Do Affirmative Action Policies Increase Educational Attainment? Examining the Effects of Caste Based Policies in India.

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[Draft: Comments Welcome!]

Abstract
The efficacy of affirmative action programs in reducing socio-economic disparities in India has been a topic of much discussion but little empirical examination. In this paper I examine the effects of a program to reserve 27 percent of all jobs in the Central Government on the educational attainment of children in a socio-economic group collectively labeled as 'Other Backward Classes (OBCs)'. Using data from two rounds of the National Family Health Survey and employing a difference-in-difference-in-difference regression framework, I find that the change over time in the gap in educational attainment between OBCs and other socio-economic groups was larger in states that that did not have a substantial affirmative action program for OBCs prior to the one introduced by the central government. Furthermore, contrary to popular belief the results suggest that the benefits are not limited to the most advantageous amongst the OBCs. Instead, the less advantaged benefit the most.

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1.Introduction

Affirmative action policies aimed at reducing socio-economic disparities between castes form the bedrock of government action to promote social justice in India. These policies date back to the early 20thcentury and precede similar policies in the United States and many other countries (Cunningham 2002). While the literature on the causes and consequences of affirmative action is large and often contentious, it is also characterized by a lack of empirical evidence in the Indian context. Debates in this empirical vacuum often take on a belligerent tone – as they did most famously in 1991 in response to a government decision to implement the key recommendation of the Mandal Commission report that suggested reserving 27% of all jobs in the central government for a group of castes collectively called the 'Other Backward Classes (OBCs).' Despite the magnitude of the shocks that such policies have had on Indian society and polity, remarkably little has been done to evaluate their impact on the disparities they are meant to reduce. In this paper, I take a step towards redressing this gap in the literature by empirically assessing the impact of affirmative action programs resulting from implementing the Mandal Commission recommendations on educational attainment.

Examining the impact of affirmative action programs in India is important not only because they affect nearly a fifth of the world's population but also because it extends the literature on consequences of affirmative action program outside the United States where it has largely focused. Although used in several developing countries, there is little evidence on the consequences of affirmative action policies to guide policy makers in evaluating them.

Evaluating the effect of affirmative action programs on educational attainment is useful for several purposes. First, it enables an examination of the incentives created by such policies that have not usually been the focus of discussions surrounding affirmative action (Sowell 1990, p.169). Theory suggests that quotas in jobs – that form the major component of Affirmative Action programs in India-- requiring minimal standards of educational attainment might increase the incentives to invest in education and thereby increase educational attainment, but do we see that empirically as well? An answer to this question is crucial in evaluating the justification for such policies in reducing socio-economic disparities – a purported aim of all such policies. Not only is education an important determinant of future earnings (Ashenfelter and Rouse 2000) but

it also has significant independent consequences for other dimensions of welfare like health, political participation (see Schulz 1988 and McMahon 1995) for a review of this literature). More broadly, education is a basic capability that has an intrinsic value of its own (Dreze and Sen 1995).

Second, although much of the discussion on the consequences of affirmative action has emphasized a trade-off between equity vs. efficiency, a positive association between educational attainment and affirmative action would suggest that a trade-off between equity and efficiency is not a necessary by-product (Lundberg and Startz 2000). Indeed, given the overwhelming evidence relating human capital and economic growth, one could argue that affirmative action policies might help attain both goals of distributive justice as well as economic growth simultaneously in certain contexts like India with low average levels of educational attainment. This would be especially true if the disadvantaged groups face explicit discrimination in the labor market or 'societal discrimination' (Holzer and Neumark 2000) that impedes their educational attainment. [1] There is an abundance of qualitative work and general belief (see Dreze and Gazder 1996 and literature cited there) that this is true in India and the limited empirical evidence (Banerjee and Knight 1984) also points to its existence.

Third, the importance of affirmative action programs as a determinant of schooling is an especially important dimension to explore because it sheds light on the impact that such programs and government policies in general can have in reducing inter-group disparities in socio-economic status. Sowell (1990) and other critics of affirmative action policies have suggested that it is the 'internal problems' and "childhood and the values of the home and the group" that often inhibits the progress of groups targeted for affirmative action. Leaving aside the question of the origin of the 'values' and 'internal problems' that Sowell (1990) assumes to be exogenous, finding changes in schooling rates in response to quotas would counter these claims and instead suggest the importance of 'external problems' and the role of values ascribed to the group by society.

Despite the reasons identified, inquiring whether or not affirmative action programs have positive consequences for the targeted group might seem like a needless question to ask on one level. After all, if affirmative action programs do not have benefits, what explains the

[1] Whether or not affirmative action is the best way to increase economic growth and achieve distributive justice is a much larger question that remains outside the scope of this paper and so does the question of whether the net efficiency gains are positive or negative.

intensity of demand for them? While it is important to identify the effects of particular dimensions that are impacted by the specific affirmative action program -- job quotas in this instance, it is also important to identify who amongst the targeted group benefits. The heterogeneity within targeted groups is often a source of controversy and a frequent allegation is that it is only the well-off amongst these groups that benefit from the job quotas. Given that only individuals who have the necessary qualifications can avail of these quotas, it is not surprising that the immediate economic and more visible benefits are restricted to those relatively better-off. However, if job quotas also increase educational attainment only amongst the richer sections then this would cast aspersions on the justification of such quotas. Thus, this question is examined in more detail later in the paper.

The results from the analysis suggest that affirmative action programs introduced in 1992 had a positive effect on the educational attainment of OBC children. Although this was a period in which average educational attainment increased amongst all socio-economic groups (defined on the basis of caste), the rise in educational attainment was largest for OBCs in states that did not have a substantial affirmative action program for OBCs prior to the one introduced by the central government. However, this was also a period in which OBCs in these states became more politically strident and there was an increased emphasis on increasing educational attainment in general. Thus, caution needs to be exercised in interpreting the 'effects' as solely due to the change in affirmative action policies.

The next section describes the socio-economic group labeled 'Other Backward Classes' that were the benefactors of the introduction of new quotas in the central government. In the third section, I provide a brief history of affirmative action programs in India and describe features of the Mandal Commission report, recommendations of which led to the quotas for OBCs in the central government and introduction of similar policies in some states. Section 4 has a theoretical discussion on why we might expect quotas in public sector jobs to impact educational attainment. Both direct economic incentives as a result of the quotas as well as well as indirect socio-psychological effects are explored as possible mechanisms by which quotas might affect educational attainment. The limited empirical literature that exists is also reviewed in this section. The data from the two rounds of the National Family Health Surveys that is used for the empirical analysis is described in Section 5. The empirical strategy of using three different dimensions of comparison: over time, across states and between different socio-

economic groups to identify the impact of the quotas is explained in Section 6. Section 7 presents the results from the analysis. These results that suggest that affirmative action programs do increase educational attainment are discussed in section 8, which also examines the distributive effects of the policy. The limitations of the analysis and the robustness of the results to various sensitivity tests are described in section 9. I conclude in section 10.

I. Who are the 'Other Backward Classes'?

The origin of the term, "Other Backward Classes", to describe a group of socially and economically disadvantaged citizens can be traced back to caste organizations formed in the early 20th century, first in response to efforts by the Colonial government to collect census data on the castes and later in response to domination by the 'upper' castes in government jobs. These organizations which often took on names like, "All-India Backward Classes Federation" (formed on 26th January, 1950) were formed in different states as well as the national level as a means to put pressure on the government to formulate policies to bridge the socio-economic gap between them and more advantaged castes. When India formulated its own constitution, many of the most disadvantaged caste groups were formally recognized under the rubric of 'Scheduled Castes' and 'Scheduled Tribes' for targeted policies. The later group is a heterogeneous collection of indigenous tribes while the 'Scheduled Castes' are castes that were below the social barrier of 'untouchability'. However, the 'backward' groups that were left behind were offered some help but mainly promises for the future and came to be collectively referred to as the 'Other Backward Classes'.

As the term implies the 'Other Backward Classes' are defined by a negative – they are termed as 'backward' but not as 'backward' as the Scheduled Castes and Tribes and hence referred as 'Other'. [2] An irony is the fact that 'Other' refers to a group that perhaps forms a majority of India's population.

The term 'classes' is also a misnomer in that membership in the group is generally defined by membership in certain castes, which does not necessarily correspond with the usual notions of class. While numerous expert commissions formed to identify the groups have used

[2] As offensive as the term might sound, it is enshrined in the Indian constitution, used by legal judgments and referred to in academic debates and research.

various criteria like wealth status, literacy rates, nature of occupation, age at marriage, caste still forms the basis of the classification.

The definition of both the caste system and who the 'OBCs' are, is quite ambiguous and not constant over time. Indeed, this ambiguity is often the source of much contention and resentment. While it has also been an obstacle to rigorous quantitative research on OBCs, it has not precluded governments from formulating policy on the basis of caste. Successive governments have in fact taken advantage of this ambiguity and affirmative action policies have been extended and withdrawn from groups often on political rather than social and economic grounds.

III. Brief History of Affirmative Action Programs in India & Mandal Commission

The literature on the history of affirmative action programs in India at the central and state levels is rich but also one that lacks clarity. Given that it describes a history that has seen many twists and turns, with policies formed by one government often modified or rejected by succeeding governments or the courts, this is not surprising. However it makes the task of describing and coding affirmative action for empirical examination difficult. The more interested reader is referred to Yadav and Singh(1994) on the issue of affirmative action for OBCs from which much of the discussion below is borrowed. Also see Gallanter (1984) for a more thorough but slightly outdated discussion and Jaffrelot (2002) for an in-depth examination of forces explaining the variation in the 'rise of lower castes'.

The Backward Classes Commission formed in 1953 represents the first steps towards the formulation of affirmative action policies for 'OBCs'. Amongst others, the commission was given the mandate to "determine the criteria to be adopted in considering whether any sections of the people of the territory of India (in addition to the Scheduled Castes and Scheduled Tribes specified by notifications issued under Articles 341 and Articles 342 of the Constitution) should be treated as socially and educationally backward classes; and in accordance with such criteria, prepare a list of such classes setting out also their approximate number and territorial distribution" (Yadav & Singh 1994). Identifying caste as the main cause of backwardness, the report by the Commission identified 2399 castes as OBCs using the following criteria:

i) Low rank in the traditional caste hierarchy

ii) Low levels of educational attainment

iii) Low levels of representation in government services and in the modern economy.

