# An efficiency argument for affirmative action in higher education

September 14, 2007

**Abstract**

We consider a dynamic framework in which generations are linked by educational background. In particular, individuals differ in ability to benefit from education, parental education and appurtenance to a group (either a disadvantaged minority or a non-minority). We identify an intergenerational externality that is larger for the minority group, provided that education tends to level the playing field. This provides an argument for affirmative action in higher education, in the form of larger subsidies to individuals from the minority group, which is exclusively based on efficiency considerations.

Keywords: affirmative action, intergenerational externality

JEL Classification: H21, I28

# 1 Introduction

In higher education, affirmative action, or preferential treatment to individuals that belong to minority groups, usually takes the form of predetermined admission quotas or specific subsidies. Frequently justified on the grounds of equity, such policies are often seen as a compensation for past or present mistreatments. Holzer and Neumark (2000), for example, mention that, taking a very long view, it can be argued that women and minorities did not face a level playing field in higher education. This view is reinforced by evidence they provide on lower quality of elementary and secondary education for minorities in the US, which continues to disadvantage these groups in competition for admission to the better universities.

Chan and Eyster (2003) focus on a different rationale in favor of affirmative action in higher education: namely, colleges and universities that value diversity of their student bodies. Banning affirmative action in universities and colleges with these preferences, they argue, will only result in their trying to achieve diversity in less efficient ways.

Generally acknowledged as a successful measure to achieve these objectives, giving preferential treatment in higher education to individuals from disadvantaged groups is also deemed costly in terms of efficiency, as it involves transferring resources from higher ability students who do not belong to these groups to lower ability students who do.

De Fraja (2005) is the first to provide an efficiency rationale for affirmative action in higher education in a utilitarian framework. In his model, individuals differ in the potential to benefit from education, which is private information, and the distribution of this potential differs across two groups: in particular, there is relatively less high-potential individuals in the disadvantaged group. The main result is that individuals from the disadvantaged group receive preferential treatment (i.e., pay a lower tuition fee and enroll to higher education levels) than otherwise identical individuals from the advantaged group. If the government did not have an informational disadvantage, individuals with the same potential in different groups would be treated identically. Preferential treatment then stems from the asymmetry of information regarding the individual's potential. The less favorable distribution in the disadvantaged group makes it less costly to prevent mimicking and, thus, plays a crucial role.

In this paper, we take a different approach and identify an intergenerational externality

that is larger for individuals belonging to disadvantaged groups under certain conditions. Such type of externality has been analyzed in Borjas (1992) who regresses individuals' schooling against schooling of parents and the average schooling of the ethnic group to which an individual belongs, and finds strong ethnic effects. Holzer and Neumark (2000) also mention community externalities and, in particular, role-model effects through which educated members of a minority group have a positive effect on the education of future generations of that minority group.[1]

Following these contributions, we assume that the decision of children to become educated depends, among other things, on parental education and on the quality of the group environment. A lower quality of the group environment increases the costs to attain higher education, and more so if the parents are uneducated. Accounting for an externality of this type, and under the assumption that education levels the playing field for families of different background, we show that larger subsidies for students that belong to disadvantaged groups can be justified on efficiency grounds alone.

Although most of the empirical analysis regarding misrepresentation of minority groups in higher education has traditionally concentrated on the US, the phenomenon is indeed present in many other countries. In Spain, only 1% of gypsies living in Andalucía attend higher education[2] and the problem of misrepresentation of minorities is likely to become more general and increasingly important given the current trends of immigration, particularly in the case of individuals with poor educational backgrounds.

The paper is organized as follows. In section 2 we present the model and highlight the role of ability, parental education and appurtenance to a group in the decision of children to undertake higher education. In section 3 we analyze the first-best and show that the deviation from the optimum is larger for disadvantaged groups, owing to a larger intergenerational externality. In section 4 we investigate the role of differentiated subsidies in order to internalize the externality. We conclude in section 5.

