Differential returns to education: Caste wise analysis

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I. Introduction

Caste is one of the primary sources of social stratification in India. Even though discrimination on the basis of caste has reduced in several areas, we can still find evidences of discrimination in the labor market. **In this paper, I estimate the marginal return, in the form of wages, every caste receives with increasing amounts of education**. What can we expect to see? There can be two different hypotheses:

1) With increasing level of education, employees enter job markets where they are more valuable for their intellectual capabilities. We will see a reduction in discrimination and difference in wages.
2) With increasing level of education, employees enter job markets where it is harder to keep a check on the exact work done and a lot of interpersonal relations matter. It is in these industries that there actually exists a scope for discrimination.

In industries which require low skilled workers, like farm labour, it is much easier to check and show the work done and hence opportunities for wage discrimination do not exist.
Through this project, I want to estimate the difference in returns to education between Scheduled Castes (SC) or Dalits and Brahmins for different level of education. Before I present the data, methodology, and the results of this paper, I will discuss some of the previous work done in this area.

II. Literature Review

[Das and Dutta, 2007] use NSSO[2005] to estimate wage differentials for different castes at different levels of education. They find that the returns to education are positive and rising in education level among regular workers. Amongst regular workers, returns to literacy and education are highest for SC workers, followed by Other Backward Classes (OBC) workers, implying that SC regular workers are rewarded the most for acquiring education. They find that the difference between SC and Forward Caste regular workers is about 0.37 log points while that between OBC and Forward Caste is about .33 log points. The endowment effects, i.e., differences in the total wage gap attributable to differences in worker characteristics, comprise about two-thirds of the overall wage gap. The treatment effect is more modest in magnitude and suggests that the unequal treatment of SC and OBC regular workers provided an average hourly wage advantage for Forward Caste regular workers of about 13 percent. [Madheswaran and Attewell, 2007] using the same methodology as [Das and Dutta, 2007] estimate wage differential for different castes in the urban labour markets of India. They find that Scheduled castes and Scheduled tribes have significantly lower rate of return to education than other castes. They further find that with the expansion of the economy and liberalisation of the Indian economy, the return to education as compared to the other castes goes down for the Scheduled castes and Scheduled tribes. Thus even as they see an increase in the raw wages of SC and ST communities, the gap with the forward castes goes up after 1991 only to reduce by the year 2000. They do the Oaxaca decomposition and find the existence of a large gap in the initial endowment of different social groups in India. The good news is that they find that this gap has been reducing.

This paper looks at more recent data than the two papers discussed above. It contributes to the literature by looking at males separately, the reasons for which are discussed in the last section.

III. Data used

In this project, I use the Indian Human Development Survey (IHDS). IHDS is a nationally representative, multi-topic survey of 41,554 households and 2,00,000 individuals in 1503 villages and 971 urban neighborhoods across India. The survey, carried out in 2005 and 2011-12 is a panel survey which means that the individuals surveyed in 2005 were surveyed again in 2012. For the purpose of this project, I use IHDS 2012 individual level dataset [Desai and Reeve, 2015].

IV. Methodology

To estimate the difference in wages across different education levels for different castes, I use Mincer earnings equation [Mincer, 1974]. In the Mincer earnings equation, I control for other parameters which may have an impact on wage. I include caste dummies and their interaction with different levels of education to evaluate the difference in wages for different castes across different levels of education. I only consider individuals who are employed and have reported income. As work days may differ across individuals, I use log of hourly wage instead of monthly wage as our independent variable. We estimate the following equation:

$$l(hourlywage) = \beta_0 + \beta_1 * X + \beta_2 * age + \beta_3 * age^2 + \beta_4 * Middle + \beta_5 * Senior + \beta_6 * Grad + \beta_7 * postgrad + \beta_{7i} \sum_i Caste_i + \beta_{8j} \sum_j Caste_j * EducLevel + DistrictFE + IndustryFE + \mu \quad (1)$$

A. Variables included

- lhourlywage$\longrightarrow$ log of hourly wage.
- age and age^2 $\longrightarrow$ According to Mincer, age has a quadratic relationship with wage.
- education level dummies$\longrightarrow$ These indicate the level of education an individual has completed. Note that we are omitting Primary. Therefore, the coefficients that we get for Middle, Senior, grad and postgrad are in comparison with primary.
- Caste dummies$\longrightarrow$ In our regression we will include caste dummies as well which indicate the caste to which the individual belongs. We will omit Brahmin and include Forward Castes, SC,ST,OBC,Muslim and Sikh/Jain/Christian.
- Interaction of caste dummies with the level of education
- X$\longrightarrow$ X contains factors like Major, vocational training, English ability, sex and Urban/rural.