Furthermore the report outlined several recommendations for the uplifting members of the OBCs, including quotas for employment in government services for them.

On the grounds that the commission had been ambiguous on the methodology by which the 2399 castes had been selected, the recommendations were largely ignored. Never the less the commission did set the terms for much of the debates that have ensued – beginning at the state level and more recently at the central level of government. Since much of the activity after the 1953 commission was at the state level, I describe this in limited details next and conclude with the implementation of the Mandal Commission recommendations at the center in 1992

State Level

The diversity of affirmative action policies within India manifests itself in the wide range of affirmative action policies for OBCs at the state level, with some states far more active than others and the central governments. Although with variation amongst them, it is the southern states of Tamil Nadu, Karnataka, Kerela and Andhra Pradesh that have had the longest history of affirmative action policies. Despite being a miniscule share of the total population, the Brahmins dominated public positions and offices in these states. Thus, the genesis of these policies was anti-brahmin protests and movements that began in the early 20th century and by some accounts even as early as 1851 (Yadav and Singh 1994).

The second wave of affirmative action programs for OBCs at the state level was in the middle and late 1970s, when states like Maharashtra, Uttar Pradesh, Bihar and Gujarat introduced quotas for the OBCs in response to the rise of various political coalitions and the weakening of the traditionally dominant Congress Party.

The last group of states include those in which affirmative action policy in favor of the OBCs was largely dormant prior to the implementation of the Mandal Commission report. These include West Bengal, Orissa, Madhya Pradesh and Rajasthan.

Admittedly, there are important variations in the specific policies and the extent of their effectiveness within each of the groups identified above and some of the states do stand at the margins of each group. However, there is more in common within each of these groups than across them. As Yadav and Singh(1994) summarize, “The struggle is old, and effective in southern states – Tamil Nadu, Karnataka, Kerela, and Andhra Pradesh. It is recent and fierce, but

not so effective in the northern states – especially in U.P. and Bihar. It is weak, almost non-existent on the eastern, western and north-western fringes."

Mandal Commission Report

The Second All India Backward Classes Commission – more popularly referred to as the Mandal Commission was appointed in 1978 by the first non-Congress government that came to power at the Center in 1977. Although given a similar mandate as the first commission, members of the Mandal Commission were far more careful in avoiding the pitfalls that had critically wounded the recommendations of the first commission. It was far more explicit in the methodology used and the data collected to select castes that it identified as 'backward'. However, neither the methodology used nor the data collected for the purpose is beyond controversy. While it conducted a 'socio-educational survey' that supposedly covered 405 out of 407 districts, the data from this survey has never been publicly released. In addition to the quantitative survey, it also relied on 'public evidence and personal knowledge of the members of the Commission' as one of the criteria by which it selected castes to be a part of the OBC list. The central recommendation made by the Commission was to reserve 27 % of all vacancies in the central governments for members of groups it identified as Social and Educationally Backward.

However, the political coalition that had appointed the Commission lost power by the time the report was completed in 1980 and its recommendations remained mired in controversy and government in-action for nearly 10 years. In 1990, with political power falling again to a non-Congress coalition, the central government implemented the recommendations of the Commission. While many saw the decision as a culmination of a long hard-fought struggle against social injustice – others saw injustice in the decision itself. Wide spread protests broke out mainly in the northern states with over 150 self-immolation attempts by upper-caste students.

Although, the protests that ensued ultimately engulfed the coalition in power and a legal challenge was posed— the 27% reservation was eventually implemented at the Center after the Supreme Court decision on November 1992 and the Memorandum of 8 September 1993 (Office Memorandum no. 36012/22/93-Estt.) [p. 366 Jaffrelot].

The introduction of quotas for OBCs in the Central Government also lead to similar quotas and other changes in policies like quotas in educational institutions in states that hitherto did not have similar affirmative action programs for OBCs. Thus, the empirical analysis presented here should be viewed in the context of these broader changes that occurred as a result

of the implementation of the Mandal Commission recommendations and not just a change in the quotas in the central government. However, since the core of these policies was quotas in public sector jobs, they will be the focus of this paper.

IV. Why would job quotas increase educational attainment?

The assurance that a certain percentage of jobs in the highest level of government are reserved for children from one of the OBCs should increase the incentives to invest in education, both directly through an increase in the expected returns to schooling and indirectly by empowering people from the OBCs.

Direct Incentives

Although the share of total employment in the public sector has been declining it still employs around 2 out of every 3 Indians employed in the organized labor market**.** [3] (Government of India 2003). Moreover 93 percent of these jobs were Class III and Class IV jobs – requiring on average a minimum of 10^{th} grade completion. In 2001, the Central Government employed approximately 3.3 million individuals-- 15 percent of total public sector employment. This coupled with the fact that on average wages in the public sector are nearly twice as high as those in the private sector (World Bank 2003) suggest that quotas can provide a significant number of attractive jobs and are therefore expected to alter the incentives to make investments necessary to acquire the jobs even for individuals with low levels of education. For instance, the average wages of government 'sweepers, cleaners and building caretakers' is 1.93 times in the private sectors. But since the job in the public sector requires a minimum level of education (usually 8^{th} grade), increasing the chance to get these jobs it should increase the incentives for individuals to attain at least the minimal levels of education necessary to get the job. In the context of two other socio-economic groups targeted by similar policies, Desai and Kulkarni (2003) argue similarly about the effect that quotas have on increasing the returns to education.

> "Reservations in government sector employment enhance returns to education for *dalits* and *adivasis*. Even primary education can substantially enhance returns to education for *dalits* and *adivasis* candidates since they then become eligible for lower level government jobs such as janitorial positions instead of having to rely on sporadically available manual labor in the private sector."

[3] Non-agricultural establishments in the private sector employing 10 persons or more

The relationship between investment in education and the increase in the probability of obtaining a job as a consequence of that investment can be conceptualized with a simple model presented in the Mathematical Appendix. As the model illustrates, an increase in the probability of obtaining a job and the consequent increase in expected returns to schooling increases the investment in education. However, the prediction from the simple static model of an unambiguous positive effect of quotas on educational attainment is not necessarily true when a more dynamic model is used. The dynamic model (see Becker 1993,p.78 for details) predicts that the equilibrium condition for optimal investment in education is that the marginal cost of investing in human capital equals the present value of future returns.

This condition is represented by the equation:

$$\frac{\alpha_i(\pi_i)E_i}{(1+r)^i} = \sum_{j=i+1}^{n} \frac{\alpha_j(\pi_j)t_{w_j}}{(1+r)^j}\frac{\partial E_j}{\partial t_{e_i}}$$

where

$\alpha_i(\pi_i)$: Expected payment per unit of Human Capital. To incorporate the effect of quotas, this is represented as a function of the probability, π of getting a job in that period.

E_i : Accumulated stock of Human Capital

r: Discount Rate

t_{w_j} : Time allocated to labor market work

t_{e_i} : Time allocated to investing in education

Beyond a certain minimum level, the quotas increase the probability of obtaining a job at all education levels. While this increases the present value of future returns to education, it also increases the opportunity costs by increasing potential earnings at even lower levels of education. Hence the increase in both the marginal cost of investing in human capital as well as the returns makes the relationship between job quotas and investment in human capital after a certain minimum level ambiguous.

Lastly, the extent to which the quotas actually increase the probability of obtaining a job needs to be given some perspective. Firstly, although the quotas do represent a large number of jobs they also extend to a sizeable population. Thus, while the probability that a selected candidate comes from the OBCs has increased significantly as a result of the quotas, the increase is only likely to be marginal for any given individual. Secondly, the size of the quotas have to

be understood relative to the number of OBCs who were all ready employed in the central government even prior to 1992. This information is presented in Appendix Table 1, which is reproduced from Prasad (1997). Although not commiserate with their share of total population, OBCs did hold a non-negligible number of central government jobs even prior to the quotas and this is especially true for lower level jobs that form the bulk of government jobs that have as a minimum qualification completion of the 8th grade. Thus, the proportionate increase of OBCs hired in such jobs, while not insignificant is smaller than the quotas would otherwise imply. The fact that the quotas apply to vacancies only, further diminishes the impact of the quotas on increasing the probability of obtaining a job. Thirdly, any prediction of positive incentive affects from the quota has to explain the under-utilization of quotas by the Scheduled Castes and Scheduled Tribes that have had had similar quotas since over fifty years. While the lack of the resources – social and economic and discrimination in access to schools, among other things, explain some of the underutilization, they also highlight their fundamental role in mitigating any impact of the quotas.

Removing Psychological Barriers

The formulators of the policy were quite explicit in recognizing that the "battle against social backwardness is to be fought in the minds of the backward people" and that government jobs that "have always been looked upon as a symbol of prestige and power" can play an enormous role in this social elevation. (*Chapter XIII, Recommendations of the Mandal Commission*).

> "It is not our contention that by offering a few thousand jobs to the OBC candidates we shall be able to make 52% of the Indian population as forward. But we must recognize that an essential part of the battle against social backwardness if to be fought in the minds of the backward people. In India Government service has always been looked upon as a symbol of prestige and power. By increasing the representation of OBCs in Government services, we give them an immediate feeling of participation in the governance of this country. When a backward class candidate becomes a Collector or a Superintendent of Police, the material benefits accruing from his position are limited to the members of his family only. But the psychological spin off this phenomenon is tremendous; the entire community of that backward class candidate feels socially elevated. Even when no tangible benefits flow to the community in large; the feeling that now it has its 'own man' in the 'corridors of power' acts as a morale booster." (Chapter XIII, Recommendations of the Mandal Commission"

To understand why we might expect job quotas to increase educational attainment amongst OBCs, it is important first to understand reasons for their current low levels of attainment compared to the 'Upper' castes. Socio-economic factors like parental wealth and

education are often considered the primary reasons why children from 'lower' castes are likely to be less educated, since caste is strongly correlated with socio-economic status. Although primary schooling in government schools in India is supposed to be free, in reality there are many costs associated with schooling like examination fees and the cost of books. These direct costs along with the opportunity costs of time are factors that perhaps explain why a lower socio-economic status might lead to lower levels of schooling. However as much empirical evidence has shown, low socio-economic status explains some but not all the disparities. For instance, I (2003) use data collected for a Living Standards Measurement Survey for the two states of Uttar Pradesh and Bihar, and find that the socio-economic status of parents accounts for around 50 percent of the enrollment gap between 'upper' and 'lower' castes. In addition, I find that only 70 percent of the enrollment gap is explained by observable factors that are clearly endogenous to caste, such as access and quality of schooling, and the local socio-economic position of caste.