[1]Holzer and Neumark actually acknowledge that affirmative action could enhance efficiency, although their focus is in arguing that efficiency costs are likely to be low (see also Fryer and Loury, 2005).

[2]According to Asociación de Mujeres Universitarias Romís de Andalucía (Amuradi), Nevipens Romaní (Gypsy News), No 381, July 2004.

# 2 The Model

We consider an extension to Del Rey and Racionero (2002) in which two groups ($G$), a disadvantaged minority ($M$) and a non-minority ($N$) group, coexist. Within each group, individuals differ both in their ability to benefit from education and in their family educational background. Ability, denoted by $a$, is stochastically determined at birth. For simplicity, we consider that $a$ is uniformly distributed between 0 and 1 in both groups. Educational background of an individual is represented by whether the parent is uneducated or educated: $e_{-1} = 0, 1$.

Individuals live for one period. First, they decide whether or not to acquire higher education. Studying entails a cost that depends on the appurtenance to a given group, the individual ability to benefit from education and on parental education. We assume this cost to be $\gamma^G_{e_{-1}} C(a)$, where the parameter $\gamma^G_{e_{-1}}$ represents the effect of parental education ($e_{-1}$) and the group environment ($G$) on the educational cost incurred by the individual.

Belonging to a disadvantaged group, individuals from the minority group have to surpass more obstacles, which increases the costs of acquiring higher education. In the case of Indigenous Australians, for instance, Hunter and Schwab (2003) identify a range of social environmental factors, which include poor quality housing and residence in a household where others have been arrested, which decrease the probability that a young person will be attending school. On the other hand the presence of household members with qualifications or who are attending school significantly increases the likelihood of school attendance. Many of the negative factors arise from a prolonged history of cultural conflict and policies that failed to meet the distinctive needs of Indigenous students which have resulted in contemporary low secondary school retention rates and low participation rates in tertiary education.

However, we assume that education tends to level the playing field, so that the gap between children of educated parents belonging to different groups is smaller than the gap between children of uneducated parents. For simplicity of presentation, we adopt hereafter the extreme case in which children of educated parents of both groups face identical educational costs.[3] Accordingly, we posit $\gamma^M_0 > \gamma^N_0 > \gamma^M_1 = \gamma^N_1 = 1$ to reflect

[3]The weaker assumption $\gamma^M_1 - \gamma^N_1 < \left(\gamma^M_0 - \gamma^N_0\right) \frac{\gamma^M_1 \gamma^N_1}{\gamma^M_0 \gamma^N_0}$ is sufficient, although not necessary, to yield the same qualitative results.

the fact that education is more costly for children of uneducated parents, and this effect is larger for children from the disadvantaged minority group, $M$. $C(.)$ is a decreasing and convex function of ability (i.e., $C' < 0, C'' > 0$).

Productivity and, thus, wages are exogenously given and depend on education alone. Higher education has a positive effect on wages, so that educated individuals earn higher wages ($w_h$) than uneducated individuals ($w_\ell$). Individuals inelastically supply one unit of labour. It it worth highlighting that we do not consider wage discrimination.[4]

The decision to become educated or not is made by comparing income with and without education. For each type, characterized by group $G$ and educational background $e_{-1}$, it is possible to determine a threshold value of ability above which individuals will acquire higher education. We denote by $\widehat{a}^G_{e_{-1}}$ this ability level.

$$\gamma^G_{e_{-1}} C(\widehat{a}^G_{e_{-1}}) = w_h - w_\ell \qquad G = M, N; \quad e_{-1} = 0, 1 \tag{1}$$

At the threshold ability level $\widehat{a}^G_{e_{-1}}$, the cost of education equals the gain, in terms of earnings, of attaining higher education. Children with given $G$ and $e_{-1}$ whose ability is larger than $\widehat{a}^G_{e_{-1}}$will invest in higher education. Children of ability $a < \widehat{a}^G_{e_{-1}}$ will not. From (1) and the assumptions made about $\gamma^G_{e_{-1}}$, $\widehat{a}^N_1 = \widehat{a}^M_1 < \widehat{a}^N_0 < \widehat{a}^M_0$.

