Reversal of Envy

Rezina Sultana

December 2010

CWPE 1106

Paper presented at Silvaplana 2010
19th Workshop on Political Economy, July 2010

REVERSAL OF ENVY

Rezina Sultana[*]

Department of Economics, Bar-Ilan University, 52900 Ramat-Gan, Israel

Abstract

Studies of compensating discrimination (known in the U.S. as affirmative action) have not accounted for the role of envy. Yet envy affects utility. I consider the compensating-discrimination policies that individuals acknowledging envy would choose when behind a veil of ignorance. The institutional background for my study is India, where low castes have been provided with preferential access to public education and reserved public sector jobs. Although the Indian case is background, the conclusions apply more generally. I define envy as occurring when people with the same abilities have different incomes because of unequal education and employment opportunities. This is the case when, because of adverse discrimination, low-caste people are denied access to education and public-sector jobs, and also when, because of compensating discrimination, it is high-caste people who are correspondingly denied equal access. A benchmark case with neither adverse nor discriminatory discrimination is efficient and equitable (envy-free). Adverse and compensating discrimination both compromise efficiency and fairness. I derive the conditions that determine attitudes of a population behind the veil of ignorance to compensating-discrimination policies.

[*] Tel.: + 972-547-648621; Fax: +972-3-7384034

E-mail address: rezina80@gmail.com (R. Sultana)

1. Introduction

Compensating discrimination (or affirmative action) has been studied in various contexts. In particular, a large number of studies examine to the Indian caste system.[1] There has however been no study of the fairness of compensating discrimination when there is disutility from envy. Perhaps the reason for disregarding envy has been that being envious is an unpleasant personal attribute. Why should people care about others' income and why are they discontented with their own absolute income?[2] Although envy has been disregarded in previous literature on the caste system, nonetheless envy is a fundamental human trait that underlies human behaviour. Envy also influences choice of ideology, which in turn affects institutions and economic policy (see Hillman, 2009, chapter 1). Ignoring envy ignores basic reality. I therefore introduce envy and consider the compensating-discrimination policies that individuals subject to envy would choose behind a veil of ignorance where they do not know if they will benefit from adverse or compensating discrimination. The institutional background for my study is India, where compensating discrimination programs provide low castes with preferential access to public education and reserved public sector jobs. Although the Indian case is background, the conclusions apply more generally.

Social justice can be defined as ex-ante or ex-post equality. In the pre-compensating discrimination period, there was *ex-ante* inequality across castes because high-caste persons were privileged. Compensating discrimination aims at achieving *ex-ante* equality through special opportunities for low-caste members to correct historical injustice. However, compensating discrimination also imposes ex-ante inequality and fails to achieve ex-post equality because of inequality in incomes between equally productive persons of different castes.

Inequality under the caste system either in the pre- or in the post-compensating discrimination period is the source of envy in different ways. The outcome under adverse discrimination was not equitable: there was envy in that a person belonging to a low-caste would prefer a high-caste person's possessions and status.[3] Envy was qualified, since low-caste persons would be driven by the hierarchical system to consider themselves inferior.

[1] See for example Ramaswami (1984), Aikara (1996), Mendelsohn and Visziany (1998), Sheth (1998), Wankhede (2001), Pande (2003), Alexander (2003), Sowell (2004), Weisskopf (2004), Borooah, Dubey and Iyer (2007) et al.

[2] Experimental economics provides answers to these questions using concepts of equity and social preferences (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Lehmann, 2001; Charness and Rabin, 2002 et al.). For an overview of envy in experiments, see Holler and Leroch (2010), who also consider conceptions of fairness more generally going back to Adam Smith.

[3] According to Foley's (1967) definition of equity.

With compensating discrimination, envy is reversed: a high-caste person envies a low-caste person because of the perceived undeserved low-caste person's good fortune through the privilege of compensating discrimination. My focus in this paper is on such reversal of envy.[4]

The envy of low-caste people under adverse discrimination is due to deprivation from lack of access to public schools and a host of other restrictions; with compensating discrimination, envy on the part of high-caste people is due to their relative deprivation.[5]

Empirical evidence confirms that positional concern can create envy in the mind of an individual whose situation is below his or her own aspiration level (Fischer and Trogler, 2006). Experimental evidence also shows that workers generally treat unequal wages as relative deprivation (Martin, 1981).

In my model, high-caste individuals in the post-compensating discrimination period experience the feeling of relative deprivation even when wages are equal, because the equal wage fails to account for different productivities. In a particular type of job, wages are the same for all individuals irrespective of caste but minimum eligibility criteria for the reserved positions are relaxed for the low caste.

Both adverse and reverse discrimination undermine efficiency and conceptions of fairness. Envy behind the veil of ignorance reduces individuals' expected utility.[6] If the expected utility loss due to envy of the low-caste people under adverse discrimination is greater than that due to high-caste people's envy under reverse discrimination, I judge the post-compensating discrimination outcome as *equity-improving*.

Whether a population behind the veil of ignorance prefers adverse or compensating discrimination depends on the trade-off between efficiency and equity (no-envy) in social outcomes. The post-compensating discrimination outcome is not achieved through Pareto-improving change because the reservation policy provides opportunities for low-caste to the detriment of the high-caste. Pareto-improving change is of course possible if gainers gain more than losers lose and compensation occurs. However, compensation does not occur. Compensating discrimination is *efficiency-improving* if the net gain in expected utility due to access as well as higher returns to education of the low-caste individuals, exceed the expected utility loss due to reverse discrimination towards the high-caste people. If these efficiency-

---

[4] In the Indian daily news paper sometimes we find the front-page headline as "Self-immolation by some high-caste students or job-seekers as a protest against the caste-based reservation". This is nothing but an expression of extremely envious attitude.

[5] See, Ben-Zeev (1992) for some examples showing how relative deprivation causes envy.

[6] Also see Lehmann (2001) who demonstrates that in a two-person competition, presence of envy in an individual's mind reduces his payoff and total satisfaction (social welfare) becomes lower than that when both parties are self-centered.

and equity-improving criteria are satisfied compensating discrimination is regarded as *fairness-improving*.

The questions to be addressed are: How (if at all) does envy change the usual conclusions about the compensating discrimination policy and is the compensating-discrimination policy fairness-improving? The paper is structured as follows. Section 2 sets out the institutional background of compensating discrimination policy in India. Section 3 reviews concepts of equity, efficiency and fairness. Section 4 sets out the model of policy choice behind a veil of ignorance. Conclusions are in the final section.

2. The institutional background

Compensating-discrimination policies have been implemented in many countries, including the U.S., South Africa, Malaysia, Brazil, Nigeria, India, and Sri Lanka. The intent has been to compensate present generations of under-privileged groups for past discrimination. In contrast to other anti-discrimination measures, compensating discrimination aims at ending differences across gender, races, castes, and communities on a *pro-active* basis, hence the term 'affirmative' in the U.S. context (Holzer and Neumark, 2000). In India, a caste-based reservation system evaluates a person not on the basis of personal merit, achievement, or personal characteristics but rather on the basis of birth. Castes are hereditary, mutually exclusive, endogamous and occupation-specific. The Indian caste system consists of four distinct social classes (called *Varna*) hierarchically ranked according to prestige, political power, economic dominance and educational privileges. I shall consider only two broad categories – lower castes and higher castes.

Land and power have long been concentrated in India in the hands of the higher castes while the lower castes provided services to the higher castes (Kumar, 1982; Banerjee and Knight, 1985). To correct for caste-based inequalities, the government of India enacted compensating discrimination policies shortly after independence (in 1951, 4 years after the end of the British colonial rule), reinforcing and amending reforms that can be traced back to British colonial-era reservation programs (Kumar, 1992). The former untouchable castes (presently known as *dalits*) and some tribal communities, who have been socially and economically marginalised, are the target group of the reservation policy. They are defined (under article 366 of India's Constitution) as the Scheduled Castes (SCs) and Scheduled Tribes (STs), and make up some 16-17 percent and 7-8 percent of the total Indian population respectively. The Constitution of India (article 46) allows for special provisions for members

of these two disadvantaged groups. Compensating discrimination by the Indian government has entailed two-fold steps. Actions were taken to prevent discrimination against the low-caste members (SCs and STs). Also *compensating discrimination* for the low castes was introduced by reserving seats (22.5 percent among which 15 percent are for SCs and 7.5 percent are for STs) in the legislature (*political reservation*), in government-sponsored educational institutions (*educational reservation*) and in public sector jobs (*job reservation*), with the objective of "empowering" the lower castes.[7]

3. Equity, efficiency and fairness

We wish to evaluate policies by criteria of equity, efficiency, and fairness. In this regard, there is a bewildering variety of experimental evidence on individuals' preferences. In some experiments, people are selfishly motivated and in other cases people have "other regarding" preferences. Fehr and Schmidt (2006, chapter 8) classify theories of "other regarding preferences" under headings of models of "social preferences", "interdependent preferences" and "intention-based reciprocity". Models with social preferences[8] view an individual as caring about material resources allocated to other individuals within a reference group. There may also be altruism, envy, or inequity aversion. Inter-caste inequality resulting from discrimination is in particular the source of envy. There can also be envy within groups, which is not taken into account in my model. An individual's utility is affected by envy when people have the same innate learning ability but are from different castes. The reference group of a low-caste individual therefore consists of high-caste individuals with the same innate ability, and vice-versa.[9]

Envy-freeness is an appealing concept of equity (Rabin, 1993; Bolton and Ockenfels, 2000; Fehr and Schmidt, 1999; Konow, 2003; Clippel, 2008). Equity means no-envy: an allocation is equitable if no individual prefers others' possession to his/her own possessions (Foley, 1967; Varian, 1974; Kolm, 1995). For an allocation to be fair, it must be equitable as

---

[7] The percentage of positions reserved for SCs and STs varies at the state level according to the approximate proportions of these groups in each state. Also in 1992, 27 percent of positions were reserved for other backward classes (OBC) belonging to different castes and communities whose position was marginally better than that of the SCs and STs but worse than that of the higher-caste group (following the recommendation of Mandal Commission set up in 1979).