An analysis of the elasticities of expenditure on education with respect to total expenditure suggests that 'upper' and 'lower' castes perceive education differently. In particular, I find that the while the share of expenditure on schooling remains constant for 'upper'-castes as total household expenditure increases, it increases in total expenditure for 'lower' castes. In economic terms, this implies that schooling is perceived as a 'necessity' by upper castes but a 'luxury' by the lower castes.

The empirical evidence of differences in the perception of education is consistent with more qualitative studies that study caste-based disparities in education. For instance, in reference to the norms regarding education in Palanpur – a village in Western Uttar Pradesh, but equally applicable elsewhere -- Dreze and Sharma(1998 p.63) write:

> "The traditional upper-caste view (often internalized by others) that education is not important or even suitable for the 'lower' castes probably continues to have some influence in Palanpur's conservative society. This view is bound to affect the educational aspirations of children from the disadvantaged castes, and the parental and social support they receive in pursuit of these aspirations."

Thus, the 'lower' castes might be exhibiting what Amartya Sen (in the context of gender disparities) has called "adaptive preferences" i.e. the preferences reflect the second-class status accorded to them by society (Nussbaum 2003). Coupled with these 'adapted preferences' is the lack of information about the benefits to schooling for many of the lower caste groups when the "entire reference group is largely untouched by the experience of being educated."(Dreze and

Gazder 1996, p. 86). To the extent that affirmative action policies change these preferences or provide this information, they would be expected to increase educational attainment.

Quotas in the public sector might be particularly efficacious in removing the stigma of 'backwardness' that often afflicts these groups The role of this 'stigma' has received much attention in the social psychology literature that has tried to explain the Black-White gap in academic achievement in the United States. This literature has, among other things, pointed to the effect on cognitive development of low-caste groups as a consequence of the "social structure of the society, by individual and institutionalized discrimination, and by social and psychological responses to that discrimination" (Ogbu and Stern 2001 p.3). [4]

However, the consequences of affirmative action or preferential policies on removing this stigma are ambiguous. On the one hand they can break down stereotypes, help raise the profile of the targeted group and diminish their second-class status. On the other hand, the self-esteem of individuals might be lowered by being perceived as having obtained jobs not because of their abilities, but merely to fill a quota. Although stated in the context of African-Americans in the United States, where much of this literature has focused, the quotes below highlight the inherent ambiguity in the effect of affirmative action programs on empowering the targeted community.

> "Affirmative action provides a positive mind-set for minorities. The U.S. government is saying it is legal and right for young blacks to believe in themselves. Strong affirmative action procedures truly are significant in raising the self-esteem and self-confidence of disposed minorities (Madkins, 1989, p.29 and cited in citied in Turner and Pratkanis (1994))
>
> "Preferential treatment, no matter how justified in the light of the day, subjects blacks to a midnight of self-doubt, and so often transforms their advantage into a revolving door."(S.Steele, 1990, pp.117-118 and cited in citied in Turner and Pratkanis (1994))

Given, that quotas form nearly fifty percent of government jobs in India, the negative effects of quotas on self-esteem might not be as great as in settings where a minority of jobs are filled by affirmative action programs. However, instances of members from targeted groups refusing to take the less competitive route of applying for a job through the quotas and instead preferring to take the general and more competitive route are not unknown in India. Thus, the effect of

[4] The concept of caste in this literature is applied more internationally and 'low-caste' groups refers to particular groups in Nigeria, Japan, Rwanda, Burundi and the United States. See Ogbu and Stern (2001 p.3) and the literature cited there for more details.

preferential policies on stigma amongst the lower castes is an empirical question that remains to be answered.

In sum, quotas are expected to increase educational attainment both by directly increasing the incentives to invest in schooling and by empowering and changing the mindset of the OBCs. But by increasing the probability of obtaining jobs at even lower levels of education, the effect of the increase in direct incentives is ambiguous especially at higher levels of education. Moreover, the effect of these forces is likely to be mitigated by the effectively small change in the probability of attaining a job and the stigma that might accompany the implementation of quotas.

Review of Empirical Literature

While there is no shortage of opinions about the impact of caste based affirmative action programs in India, rarely are these claims backed with convincing empirical evidence. Panandiker's (1997) dismissal without any empirical evidence of 'compensatory discrimination' as 'pernicious' because "it does not serve the purpose for which it is meant"(p.3) is a fair representation of how the discussions of the effect of affirmative action have been carried out in this literature. Some researchers who have tried to provide empirical evidence (e.g. Alexander 2003, Shah 1997) have relied on aggregate data. Although this work has been useful to identify trends, the data used and the lack of appropriate controls (e.g. household wealth, parental education) does not allow us attribute these trends to specific causes and distinguish the impact of the affirmative action from other possible causes—an admission made by the authors themselves.

To the best of my knowledge, Desai and Kulkarni (2003) is the only other paper that examines the effect of caste-based policies on educational attainment in India using a large scale data set and similar empirical tools. In an important contribution to the literature, Desai et al find that Scheduled Castes and Tribes have made significant strides in closing the schooling gap between them and other Hindus and non-Muslims. In addition they find that Muslims – who were not beneficiaries of similar affirmative action policies did not make similar strides in the period they examine, and take this as evidence of the positive impact of affirmative action policies. [5]

[5] The Mandal Commission list however includes some castes that are identified as being Muslim. For instance the list of OBCs accepted by the Central Government (The Gazette of India Extraordinary, dated Septmeber, 1993 and

This paper builds on the work of Desai and Kulkarni (2003) in three significant ways. Firstly, while Desai and Kulkarni (2003) focus on the Scheduled Castes, the focus of this paper is on OBCs – a much larger and in many ways a more controversial group (Alexander 2003). Thus, while there is little opposition to affirmative action programs for Scheduled Castes, quotas for OBCs are often dismissed as nothing more than a political tool. Secondly, while Desai and Kulkarni(2003) examine the changes in educational attainment in the general context of affirmative action programs, they do not attribute these changes to any specific program. Amongst other things, they interpret the growth in educational attainment of Scheduled Castes in the 1990s as a result of strengthening of affirmative action programs in the 1990s via the implementation of the Mandal Commission report. It is unclear why the Mandal Commission report which focused explicitly on the OBCs, would benefit the Scheduled Castes and Tribes. Thirdly, the comparison groups used by Desai and Kulkarni (2003) result in some paradoxes, which need to be resolved. As mentioned earlier, many Muslim groups were also targeted by affirmative action programs. Their other comparison group – the 'others' includes OBCs and other 'upper' caste Hindus with OBCs constituting a larger percentage of this group. Given that OBCs themselves became beneficiaries of similar affirmative action programs in the time period their results might in fact suggest that while the Scheduled Castes and Tribes have benefited from the affirmative action programs, the OBCs – including the Muslim groups within them have not.

The literature on the consequences of affirmative action in the United States is much richer but equally contentious. (See Holzer and Neumark 2000 for a review of this literature.) Although not examining the link between affirmative action in the labor market and educational attainment, the balance of empirical evidence seems to favor of a positive effect of affirmative action on enrollment in institutions of higher education in the United States (Bowen and Bok 1998).

V. Data

The data I use to assess the impact of the quota on educational attainment of OBCs comes from two independent cross-sectional rounds of the National Family Health Survey (NFHS)

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reproduced in Yadav and Singh(1994)) includes, amongst others, the following castes identified as Muslims in Bihar: Kasai, Chik, Churihar, Dafali, Dhobi (Muslim), Dhunia(Muslim), Nalband (Muslim), Pamaria(Muslim) Prajapati(Muslim).

conducted in almost all Indian states in 1992-93 and 1998-99. [6] The NFHS is unique in collecting data about the caste a child belongs to in addition to a variety of other household and village level information that can be used to assess the determinants of educational attainment. Moreover the timing of the first survey is appropriate as it coincided with the introduction of the earlier job quota for OBCs at the federal level.

One problem with using the 1992 NFHS survey is that unlike the 1998 NFHS survey it does not explicitly distinguish between OBCs and 'Upper' Castes. Details of how I code the OBC and 'Upper' Caste variable in 1992 are provided in the appendix. I also conduct sensitivity tests of this coding that use data only from the 1998 survey and hence are free of problems caused by the classification method used by me for the 1992 survey. These results are reported in the appendix.

For the purposes of the analysis, I restrict the data to only children from the following groups: Scheduled Caste, Other Backward Class and 'Upper' Caste. Thus, I exclude Schedule-Tribe and non-Hindu (unless they are also classified as OBC) children to focus on the impact of the caste based affirmative action. The means of the variables used in the analysis are in Table 1.

The control variables include the education level of the male and female heads of the household, a dummy variable for the 'wealth' quintile the household belongs to (more details on the wealth variable is constructed are in the Appendix), age and gender of the child, a dummy variable for whether the child lives in the rural sector, and a dummy variable for the survey year. The addition of other control variables like household size and other village level variables made no difference to the main results. It is not obvious if the socio-economic status of parents should be controlled when trying to asses the impact of the quotas. It is possible that parents could have taken advantage of the quotas and therefore that quotas increased the socio-economic status of parents.[7] If this happened, then controlling parental socio-economic status reduces the estimated effect the quotas in my models. However, since a policy implemented in 1992 is unlikely to have a significant impact on the average wealth and education level of parents of the cohort of teenagers in 1998, I decide to add these variables as controls. The coefficients on the control

[6] These are similar to the Demographic and Health Surveys conducted in developing countries around the world and are a collaborative project of the International Institute for Population Sciences , Mumbai, India; ORC Macro, Calverton, Maryland, USA and the East-West Center, Honolulu, Hawaii, USA.

[7] Since the quotas apply only to new vacancies, they are unlikely to displace any parents from current jobs with the government and thereby reduce their socio-economic status.

variables from regressions using upper castes as comparison groups are presented in Appendix Table 2.

