_STA} + \beta_4 \text{ GEN\_EDU} + \beta_5 \text{ GEN\_EDU2} + \beta_5 \text{ TECH\_EDU} + \beta_6 \text{ VOC\_TRNG} + \beta_7 \text{ REL} + \beta_8 \text{ SOCIAL\_GRP} + \beta_9 \text{ WORK\_EXP} + \beta_{10} \text{ WORK\_EXP2} + \beta_{11} \text{ JOB\_CNTRACT} + \beta_{12} \text{ TYPE\_ENT} + \beta_{13} \text{ SIZE\_ENT} + \varepsilon$$

Method

In economics literature, the regression method is generally used to examine the relationship between a dependent variable and independent variables. The most widely employed technique is the ordinary least square regression. However, in this paper, we apply quantile regression model to identify the factors determining the wage difference in managerial and professional employment. We employ quantile regression for two specific reasons. First, one of the key assumptions of the OLS regression is that the error term is normally distributed. When this assumption is violated, the OLS tenchniqe is not as effiencnt as quantile regression model. Second, in the presence of ouliers in the regular wage distribution, the least square regression estimators are biased. Therefore, a desireable way of illustrating the entire regular wage distribution is the QR. It will help in identifying the excat the relationship between the

regressors and the independent variable evolves across its conditional distribution. Martins & Pereira (2004) specifies the typical quantile regression model as follows.

$$lnw_i = x'_i\beta_\theta + u_{\theta i} \text{ with } Quant_\theta(lnw_i|x_i) = x_i\beta_\theta$$

where

x_i represents the vector of exogenous variables (regressors), and the vector of parameters to be estimated is represented by β_θ, and the vector of residuals is denoted by $u_{\theta i}$. Quant$_\theta$ $(lnw_i|x_i)$ denotes the θth conditional quantile of w_i given x_i. Unlike the convetional least square model, traditional The θth regression quantile lies between 0 and 1.

$$\min_\beta = \sum_i \theta|\, w_i - x_i\beta| + \sum_i (1-\theta)|\, y_i - x_i\beta|$$

$$= \min_\beta \sum_i \rho_\theta \mathrm{u}_{\theta it}; \theta \in (0,1)$$

$$\rho_\theta(\varepsilon) = \theta\, \varepsilon\, if\, \varepsilon \geq 0$$

$$(\theta - 1)\varepsilon\, if\, \varepsilon < 0$$

In this study, the dependent variable is regular wage/salaries reported by managerial and professional workers employed in different segments of enterprises. Using bootstrap methods, we estimated the standard errors. The median regression is obtained by setting θ = 0.5. The other quartile used in this study are obtained by setting θ = 0.10, θ = 0.25; θ = 0.75, and θ = 0.90. When θ moves from 0 to 1, the effects of explanationary variables on regular wage distribution satisfy procedures of conditional distribution. As recommended by Buchinsky (1995), the standard enrrors obtained using the bootstrap method is much more robust. Taking insights from Anderson and Pomfret (2000) and Fattouh et al. (2005), the standard errors presented in this study is estimated using the bootstrap method with 1000 repetitions. Importantly, the estimates of the quantile regression model is also presented along with the OLS estimates. In the economics literature, we found the following empirical studies have specifically used quantile regression model to study wage determintans and wage inequality (Buchinsky, 1998; Bedard, 2003; Skoufias, 2003; Min and Kim, 2003; Martins and Pereira, 2004; Sakellariou, 2006; Melly, 2005; Bino and Krishna, 2021)

Also, in this study, wage inequality is measured using Gini coefficient and Atkinson's index along with reporting mean log deviation and the Theil Index. The indices of inequality is

sensitive to the differences in wage distribution. Cowell (1995), Jenkins (1991), present a detailed review of the various inequality indices and its measurement issues in the economics literature.

The Gini coefficient is given by

$$G = 1 + (1 / N) - [2/(m . N^2)] [SUM (N - i + 1) w_i]$$

where m resepresents aithmatic mean wage, and w_i is wage.