[8] In models of "interdependent preferences" and "intention based reciprocity" the individuals, in addition to own monetary payoff, are concerned respectively by the 'type' and 'intention' of the reference agents.

[9] My envy-based specification of preferences, therefore, differs from the "keeping up with the Joneses" attribute of preferences, which refers to the idea that an individual's utility depends on the individual's consumption relative to the total past or present consumption of the society. My model shares the idea put forward by the inequity aversion literature that people dislike inequality that makes them worse off, but I rule out the symmetry that people also dislike inequality that makes them better off.

well as Pareto-efficient (Varian, 1974)[10], but some economists define fairness only in the sense of no-envy (see, e.g., Feldman and Kirman, 1974; Chaudhuri, 1986; Diamantaras and Thomson, 1990; Nishimura, 2003a,b; Chavas, 2008). Compatibility between equity/fairness and efficiency is a highly debated issue.[11] My model shows that post-compensating discrimination allocation can be efficiency-improving only at the expense of equity – which is consistent with equity and efficiency as mutually exclusive. Envy can be efficiency-enhancing or the source of inefficiency, depending on how envy affects incentives (Hillman (2009, chapter 1).[12]

Also of relevance as background for my model is a literature on identity and economic outcomes (Akerlof and Kranton, 2000; Rapoport and Weiss, 2003) and expressive utility from confirming identity (Hillman, 2010). An individual's group identity determines his or her economic ex-post outcome when individuals in different groups are identical ex-ante in education or in innate qualities (Basu, 2006). Also, experiments conducted by Hoff and Pandey (2006) suggest that discrimination shapes social identity among castes such that, after equal opportunities across groups are provided, low-caste people still do not take advantage of opportunities when social identity or status is publicly revealed. In my model compensating discrimination based on social identity results in different ex-post economic outcomes for individuals with the same innate learning abilities, with caste-identity generating envy in the mind of the unprivileged group.

4. The model

I view individuals behind *a veil of ignorance* as identical, with the same utility function and facing the same uncertainty about future incomes. Individuals know the probabilities of

---

[10] Also Piketty (1994) defines a fair allocation as one that satisfies the Pareto-optimality criterion as well as equal liberty in the sense that every individual must have an access to the same set of opportunities, which is equivalent to the 'no-envy' criterion as long as the individual is rational, because rationality guides the individual to choose the most preferred bundle from the given opportunity set.

[11] In the context of classical exchange economies, unanimous envy (i.e., every agent envies another) cannot exist in an efficient allocation (Varian, 1974) but it is also possible to have unanimous envy at the interim stage even with interim efficient allocation rules if there is asymmetric information regarding the fundamentals of the economy among the agents in course of contracting (Clippel, 2008). A competitive market can result in a fair allocation only when the purchasing power among consumers is not very unequally distributed (Chavas, 2008).

[12] Mui (1995) considers a setting in which a follower attempts to retaliate against an innovation introduced by an innovator, with a personal cost justified by envy – and innovation may therefore be deterred. Grund and Sliwka (2002) demonstrate that for a given prize structure greater efforts are exerted in a tournament among inequity averse agents compared to among agents with purely self-regarding preferences, because anticipation of envy – feelings of disadvantageous inequality – provide greater incentives for increasing efforts than that of compassion - feelings of advantageous inequality - for reducing efforts.

outcomes in the society.[13] The fairness of compensating discrimination in a caste-based society is judged by comparing the pre- and the post-compensating discrimination allocations after the computation of expected utility losses from inequity and inefficiency. The benchmark case with which I begin has counterfactually no caste-based discrimination.

4.1. Benchmark

A caste-based economy is populated by a continuum of individuals of measure 1. The individuals behind a veil of ignorance know that they are going to born in a caste-based economy where n^L and n^H are respectively the proportions of the low-caste and the high-caste groups, so that

$$n^L + n^H = 1 \qquad (1)$$

Innate learning abilities across the caste groups are uniformly distributed on the ability space $[0, 1]$, such that, $a_j^L \sim U[0, 1]$ and $a_k^H \sim U[0, 1]$. Individuals within a particular caste group are differentially efficient in transforming time spent on learning into productive skills. They know that there is a continuum of jobs of measure 1 among which p^s and p^{us} are respectively the proportions of skilled and unskilled jobs, so that

$$p^s + p^{us} = 1 \qquad (2)$$

The individuals know behind the veil of ignorance that they will be treated equally in facing no discrimination in access to education or choice of occupation after emergence from behind the veil of ignorance. In the absence of discrimination, the society appears as if there is no caste system. The individuals have two options - either to be educated and earn income as a skilled worker or not to invest in education and earn income as an unskilled worker. There is perfect competition and full employment in the skilled sector, and the skilled jobs are allocated on the basis of comparative advantage. The productivity level of an individual is defined as

$$q_i = \begin{cases} 1 & \textit{if he or she does not choose education} \\ 1 + a_i & \textit{if he or she chooses education} \end{cases} \qquad (3)$$

---

[13] In earlier literature, the effect of veil of ignorance on the choice of equity (equality in distributions) has been investigated either under risk where the risk-averse individuals know the probabilities of belonging to one group or under genuine uncertainty where the uncertainty-averse individuals do not know these probabilities (see Rawls, 1971; Andersson and Lyttkens, 1999 et al.).

The linear form is for simplicity. Without education all individuals are homogeneous in productivity.[14]

An individual behind the veil of ignorance decides on education if and only if education enables him or her to earn net income (total wage minus cost of education) higher than the income he could obtain without education, i.e.,

$$(1 + a_i)w - cw > w \qquad (4)$$

Here w is the wage per unit of productivity level and $c \in (0, 1)$ is the cost of education parameter – a fixed proportion of wage spent on learning. After simplification,

$$a_i > c = a_c \qquad (5)$$

Definition 1: *A critical agent is defined as an individual with the threshold level innate learning ability for choosing education, $a_c = c$.*[15]

Individuals with learning abilities higher than that of the critical agent opt for education. Due to the uniform distribution of a_i and full employment in the skilled sector, we can write:

$p^s = 1 - c$ and $p^{us} = c$.

Definition 2: *The utility function of an unskilled ($a_i \leq a_c$) and a skilled ($a_i > a_c$) worker is*

$$u(y_i(a_i)) = \begin{cases} 1 & \text{if } a_i \leq a_c = c \text{ }_{16} \\ 1 + a_i - c & \text{if } a_i > a_c \end{cases}$$

where $y_i(a_i)$ is an individual i's income endogenously determined by learning ability.

The wage per productivity level is set equal to unity ($w = 1$). The individuals after emergence from behind the veil of ignorance are equal[17] in the sense that there is no ex-ante inequality in socio-economic status across individuals at the beginning of life and no ex-post inequality for individuals with the same productivity level. This implies that there is envy neither to begin with nor after incomes have been determined.

---

[14] See also Docquier and Rapoport (2003a,b).

[15] Also see Kanbur and Rapoport (2005) who define the critical agent as one who is indifferent in making decisions whether or not to invest in education when his expected lifetime income with education does not exceed his lifetime income without education.

[16] I assume a linear income utility function for simplicity. Extension to concave utility function to allow for risk aversion will not change the conclusions.

[17] People after emerging from behind the veil of ignorance might be treated as unequal having different income levels and that kind of inequality could generate envy in the mind of low-income group, but we ignore that possibility for the sake of our argument. In the absence of caste-based discrimination the individuals are self-interested and do not bother about other individuals' possessions.

Behind the veil of ignorance, individuals know the threshold level innate ability for choosing education and the income distribution across the skilled and unskilled workers in the society. Without having knowledge of their own ability, they do not know whether they will earn income as skilled or unskilled labour. An individual behind the veil of ignorance computes expected utility as:

$$EU = c\int_0^{a_c} da + (1 - c)\int_{a_c}^1 (1 + a - c)da \tag{6}$$

After calculation, Eq.(6) yields,

$$EU = \frac{3 - 7c + 7c^2 - c^3}{2}. \tag{7}$$

In the absence of caste-based discrimination, education allows individual improvement and the outcome is efficient as well as equitable.