The dependent variables used to measure educational attainment are:

i) Primary School completion: The variable is equal to 1 if the highest grade completed is greater than or equal to 5th grade and defined as zero otherwise. The variable is defined only for children between the ages of 13 and 18. Children older than 13 years are selected to account for those behind the normal age profile and who are more likely to be from the lower castes.

ii) Middle School Completion: The variable is equal to 1 if the highest grade completed is greater than or equal to 8th grade and defined as zero otherwise. The variable is defined only for children between the ages of 15 to 18.

Given that the average of the highest grade completed in the sample is 6th grade, primary school completion is an appropriate level at which I examine changes in educational attainment. This is also the first level at which we should see the impact of a change in incentives. However since the minimum qualifications for many of the reserved government jobs is 8th grade, I also examine changes in the probability of completing 8th grade. While examining higher levels of attainment would be useful, the fact that the survey collected information about education from children residing in the house with parents would imply significant problems of selection.

As Table 1 illustrates, there is a clear hierarchy in the socio-economic dimensions across the three groups, with the Schedule Caste being the most disadvantaged and the 'Upper' Castes being the most advantaged. Adjusted for socio-economic status, the OBC primary school completion rates are 6 percentage points lower and the middle school completion rates 4 percentage points higher than that for 'upper' caste children with both differences statistically significant.

VI. Empirical Strategy

To identify the impact of the affirmative action program I examine how the introduction of quotas for OBCs in the central government affected the change in educational attainment of OBCs versus non-OBCs over time. Given the heterogeneity of the later category, I compare the differential impact on OBCs versus 'upper' caste and OBCs versus Scheduled Castes separately.

This comparison allows me to control for time varying factors like growth in the economy, government expenditure on schooling etc. that might affect the educational attainment of all group. The comparison over time controls any factors common to the group of states, or the caste group that do not change over time -- any intrinsic 'cultural' factors explaining differences in educational attainment for example. However, the two comparisons do not allow me to attribute changes in educational attainment to the introduction of quotas themselves and isolate it from other factors that might have affected OBCs and non-OBCs differently in this time period. To do so, I require another dimension of comparison that forms the basis of my identification strategy.

The decision of the federal government to reserve 27% of all jobs for OBCs is likely to have had a differential impact in different states, because as mentioned earlier many states already had a long history of such quotas (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, referred to as the NewQ states herewith) while others had no such or only limited affirmative action policies for OBCs (Madhya Pradesh, Rajasthan, Orissa and West Bengal, referred to as OldQ states herewith).I compare the educational attainment of OBCs with other groups defined below(one 'difference'), across two groups of states defined by the strength of existing affirmative programs ('second' difference) and over time(the third 'difference'). (See Collins 2001 for an application of the same method to assess the impact of state-level anti-discrimination laws in the United States).

In particular, the parameter of interest is:

$$[(Ed_{1998} - Ed_{1992})_{OBC} - (Ed_{1998} - Ed_{1992})_{g}]^{NewQ=1} - [(Ed_{1998} - Ed_{1992})_{OBC} - (Ed_{1998} - Ed_{1992})_{g}]^{NewQ=0}$$

where *Ed* refers to the measures of educational attainment – primary school and middle school completion described above.

g indexes 'Scheduled Castes' or 'upper' caste Hindus. I compare the educational attainment of OBCs to groups, those above them ('upper' caste Hindus) and below them ('Scheduled Castes') in terms of socio-economic development and traditional hierarchy. The latter group has had affirmative action policies in its favor at the federal as well as state level for over fifty years and was outside the purview of the Mandal Commission report. However, as Desai et al (2003) mention there was a strengthening in the implementation of policies targeted at the Scheduled Castes in the 1990s and thus the estimated impact using Scheduled Castes as a comparison group is likely to be smaller than when using the 'upper' castes.

NewQ is equal to one for states with limited affirmative action programs for OBCs prior to 1992 and zero for those with a long history of such programs.

The estimating equation used to estimate the parameter is:

$$Ed_{ijt} = \alpha + \beta_1(OBC_i * NewQ_j * Year_t) + \beta_2(OBC_i * NewQ_j) + \beta_3 NewQ_j + \beta_4 Year_t + \beta_5 OBC_i + \beta_6(OBC_i * Year_t) + \beta_7(NewQ_j * Year_t) + \beta_8 .Control_{ijt} + \varepsilon_{ijt}$$

Ed is the dependent variable measuring educational attainment defined above, *i* indexes individuals, *j* indexes the groups of states and *t* indexes the survey years. *Control* is a vector of personal characteristics (age, gender, rural status, parental education, the 'wealth' quintile the household belongs to, the presence of a young child in the family); [8] *OBC* is a dummy variable equal to one for OBCs, *NewQ* is a dummy variable equal to one for states that had little or no quotas for OBCs at the state government and equal to zero for states that have had a long history of significant affirmative programs for OBCs; *Year* is a dummy variable equal to one for the survey year 1998. The relevant coefficient to assess the impact of the affirmative action program is β_1. The coefficient measures the change over time in the difference between the primary school completion rates of OBC teenagers and either the 'Scheduled Castes' or 'Upper' Caste Hindus in states newly exposed to affirmative action minus the same in states that have long been exposed to affirmative action.

While the federal action increased the opportunities for OBCs in all states, given that OBCs in the OldQ states have already had affirmative action programs for a number of years, it is expected that the introduction of the program at the federal level will have a greater impact on states that had no affirmative action program or a limited program. Thus if quotas have a positive effect on educational attainment, β_1 will be positive. However, given that the program was equally applicable to even the OldQ states, the empirical strategy provides a downwardly biased estimated of the impact of the quotas.

VII. Results

Preliminary Evidence

Before looking at the main regression results, it would be useful to examine changes in educational attainment over time for the three groups. In order to get a sense of the trend over

[8] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

time and overcome the absence of survey data from 1986, I use the primary completion rates of individuals aged 19 to 24 years in 1992 to proxy for the primary school completion rates of teenagers in 1986. These along with the primary school completion rates for teenagers in 1992 and in 1996 are plotted in Figure 1.

The figure suggests that the primary school completion rates of all three groups have risen over time and the growth appears to be the faster for the OBCs in the second time period. In numbers, the primary school completion rates for OBCs increased by 10 percentage points from 1992 to 1998 and this was twice as high as the 6 percentage point improvement in the prior 6 years. The increase for OBCs was greater than the increase for Scheduled Castes (9 percentage points) and 'upper' castes (5 percentage points) for the same period after the implementation of the Mandal Commission recommendations.

Regression results reported in Table 2 (for Primary School Completion) and Table 3 (for Middle School Completion) that control for individual and household characteristics further indicate that the changes in primary school and middle school completion rates between 1992 and 1998 were significantly greater for OBCs compared to the 'upper' castes, but the differences are statistically insignificant in comparison to the Scheduled Castes.

Figure 2 separates the data into states newly exposed to affirmative action policies for the OBCs and those that have had a long history of such policies. As the figure indicates, the primary school completion rates have increased over time for all three groups in both set of states. For all groups, the rate of growth increased in the second time period. Furthermore, the graph on the right which plots the primary school completion rates for teenagers in the *NewQ* states suggests that the increase in the rate of change for primary school completion rates after 1992 -- the year in which the Mandal Commission recommendations were implemented -- was greatest for the OBCs.

Main Regression Results

Regression results using the difference-in-difference-in-difference framework outlined earlier are reported in Table 4 (Primary School completion) and Table 5 (Middle School completion). The random effects estimator is used to account for the intra-cluster correlation within observations for the same state and year and a Hausman test does not suggest that these estimates are different from a fixed effects framework. With primary school completion as the dependent variable, the coefficient of interest, β_1 is.11 (standard error= .023) when 'upper'

caste Hindus are the comparison group and is .089 (standard error= .024) when the 'Scheduled Castes' are the comparison group. With middle school completion as the dependent variable, the coefficient is 0.09 (standard error=0.03) when the 'upper' castes are the comparison group and is 0.065 (standard error=0.031) when the Scheduled Castes are the comparison group. As mentioned earlier, the coefficient represents the difference in the change in the gap in educational attainment of OBCs compared to other groups over time in states previously not exposed to quotas versus the change in the gap in states with a long history of quotas for OBCs. When the Scheduled Castes are the comparison group, the coefficient is statistically significant at the 5 percent level when the dependent variable is primary school completion and insignificant for middle school completion. The effect is statistically significant at the 5 percent when the 'upper' castes are the comparison group for both dependent variables.

VIII. Discussion of Results

The difference-in-difference-in-difference estimates suggest that affirmative action programs introduced in 1992 had a positive impact on educational attainment for the targeted group. However, the magnitude of the estimated effect depends on the changes in educational attainment not only for OBCs in the treatment states but also changes in educational attainment for other groups. For instance, the DDD parameter could be positive even if the educational attainment of OBCs in NewQ states declined if the educational attainment of the comparison group increased substantially in the OldQ states. To understand what is driving the estimated impact, I report estimates of the adjusted changes in educational attainment for each of the socio-economic groups using coefficients estimated from the DDD regression and report these in Tables 6 and 7 for primary and middle school completion respectively. These are also presented graphically in Figure 3. The different components of the DDD parameters are changes in educational attainment for:

i) OBCs in the NewQ states
ii) 'Upper'castes/ Scheduled Castes in the NewQ states
iii) OBCs in the OldQ states
iv) 'Upper'castes/ Scheduled Castes in the NewQ states

The regression results imply that the adjusted change in primary school completion rates for OBCs in NewQ states was around 8 percentage points higher than that of the 'upper' castes

and 6 percentage points higher than that of the Scheduled Castes in the same states. The differences in middle school completion were around 6 and 4 percentage points respectively for the two comparison groups. In the OldQ states the differences between OBCs and the comparison groups were statistically insignificant for both primary and middle school completion.

Comparing OBCs in NewQ and OldQ states, the adjusted increase in primary school completion rates and middle school completion rates was 7 percentage points and 5 percentage points, respectively for OBCs in NewQ states after 1992.

This suggests that while OBCs in NewQ states did better than other groups in terms of educational attainment, they also did much better than OBCs in OldQ states. While the latter group seems to have done slightly worse than the comparison groups, these differences are statistically insignificant. Moreover, the raw changes in primary and middle school completion do not suggest that the changes for OBCs was lower than those for the other groups. This suggests that the socio-economic status of OBCs improved more than for other groups in these states and controlling for them absorbs some of these changes. Nevertheless, given that the central government affected these groups as well, this relatively small effect on OBCs in the OldQ states is rather surprising and needs further exploration. One possible explanation is that quotas introduced at the Central Government were too weak to substantially change the incentives to invest in education and that it was the simultaneous introduction of quotas and other affirmative action policies at the state level which played a greater role. This also suggests the possibility that there are diminishing returns to the impact that job quotas can have in improving educational attainment.