At the end of the period each individual gives birth to another one and dies. Population is thus constant. Given that $a$ is uniformly distributed between 0 and 1, $\widehat{a}^G_{e_{-1}}$ denotes the probability of remaining uneducated depending on parental educational background, $e_{-1}$, and group environment, $G$. Under the assumptions made we can conclude that, children of educated parents are more likely to gain tertiary education than those of non-educated ones and, among children of uneducated parents, children from the disadvantaged minority group are less likely to gain tertiary education than children in the non-minority group of the same ability. The evolution over time of the proportions of educated and uneducated people of group $G$ in this economy can be described by a Markov chain with the following

[4]Holzer and Neumark (2000) argue that "differences in educational attainment and cognitive skills account for large fractions of racial differences in wages". The question is then how much cannot be accounted for (and there is no great consensus) and whether the gap (which is often put at around 10%) could be explained by other differences among races or sexes that are difficult to measure (like, for instance, non-cognitive skills, etc.) but may have an effect on productivity, and that perhaps employers are better placed to "know" although they cannot easily document their choice.

transition matrix:

$$P^G = \begin{pmatrix} \widehat{a}_0^G & 1-\widehat{a}_0^G \\ \widehat{a}_1^G & 1-\widehat{a}_1^G \end{pmatrix}. \tag{2}$$

Let $\pi_0^G$ and $\pi_1^G$ denote, respectively, the proportions of uneducated and educated people of group $G$ in each generation. Once the steady state has been reached, the proportion of educated and uneducated people of each group replicates itself: $(\pi_0^G, \pi_1^G) = (\pi_0^G, \pi_1^G)P^G$. The vector of steady state probabilities is then:

$$\pi_0^G = \frac{\widehat{a}_1^G}{1-\widehat{a}_0^G+\widehat{a}_1^G} \text{ and } \pi_1^G = \frac{1-\widehat{a}_0^G}{1-\widehat{a}_0^G+\widehat{a}_1^G}. \tag{3}$$

We assume that costs associated to education are such that $\widehat{a}_{e_{-1}}^G$ is interior for all $G$ and $e_{-1}$.

# 3 The First Best

Let $y_{e_{-1},e}^G$ be the net income of an individual of group $G$, family education $e_{-1}$ and education $e$. Thus, $y_{e_{-1},0}^G = w_\ell$ and $y_{e_{-1},1}^G = w_h - \gamma_{e_{-1}}^G C(a)$. We define the first best proportions of educated and uneducated individuals of each group $G$, $\tilde{a}_0^G$ and $\tilde{a}_1^G$, as those which provide the highest aggregate net income. The government then maximizes $\pi_0^G Ey_0^G + \pi_1^G Ey_1^G$, where

$$Ey_{e_{-1}}^G = \tilde{a}_0^G \; y_{e_{-1},0} + \int_{\tilde{a}_0^G}^1 y_{e_{-1},1}^G(a)da \tag{4}$$

stands for the expected utility of children of parental educational background $e_{-1}$ and group environment $G$. After some rearrangements, the optimality condition for interior $\tilde{a}_{e_{-1}}^G$ is:

$$\gamma_{e_{-1}}^G C(\tilde{a}_{e_{-1}}^G) = w_h - w_\ell + \frac{Ey_1^G - Ey_0^G}{1-\tilde{a}_0^G+\tilde{a}_1^G} \tag{5}$$

Since $C$ is decreasing, $\tilde{a}_0^G > \tilde{a}_1^G$. Thus, at the first best, a higher proportion of children of educated than of uneducated parents undertake higher education within each group. The reason for this result is that the education of the children of uneducated parents is more costly.

On the other hand, since, at the laissez-faire, the expected utility is larger for children of educated parents ($Ey_1^G > Ey_0^G$), all individuals who make their educational choice in the absence of government intervention end up consuming too little education.