4.2. Adverse discrimination

The individuals behind the veil of ignorance now do not know whether they will belong to low- or high-caste group but they do know that there is caste-based discrimination in access to education and in choice of jobs in the society. All low-caste individuals without the opportunity to choose education will be homogeneous with the level of productivity,

$$q_j^L = 1 , \ \forall \ j \in n^L \tag{8}$$

and earn income as unskilled workers. Because of access to educational opportunities, the productivity level of an individual k belonging to the high-caste group will be:

$$q_k^H = \begin{cases} 1 & \text{if he or she does not choose education} \\ 1 + a_k & \text{if he or she chooses education} \end{cases} \tag{9}$$

The income level of a high-caste individual will be endogenously determined by personal learning ability. An individual k will choose education if and only if

$$a_k > c = a_c^H \tag{10}$$

Where a_c^H is the critical agent in the high-caste group. Behind the veil of ignorance, individuals know that because of discrimination the skilled jobs will be allocated only to the educated high-caste individuals on basis of personal productivity.[18]

---

[18] The utility function below does not take into account other-regarding preferences. A high-caste individual is not envious and the possibility of extra utility gain when his income level exceeds that of the reference group has been ruled out. In contrast to the literature on inequity aversion, there is literature that propose utility gain when a person is better off than others, although this positive effect is weaker than the negative effect of envy on utility

Definition 3: *The utility function of a high-caste individual k is*

$$u_k^H(y_k) = \begin{cases} 1 & if \ a_k \le a_c^H = c \\ 1 + a_k - c & if \ a_k > a_c^H \end{cases}$$

Behind the veil of ignorance, individuals are aware of envy among the to-be low-caste group. They anticipate that some low-caste people will be born with learning abilities higher than that of the low-caste critical agent, a_c^L ($a_j > a_c^L = a_c^H = c$, assuming the same threshold level for choosing education across the castes). Such low-caste people could increase their productivity levels, if there were equal opportunities in access to education irrespective of caste. They however receive lower wages than high-caste individuals of same learning ability, due to their low-caste identity. They envy the high-caste individuals and incur a utility loss from the unfavourable wage inequality.[19]

Definition 4: *The utility function of an individual j belonging to the low-caste group is based on other regarding preferences and is*

$$u_j^L(y_j, y_k) = y_j(a_j) - \beta_1 \gamma_1 [y_k(a_j) - y_j(a_j)] \qquad [20]$$

$$where \ \beta_1 = \begin{cases} 1 & if \ a_j > a_c^L = a_c^H \\ 0 & if \ a_j \le a_c^L = a_c^H \end{cases}$$

$y_j(a_j)$ and $y_k(a_j)$ are the levels of income of the respective low-caste individual j and the high-caste individual k with the same abilities, the latter being endogenously determined by learning abilities. A low-caste individual j 's total utility is equal to his income $y_j(a_j)$ (where $y_j(a_j) = 1, \ \forall \ a_j \in [0, 1]$) if his learning ability is less than that of the critical agent ($a_j \le a_c^L = a_c^H$), i.e., when he does not envy anyone; but if a low-caste individual j earns one unit less of income than the high-caste individual k, in spite of having learning ability

---

(see Loewenstein et al., 1989;, Banerjee, 1990; Schoeck, 1996; Goel and Thakor, 2005 et al.). Usually high income provides high social status due to which an individual may gain additional utility but in a caste-based economy high-caste individuals have an inherited right to high social status whatever be their levels of income.

[19] See Grund and Sliwka (2002), Goel and Thakor (2005), Bartling and Siemens (2006), who likewise describe an envious agent incurring disutility when he or she receives a lower wage than others.

[20] This utility function is formulated on the basis of the idea developed by Fehr and Schmidt (1999), but it differs from the latter by not considering disutility from advantageous inequity and normalization of the disutility since the number of individuals in the reference group is infinite in our model.

higher than that of the critical agent ($a_j > a_c^L = a_c^H$), his utility is reduced by γ_1. I assume that $0 < \gamma_1 < 1$: the individual is thus envious but the intensity of envy[21] is less than unity.[22]

Proposition 1: *In the presence of caste-based discrimination with the utility functions of the high-caste and low-caste individuals respectively given by (3) and (4), expected utility in the pre-compensating discrimination period behind the veil of ignorance is*

$$E\breve{U} = \frac{3 - 7c + 7c^2 - c^3}{2} - n^L \frac{(1-c)^3}{2} - n^L(1-c)\frac{(1-c^2)\gamma_1}{2}$$

The proof is in Appendix A. An important notification is that this expected utility function is fairness consistent.[23] The first term on the RHS is expected utility as in the absence of caste-based discrimination (the benchmark case); the second and the third terms are respectively the expected utility losses in the pre-compensating discrimination regime resulting from inefficiency and envy attributable to deprivation in access to education of the low-caste individuals who might have innate learning abilities greater than that of the critical agent ($a_j > a_c^L = a_c^H$).

Discrimination in access to education results in differences in productivities across castes, which, coupled with discrimination in choice of jobs, creates inequality in incomes, which is the source of envy. The benefit of education is not fully reaped under caste-based discrimination. Expected utility under caste-based discrimination is lower than that under no discrimination because *caste-based discrimination in the pre-compensating discrimination regime makes for an inefficient and inequitable allocation.*

---

[21] The definition of intensity of envy is adopted from Fehr and Schmidt (1999). Intensity of envy is also measured by the resources required to convert an envious agent to non-envious one. The larger the resources needed to make an envious agent non-envious one, the higher is his envy intensity (Fleurbaey, 2006). It is also found to be larger when one can imagine, "I could be in his place" (see Heider, 1958; Elster, 1991; Parrott, 1991), or the superiority of the person who is envied increases (Goel and Thakor, 2005).

[22] See also Kirchsteiger (1994) who assumes an envy parameter (or intensity of envy) less than unity predicated on an individual having a higher regard for own income than for the incomes of the individuals in his or her reference group.

[23] Varian (1974) defines the social welfare function consistent with fairness, $W\left(u_i\left(x_j\right)\right)$, by introducing the other regarding preferences in the Bergson-Samuelson social welfare function, $W\left(u_i\left(x_i\right)\right)$. The specific form is as follows:

$$W(x) = \alpha \sum u_i(x_i) - \beta \sum \left(u_i\left(x_j\right) - u_i\left(x_i\right)\right)\delta_{ij},$$

where the parameters α and β are the weights assigned to efficiency and equity arguments. δ_{ij} is zero if there is no-envy and unity otherwise.

4.3. Compensating discrimination

The individuals behind the veil of ignorance now know that they are going to born into a caste-based economy with compensating discrimination where all the individuals irrespective of castes are permitted access to education. The productivity level of a high-caste individual k is given by (9) and that of a low-caste individual j is

$$q_j^L = \begin{cases} 1 & if \ \ he \ or \ she \ does \ not \ choose \ education \\ 1 + a_j & if \ he \ or \ she \ chooses \ education \end{cases} \tag{11}$$

Compensating discrimination is implemented by a quota that reserves places in education and public sector jobs for the low-caste people. Let $\wp$ be the proportion of reserved places in the skilled sector jobs. The remaining places are allocated between the low- and the high-castes according to personal comparative advantage. The minimum-ability requirement for the reserved places is lower than that for the unreserved (*general*) places, implying that low-caste individuals have larger scope to increase their productivity levels under the educational reservation and they have higher returns to the same productivity level compared to the high-caste under the job reservation.

4.3.1. Autonomous education decision

Assume that the individuals behind the veil of ignorance do not take into account the proportion of reserved skilled jobs ($\wp$) but they do take into account the benefits and costs of the reservation policy in making education decision across the castes. An individual j assuming himself in to-be low-caste group decides on education if

$$\left(1 + \varepsilon a_j\right) - \eta c > 1 \quad , \tag{12}$$

where $\varepsilon \ (>1)$ is the return to education under the job reservation policy. The higher the learning ability of a low-caste individual, the greater is the benefit obtained. $\eta \ (<1)$ is present as a government subsidy on the cost of education – a proportional cost reduction – for low-caste people accompanying the compensating discrimination policy scheme. After simplification,

$$a_j > \frac{\eta}{\varepsilon}c = \hat{a}_c^L \ . \tag{13}$$

The high-caste critical agent is defined as $\hat{a}_c^H = a_c^H = c$ since $\varepsilon = 1$ and $\eta = 1$ for the high caste. It follows that $\hat{a}_c^L < \hat{a}_c^H = c$. That is, compensating discrimination provides an incentive

for the low-caste individuals to choose education even with learning ability lower than that of the high-caste critical agent, thereby raising the number of educated individuals in the low-caste group.

Definition 5: *The utility function of a low-caste individual* j *under autonomous education decision is*

$$u_j^L(y_j) = \begin{cases} 1 & \text{if } a_j \leq \hat{a}_c^L = \dfrac{\eta}{\varepsilon}c \\ 1 + \varepsilon a_j - \eta c & \text{if } a_j > \hat{a}_c^L \end{cases}$$

Since low-caste individuals are the privileged group in the compensating-discrimination regime, envy does not enter into their utility function. However, the individuals behind the veil of ignorance perceive envy among the to-be high-caste group.

Definition 6: *The utility function of a high-caste individual* k *is:*

$$u_k^H(y_k, y_j) = y_k(a_k) - c - \beta_2 \gamma_2 [y_j(a_k) - y_k(a_k)]$$

$$\text{where} \quad c \begin{cases} > 0 & \text{if } a_k > \hat{a}_c^H \\ = 0 & \text{if } a_k \leq \hat{a}_c^H \end{cases} \text{and} \quad \beta_2 = \begin{cases} 1 & \text{if } \hat{a}_c^H \geq a_k > \hat{a}_c^L \quad \text{or if } a_k > \hat{a}_c^H \\ 0 & \text{if } a_k \leq \hat{a}_c^L \end{cases}$$

$y_j(a_k)$ and $y_k(a_k)$ are incomes of the respective low-caste individual j and the high-caste individual k, endogenously determined by their own but same learning abilities. Utility of a high-caste individual k is equal to his income earned without education, $y_k(a_k)$, if his learning ability is less than that of the low-caste critical agent ($a_k \leq \hat{a}_c^L$). $y_k(a_k)$ is thus the utility of an uneducated envy-free high-caste individual k.

A high-caste individual with learning ability between the threshold levels for choosing education in the low- and high-caste groups ($\hat{a}_c^H \geq a_k > \hat{a}_c^L$) cannot choose education and earn the unskilled wage but could become educated and might obtain a skilled job if he or she were to belong to the low-caste group. Again, with ability higher than that of the high-caste critical agent ($a_k > \hat{a}_c^H$), an individual can become educated but obtains lower returns to education compared to low-caste individuals with same ability. As a result of unfavourable wage inequalities caused by compensating discrimination, a high-caste individual in either

case become envious[24, 25] and incurs utility loss. The intensity of envy of the high-caste individuals is γ_2, where $0 < \gamma_2 < 1$.