Another interesting insight from the results is that in almost all cases, the increase in educational attainment for SCs was greater than the increase of 'upper' castes in all states and in particular in the NewQ states. This might be because affirmative action programs that targeted the SCs became stronger during this period. An alternative explanation is that primary school completion rates in both OBCs and SCs started from a lower base and hence grew faster. This cannot be the central explanation because it would imply that the educational attainment of SCs should have increased even faster than that of the OBCs.

Distribution of Impact

The Supreme Court in its judgment to implement the Mandal Commission Recommendations also instructed the government to formulate criteria to eliminate the 'creamy' layer – the well of amongst the OBCs from taking advantage of the quotas. Despite this, a frequent criticism of caste based affirmative action programs is that they help the most well-off members of the targeted groups. This is not a criticism restricted to India alone. In describing patterns common to a wide range of affirmative action programs across the world, Sowell (1990) for instance writes, "Within the groups designated by government as recipients of preferential treatment, the benefits have usually gone disproportionately to those members already more fortunate." While a direct test of the criticism's validity is not possible here, it can be tested indirectly by looking at the effect of quotas on educational attainment rates for different economic groups within the caste groups. If the benefits are truly restricted to the most advantaged, then the implementation of the quotas should not change the educational attainment amongst the worse off. Secondly, although lack of qualifications might hinder poorer sections of the targeted groups from taking immediate advantage of the quotas, this is too short-sighted a view that ignores their long-term consequences. Since educational attainment is a good predictor of future earnings, assessing the impact of quotas on educational attainment provides an assessment of the distribution of future advantages. For instance, Duraisamy(2002) estimates the private returns to an additional year of schooling for the primary and middle level in India to be 7.9 and 7.4 % respectively. Finally, given that education has an intrinsic value of its own, an increase in educational attainment can also be understood as a direct benefit in itself.

In order to test the hypothesis that it is only the most well off who benefit from quotas, I estimate the relative changes in educational attainment of the 'poor' and 'rich' OBCs. Thus I divide the sample into two halves – those below and above the median asset index for OBCs and use the DDD regression for each of these two samples. Dividing the sample further was not possible since this leads to very small cell sizes, but to account for the broad range of 'wealth' within each half, I control for the actual value of the asset index and its square term. The results from these regressions are presented in Table 8 (with 'upper' caste as the comparison group) and Table 9 (with Scheduled Castes as comparison groups). I focus on the later group since the number of upper castes in the same cell as 'poor' OBCs are rather small.

The DDD estimates by themselves suggest that the estimated impact of the affirmative action policies were on the whole better for the 'poorer' OBCs than they were for the 'richer'

OBCs. The DDD estimate for the 'poor' is 0.083 (standard error: 0.038) while that for the 'rich' is .069 (standard error: .031). For middle school completion, the DDD estimate of the impact for the 'rich' is 0.071 (standard error: .044) slightly higher than that for the poor, 0.058 (standard error: 0.057) when the dependent variable is middle school completion. When the DDD parameter is broken into its components as described before, the results suggest that the primary school completion rates of 'poor' OBC children in NewQ (11 percentage points) states increased more than 'rich' OBC children (6 percentage points) with the same being true for middle school completion as well. Therefore, the results suggest that even the relatively poor amongst the OBCs were positively impacted by the affirmative action policies and provide no evidence that the rich benefit more than the poor.

Contemporary Successes vs. Historic Failures?

Job quotas have been in place for nearly fifty years – at both the federal and state level for the Scheduled Castes and Scheduled Tribes and yet as illustrated earlier, these groups still have the lowest levels of educational attainment. Similarly there is a significant gap between the educational attainment levels of OBCs and 'upper' castes even in states that have had job quotas for a number of years. Although these gaps have been decreasing over time, this historical experience has to be reconciled with the findings from this paper that job quotas increased primary school completion rates by around 10 percentage points in the 1990s.

One possible explanation is that prior quotas did not translate into the same increases in educational attainment because the costs of investing in education remained greater than the expected value of investing in education for most families. In contrast, the nineties was a period in which there was a spurt in expenditure and programs to increase basic educational attainment levels – the World Bank funded, District Primary Education Program (DPEP) being an important example, particularly in the NewQ states. The costs of schooling, especially the indirect costs like the costs of commuting to the nearest school thus fell during this period and this might have allowed OBCs in the NewQ states to respond to the incentives created by the quotas. While this cannot be the central explanation since such changes would have impacted comparison groups as well, it can be argued that the most disadvantaged groups are the most price sensitive. If true this argument would imply that the attainment rates of SCs are affected more than the OBCs and that of the 'upper' castes less. This suggests that the estimated impact might be biased upwards when

'upper' castes are the comparison group and another reason why it might be biased downwards when SCs are the comparison group.

IX. Sensitivity Tests

As mentioned earlier, the data does not distinguish between OBCs and upper-caste households in the 1992 survey. Secondly, there might not be a perfect match between the castes classified as OBC and those that were actually targeted by the policy. However, if the groups that were not actually beneficiaries of the quota but identified themselves as OBC had a slower improvement in their educational attainment rates, it should imply the measure of the impact is biased downwards.

To test the sensitivity of the results to the coding system used for OBCs in 1992, I use the older cohort of 19 to 24 year olds in the 1998 survey to proxy for the 12 to 18 year old group in 1992. Hence, I use only the 1998 survey data and caste classification to estimate the impact of the quotas. The results from these regressions are reported in Appendix Table 3b. Although the magnitudes are lower the patterns are entirely consistent with the main results.

I also test the robustness of the empirical strategy and caste classification by estimating the impact for a sample of population that should not have been impacted by the quotas. Thus, I use the sample of 19 to 24 year olds from both the survey and these results are presented in Appendix Table 4. I am unable to reject the null hypothesis that there was no impact of the quotas on primary school completion rates for this older group.

X. Conclusions

It is unfortunate that caste continues to cast its ugly shadow on Indian society even today. Affirmative action policies on the basis of caste perhaps entrench the institution of caste even further – a charge often leveled at such policies. However, to ignore the disparities that exist on the basis of caste is to ignore fundamental realities of Indian society. This work both demonstrates these disparities as well as evaluates the effect of job quotas—a much used but little analyzed component of policies meant to reduce these disparities.

The introduction of quotas at the central government level exposed OBCs in many of the Indian states to such explicit affirmative action for the first time. The empirical analysis conducted here demonstrates that the change in policy had a positive impact on the educational attainment of the groups targeted by the quotas. While there was an increase in average educational attainment across all groups and states after the introduction of the quotas, the results

suggest that relative to other caste groups the increase was greater for OBCs in states that hitherto did not have such a program of affirmative action.

Despite finding a positive effect of caste-based job quotas on reducing disparities in educational attainment, it would be hasty to reach an overall positive judgment about job quota policies. There are several important caveats that need to be noted in drawing conclusions from this paper.

The period examined, the 1990s was a period of dramatic changes in India. While the focus of this paper is the changes in affirmative action programs targeted at the OBCs, there were also tremendous changes in the economic and political environment. Many of there might have affected educational attainment as well. The economy was gradually transformed from a license-quota *raj* mimicking a socialist economy to one dominated by competitive forces and the economy grew at a much faster rate than the insipid *hindu* growth rate that shackled it in the past. There were tremendous upheavals politically as well with many of the lower castes asserting themselves politically – a new phenomenon in many of the northern states (Jaffrelot 2002).

Disentangling the impact of the quotas – a policy change affecting such a large population in such an environment is a challenging task. Although the methodology used here does enable me to account for many of these other factors, it is not free of limitations.

The coefficient β_1 might be biased up or down if there were other changes that affected *NewQ* and non-*NewQ* states and OBCs and Scheduled Castes/'Upper' caste differentially. In fact, this was the case with the introduction of reservations at the state level in addition to those in the federal level for OBCs in many of the *NewQ* states during the period studied In addition, it is widely perceived that the OBCs as a group became more politically powerful during the 1990s in these states. Although data on the caste composition of the elected representatives from two of these states in Jaffrelot (2002) provides mixed evidence for this claim, to the extent that these and other changes were a consequence of the policy change at the federal level, it is not clear if these should necessarily be considered as introducing a bias or be part of the effect itself. However, these changes do suggest the need to be cautious in generalizing these results to other contexts or even to the future programs within India.

Second, the dependent variable used here is educational attainment. Given the wide variance in the quality of schooling, this is a rather imperfect measure of investment in human capital. Thus, although results from the analysis suggest that job quotas increased educational

attainment, we know little about their effects on either future earnings or their contribution to improving basic capabilities. While educational attainment is an important first dimension, I think there is an urgent need for future work to examine the disparities in the quality of education accessible to and chosen by different castes.

Third, the study does leave several issues surrounding the use of job quotas untouched. The effect of caste based quotas on government performance is one such dimension that needs to be critically analyzed. Indeed the bigger and more important question of whether or not affirmative action policies are the best way to reduce these disparities remains unanswered. In evaluating the benefits I have not considered the costs of such policies at all. While there has been much written and said about what these costs are, future work should try to identify and quantify the different components of these costs – both in terms of administering such policies and also the efficiency losses that might accompany them.

Nevertheless, I believe that the study makes some important contributions. Firstly in contrast to the broad generalizations that typically characterize the literature on consequences of affirmative action in India, I examine the impact in an empirically rigorous manner using a large scale data set in the context of one specific policy. Admittedly there is a lot of chaos and confusion surrounding these policies. Politicians, as might be expected have undoubtedly taken advantage of these ambiguities to further their own ends. Moreover this has not prevented the formation of strong opinions on this topic from social scientists. But this ambiguity should not be used as an excuse for not putting these opinions to the test of data, as I have in this paper.