The Atkinson inequality is measured by

$$A(e) = 1 - Yede(e) / m.$$

Empirical results

Descriptive statistics

Give a brief description of the TABLE 2

Table 2

Descriptive statistics of key variables

Independent Variables	Obs	Mean	Standard Deviation	Minimum	Maximum
SECT	6,957	0.23	0.42	0	1
SEX	6,957	0.31	0.46	0	1
MAR_STA	6,957	0.69	0.46	0	1
GEN_EDU	6,957	15.22	2.90	0	25
GEN_EDU2	6,957	240.12	78.06	0	625
TECH_EDU	6,957	0.32	0.47	0	1
VOC_TRNG	6,907	0.34	0.47	0	1
RELI	6,957	0.78	0.42	0	1
SOC_GRP	6,957	0.46	0.50	0	1
WORK_EXP	6,957	37.28	10.23	17	60
WORK_EXP2	6,957	1494.71	811.67	289	3600
JOB_CNTRCT	6,928	0.57	0.50	0	1
TYPE_ENT	6,928	0.40	0.49	0	1
SIZE_ENT	6,928	0.41	0.49	0	1

Source: Authors' calculation based on the unit-level records of PLFS 2020-21

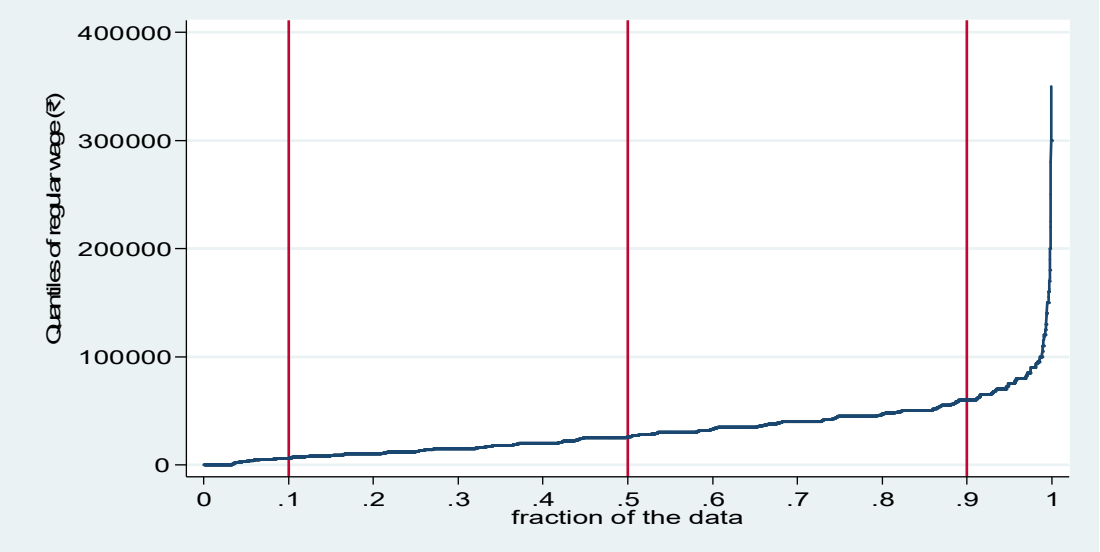
Distribution of regular wage

Figure 1, which illustrate the distribution of regular wage for managerial and professional empoyees, shows that regular wage is increasing. It is worth noting that the rate of increase

differs from 10th to 90th percentiles. Beyond 90th percentiles, the level of regular wage increases dramatically.

Figure 1

Distribution of regular wage for managerial and professional employees



Heterogeneity Test

We need to conduct a heteroscedasticity test to justify the use of quantile regression. We find that the Breusch-Pagan test statistic is significantly different than zero, therefore we have heteroscedasticity and are justified in the use of quantile regression. Before employing the QR technique, we performed the following two tests: the White test and Breusch-Pagan test. In econometrics, these tests are conducted to validate the heterogeneity in the data. The null hypothesis of homoscedasticity is tested against the alternative hypothesis of heteroskedasticity. Table 3, which presents the results of heterogeneity test, clearly indicates that the data do not support the assumption of constant variance. The finding supports the application of QR in this study, as it could provide more information and accurate results than the traditional OLS technique in examining the wage determinants. While some parts of the regular wage distribution are strongly influned by the select variables, the other part of the distribution may not have any relationship with the exgogenous varibles.