B. Interpretation of interaction term

Suppose our estimation equation is the following:

$$l(hourlywage) = \alpha_0 + \alpha_1 * postgrad + \alpha_2 * Dalit + \alpha_3 * postgrad * Dalit \quad (2)$$

We know that the omitted variables are primary and Brahmin.

- lhourlywage(Brahmin & Primary)=α_0
- lhourlywage(Brahmin & Postgrad)= α_0+α_1
- lhourlywage(Dalit & Primary)=α_0+α_2
- lhourlywage(Dalit & Postgrad)=α_0+α_1+α_2+α_3
- Difference in wages between Primary Brahmin and Postgrad Brahmin

$$(\alpha_0 + \alpha_1) - (\alpha_0) \quad (3)$$

- Difference in wages between Primary Dalit and Postgrad Dalit

$$(\alpha_0 + \alpha_1 + \alpha_2 + \alpha_3) - (\alpha_0 + \alpha_2) \quad (4)$$

- α_3= equation 4-equation 3

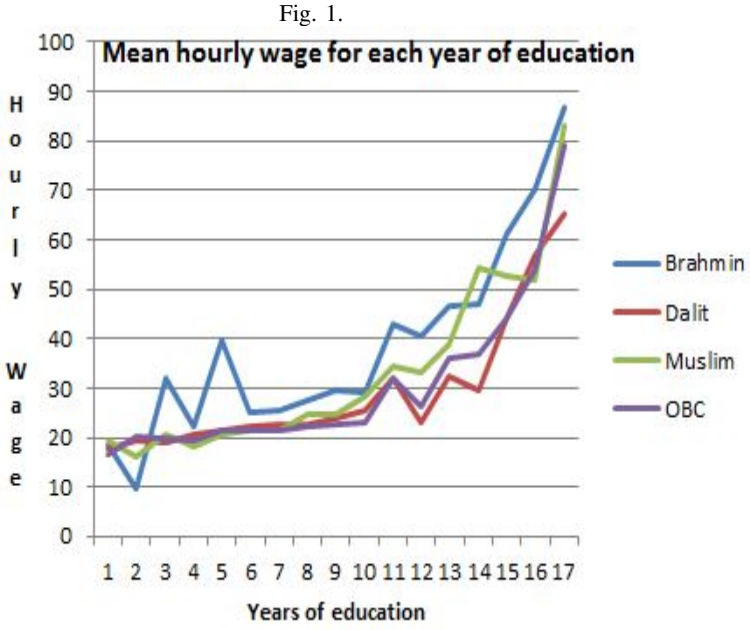
In the above example, α_3 gives us the difference between increase in wage of Dalit and Brahmin when they attain Postgrad education. If α_3 is negative, then increase in wage of a Dalit once he attains postgrad is less than the increase in wage of a Brahmin.

V. Results

A. Mean hourly wage for each year of education for different castes

We have visualized the mean hourly wage at each level of education for different castes/religion.

Fig. 1.



- Hourly wage for a Dalit postgrad is significantly lower than that of a Brahmin postgrad (Fig 1).
- At primary and middle school, there is not a big inter-caste difference in the hourly wage. Till class 10, hourly wage lies within Rs 40 for every caste.
- There is a significant wage difference among graduates of different castes. It can be seen that

Brahmin graduates earn much more than Dalit, OBC or Muslim graduates.

B. Estimating equation 1

I get the following table on estimating equation 1. The first column in the table captioned 'variables' lists all the independent variables. The second column, 'lhourlywage' gives the result on estimating equation 1. The third column, 'wage_male' gives the result on estimating the same equation but only for males.