The results from the study have some important policy implications. Firstly, it examines the consequences of an important and controversial policy change in India—the implementation of the Mandal Commission recommendations. As emphasized earlier, there are several possible short-comings in using job quotas that, although unexamined here, should be investigated before reaching a final judgment on the efficacy of such policies. However, this study demonstrates the positive effect of these policies in increasing educational attainment – an important policy goal in itself. In addition, it finds that these benefits are not restricted to only the well-off amongst these groups – refuting a widely held perception that these policies increase disparities within the targeted groups. Lastly, it highlights the importance of incentives and changing the mind-set of disadvantaged groups with regard to education and suggests the role of affirmative action policies like job quotas in doing so.

Mathematical Appendix

Assume individuals maximize their utility, which is represented by U(X). It is assumed for the purposes of this model, that education affects the consumption of goods and services only through its affects on income.

The individuals optimal choice of education will be the solution to the following utility maximization problem:

$\underset{X}{Max}\ \ U(X)$ s.t. to the constraint $p_x X + p_e E = \pi_g G(E)$

where

p_e is the cost of investing in an additional year of schooling

E is the years of schooling

π_g is the probability of obtaining a job that pays an income G(E) which is a function of the total investment in education[9] .

G(E) is assumed to be a increasing in E, ($G'(E) > 0$) and concave $G''(E) < 0$ i.e. the returns to education are assumed to be positive but diminishing.

X represents a composite good priced at p_x .

$U(X)$ is assumed to be strictly monotonic and increasing in X, thus

$U('X) \neq 0 \forall X$

For simplicity and without any loss of generality we can assume p_x is equal to one.

Re-writing the budget constraint in terms of X

$X = \pi_g G(E) - p_e E$

The choice problem can now be re-written as

$$\underset{E}{Max}\ U(\pi_g G(E) - p_e E)$$

The optimal value of education is E* that satisfies the First Order Condition below:

$$U'(\pi_g G(E) - p_e E)(\pi_g \frac{\partial G(E)}{\partial E} - p_e) = 0$$

Now since by assumption, the first term is non-zero it must be the case that

$$\pi_g \frac{\partial G(E)}{\partial E} - p_e = 0$$

or

[9] The model implicitly assumes that the income from an alternative job is equal to zero, but this does not change the substance of the results.

$$\pi_g \frac{\partial G(E)}{\partial E} = p_e \quad \text{- (1)}$$

Thus individuals invest in education till the expected value of investment equals to the cost of making the investment in education.

Differentiating (1) with respect to π_g, leads to the final result:

$$\frac{\partial E^*}{\partial \pi_g} = -\frac{p_e}{\pi_g^2} \cdot \frac{1}{G''(E)} \quad \text{- (2)}$$

Since $G''(E)$ <0, this implies $\frac{\partial E^*}{\partial \pi_g}$>0

Thus the investment in education increases with the probability of obtaining a job as a result of that investment.

Data Appendix

Coding OBC and 'Upper' Caste in 1992

The NFHS survey conducted in 1998-99 includes both information on the religion, *jati* and whether or not the household belongs to any of the following groups: Scheduled Caste, Scheduled Tribe, Other Backward Class. While, the 1992-93 NFHS survey only separates the groups to Schedule Caste and Schedule Tribe, it does provide the *jati* of the household and I use this information to categorize the households into the OBC group.

The *jatis* that are classified as OBC in 1998-99 are also classified as OBC in 1992-93.

One restriction that comes about because of the coding is that I lose observations from sub-castes in 1992 that are unrepresented in 1998. In addition, while names of certain sub-castes are often very similar to each other there are also alternative spellings for the same sub-caste. In most cases where the differently spelled sub-castes fall under the same broad caste categories (Scheduled Caste, OBC, 'upper' caste) this does not pose a problem but in others this might. I have tried to mitigate this problem by investigating the presence of sub-castes with alternative spellings.

Categorization of Educational Attainment in the NFHS.

Highest level of education the household member has attained. This is a standardized variable providing level of education in six categories, i.e., illiterate, literate (has been to school but has not completed primary), primary complete, middle school complete, high school complete and university. Any member below the lower age limit for the education questions is classified in the "Illiterate" category.

Measuring Household Wealth

As rich as the National Family Health Survey is, it does not include a measure of household income or consumption. However, it does have information on ownership of a wide range of assets and housing characteristics, all of which convey some information on the wealth status of households. Thus along the lines suggested by Filmer and Prittchet (1999), I use principal components analysis to construct an index from the information collected on assets owned by households and housing characteristics and like them hope that the index proxies

'long-run' wealth. Briefly stated, principal components analysis derives weights on the different assets by explaining the complete correlation matrix in the ownership of the assets. Thus, the method produces as many factors as there are variables and explains completely all the variance and correlation between the variables. Filmer and Pritchett (1999) also validate their method by using it to construct similar indices from other data sets that include information on household expenditures as well as ownership of assets.

The variables used to construct the index include ownership of land, number of rooms, the quality of materials used in building the house, the nature of bathrooms, whether the household has access to electricity, the usage of bio-mass as cooking fuel, ownership of: livestock, sewing machine, clock, fan, radio, television, refrigerator, car, bicycle and motorcycle.

Appendix Tables

A.Table 1: Caste Composition of Central Government Jobs

	OBC	SC/ST
Class I	4.69%	5.58%
Class II	10.63%	18.18%
Class III & IV	18.98%	24.40%
All Classes	12.55%	18.72%

"Figures based on the replied furnished by 30 Central Ministries and Departments and 31 attached and subordinate offices and public sector undertakings under the administrative control of 14Ministries which may be treated as sufficiently representative of the total picture." (p. 16 Prasad 1997)

A.Table 2: Coefficients on Control Variables

	Primary (from OBC vs. UP)	**Middle (from OBC vs UP)**
Asset Quintile2	**.054 (.008) [6.77]**	**.076 (.011) [7.09]**
Asset Quintile 3	**.160 (.008) [20.69]**	**.159 (.01) [15.31]**
Asset Quintile 4	**.226 (.008) [28.99]**	**.257 (.010) [24.67]**
Asset Quintile 5	**.282 (.009) [32.96]**	**.375 (.011) [32.72]**
Female	**-.166 (.004) [-37.68]**	**-.166 (.006) [-28.15]**
Rural	**-.109 (.005) [-19.89]**	**-.137 (.007) [-18.66]**
Age	**-.043 (.027) -1.59**	**.329 (.098) [3.36]**
Age Square	**.001 (.001) [1.06]**	**-.01 (.003) [-3.34]**
Mother's Education		
Literate	**.131 (.007) [17.66]**	**.127 (.011) [12.72]**
Completed Primary	**165 (.008) [21.62]**	**.155 (.010) [15.08]**
Completed Middle	**.137 (.009) [15.75]**	**.195 (.012) 16.55**
Completed High School	**.095 (.012) [8.24]**	**.187 (.015) [12.11]**
Completed University	**.054 (.015) [3.65]**	**.116 (.020) [5.79]**
Father's Education		
Literate	**.120**	**.079**

	(.007) [17.15]	**(.009) [8.56]**
Completed Primary	**.173 (.007) [23.94]**	**.129 (.01)[13.41]**
Completed Middle	**.193 (.008) [25.06]**	**.180 (.01) [17.37]**
Completed High School	**.192 (.009) [21.83]**	**.222 (.012) [18.91]**
Completed University	**.178 (.011) [16.81]**	**.233 (.014) [16.36]**

Note: The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the 'wealth'[10] quintile the household belongs to.

Sensitivity Tests

A.Table 3: Using only 1998 Data and Caste Classification:

	Primary School Completion DDD estimate(β_8)	
Comparison Group	'Up' Caste	SC
Estimated Effect of Quotas (DDD Paramter Estimate)	.059 (0.021) [2.82]	.046 (0.022) [2.04]

Notes: Older Cohort (19-24) is used a proxy for 13-18 year olds in 1992

[10] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

A.Table 4: Primary School Completion: Using 19-24 yr olds only from 1992 & 1998

	Primary School Completion DDD estimate(β_8)	
Comparison Group	Up Caste	SC
Estimated Effect of Quotas (DDD Parameter Estimate)	.003 (.024) [0.13]	.014 (.025) [0.56]

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Table 1: Means of Variables

Variable	SC	OBC	Upper Caste	All Three
Completed Primary (13-18 yrs old)	0.616	0.711	0.798	0.716
Completed Middle (15-18 yrs old)	0.378	0.489	0.622	0.503
OBC	0	1.000	0	0.564
SC	0	0	0	0.181
'Upper' Caste		0	1.000	0.293
'Treatment' States	0.586	0.427	0.783	0.547
Female	0.487	0.507	0.501	0.502
Rural	0.741	0.699	0.654	0.695
Asset Quintile 1	0.282	0.181	0.100	0.178
Asset Quintile 2	0.256	0.199	0.134	0.192
Asset Quintile 3	0.213	0.218	0.197	0.212
Asset Quintile 4	0.162	0.218	0.264	0.220
Asset Quintile 5	0.087	0.184	0.305	0.198
Male Head of Household/Spouse				
Illiterate	0.481	0.328	0.224	0.328
Primary Incomplete	0.163	0.182	0.126	0.164
Primary Complete	0.121	0.169	0.121	0.148
Middle School Complete	0.126	0.141	0.192	0.152
High School Complete	0.061	0.105	0.162	0.112
University Complete	0.048	0.074	0.175	0.096
Female Head of Household/Spouse				
Illiterate	0.784	0.618	0.510	0.621
Primary Incomplete	0.077	0.117	0.119	0.110
Primary Complete	0.054	0.115	0.118	0.105
Middle School Complete	0.058	0.082	0.122	0.088
High School Complete	0.019	0.047	0.066	0.047
University Complete	0.009	0.021	0.064	0.029
Age of Child	15.590	15.590	15.597	15.592
1992	.37	.59	.39	.50
1998	0.630	0.41	0.61	0.50

Table 2: Relative Changes in Primary School Completion Rates over Time (Diff-in-Diff)
Coefficient (Standard Error) [t-stat]

	Comparison Group	
	Upper-Caste	**Scheduled Caste**
OBC*1998	.028 (.01) [2.89]	.012 (.012) [1.05]
OBC	-.043 (0.008) [-5.69]	-.008 (.009) [-0.88]
NewQ	-.083 (.005) [-17.22]	-.094 (.005) [-18.39]
1998	.021 (0.008) [2.58]	.039 (.01) [3.77]
Intercept	1.06 (.21) [5.06]	1.21 (.233) [5.17]
R-Squared (Overall)	0.284	0.2736
No. of Observations	28424	**25902**

Note: Defined for 13 to 18 year olds. Models estimated using a random effects estimator that adjusts standard errors for correlation between observations. The Model includes the following: age, gender, rural status, parental education, the 'wealth'[11] quintile the household belongs to.