Table 3

Heterogeneity test

Diagnostic tests	**Statistics test value**
Wald test	146.18***
Breusch-Pagan / Cook-Weisberg test (χ^2)	42.54***

***The significant level of statistical test at the 1%
The null hypothesis indicates the data is homogenous

Determinants of Wage differentials: QR results

To understand the relationship between earnings and level of education and social group, we use boxplot. When we look at the distribution of earnings by level of education, it is clear that there is a great deal of disparity among those who attained graduate and above. In terms of demographic characteristics, the largest influence on wages has been the level of education

Table 4
Results of the simultaneous quantile regression

Dependent Variable: Natural log of earnings	(1)	(2)	(3)	(4)	(5)
	Q (0.10)	**Q (0.25)**	**Q (0.50)**	**Q (0.75)**	**Q (0.90)**
SECT	-0.41*** (0.05)	-0.33*** (0.03)	-0.28*** (0.02)	-0.21*** (0.03)	-0.15*** (0.03)
SEX	-0.49*** (0.04)	-0.41*** (0.03)	-0.30*** (0.02)	-0.20*** (0.02)	-0.15*** (0.02)
MAR_STA	0.03 (0.05)	0.05 (0.03)	0.03 (0.03)	0.01 (0.02)	0.03 (0.02)
GEN_EDU	0.18*** (0.04)	0.17*** (0.03)	0.11*** (0.02)	0.06** (0.02)	0.03 (0.02)
GEN_EDU2	0.01** (0.00)	-0.01*** (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
TECH_EDU	0.29*** (0.04)	0.21*** (0.02)	0.21*** (0.02)	0.20*** (0.02)	0.20*** (0.02)
VOC_TRNG	-0.02 (0.03)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)	0.00 (0.02)
RELI	-0.01 (0.04)	0.05 (0.02)	0.04** (0.02)	0.03 (0.02)	0.06** (0.03)
SOC_GRP	0.13*** (0.03)	0.15*** (0.02)	0.14*** (0.02)	0.11*** (0.02)	0.13*** (0.02)
WORK_EXP	0.02** (0.01)	0.02 (0.01)	0.03*** (0.01)	0.04*** (0.01)	0.03*** (0.01)
WORK_EXP2	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.001** (0.00)	0.00 (0.00)
JOB_CNTRCT	0.32*** (0.03)	0.29*** (0.03)	0.21*** (0.02)	0.14*** (0.02)	0.09*** (0.02)
TYPE_ENT	0.37*** (0.03)	0.37*** (0.02)	0.38*** (0.02)	0.33*** (0.02)	0.28*** (0.02)