VARIABLES	(2) lhourlywage	(3) wage_male
Male	0.335***	
	(0.00591)	
URBAN2011	0.167***	0.165***
	(0.00968)	(0.0108)
middle	0.0901*	0.0982
	(0.0532)	(0.0597)
senior	0.163***	0.124**
	(0.0507)	(0.0554)
grad	0.463***	0.363***
	(0.0584)	(0.0650)
postgrad	0.708***	0.495***
	(0.0687)	(0.0799)
English Ability	0.133***	0.103***
	(0.00752)	(0.00810)
age	0.0239***	0.0286***
	(0.000963)	(0.00115)
agesq	-0.000225***	-0.000273***
	(1.17e-05)	(1.40e-05)
Dalit_middle	-0.0289	-0.0339
	(0.0540)	(0.0607)
Dalit_senior	-0.0856*	-0.0532
	(0.0515)	(0.0563)
Dalit_grad	-0.154**	-0.141**
	(0.0661)	(0.0721)
Dalit_postgrad	-0.246***	-0.287***
	(0.0916)	(0.104)
HighCaste_middle	-0.0206	-0.0311
	(0.0561)	(0.0635)
HighCaste_senior	0.0136	0.0308
	(0.0535)	(0.0587)
HighCaste_grad	-0.0233	-0.0174
	(0.0637)	(0.0703)
HighCaste_postgrad	0.132*	0.180**
	(0.0776)	(0.0902)
Adivasi_middle	-0.0232	-0.0115
	(0.0553)	(0.0624)
Adivasi_senior	-0.0286	0.0148
	(0.0540)	(0.0591)
Adivasi_grad	0.0759	0.0624
	(0.0788)	(0.0883)
Adivasi_postgrad	0.165	0.0905
	(0.109)	(0.126)
Muslim_middle	-0.0516	-0.0635
	(0.0562)	(0.0627)
Muslim_senior	-0.0849	-0.0673
	(0.0551)	(0.0598)
Muslim_grad	-0.263***	-0.321***
	(0.0814)	(0.0891)
Muslim_postgrad	-0.164	-0.144
	(0.111)	(0.122)
OBC_middle	-0.0330	-0.0351
	(0.0539)	(0.0607)
OBC_senior	-0.0990*	-0.0669
	(0.0514)	(0.0562)
OBC_grad	-0.150**	-0.154**
	(0.0623)	(0.0684)
OBC_postgrad	-0.0880	-0.0322
	(0.0781)	(0.0896)
Sikh_middle	-0.0568	-0.0367
	(0.0892)	(0.101)
Sikh_senior	-0.00868	0.0200
	(0.0853)	(0.0955)
Sikh_grad	-0.0361	0.0478
	(0.102)	(0.125)
Sikh_postgrad	0.0718	0.171
	(0.125)	(0.152)
HighCaste	-0.0692	-0.0667
	(0.0433)	(0.0495)
Dalit	-0.0270	-0.0339
	(0.0419)	(0.0474)
Muslim	-0.0276	-0.0365
	(0.0431)	(0.0487)
Adivasi	-0.0601	-0.0923*
	(0.0422)	(0.0481)
OBC	-0.0219	-0.0332
	(0.0419)	(0.0475)
Sikh	0.00140	-0.0351
	(0.0723)	(0.0830)
Constant	2.119***	2.414***
	(0.0750)	(0.0798)
District FE	Yes	Yes
Vocational FE	Yes	Yes
Major	Yes	Yes
Industry FE	Yes	Yes
Observations	53,105	36,854
R-squared	0.473	0.445

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

a) Interpretation of coefficients and Discussion:

