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## **ABSTRACT**

### **Public Education and the Melting Pot**

This Paper proposes a theoretical framework that combines the role of education as a cultural melting pot with its function as an instrument of human capital accumulation. It highlights the important role of public education in promoting social cohesion: requiring minority parents to pay twice for culturally distinct private education is a powerful incentive for cultural assimilation through public education. Conversely, subsidizing private schooling through vouchers or tax credits increases social polarization, which may partly explain the strong opposition to voucher experiments. Public education is especially effective in promoting the cultural assimilation of poorer immigrants, but may not be effective in dealing with large numbers of high-income immigrants.

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## **1 Introduction**

In this paper, we focus on the role of public education as an “agent of cultural standardization” that draws immigrant children closer to the majority culture by weakening their ties to their parents’ traditional values (Katz, 1976). This view of education as a key element of the melting pot is incorporated in a simple growth model in which the productivity of human capital is predicated on cultural proximity, and education is both an instrument of human capital accumulation and a catalyst of cultural assimilation.

In the United States, public schools have historically enjoyed substantial success in assimilating a large immigrant population in a common culture. While ethnic and cultural divisions remain a potential source of social tension, the United States continues to be a melting pot in which people from widely varying backgrounds assume a common cultural identity in the course of two or three generations.<sup>1</sup> Some immigrant ethnic groups may retain their separate identities for longer periods, and in a few exceptional cases these may remain undiminished, however, generally the cultural assimilation of immigrants in the United States has proceeded smoothly.<sup>2</sup> This success can be at least partly attributed to the method of public finance of education in the US, which does not reduce the tax liability of parents who opt out of public education, thus requiring them to pay twice if they choose to educate their children privately. Clearly, this provides a strong economic incentive for minority parents to send their children to public schools where they will be more rapidly assimilated in the dominant national culture. Conversely, proposals to subsidize private schooling through vouchers, tax credits or more direct means, by weakening these incentives serve to increase social polarization.

This paper’s framework integrates the role of education in promoting social cohesion within a simple dynamic model of growth driven by the human capital, which accumulates through education. Positing that the productivity of economic transactions depends on the

social distance between the transacting agents, we argue that education can affect economic growth by fostering social cohesion as well as by building up skills, so that income is a decreasing function of average social distance from one's cohort, determined by the social orientation of the schooling that parents provide their children. Minority parents can contribute to the material well being of their children by raising them in the mainstream culture only at the cost of diluting traditional minority values and weakening the bond between parent and child.

An education system that offers minority families tax-funded free public schooling in the mainstream culture, while requiring them to "pay twice" for private education in the minority culture, provides incentives for minority parents to culturally assimilate their children by sending them to public schools. The greater cultural homogeneity that results has an external beneficial effect on the cultural majority, as it reduces the cost of cultural heterogeneity, which they also incur, beyond any affect it may have on the quality of public schooling.<sup>3</sup> Conversely, any perceived benefits for the quality of education system that can be achieved through vouchers or education tax credits that dampen these incentives will entail some sacrifice of social cohesion, which must also be taken into account. This aspect can help explain why such reforms remain largely untried despite their popularity with beneficiaries, and little or no reason to assume ex ante that they will have an adverse effect on public schooling and indeed may improve it if correctly implemented.<sup>4</sup> For many, this polarizing effect may outweigh the academic benefits that may or may not accrue from voucher programs.<sup>5</sup>

Several empirical papers have recently described the destructive effect of ethnic strife on economic welfare, thus providing support for one of this paper's tenets. Cross-country analyses by Easterly and Levine (1997) and Knack and Keefer (1997) find that ethnic heterogeneity adversely affects the quality of services provided by the central government, promotes

corruption and rent-seeking, leads to inefficient policies and generates political instability. Adverse effects on social policies and behavior of ethnic and racial heterogeneity in a cross-section of communities in the United States are indicated by Alesina et al. (1999), Goldin and Katz (1999), and Luttmer (2001), among others; and Glaeser et al. (1995) find that racial heterogeneity negatively affects urban growth in the United States. Finally, Glaeser et al. (2000) present experimental evidence on a negative relationship between ethnic heterogeneity and trust, and Fershtman and Gneezy (2001) demonstrate its adverse effect on the efficiency of economic transactions.