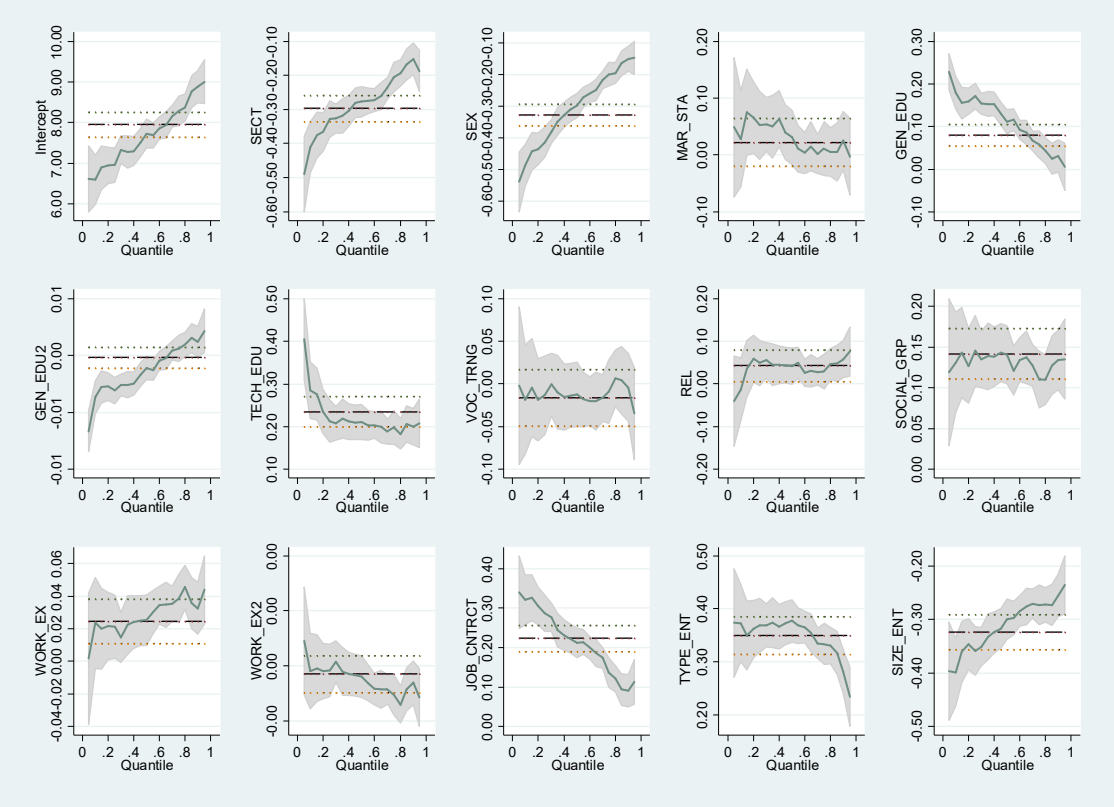
SIZE_ENT	-0.40*** (0.04)	-0.36*** (0.02)	-0.30*** (0.02)	-0.27*** (0.02)	-0.25*** (0.02)
Constant	6.59*** (0.35)	6.95*** (0.33)	7.73*** (0.23)	8.28*** (0.23)	8.88*** (0.21)
Pseudo R Square	0.257	0.296	0.292	0.242	0.223
Number of Observations (N) = 6658					

Note: Figures in parantesis is bootstrap Standard Error for 1000 times.
***, ** and * represent 1%, 5% and 10% significance levels respectively.
Source: Unit-level records of Periodic Labour force Survey 2020-21

As mentioned prevosuly, two types of significance are important for quantile regression coefficients. . Quantile coefficients can be significantly different than the OLS coefficients, showing different effects along the distribution of the dependent variable. The quantiles of the dependent variable are on the horizontal axis, and the coefficient magnitudes on the vertical axis. The OLS coefficient is plotted as a horizontal line with the confidence interval as two horizontal lines around the coefficient line. The OLS coefficient doesn't vary by quantiles. The quantile regression coefficients are plotted as lines varying across the quantiles with confidence intervals around them. If the quantile coefficient is outside the OLS confidence interval, then we have significant differences between the quantile and OLS coefficients (as denoted by the + sign in the table). The quantile coefficients for the number of chronic problems (independent variable) on total medical expenditures (dependent variable) are significantly different from the OLS coefficients. Moreover, the effect of the number of chronic conditions increases for individuals with higher expenditures (higher quantiles), similarly to what we concluded from the table.