- Coefficients for middle, senior, grad and postgrad are significant and increasing. The base variable is Primary. This means that the hourly wage is increasing with increase in education.
- Coefficient for Dalit and other caste groups is insignificant. Moreover, coefficient for interaction of caste groups with middle and senior is also insignificant for almost every caste group. This tells us that the wages of Dalits who have only completed primary, middle or senior school face no discrimination in labor market. The intuition is the following: There is very less scope for discrimination in the jobs associated with these levels of education. Wage is low and most of the individuals are not salaried. They receive money on the basis of amount of hours they put in a day. Because the effort in these jobs is directly observable, and thus also easily demonstrable, it is very hard to give different wages to similar performances.
- The interpretation of Dalit_postgrad is as follows: The difference in return to education for a Dalit postgrad vis-a-vis Dalit Primary and a Brahmin postgrad vis-a-vis Brahmin Primary is -24.6%. This difference is significant at 1% level of significance. We know that hourly wages for postgraduates and graduates are very high. The nature of the work is also such that the effort is often not easily observable and hence demonstrable. Thus, the wages might be dependent on personal relations between employers and employees and also the nature of networking an employee manages to nurture. Therefore the scope for giving different wages in jobs associated with postgraduates and graduates is also high.
- These results contradict the findings of [Das and Dutta, 2007] discussed in the literature review. They find increasing marginal returns to education for lower castes while we find decreasing marginal returns to education for upper castes. This result is surprising and demands more thought. [Bertrand et al., 2010] supports the results in this paper when they find that the reservation system, although has redistributive benefits, is not efficiency optimizing. Thus the benefit a Brahmin student gains from an engineering degree, is significantly more than the benefit in form of wages gained by a Dalit student.
- It is important to note that because I am only including individuals who have reported an income, the number of observations reduce to 53,279 from 2,04,000.

VI. Limitations and Discussion

- The above model suffers from selection bias. This means that it is possible that there is particular group of people who self select themselves to work participate in labor force. Moreover, there may be characteristics that take are common among the people who are unemployed. I tackle this issue by doing the above analysis only for males (see column 3 of the table). The argument is that most men participate in labor force, unlike women. I don't look at unemployed individuals as the number of those is only 3000 in our dataset and won't make a huge difference. The coefficients for most of the variables have not changed. In case of Dalit postgrad and Muslim grad and OBC grad the coefficient has increased which means that Dalit women grads and postgrads face less discrimination in the labor market.
- In the above table, there is a high multicollinearity among the variables as well. This means that belonging to a particular group, gender or region impacts the level of education one acquires. This education in turn affects what one's wages. It is very difficult to mitigate these effects of multicollinearity out unless we have a good instrument variable. As a result of this, the standard errors estimated are large which reduces the t-statistic and therefore the probability of rejecting the null hypothesis.
- In the estimation equation, I don't control for score that students achieve in their respective colleges. Cutoff for SCs and OBCs in India is lower than that for students from general category. It is possible, that students from SC have a lower score in semester courses which is reflective of their productivity. Or, it is possible that the OBC and SC students select subjects which are not very popular among the employers. This is just a hypothesis and our estimation equation can be strengthened if we have information about college CGPA as well. [Kirpal et al., 1985] suggests that this hypothesis can be true.
- The data for schooling quality and family background was not available in the dataset. The latter in particular can influence greatly both the quality

of schooling and the ability to find jobs through networks. [Kingdon, 1998] in a study in urban Uttar Pradesh find that ignoring family background (such as parental education) overstated the returns to schooling by about two percentage points. This was particularly important at the higher level of education. Individuals who acquire higher education generally belong to privileged backgrounds which translates to their wages in the job market.

VII. Oaxaca Decomposition

I also use the threefold oaxaca decomposition to segregate the wage difference of Dalit and Forward caste grads and postgrads between explained and unexplained factors. Explained factors include age, male, urban/rural and English ability. The number of observations for Dalit grads and postgrads is 752 and Brahmin grad and postgrad is 2038

	(Table 2)
lhourlywage	Coef
Brahmin	3.94***
Dalit	3.62***
difference	.3176***
endowments	.2635***
coefficients	.0567
interaction	-.0026

This data was only for grad and postgrad Dalits and Brahmin.The difference in wages for grad Forward caste and Brahmin is .3176 log points. The endowments explain .2635 of the log difference and coefficients explain .0567 of the difference (p value=.11) . I do the same analysis with Twofold Oaxaca decomposition and derive the same result.

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