[11] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 3: Relative Changes in Middle School Completion Rates over Time (Diff-in-Diff)
Coefficient (Standard Error) [t-stat]

	Comparison Group	
	Upper-Caste	Scheduled Caste
OBC*1998	.027 (.013) [2.05]	.006 (.015) [0.38]
OBC	-.058 (.01) [-5.69]	-.001 (.012) [-0.09]
NewQ	-.115 (.006) [-17.90]	-.128 (.006) -19.51
1998	.015 (.011) [1.38]	.037 (.013) [2.80]
Intercept	-2.286 (0.81) [-2.82]	-2.248 (.868) [-2.59]
R-Square	0.3333	0.3021
No. of Observations	19280	17582

Note: Defined for 13 to 18 year olds. Models estimated using a random effects estimator that adjusts standard errors for correlation between observations. The Model includes the following: age, gender, rural status, parental education, the 'wealth'[12] quintile the household belongs to.

[12] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 4: Results from DDD regressions for Impact of Quotas on Relative Changes in Primary School Completion Rates for OBCs in NewQ vs. OldQ states.
Coefficient (Std. Error) [t-stat]

	Comparison Group	
	Upper-Caste	Scheduled Caste
OBC*NewQ*1998 (DDD Parameter)	.110 (.023) [4.88]	.089 (.024) [3.76]
OBC*NewQ	-.086 (.017) [-5.01]	-.015 (.018) [-0.86]
OBC*1998	-.033 (.019) [-1.71]	-.030 (.017) [-1.74]
NewQ*1998	-.035 (.020) [-1.79]	-.012 (.021) [-0.58]
OBC	.01 (.015) [0.67]	-.003 (.013) [-0.26]
NewQ	-.036 (.016) [-2.26]	-.104 (.016) [-6.39]
1998	.05 (.018) [2.82]	.047 (.016) [3.02]
R-Square(Over-all)	0.2854	0.2749
No. of Observations	28424	25902

Note: The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the 'wealth'[13] quintile the household belongs to.

[13] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 5: Results from DDD regressions for Impact of Quotas on Relative Changes in Middle School Completion Rates for OBCs in NewQ vs. OldQ states.
Coefficient (Std. Error) [t-stat]

	Comparison Group	
	Upper-Caste	Scheduled Caste
OBC*NewQ*1998	.09 (.03) [2.97]	.065 (.031) [2.11]
OBC*NewQ	-.09 (.023) [-3.93]	-.016 (.023) [-0.72]
OBC*1998	-.026 (.025) [-1.03]	-.025 (.022) [-1.10]
NewQ*1998	-.036 (0.026) [-1.35]	-.008 (.027) [-0.31]
OBC	.002 (0.02) [0.10]	.005 (.017) [0.31]
NewQ	-.057 (.021) [-2.71]	-.132 (.021) [-6.36]
1998	.045 (.024) [1.90]	.042 (.02) [2.10]
R-Square(Over-all)	0.3342	0.302
No. of Observations	19280	17582

Note: The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the 'wealth'[14] quintile the household belongs to.

[14] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 6: Components of the DDD Parameter for Primary School Completion
Coefficient (Std. Error) [t-stat]

	Comparison Group (*g*)in Regression	
	'Up' Caste	Scheduled Caste
States with limited Affirmative Action policies for OBCs prior to 1992(NewQ States)		
I. Growth for OBCs	.092 (.008) [11.08]	.094 (.009) [10.68]
II. Growth for Comparison Group	.014 (.009) [1.55]	.035 (.014) [2.54]
III.: Changes in gap between OBCs and comparison group in Primary School completion (I- II)	.078 (.012) [6.32]	.059 (.016) [3.62]
States with substantial Affirmative Action policies for OBCs prior to 1992 (OldQ States)		
IV. Growth for OBCs	.017 (.007) [2.32]	.017 (.008) [2.16]
V. Growth for Comparison Group	.05 (.018) 2.82	.047 (.016) [3.02]
VI. Changes in gap between OBCs and comparison group in Primary School completion (IV- V)	-.033 (.019) [-1.71]	-.030 (.017) [-1.74]
VII. Change in Gap between OBCs and comparison in NewQ states- Change in Gap between OBCs and comparison in NewQ states(III- VI)	.110 (.023) [4.88]	.089 (.024) [3.76]

Note: The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the 'wealth'[15] quintile the household belongs to.

[15] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 7: Components of the DDD Parameter for Middle School Completion
Coefficient (Std. Error) [t-stat]

	Comparison Group (*g*) in Regression	
	'Up' Caste	Scheduled Caste
States with limited Affirmative Action policies for OBCs prior to 1992(NewQ States)		
I. Growth for OBCs	.073 (.011) [6.59]	.074 (.011) [6.55]
II. Growth for Comparison Group	.009 (.012) [0.73]	.034 (.018) [1.94]
III.: Changes in gap between OBCs and comparison group in MiddleSchool completion (I-II)	.064 (.016) [3.89]	.040 (.021) [1.92]
States with substantial Affirmative Action policies for OBCs prior to 1992 (OldQ States)		
IV. Growth for OBCs	.019 (.01) [1.88]	.018 (.01) [1.76]
V. Growth for Comparison Group	.045 (.023) [1.90]	.042 (.02) [2.10]
VI. Changes in gap between OBCs and comparison group in MiddleSchool completion (IV- V)	-.026 (.025) [-1.03]	-.025 (.022) [-1.10]
VII. Change in Gap between OBCs and comparison in NewQ states- Change in Gap between OBCs and comparison in NewQ states(III- VI)	.09 (.03) [2.97]	.065 (.031) [2.11]

Note: The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the 'wealth'[16] quintile the household belongs to.

[16] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 8: Relative Changes in Educational Attainment by Wealth Status & Caste Group: OBC vs. 'Upper' Caste

Coefficient (Std. Error) [t-stat]

	NewQ States			OldQ States		
	OBC	Up		OBC	UP	DDD
Changes in Primary School Completion						
Lower-Half	.114 (.015) 7.52]	.037 (.022) 1.68		.019 (.016) [1.19]	.146 (.047) [3.12]	.205 (.056) [3.65]
Upper-Half	.06 (.01) [6.17]	.004 .009) [0.47]		.011 (.008) [1.39]	.029 (.018) [1.65]	.073 (.023) [3.14]
Changes in Middle School Completion						
Lower-Half	.056 (.017) [3.28]	-.004 (.025) [-0.16]		.005 (.018) [0.25]	.066 (.054) [1.22]	.122 (.065) [1.89]
Upper-Half	.077 (.014) [5.37]	.009 .014) [0.64]		.016 (.011) [1.35]	.036 (.026) [1.39]	.088 (.035) [2.54

Note: The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the 'wealth' quintile the household belongs to.[17]

[17] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Table 9: Relative Changes in Educational Attainment by Wealth Status & Caste Group: OBC vs. Scheduled Caste

Coefficient (Std. Error) [t-stat]

	NewQ states			OldQ States		
	OBC	SC		OBC	SC	DDD Estimate
Dependent Variable: Primary School Completion						
Lower-Half	.116 (.015) [7.62]	.039 (.02) [1.89]		.020 (.016) [1.26]	.027 (.024) [1.14]	.083 (.038) [2.18]
Upper-Half	.06 (.01) [5.88]	.026 (.018) [1.38]		.01 (.009) [1.14]	.043 (.021) [1.99]	.069 (.031) [2.21]
Dependent Variable: Middle School Completion						
Lower-Half	.059 (.017) [3.42	.034 (.023) [1.46]		.006 (.018) [0.31]	.03 (.027) [1.09]	.048 (.043) [1.11]
Upper-Half	.077 (.015) [5.10]	.031 (.026) [1.18]		.013 (.012) [1.07]	.038 (.03) [1.24]	.071 (.044) [1.60]

Note: The results are from 4 separate regressions. The samples are defined into halves defined by the median asset index of OBCs in 1992. The standard errors are adjusted for correlation between observations at the state and year level using a random effects estimator. The Model includes the following: age, gender, rural status, parental education and the value of the asset index[18] for the household.

[18] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .

Figure 1: Growth in Primary School Completion (1986-1998) amongst 13-18 year olds