Figure 3

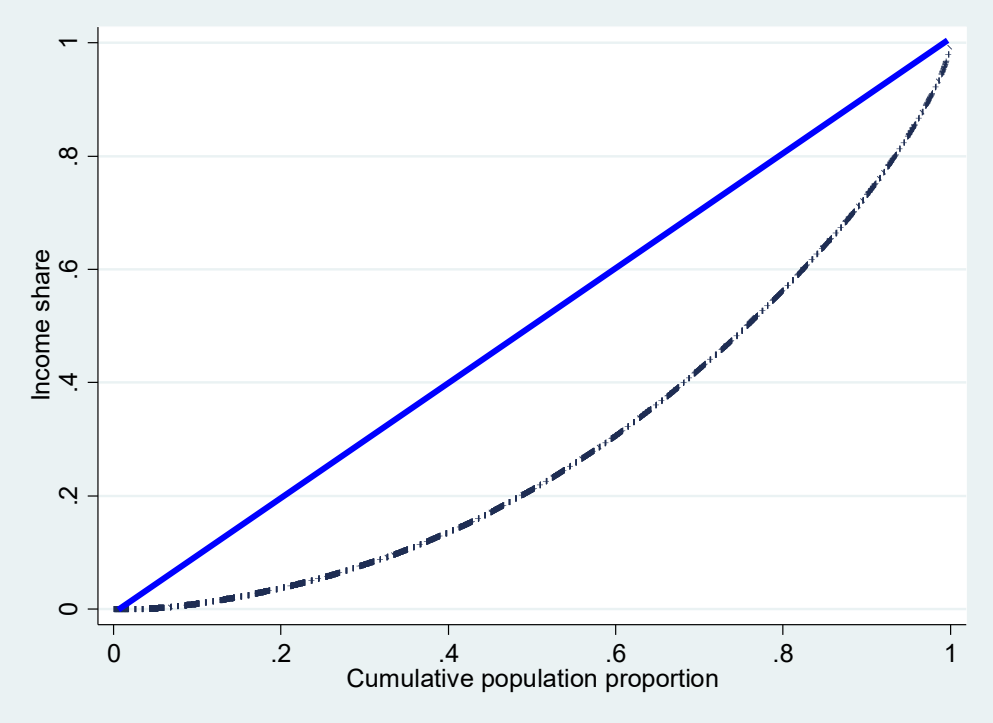
Quantile regression coefficients



Inequality in Professional and Managerials Jobs

Figure 1

Lorenz curves of Managerial and Professional employment, 2020-21



Source: Unit level data from various NSSO rounds

Regular wage and salaried workers in India account for less than one fifths of the total wmployment, with self-employed share the significant share of the employment. The share of regular wage workers rose from around 13% in 1983 to roughly 18% in 2011-12. A greater proportion of urban men and women in the workforce are regular wage employees, while the share of working rural men and women who are regular wage employees have historically been very low. While the share of urban men who are regular wage employees has remained constant over time, the period between 2004-05 to 2011-12 saw a huge rise in the share of working urban women in regular wage employment.

Inequality has increased in india. Write a paragraph here regarding the wage inequality across different categories of society.

Explain the table 5 here

Table 5

Inequality measures

	Gini coefficient	Mean Log Deviation	Theil's T index	Atkinson index, ε=0.5	Atkinson index, ε=1	Atkinson index, ε=2

Rural	0.428	0.354	0.298	0.151	0.298	0.552
Urban	0.369	0.262	0.232	0.115	0.230	0.599
Male	0.371	0.260	0.233	0.115	0.229	0.541
Female	0.419	0.353	0.294	0.148	0.298	0.657
Primary & below	0.446	0.349	0.341	0.158	0.295	0.550
Secondary	0.418	0.315	0.286	0.139	0.270	0.526
Graduate and above	0.359	0.250	0.221	0.109	0.221	0.575
Scheduled tribe	0.385	0.327	0.246	0.132	0.279	0.756
Scheduled caste	0.434	0.352	0.313	0.153	0.297	0.588
Other backward class	0.386	0.278	0.249	0.123	0.242	0.516
Upper caste	0.372	0.275	0.241	0.119	0.241	0.563
Government/Public enterprises	0.347	0.273	0.215	0.112	0.239	0.657
Private & other enterprises	0.386	0.275	0.252	0.122	0.241	0.534
Job contract	0.341	0.231	0.198	0.10	0.207	0.604
Without job contract	0.427	0.338	0.314	0.151	0.287	0.561
Overall	***0.388***	***0.296***	***0.256***	***0.127***	***0.257***	***0.598***

Note: ε stands for the inequality aversion parameter in Atkinson's index
Atkinson indices, A(e), where e > 0 is the inequality aversion parameter

Concluding remarks

The purpose of this paper was to identify the major determinants of wages in India, based on the unit-level records of recently published periodical labour force survey. By way of combining different characteristics, including household, perional, and labour market features, we attempt to provide explanation for the wage difference in professional and managerial employment in India. With a sample size of ??/ wagvariables, which broadly cover the household, personal, labour market characteristics, the results of our paper tend to suggest that wage function in India is bound up with conventional variables predicted by human capital theory, personal and social dualistic identities, and human development.

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