Proposition 2: *In the post-compensating discrimination period when the utility functions of the low-caste and the high-caste individuals are given by Def. (5) and Def. (6), individuals behind the veil of ignorance compute expected utility as*

$$E\hat{U} = \frac{3 - 7c + 7c^2 - c^3}{2} + n^L(1-c)\left[\frac{(\varepsilon - \eta c)^2}{2\varepsilon}\right] - n^L(1-c)\left[\frac{(1-c)^2}{2}\right] + (1 - 2c)\left(1 - \frac{\eta}{\varepsilon}\right)c$$

$$- (1 - n^L)(1-c)\gamma_2\left[\frac{\varepsilon(\varepsilon - 1) + (\varepsilon - \eta^2)c^2}{2\varepsilon}\right]$$

The formal proof of the proposition 2 is in Appendix B but the important implications are as follows. The first term on the RHS is the expected utility equivalent to the benchmark case. The second term defines the expected efficiency gains resulting from compensating discrimination. This term has two components. In particular, Eq. (B.4) (in Appendix B) shows that $n^L(1-c)\int_c^1 (\varepsilon a - \eta c)\, da$ is the expected utility gain due to low-caste individuals' access to education and higher returns and $n^L(1-c)\int_{\frac{\eta}{\varepsilon}c}^c (\varepsilon a - \eta c)\, da$ indicates expected utility gains due to an increase in number of the educated low-caste individuals. The third term is the expected utility loss from non-Pareto-improving change because low-caste individuals benefit at the expense of some high-caste individuals under the reservation policy. The expected utility loss is $n^L(1-c)\int_c^1 (a - c)\, da$, which is equivalent to the expected utility loss resulting from inefficiency due to low-caste individuals' being denied access to education in the pre-compensating discrimination period.

---

[24] It might be surprising to view the high-caste individual with $a_k > \hat{a}_c^H$ as envious since he earns high income in absolute term. But utility or overall job satisfaction depends on the relative income/consumption – income/consumption compared to others in the reference group (see Frank, 1984; Bolton, 1991; Clark and Oswald, 1996; Lehmann, 2001; Goel and Thakor, 2005). In particular, Goel and Thakor (2005) specify an individual's preferences as based on relative consumption in addition to absolute consumption, such that the individual gains and loses utility according to whether his consumption exceeds and is below that of his reference group.

[25] The literature on envy also reveals that people generally do envy those people who are like them or equal to them but turn out to be a bit superior to them (see Parrott, 1991).

Under the reservation policy, there are two sources of *inefficiency*. First, some reserved places can remain vacant due to non-fulfilment of the minimum productivity requirement: Pareto-improving change could have taken place if these reserved vacant places would be open for all individuals irrespective of caste. Second, the places excluding the reserved positions allocated on the basis of comparative advantage are insufficiently small, resulting in excess demand for skilled jobs. Therefore, some high-caste individuals with learning abilities higher than that of the high-caste critical agent, who could have skilled jobs in the adverse discrimination regime, are compelled to take unskilled jobs under the compensating discrimination regime, which is an inefficient allocation of ability.

The fourth term (see Eq. (B.4) in Appendix) indicates the expected utility gain if the proportion of skilled jobs is higher than that of unskilled jobs. The fifth term defines the expected utility loss due to envy of high-caste people towards the low-caste with the same learning abilities but different levels of earning. This term also has two components. In particular, Eq. (B.4) (in Appendix B) reveals that $(1 - n^L)(1 - c)\gamma_2\,\varepsilon \int_{\frac{\eta}{\varepsilon}c}^{c} a\, da$ is the expected utility loss due to envy of the uneducated high-caste individuals with learning abilities with $\hat{a}_c^H \geq a_k > \hat{a}_c^L$; and $(1 - n^L)(1 - c)\gamma_2(\varepsilon - 1)\int_{c}^{1} a\, da$ is the expected utility loss due to envy of educated high-caste individuals whose learning abilities are higher than that of their critical agent ($a_k > \hat{a}_c^H$). Therefore, the post-compensating discrimination allocation is inequitable and not Pareto-improving.

Proposition 3: *Assignment to jobs under the caste system in the post-compensating discrimination regime is efficiency-improving if the proportion of unskilled jobs is no more than half, but compensating discrimination is not fairness-improving.*

Proof: The assignment under compensating discrimination regime is efficiency-improving compared to the adverse discrimination regime if

$$n^L(1 - c)\left[\frac{(\varepsilon - \eta c)^2}{2\varepsilon}\right] + (1 - 2c)\left(1 - \frac{\eta}{\varepsilon}\right)c - n^L(1 - c)\left[\frac{(1 - c)^2}{2}\right] > -\,n^L(1 - c)\left[\frac{(1 - c)^2}{2}\right]\,.$$

Given that $n^L > 0$, $\varepsilon > 1$, $\eta < 1$ and $c \in (0, 1)$, the above inequality holds for $c \leq \dfrac{1}{2}$.

Further, the ratio of expected utility losses due to envy in the compensating discrimination regime $\left(\hat{\Gamma}\right)$ to that in the adverse discrimination regime $\left(\breve{\Gamma}\right)$ is

$$\frac{\hat{\Gamma}}{\breve{\Gamma}} = \frac{\left(1 - n^L\right)\left(1 - c\right)\gamma_2 \left[\dfrac{\varepsilon(\varepsilon - 1) + \left(\varepsilon - \eta^2\right)c^2}{2\varepsilon}\right]}{n^L\left(1 - c\right)\dfrac{\left(1 - c^2\right)\gamma_1}{2}} \; .$$

After simplification,

$$\frac{\hat{\Gamma}}{\breve{\Gamma}} = \frac{\left(1 - n^L\right)\gamma_2}{n^L\gamma_1} \left[\frac{\varepsilon^2\left(1 - \left(\dfrac{\eta}{\varepsilon}c\right)^2\right)}{\varepsilon\left(1 - c^2\right)} - 1\right]$$

Substitute $\hat{a}_c^L = \dfrac{\eta}{\varepsilon}c$ and $\hat{a}_c^H = c$ so that

$$\frac{\hat{\Gamma}}{\breve{\Gamma}} = \frac{\left(1 - n^L\right)\gamma_2}{n^L\gamma_1} \left[\varepsilon\left(\frac{1 - \hat{a}_c^{L2}}{1 - \hat{a}_c^{H2}}\right) - 1\right]$$

With $n^L \leq \dfrac{1}{2}$ and $\gamma_2 = \gamma_1$,

$$\frac{\left(1 - n^L\right)\gamma_2}{n^L\gamma_1} > 1 \, .$$

Also $\varepsilon > 1$ and $\hat{a}_c^L < \hat{a}_c^H$ implies that

$$\varepsilon\left(\frac{1 - \hat{a}_c^{L2}}{1 - \hat{a}_c^{H2}}\right) > 1 \, .$$

Therefore, $\dfrac{\hat{\Gamma}}{\breve{\Gamma}}$ can be larger than unity if

$$\left[\varepsilon\left(\frac{1 - \hat{a}_c^{L2}}{1 - \hat{a}_c^{H2}}\right) - 1\right] \geq 1 \, ,$$

which is the case either if $\varepsilon \gg 1$ or if $\eta \ll 1$ so that $\hat{a}_c^L \ll \hat{a}_c^H$. (Q.E.D.)

There is a *'paradox of equity'*: the greater is the intent to achieve equity, the larger is the expected utility loss due to envy and the greater is the inequitable job assignment.

4.3.2. Quota ($\wp$) dependent education decision

After the implementation of affirmative action, the total number of educated individuals in the society is larger than the total number of skilled jobs:

$$\left(1 - n^L\right)\left(1 - c\right) + n^L\left(1 - \frac{\eta}{\varepsilon}c\right) = \left(1 - c\right) + n^L\left(c - \frac{\eta}{\varepsilon}c\right) > \left(1 - c\right) \tag{14}$$

There is therefore an excess demand for skilled jobs. If the total number of reserved places is at least equal to the total number of educated low-caste people ($\wp\left(1 - c\right) \geq \left(1 - \hat{a}_c^L\right)n^L > 0$), a low-caste person with $a_j > \hat{a}_c^L$ will certainty obtain a skilled job but there is uncertainty about a high-caste individual even with innate ability $a_k > \hat{a}_c^H$ obtaining a skilled job.

(A) Education decision of the high-caste

The education decision among the high-caste individuals with innate abilities $a_k > \hat{a}_c^H = c$ can be simplified and represented by a game of chicken (or "hawk-dove" game) in which there are two high-caste players and one skilled job. Behind the veil of ignorance, players do not know each others' abilities and treat each other as equally productive in an expected sense. The players choose between education and non-education $\{E, NE\}$. The game is symmetric, with the two identical players confronting the same costs and benefits of education.

Player 2

	Not Educate	Educate
Not Educate	1, 1	1, $\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\}$
Educate	$\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\}$, 1	$\{(1 - c - \gamma_2\varepsilon a) + \pi(1 + \gamma_2)a\}$, $\{(1 - c - \gamma_2\varepsilon a) + \pi(1 + \gamma_2)a\}$

(Player1 appears at left of the Educate/Not Educate rows)

Table 1: High-Caste Education Decision Game

When both individuals decide against education, the outcome is (1, 1). The uneducated individuals are not envious towards the low-caste, because of their voluntary decision not to become educated. When one person becomes educated, he or she obtains the skilled job but incurs disutility due to relative deprivation when comparing own income with that of the low-caste of same abilities: the outcome is ($\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\}$, 1) if person 1 chooses

16

education or (1, $\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\}$) if person 2 become educated. When both persons decide on education, one of them will have to work in the unskilled sector, and will be envious towards the low-caste because of not having access to reserved skilled jobs.