Finally, since the difference in participation between children of educated and uneducated parents is larger for the minority group $M$ and the difference in the costs they face is also larger, $Ey_1^M - Ey_0^M > Ey_1^N - Ey_0^N$. Therefore, the difference between first best and decentralized threshold ability is larger for the minority group.

In other words, the individual decision to undertake education is inefficient because people fail to account for the fact that their getting higher education increases the chances that their children also will gain access to higher education. This intergenerational externality is higher for people from the disadvantaged minority, since the difference in expected income for children of uneducated and educated individuals is larger within this group.

# 4 Optimal subsidies

The government may subsidize education in order to internalize the externality. We assume that subsidies can be dependent on group or ethnicity but not on the education decision previously made by parents. To finance this policy, it levies a lump-sum tax $T$ on all workers.

The objective of the government is to maximize

$$\sum_G \sum_{e_{-1}} \pi_{e_{-1}}^G \left( \widehat{a}_{e_{-1}}^G \ (w_\ell - T) + \int_{\widehat{a}_{e_{-1}}^G}^1 \left( w_h - \gamma_{e_{-1}}^G C(a) + S^G - T \right) da \right)$$

subject to the budget constraint $2T = \sum_G \pi_1^G S^G$, where $S^G$, $G = M, N$, represents the subsidy.

The optimal policy is characterized by the first order conditions corresponding to the lump sum tax $T$ and subsidies $S^N$ and $S^M$. The optimality condition for $T$ yields $\lambda = 1$ (i.e., the marginal cost of raising one unit of revenue is one since lump-sum taxes are non-distortionary). The optimality condition for each $S^G$ is:

$$\frac{\partial \pi_0^G}{\partial S^G} \left[ Ey_0^G - Ey_1^G \right] + \pi_0^G \frac{\partial Ey_0^G}{\partial S^G} + \pi_1^G \frac{\partial Ey_1^G}{\partial S^G} - \left( \pi_1^G + S^G \frac{\partial \pi_1^G}{\partial S^G} \right) \ = 0.$$

After some manipulation, these conditions become

$$S^G = Ey_1^G - Ey_0^G.$$

Since $Ey_1^M - Ey_0^M > Ey_1^N - Ey_0^N$, it follows that $S^M > S^N$. Hence, individuals from the disadvantaged group receive a larger Pigouvian subsidy.

# 5 Conclusions

In this paper, we have considered a dynamic framework in which generations are linked by family background, which is determined both by family education and appurtenance or not to a disadvantaged group. We have identified an intergenerational externality that is larger for disadvantaged groups provided that education levels out the playing field (i.e., existing differences across groups are smaller for educated individuals). This externality can be internalized by means of Pigouvian subsidies, equal to the size of the externality in each case. Therefore, larger subsidies for students that belong to disadvantaged groups can be justified on efficiency grounds alone.

# References


[1] Borjas, G. J., 1992, Ethnic Capital and Intergenerational Mobility. Quarterly Journal of Economics 107(1), 123-50.

[2] Chan, J. and E. Eyster, 2003, Does banning affirmative action lower college student quality? American Economic Review 93(3), 858-872

[3] De Fraja, G., 2005, Reverse discrimination and efficiency in education, International Economic Review 46(3), 1009-1031.

[4] Del Rey, E. and M. Racionero, 2002, Optimal Educational Choice and Redistribution when Parental Education Matters, Oxford Economic Papers 54(3), 435-448.

[5] Fryer, R. and G. Loury, 2005, Affirmative Action and its Mythology. Journal of Economic Perspectives 19 (3), 147-162.

[6] Holzer, H. and D. Neumark, 2000, Assessing affirmative action, Journal of Economic Literature 38(3), 483-568.

[7] Hunter, H.B. and Schwab, R.G., 2003, Practical reconciliation and recent trends in Indigenous education, Centre for Aboriginal Policy Research DP No. 249/2003, The Australian National University.