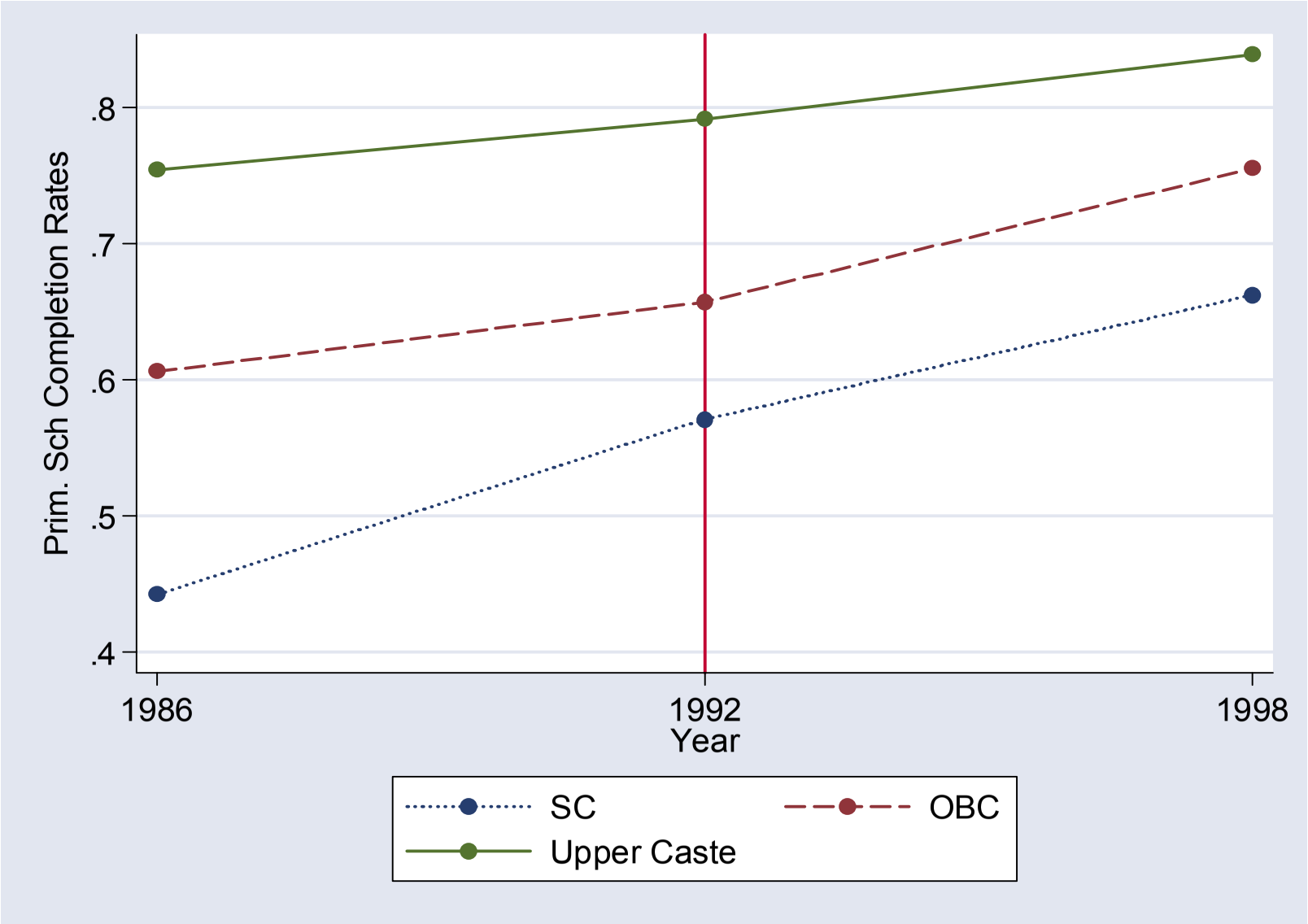


Figure 2: Growth in Primary School Completion (1986-1998) amongst 13-18 year olds- Separated by Status of Affirmative Action Policies for OBCs.

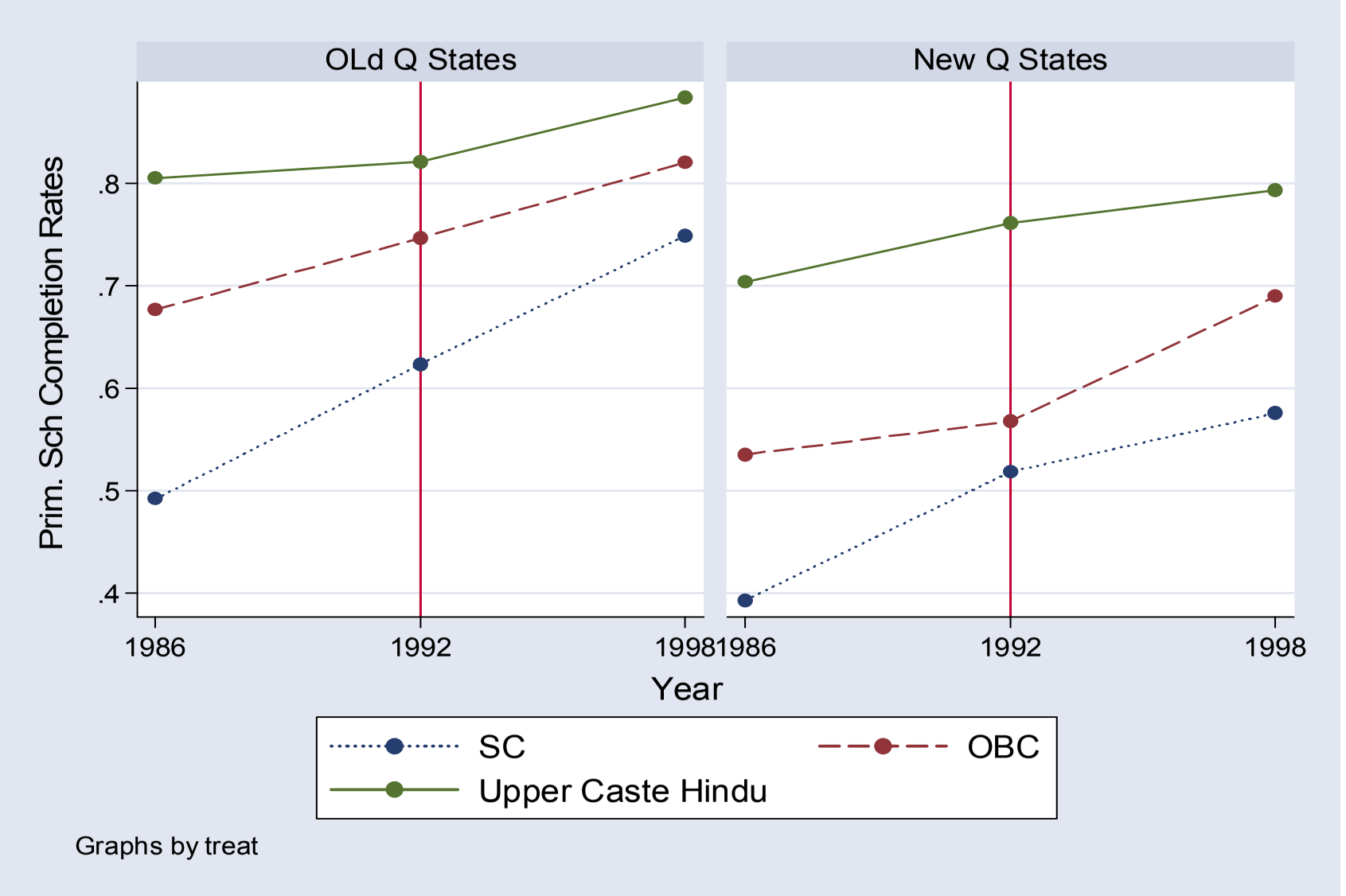
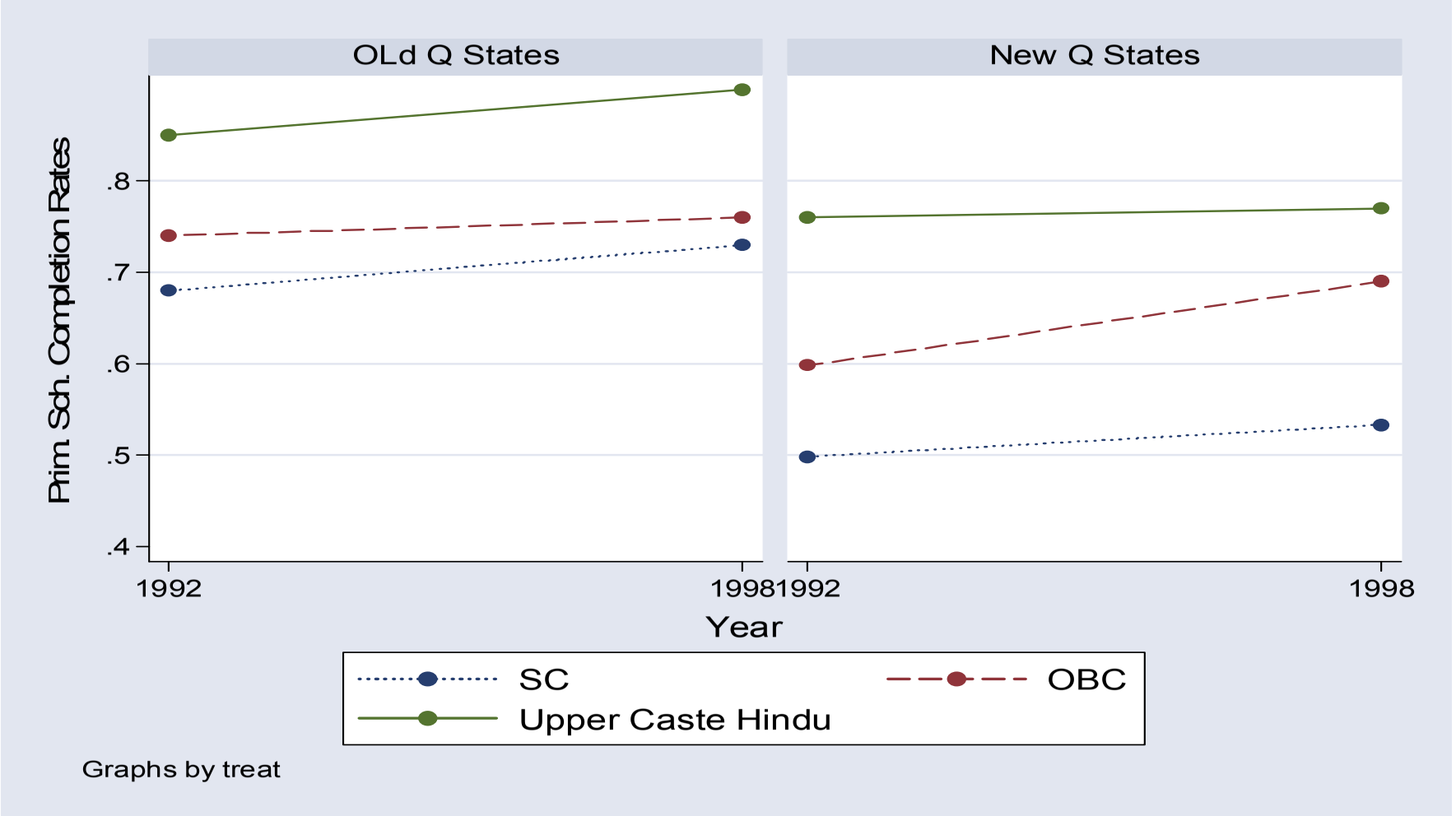


Figure 3: 'Adjusted' Growth in Primary School Completion (1992-1998) amongst 13-18 year olds- Separated by Status of Affirmative Action Policies



Note: Figure plots changes in Primary School Completion rates adjusted for: age, gender, rural status, parental education and the 'wealth'[19] quintile the household belongs to.

[19] The 'wealth' status of a household is measured by an asset index based on the ownership of different assets and derived using principal component analysis .