Conditional on being high-caste, individuals behind the veil of ignorance do not know who will have the skilled job and compute the expected utility from education as:

$$\pi\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\} + (1 - \pi)(1 - c - \gamma_2\varepsilon a) = (1 - c - \gamma_2\varepsilon a) + \pi(1 + \gamma_2)a \qquad (15)$$

where π is the probability of having a skilled job and $\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\}$ and $(1 - c - \gamma_2\varepsilon a)$ are respectively an educated envious high-caste person's utility from skilled and unskilled jobs. The outcome when both persons decide on education is $(\{(1 - c - \gamma_2\varepsilon a) + \pi(1 + \gamma_2)a\}, \{(1 - c - \gamma_2\varepsilon a) + \pi(1 + \gamma_2)a\})$.

There is no dominant strategy and there are two pure strategy Nash equilibria, at $(\{(1 + a - c) - \gamma_2(\varepsilon - 1)a\}, 1)$ and $(1, \{(1 + a - c) - \gamma_2(\varepsilon - 1)a\})$ under the assumption that

$a > \dfrac{c}{1 - \gamma_2(\varepsilon - 1)}$ so that payoff with envy in the skilled job exceeds payoff without envy in

the unskilled jobs. The Nash equilibria are fairness-improving because total benefit is maximal ($= 2 + \{1 - \gamma_2(\varepsilon - 1)\}a - c$) taking into account the equity-efficiency trade off. We use the game to show how the number of reserved places plays a crucial role in the education decision of high-caste people.

Taking into account the possibility of obtaining either skilled or unskilled jobs when educated, an individual k conditional on being high-caste will decide on education behind the veil of ignorance if

$$(1 - c)(1 - \wp)(1 + a_k - c) + c(1 - c) > 1 \quad [26] \qquad (16)$$

which yields $a_k > \dfrac{c + \wp(1 - c)^2}{(1 - c)(1 - \wp)} = \hat{a}_c^H(\wp)$ \qquad (17)

Lemma 1: $0 < \hat{a}_c^H(\wp) < 1 \quad \forall \wp \in [0, 1)$ *and* $\hat{a}_c^H(\wp)$ *is a convex function of* $\wp$ *and represented by an upward rising convex curve.*

---

[26] The benefits from reserved skilled jobs, $(1 - c)r$, is equal to zero for the high-persons.

Proof: From Eq. (17), $\hat{a}_c^H(0) = \dfrac{c}{1-c}$ and $\hat{a}_c^H(1) \to \infty$. $\hat{a}_c^H(\wp) < 1$ if $\wp < \dfrac{1-2c}{(1-c)(2-c)}$ which

is true for $0 < c < \dfrac{1}{2}$. Also, $\hat{a}_c^{H'}(\wp) = \dfrac{c + (1-c)^2}{(1-c)(1-\wp)^2} > 0$ i.e., $\hat{a}_c^H(\wp)$ is increasing in $\wp$ and

$\hat{a}_c^{H''}(\wp) = \dfrac{2\left[c + (1-c)^2\right]}{(1-c)(1-\wp)^3} > 0$. By the continuity of $\hat{a}_c^{H'}(\wp)$ for $\wp \in [0, 1)$ Lemma 1 is

proved.

(B) Education decision of the low-caste

Assumption : $0 < \wp(1-c) < \left(1 - \hat{a}_c^L\right)n^L$

This assumption introduces uncertainty in obtaining reserved places in the skilled sector jobs for educated low-caste people. An individual j behind the veil of ignorance conditional on being low caste computes expected net earnings from education as:

$$\wp(1 + \varepsilon a_j - \eta c) + (1 - \wp)(1 + a_j - \eta c) = 1 + \{1 + r(\varepsilon - 1)\}a_j - \eta c \qquad (18)$$

Due to the limitation of the quota of reserved skilled jobs, the education decision of low-caste individuals (with innate ability $a_j > \hat{a}_c^L$) can be represented by a game similar to that described for the high-caste. Table 2 shows the possible decisions of two low-caste individuals with innate abilities $a_j > \hat{a}_c^L$ when only one place is reserved in the skilled sector jobs.

		Player 2	
		Educate	Not Educate
Player1	Educate	$(1 - \eta c),\ (1 - \eta c)$	$\left[1 + \{1 + r(\varepsilon - 1)\}a - \eta c\right],\ 1$
	Not Educate	$1,\ \left[1 + \{1 + r(\varepsilon - 1)\}a - \eta c\right]$	$1,\ 1$

Table 2 Low-Caste Education Decision Game

When both persons decide on education, the outcome is $((1 - \eta c),\ (1 - \eta c))$. When neither person decides to become educated, the outcome is $(1, 1)$. Again there is no dominant strategy and there are two pure strategy Nash equilibria, at $(\left[1 + \{1 + r(\varepsilon - 1)\}a - \eta c\right],\ 1)$ and $(1,\ \left[1 + \{1 + r(\varepsilon - 1)\}a - \eta c\right])$. The Nash equilibria are efficient, since total benefit is maximal

$(= 2 + \{1 + \wp(\varepsilon - 1)\}a - \eta c)$. In the mixed strategy equilibrium, a player chooses E and NE with probabilities $\left(\dfrac{\eta c}{\{1 + \wp(\varepsilon - 1)\}a}, 1 - \dfrac{\eta c}{\{1 + \wp(\varepsilon - 1)\}a} \right)$.

Therefore, some low-caste individuals in spite of having innate abilities $a_j > \hat{a}_c^L$ are uncertain about obtaining reserved places in the skilled sector. They will either work as unskilled labour or occupy the unreserved places in the skilled sector through competition with the high-caste educated people. Taking into account these possibilities, an individual j behind the veil of ignorance conditional on being low caste will decide on education if

$$(1 - c)\big[\wp(1 + \varepsilon a_j - \eta c) + (1 - \wp)(1 + a_j - \eta c)\big] + c(1 - \eta c) > 1 \tag{19}$$

After simplification,

$$a_j > \frac{\eta c}{(1 - c)[1 + \wp(\varepsilon - 1)]} = \hat{a}_c^L(\wp) \tag{20}$$

Obviously, $\hat{a}_c^L(\wp) < \hat{a}_c^H(\wp)$. $\tag{21}$

Lemma 2: $0 < \hat{a}_c^L(\wp) < 1 \quad \forall \, \wp \in [0, 1]$ *and* $\hat{a}_c^L(\wp)$ *is a convex function of* $\wp$ *and represented by a downward sloping convex curve.*

Proof: From Eq. (20), $\hat{a}_c^L(0) = \dfrac{\eta c}{1 - c}$ and $\hat{a}_c^L(1) = \dfrac{\eta c}{\varepsilon(1 - c)}$, which implies that

$0 < \hat{a}_c^L(1) < \hat{a}_c^L(0) < 1$. Also, $\hat{a}_c^{L'}(\wp) = \dfrac{\eta c(\varepsilon - 1)}{(1 - c)}\left[\dfrac{-1}{[1 + \wp(\varepsilon - 1)]^2} \right] < 0$, i.e., $\hat{a}_c^L(\wp)$ is

decreasing in $\wp$ and $\hat{a}_c^{L''}(\wp) = \dfrac{\eta c(\varepsilon - 1)^2}{(1 - c)}\left[\dfrac{2}{[1 + \wp(\varepsilon - 1)]^3} \right] > 0$. By the continuity of $\hat{a}_c^{L'}(\wp)$

for $\wp \in [0, 1]$, Lemma 2 is proved.

Definition 7: *The utility function of a low-caste individual* j *is*

$$u_j^L(y_j) = \begin{cases} 1 & \text{if } a_j \leq \hat{a}_c^L = \dfrac{\eta c}{(1 - c)[1 + \wp(\varepsilon - 1)]} \\[4mm] 1 + \varepsilon a_j - \eta c & \text{if } a_j > \hat{a}_c^L \text{ and } \varepsilon \begin{cases} > 1 & \text{if } j \in \wp(1 - c) \\ = 1 & \text{if } j \in (1 - \wp)(1 - c) \end{cases} \end{cases}$$

The utility function in (7) is similar to that in (5) but (7) is based on the quota ($\wp$) dependent education decision. Likewise, a high-caste person's utility function is given by (6) taking into account $\wp$.

Proposition 4: *In the compensating discrimination regime when the utility functions of the high-caste and the low-caste individuals are given by (6) and (7), individuals behind the veil of ignorance compute expected utility as*

$$
\begin{aligned}
E\hat{U} =\ & \left[\left(\frac{3 - 5c + 2c^2}{2} \right) - \left(1 - 3c + c^2\right)\frac{c + \wp(1 - c)^2}{(1 - c)(1 - \wp)} - (1 - c)\frac{\left(c + \wp(1 - c)^2\right)^2}{2(1 - c)^2(1 - \wp)^2} \right] \\
& + n^L(1 - c)\left[\frac{1}{2}\{1 + \wp(\varepsilon - 1)\}\left\{1 - \left(\frac{\eta c}{(1 - c)[1 + \wp(\varepsilon - 1)]} \right)^2 \right\} - \eta c\left\{1 - \left(\frac{\eta c}{(1 - c)[1 + \wp(\varepsilon - 1)]} \right)\right\} \right] \\
& - n^L(1 - c)\left[\frac{1}{2}\left\{(1 - 2c) + 2\left(\frac{c + \wp(1 - c)^2}{(1 - c)(1 - \wp)} \right) - \left(\frac{c + \wp(1 - c)^2}{(1 - c)(1 - \wp)} \right)^2 \right\} \right] \\
& + n^L(1 - 2c)\left[\frac{c + \wp(1 - c)^2}{(1 - c)(1 - \wp)} - \frac{\eta c}{(1 - c)[1 + \wp(\varepsilon - 1)]} \right] \\
& - (1 - n^L)\gamma_2 \frac{1}{2}\left[\begin{array}{l} \wp(\varepsilon - 1)(1 - c) + \{c\varepsilon - \wp(1 - c)(\varepsilon - 1)\}\left(\frac{c + \wp(1 - c)^2}{(1 - c)(1 - \wp)} \right)^2 \\[2mm] - c\varepsilon\left(\frac{\eta c}{(1 - c)[1 + \wp(\varepsilon - 1)]} \right)^2 \end{array} \right]
\end{aligned}
$$

The formal proof of the proposition 4 is in Appendix C. The terms on the RHS have similar interpretations to those in proposition 2.

Proposition 5: *The greater is the intensity of envy (γ_2) in the compensating discrimination regime, the lower is the size of the quota ($\wp$) chosen by the individuals behind the veil of ignorance, if* $\dfrac{c}{\wp(1 - c)} \geq \dfrac{\varepsilon - 1}{\varepsilon}$.

Proof: The proof is in Appendix D.

Individuals behind the veil of ignorance do not know whether they will be low-caste, and therefore they do not know whether they will benefit from the quota. Because they perceive the feeling of envy among to-be high-caste in the presence of quota, they take account of the utility losses attributed to inequity when deciding on the quota of reserved jobs. They therefore consider the effect of a change in γ_2 on $\wp^*$.

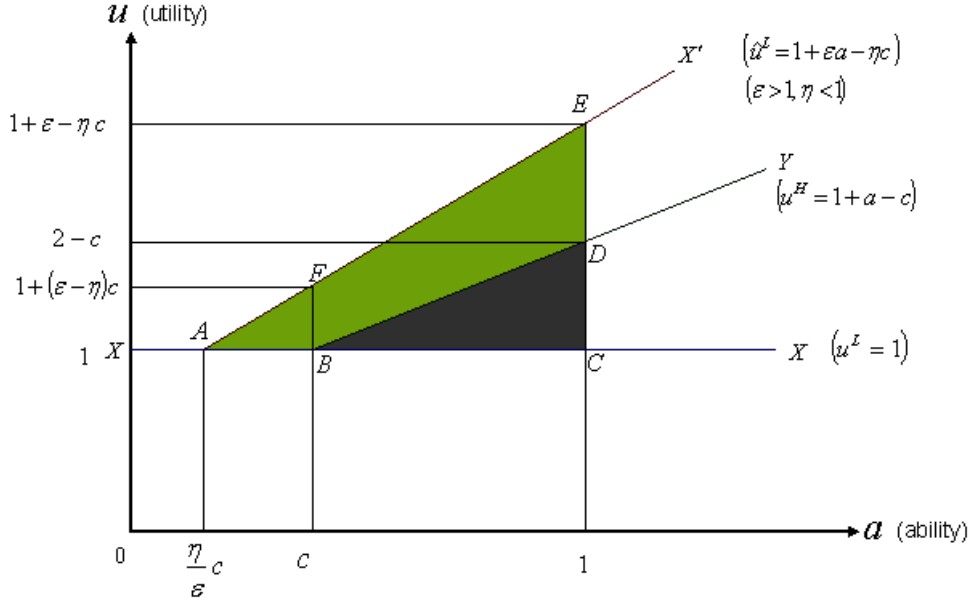## 4.4. Diagrammatical representation

Figure 1: Utility loss due to envy

Figure 1 shows the utility functions of a representative high-caste ($u^H = 1 + a - c$) and low-caste individual ($u^L = 1$) in the adverse discrimination regime as XBY and XX. Learning ability is measured on the horizontal axis. The horizontal line XX reflects the fact that the utility of the low-caste individuals is independent of learning ability, since they do not have access to education under adverse discrimination. XBY represents the utility of the high-caste person endogenously determined by innate learning ability.

Under the compensating discrimination regime, low-caste individuals are allowed to be educated. They obtain higher returns $(\varepsilon > 1)$ and benefit from subsidized cost of education $(\eta < 1)$. Therefore, their utility function ($\hat{u}^L = 1 + \varepsilon a - \eta c$) is kinked and given by XAX', which has steeper slope than the corresponding function of high-caste individuals, the latter being the same both under adverse and compensating discrimination regimes.

Utility loss due to envy of the low-caste people by the high-caste in the adverse discrimination regime is

$$\Delta\, BCD = \frac{1}{2} \times BC \times DC = \frac{1}{2}\left(1 - 2c + c^2\right)$$

Utility loss due to envy of the high-caste people in the compensating discrimination regime is

$$\Delta\, ABF + \text{ Area of quadrilateral } BDEF$$

or equivalently,

21

$$\textit{Area of } \Delta ACE - \textit{Area of } \Delta BCD$$

$$= \left(\frac{1}{2} \times AC \times EC \right) - \left(\frac{1}{2} \times BC \times DC \right)$$

$$= \frac{1}{2} \left[\left(1 - \frac{\eta}{\varepsilon} c \right) (\varepsilon - \eta c) - (1 - c)^2 \right]$$

$$= \frac{1}{2} \left[(\varepsilon - 1) + 2(1 - \eta)c - \left(1 - \frac{\eta^2}{\varepsilon} \right) c^2 \right]$$

5. Conclusion

I have incorporated envy into choice of compensating discrimination policies behind a veil of ignorance and shown how a reversal of envy occurs. In the choice behind the veil of ignorance, it is known that under adverse discrimination low-caste people will be denied access to education and skilled-job opportunities, and that with a policy of compensating discrimination high-caste people will be denied the same opportunities. Because of differences in returns to education due to differences in minimum requirements for the reserved places for the low-caste and unreserved places for the high-caste, a high-caste individual's earnings are either less than those of a low-caste individual with similar intrinsic ability or equal to that of a less productive low-caste individual. The inter-caste inequality resulting from adverse discrimination makes the low-caste individuals envious towards the high-caste people. Compensating discrimination reverses the direction of envy.

There is inefficiency when, under adverse discrimination, low-caste individuals are denied access to educational opportunities and good jobs. Under the compensating-discrimination job reservation policy, low-caste individuals obtain access to skilled jobs that are unavailable to high-caste individuals with similar intrinsic ability. In either case the outcomes are inequitable and inefficient.

The expected utility loss due to envy under reverse discrimination is greater than that under adverse discrimination, if extensive privilege is provided to low-caste people. In that case there is a *paradox of equity*. A compensating-discrimination policy is not, therefore, necessarily fairness-improving.

Allocation of ability and the paradox of equity under the reservation policy impede efficiency outcomes. Compensating discrimination policies provide greater incentives for the low-caste people to be educated but envy then results in more inefficiency because of the diminished incentives of the potentially productive high-caste people to choose to become

educated. The effect of recognizing envy therefore compels the individuals behind the veil of ignorance to choose a reduced quota when the intensity of envy parameter is higher.

Acknowledgements

Appendices

Appendix A. Proof of Proposition 1

The total utility of the high-caste group computed by Def. (3) is as follows

$$u^H(y_k) = \begin{cases} \int_0^{a_c^H} da & \text{if } a_k \leq a_c^H = c \\ \int_{a_c^H}^1 (1 + a - c)da & \text{if } a_k > a_c^H \end{cases} \tag{A.1}$$

and the total utility of the low-caste group computed by Def. (4) is as follows

$$u^L(y_j, y_k) = \begin{cases} \int_0^{a_c^L} da & \text{if } a_j \leq a_c^L = a_c^H = c \\ \int_{a_c^L}^1 (1 - \gamma_1 a)da & \text{if } a_j > a_c^L = a_c^H \end{cases} \tag{A.2}$$

Behind the veil of ignorance the individuals compute the expected utility under the adverse discrimination regime as:

$$E\breve{U} = n^L \left[c\int_0^c da + (1-c)\int_c^1 (1 - \gamma_1 a)da \right] + (1 - n^L)\left[c\int_0^c da + (1-c)\int_c^1 (1 + a - c)da \right] \tag{A.3}$$

Using the linearity property of the definite integral the above equation can be rewritten as

$$E\breve{U} = c\int_0^c da + (1-c)\int_c^1 (1 + a - c)da - n^L(1-c)\gamma_1\int_c^1 a\,da - n^L(1-c)\int_c^1 (a - c)da \tag{A.4}$$

Eq. (A.4) defines the expected utility computed by the individuals behind the veil of ignorance when they know that they will confront the objective probabilities of belonging

either to the low-caste or to the high-caste groups and the subjective probabilities[27] of having innate abilities either higher or lower than the threshold level for choosing education. After computation Eq. (A.4) yields expected utility obtained in proposition 1.   (Q.E.D.)

Appendix B. Proof of Proposition 2

The total utility of the low-caste group can be computed by Def. (5) as

$$
u^L(y_j) = \begin{cases} \displaystyle\int_0^{\hat{a}_c^L} da & \text{if } a_j \leq \hat{a}_c^L = \dfrac{\eta}{\varepsilon}c \\ \displaystyle\int_{\hat{a}_c^L}^1 (1 + \varepsilon a - \eta c)\, da & \text{if } a_j > \hat{a}_c^L \end{cases}
\tag{B.1}
$$

and the total utility of the high-caste group can be computed by Def. (6) as follows:

$$
u^H(y_k, y_j) = \begin{cases} \displaystyle\int_0^{\hat{a}_c^L} da & \text{if } a_k \leq \hat{a}_c^L \\ \displaystyle\int_{\hat{a}_c^L}^{\hat{a}_c^H} (1 - \gamma_2 \varepsilon a)\, da & \text{if } \hat{a}_c^H \geq a_k > \hat{a}_c^L \\ \displaystyle\int_{\hat{a}_c^H}^1 [(1 + a - c) - \gamma_2(\varepsilon - 1)a]\, da & \text{if } a_k > \hat{a}_c^H \end{cases}
\tag{B.2}
$$

Behind the veil of ignorance the individuals compute the expected utility consistent with fairness under the compensating discrimination regime as:

$$
E\hat{U} = n^L \left[c \int_0^{\frac{\eta}{\varepsilon}c} da \ + (1-c) \int_{\frac{\eta}{\varepsilon}c}^1 (1 + \varepsilon a - \eta c)\, da \right]
$$

$$
+ (1 - n^L) \left[c \int_0^{\frac{\eta}{\varepsilon}c} da + (1-c) \left\{ \int_{\frac{\eta}{\varepsilon}c}^c (1 - \gamma_2 \varepsilon a)\, da + \int_c^1 [(1 + a - c) - \gamma_2(\varepsilon - 1)a]\, da \right\} \right]
\tag{B.3}
$$

Using the linearity property and the property of additivity of integration on intervals Eq. (B.3) can be written as follows

---

[27] The subjective probabilities have been transformed into objective probabilities of getting the skilled and unskilled jobs.

$$E\hat{U} = \left[c\int_0^c da + (1-c)\int_c^1 (1+a-c)da \right] + n^L(1-c)\left[\int_{\frac{\eta}{\varepsilon}c}^c (\varepsilon a - \eta c)da + \int_c^1 (\varepsilon a - \eta c)da \right]$$

$$- n^L(1-c)\int_c^1 (a-c)da + \left[(1-c)\int_{\frac{\eta}{\varepsilon}c}^c da - (1-p)\int_{\frac{\eta}{\varepsilon}c}^c da \right] \qquad (B.4)$$

$$- (1-n^L)(1-c)\gamma_2 \left[\varepsilon\int_{\frac{\eta}{\varepsilon}c}^c a\,da + (\varepsilon-1)\int_c^1 a\,da \right]$$

After computation Eq. (B.4) yields expected utility under compensating discrimination regime. (Q.E.D.)

Appendix C. Proof of Proposition 4

Taking into account ($\wp$) the individuals behind the veil of ignorance compute the expected utility as:

$$E\hat{U} = n^L\left[c\int_0^{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}} da + (1-c)\left\{ \wp \int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^1 (1+\varepsilon a - \eta c)da + (1-\wp)\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^1 (1+a-\eta c)da \right\} \right]$$

$$+ (1-n^L)\left[c\left\{ \int_0^{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}} da + \int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}} (1-\gamma_2 \varepsilon a)da \right\} + (1-c)\left\{ \begin{array}{c} \wp \int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^1 [(1+a-c)-\gamma_2(\varepsilon-1)a]da \\ + (1-\wp)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^1 (1+a-c)da \end{array} \right\} \right]$$

$$(C.1)$$

Using the linearity property and the property of additivity of integration on intervals Eq. (C.1) can be written as follows

$$E\hat{U} = n^{L}(1-c)\left[\wp\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{1}(\varepsilon a - \eta c)da + (1-\wp)\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{1}(a-\eta c)da\right] + c\int_{0}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}da$$

$$+ (1-n^{L})(1-c)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}(1+a-c)\,da + n^{L}(1-c)\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{1}da - n^{L}c\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}da$$

$$- (1-n^{L})\gamma_2\left[c\varepsilon\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}a\,da + (1-c)\wp(\varepsilon-1)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}a\,da\right]$$

(C.2)

Proceeding further,

$$E\hat{U} = \left[c\int_{0}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}da + (1-c)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}(1+a-c)\,da\right]$$

$$+ n^{L}(1-c)\left[\wp\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}(\varepsilon a - \eta c)da + (1-\wp)\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}(a-\eta c)da\right]$$

$$+ n^{L}(1-c)\left[\wp\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}(\varepsilon a - \eta c)da + (1-\wp)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}(a-\eta c)da\right]$$

$$- n^{L}(1-c)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}(a-c)\,da + n^{L}\left[(1-c)\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}da - c\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}da\right]$$

$$- (1-n^{L})\gamma_2\left[c\varepsilon\int_{\frac{\eta c}{(1-c)[1+\wp(\varepsilon-1)]}}^{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}a\,da + (1-c)\wp(\varepsilon-1)\int_{\frac{c+\wp(1-c)^2}{(1-c)(1-\wp)}}^{1}a\,da\right]$$

(C.3)

After computation Eq. (C.3) yields expected utility obtained in proposition 4. (Q.E.D.)

Appendix D. Proof of Proposition 5

Substituting Eqs. (17) and (20) the expected utility computed in proposition 4 can be rewritten as a function of the decision variable $\wp$ as:

$$
E\hat{U} = \frac{1}{2}\left[(3 - 5c + 2c^2) + n^L(1 - c)\{2 + \wp(\varepsilon - 1) - 2(1 + \eta)c\}\right]
$$
$$
- \frac{(1 - c)}{2}(1 - n^L)\hat{a}_c^{H^2}(\wp) - \{(1 - 3c + c^2) - n^L(2 - 3c)\}\hat{a}_c^H(\wp)
$$
$$
- \frac{(1 - c)}{2}n^L(1 + \wp(\varepsilon - 1))\hat{a}_c^{L^2}(\wp) + n^L\{(1 - c)\eta c - (1 - 2c)\}\hat{a}_c^L(\wp)
$$
$$
- \frac{1}{2}(1 - n^L)\gamma_2\left[\wp(1 - c)(\varepsilon - 1) + \{c\varepsilon - \wp(1 - c)(\varepsilon - 1)\}\hat{a}_c^{H^2}(\wp) - c\varepsilon\hat{a}_c^{L^2}(\wp)\right] \tag{D.1}
$$

The first order condition for the expected utility maximization with respect to $\wp$ has the following appearance:

$$
\frac{(1 - c)}{2}n^L(\varepsilon - 1) - \{(1 - c)(1 - n^L)\hat{a}_c^H(\wp) - (1 - 3c + c^2) + n^L(2 - 3c)\}\hat{a}_c^{H'}(\wp)
$$
$$
- \frac{(1 - c)}{2}n^L(\varepsilon - 1)\hat{a}_c^{L^2}(\wp) - \{(1 - c)n^L(1 + \wp(\varepsilon - 1))\hat{a}_c^L(\wp) - n^L(1 - c)\eta c - (1 - 2c)\}\hat{a}_c^{L'}(\wp)
$$
$$
- \frac{1}{2}(1 - n^L)\gamma_2\left[\begin{array}{l}(1 - c)(\varepsilon - 1) - (1 - c)(\varepsilon - 1)\hat{a}_c^{H^2}(\wp) + 2\{c\varepsilon - \wp(1 - c)(\varepsilon - 1)\}\hat{a}_c^H(\wp)\hat{a}_c^{H'}(\wp) \\ - 2c\varepsilon\hat{a}_c^L(\wp)\hat{a}_c^{L'}(\wp)\end{array}\right]
$$
$$
= 0 \tag{D.2}
$$

The second order condition (SOC) for maximization requires that

$$
-\left[\begin{array}{l}\{(1 - c)(1 - n^L)\hat{a}_c^H(\wp) - (1 - 3c + c^2) + n^L(2 - 3c)\}\hat{a}_c^{H''}(\wp) + (1 - c)(1 - n^L)\hat{a}_c^{H'^2}(\wp) \\ + (1 - c)n^L(\varepsilon - 1)\hat{a}_c^L(\wp) + \{(1 - c)n^L(1 + \wp(\varepsilon - 1))\hat{a}_c^L(\wp) - n^L(1 - c)\eta c - (1 - 2c)\}\hat{a}_c^{L''}(\wp) \\ + (1 - c)n^L(\varepsilon - 1)\hat{a}_c^L(\wp)\hat{a}_c^{L'}(\wp) + (1 - c)n^L(1 + \wp(\varepsilon - 1))\hat{a}_c^{L'^2}(\wp) \\ - (1 - n^L)\gamma_2\left[\begin{array}{l}(1 - c)(\varepsilon - 1)\hat{a}_c^H(\wp)\hat{a}_c^{H'}(\wp) - \{c\varepsilon - \wp(1 - c)(\varepsilon - 1)\}\left\{\hat{a}_c^{H'^2}(\wp) + \hat{a}_c^H(\wp)\hat{a}_c^{H''}(\wp)\right\} \\ + (1 - c)(\varepsilon - 1)\hat{a}_c^H(\wp)\hat{a}_c^{H'}(\wp) + c\varepsilon\left\{\hat{a}_c^{L'^2}(\wp) + \hat{a}_c^L(\wp)\hat{a}_c^{L''}(\wp)\right\}\end{array}\right]\end{array}\right]
$$
$$
< 0 \tag{D.3}
$$

From Eq. (D.2) the optimal amount of quota, $\wp^*$ is obtained.

In order to prove proposition 5 the implicit function rule is applied to the first order condition in Eq. (D.2). It yields,

$$
\frac{d\wp}{d\gamma_2} = \frac{\frac{1}{2}(1 - n^L)\left[(1 - c)(\varepsilon - 1)\{1 - \hat{a}_c^{H^2}(\wp)\} + 2\left\{\begin{array}{l}\{c\varepsilon - \wp(1 - c)(\varepsilon - 1)\}\hat{a}_c^H(\wp)\hat{a}_c^{H'}(\wp) \\ - c\varepsilon\hat{a}_c^L(\wp)\hat{a}_c^{L'}(\wp)\end{array}\right\}\right]}{SOC}
$$

The denominator is obviously negative since it is the second order (sufficient) condition for expected utility maximisation. The sign of the numerator is ambiguous. Using Lemma 1 and lemma 2 it is found that if $c\varepsilon - \wp(1-c)(\varepsilon-1) \geq 0$, i.e., $\dfrac{c}{\wp(1-c)} \geq \dfrac{\varepsilon-1}{\varepsilon}$, the numerator becomes positive implying that $\dfrac{d\wp}{d\gamma_2} < 0$.   (Q.E.D.)

References

Aikara, J., 1996. Inequality of educational opportunities: the case of scheduled castes in India. Journal of Educational Planning and Administration 10(1), 1-14.

Akerlof, G. A., Kranton, R. E., 2000. Economics and identity. Quarterly Journal of Economics 115(3), 715-753.

Alexander, J. M., 2003. Inequality, poverty and compensating discrimination: contemporary trends in India. Paper prepared for the WIDER conference Inequality, Poverty and Human Well-being, United Nations University, Helsinki, Finland.

Andersson, F., Lyttkens, C. H., 1999. Preferences for equity in health behind a veil of ignorance. Health Economics 8, 369-378.

Banerjee, B., Knight, J. B., 1985. Caste discrimination in the Indian urban labour market. Journal of Development Economics 17(1), 277-307.

Banerjee, A. V., 1990. Envy, in: Dutta, B., Gangopadhyay, S., Mukherjee, D. and Ray, D. (Eds.), Economic Theory and Policy: Essays in Honour of Dipak Banerjee, Bombay: Oxford University Press.

Bartling, B., Siemens, von F., 2006. The intensity of incentives in films and markets: moral hazard with envious agents. GESY Discussion Paper, No. 115.

Basu, K., 2006. Participatory equity, identity, and productivity: policy implications for promoting development. CAE Working Paper # 06-06.

Ben-Zeev, A., 1992. Envy and inequality. The Journal of Philosophy 89(11), 551-581.

Bolton, G. E., 1991. A comparative model of bargaining: theory and evidence. American Economic Review 81, 1096-1136.

Bolton, G. E., Ockenfels, A., 2000. ERC: A theory of equity, reciprocity and competition. American Economic Review 90(1), 166-193.

Borooah. V. K., Dubey, A. and Iyer, S., 2007. The effectiveness of jobs reservation: caste, religion and economic status in India. Development and Change 38(3), 423–445.

Charness, G., Rabin, M., 2002. Understanding social preferences with simple tests. Quarterly Journal of Economics 117(3), 817-869.

Chaudhuri, A., 1986. Some implications of an intensity measure of envy, Social Choice and Welfare 3, 255-270.

Chavas, J-P., 2008. On fair allocations, Journal of Economic Behavior and Organization 68, 258-272.

Clark, A. and Oswald, A., 1996. Satisfaction and comparison income. Journal of Public Economics 61(3), 359-381.

Clippel, G. de, 2008. Equity, envy and efficiency under asymmetric information. Economics Letters 99, 265-267.

Diamantaras, D., Thomson, W., 1990. A refinement and extension of the no-envy concept. Economics Letters 33, 217–222.

Docquier, F., H. Rapoport, 2003a, Ethnic discrimination and the migration of skilled labor. Journal of Development Economics 70, 159-72.

Docquier, F., H. Rapoport, 2003b. Endogenous discrimination, migration prospects and the protection of ethnic minorities. Annales d'Economie et de Statistique 71-72: 79-95.

Elster, J., 1991. Envy in social life. In: Zeckhauser, R.J. (Ed.), Strategy and Choice, Cambridge, MA, and London: The MIT Press.

Fehr, E., Schmidt, K. M., 1999. A theory of fairness, competition, and cooperation. Quarterly Journal of Economics 114, 817-868.

Fehr, E. and Schmidt, K. M., 2006. The economics of fairness, reciprocity and altruism – experimental evidence and new theories, in: Kolm, S-C., Ythier, J. M. (Eds.) Handbook of the Economics of Giving, Altruism and Reciprocity, DOI: 10.1016/S1574-0714(06)01008-6.

Feldman, A., Kirman, A., 1974. Fairness and envy. American Economic Review 64(6), 995-1005.

Fischer, J. A. V., Torgler, B., 2006. Does envy destroy social fundamentals? The impact of relative income position on social capital. Development Economics Discussion Paper Series 46.

Fleurbaey, M., 2006. To envy or to be envied? Refinements of no-envy for the compensation problem. IDEP Working Paper, 56.

Foley, D., 1967. Resource allocation and the public sector. Yale Econ. Essays 7(1), 45-98.

Frank, R. H., 1984. Are workers paid their marginal products? American Economic Review 74(4), 49-71.

Goel, A. M., Thakor, A. V., 2005. Green with envy: implications for corporate investment distortions. Journal of Business 78(6), 2255-2287.

Grund, C., Sliwka, D., 2002. Envy and compassion in tournaments, IZA Discussion Paper, No. 647.

Heider, F., 1958. The Psychology of Interpersonal Relations, New York, Willey.

Hillman, A. L, 2009. Public Finance and Public Policy: Responsibilities and Limitations of Government, 2nd Edition, Cambridge University Press, New York.

Hillman, A. L., 2010. Expressive behaviour in economics and politics. European Journal of Political Economy 26, 404 – 419.

Hoff, K., Pandey, P., 2006. Discrimination, social identity, and durable inequalities. American Economic Review 96(2), 206-211.

Holler, M.J., Leroch, M., 2010. Efficiency and justice revisited. European Journal of Political Economy 26, 311–319.

Holzer, H., Neumark, D., 2000. Assessing compensating discrimination. Journal of Economic Literature 38(3), 483-568.

Kanbur, R., Rapoport, H., 2005. Migration selectivity and the evolution of spatial inequality. Journal of Economic Geography 5, 43-57.

Kirchsteiger, G., 1994. The role of envy in ultimatum games. Journal of Economic Behaviour and Organization 25, 373-389.

Kolm, S-C., 1995. The economics of social sentiments: the case of envy. The Japanese Economic Review 46(1), 63-87.

Konow, J., 2003. Which is the fairest one of all? A positive analysis of justice theories. Journal of Economic Literature 61, 1188-1239.

Kumar, M., 1982. Social Equality: The Constitutional Experiment in India, New Delhi: S. Chand.

Kumar, D., 1992. The compensating discrimination debate in India. Asian Survey 32, 290-302.

Lehmann, D. R., 2001. The impact of altruism and envy on competitive behaviour and satisfaction. International journal of Research in Marketing 18, 5-17.

Loewenstein, G. F., Thompson, L. and Bazerman, M. H., 1989. Social utility and decision making in interpersonal contexts. Journal of Personality and Social Psychology 57(3), 426-441.

Martin, J., 1981. Relative deprivation: a theory of distributive injustice for an era of shrinking resources, in: Larry L. C. and Barry M. S. (Eds.), Research in Organizational Behavior: An Annual series of Analytical Essays and Critical Reviews 3, Greenwich, CT: JAI Press.

Mendelsohn, O., Vicziany, M., 1998. The Untouchables: Subordination, Poverty and the State in Modern India, Cambridge: Cambridge University Press.

Mui, V-L, 1995. The economics of envy. Journal of Economic Behavior and Organization 26(3), 311-336.

Nishimura, Y., 2003a. Optimal non-linear income taxation for reduction of envy. Journal of Public Economics 87, 363-386.

Nishimura, Y., 2003b. Optimal commodity taxation for reduction of envy. Social Choice and Welfare 21, 501-527.

Pande, R., 2003. Can mandated political representation increase policy influence for disadvantaged minorities? Theory and evidence from India. American Economic Review 93(4), 1132-51.

Parrott, W. G., 1991. The emotional experience of envy and jealousy, in: Peter S. (Ed.), The Psychology of Jealousy and Envy, New York: Guildford Press.

Piketty, T., 1994. Existence of fair allocations in economies with production. Journal of Public Economics 55, 391-405.

Rabin, M., 1993. Incorporating fairness into game theory and economics. American Economic Review 83(5), 1281-1302.

Ramaswamy, U., 1984. Preference and progress: the scheduled castes. Economic and Political Weekly 19, 1214-47.

Rapoport, H., Weiss, A., 2003. The optimal size for a minority, Journal of Economic Behavior and Organization 52(1), 27-45.

Rawls, J.A., 1971. A Theory of Justice. Cambridge, Mass: Harvard Univ. Press, Belknap Press.

Schoeck, H., 1996. Envy: A Theory of Social Behaviour, New York: Harcourt, Brace and world.

Sheth, D. L., 1998. Reservation policy revisited. In: Mahajan, G. (Ed.), Democracy, Difference and Social Justice, New Delhi: Oxford University Press.

Sowell, T., 2004. Compensating Discrimination around the World: An Empirical Study, New Haven, CT: Yale University Press.

Varian, H. R., 1974. Equity, envy, and efficiency. Journal of Economic Theory 9, 63-91.

Wankhede, G. G., 2001. Educational inequalities among scheduled castes in Maharashtra, Economic and Political Weekly 1553-58.

Weisskopf, T. E., 2004. Compensating Discrimination in the United States and India: A Comparative Perspective, Routledge, London.