Our emphasis on the possible detrimental effect of interaction between individuals from different social groups is related to Bénabou's (1993, 1996, 2000) theoretical analyses of the interaction between heterogeneity and growth, though he focuses on income as a source of social heterogeneity. Borjas (1995) emphasizes differences in ethnic background, but does not address their growth implications. Bisin and Verdier (2000) and Lazear (1999) examine different aspects of cultural assimilation, but do not consider the role of public education. Closer to the present work, Kremer and Sarychev (1998) consider the socializing role of education and Gradstein and Justman (2001) study its effect on income growth, but both papers ignore important institutional aspects of public education finance on which we focus here.

The structure of the paper is as follows. Section 2 begins by laying out the basic definition of an economy populated by an indigenous, culturally stable majority and a distinct immigrant population, in which education both builds human capital and determines cultural orientation. It then analyzes the benchmark case of decentralized education in which the minority group independently sets its own education policy, balancing the economic cost of cultural separatism against the emotional benefits of raising one's child in one's own tradition. Section 3 then goes on to analyze a system of public education in which minority

parents can “opt out” of the public system and pay for private schooling, allowing them to control its curriculum, while continuing to pay the full education tax. Section 4 examines the incentives for the majority to offer school vouchers. Section 5 extends the basic analysis to consider the role of public education in the cultural assimilation of new immigrants, and section 6 concludes.

## 2 Definition of the model

### 2.1. Basic assumptions

Consider an economy with a population of households of measure one indexed by  $i$ , each comprising a parent and child and operating in discrete time periods  $t$ . Households are characterized by cultural identity and income. We assume that cultural identity can be represented by a uni-dimensional numerical scale, and that the population initially consists of two uniform groups: an indigenous, culturally immobile majority and a distinct, potentially assimilating minority. Without loss of generality we locate the permanent cultural orientation of the majority at the origin, and denote by  $d_0 > 0$  the uniform initial cultural orientation of the minority; this will imply that future minority cohorts also have a uniform cultural orientation, which we denote  $d_t$ .<sup>6</sup> Let  $w_t$  denote the measure of the majority in period  $t$ , so that  $1 - w_t$  is the measure of the minority. The initial share of the majority,  $w_0 > 1/2$ , is given, and this will imply that in subsequent periods  $w_{t+1} \geq w_t > 1/2$ . Thus the extent of cultural heterogeneity in any period  $t$  is measured in two dimensions: the size of the minority  $1 - w_t$ , and the cultural distance between the two groups,  $d_t$ .

Denote the income of household  $i$  in period  $t$  by  $y_{it}$ , and the distribution of income in the majority and minority groups respectively by  $F_t(y)$  and  $G_t(y)$ , where the initial distributions  $F_0(y)$  and  $G_0(y)$  are given. Income is produced by parents in proportion to the amount of human capital they acquired as children,  $h_{it}$ , modified by an exogenous parameter

$a_{it}$  that captures an individual's innate ability, access to technological opportunities, etc., and by a productivity coefficient  $P_{it}$  that is a function of cultural distance,<sup>7</sup>

$$y_{it+1} = a_{it+1} h_{it+1} P_{it+1} \quad (1)$$

We assume that the  $\{a_{it}\}$  are i.i.d. with a skewed distribution such that their mean value in any given generation always exceeds their median; and that the initial distribution of  $a_{i0}$  is uncorrelated with the initial income distribution, implying the absence of a correlation in future periods, too.<sup>8</sup> The productivity coefficient  $P_{it}$  is taken as the mean productivity of numerous chance encounters that individual  $i$  is assumed to have in period  $t$  with other individuals in her cohort. Denoting by  $p(d)$  the productivity of a single transaction between individuals separated from each other by the distance  $d$ , internal cultural uniformity in each group implies that:

$$P_{it} = \begin{cases} w_t + p(d_t) (1 - w_t) & \text{if individual } i \text{ belongs to the majority} \\ w_t p(d_t) + 1 - w_t & \text{if individual } i \text{ belongs to the minority} \end{cases} \quad (2)$$

We assume that  $p(0) = 1$ ,  $p(d_0) < 1$ ,  $p'(d_0) < 0$ , and  $p''(d) < 0$ .<sup>9</sup>

Both human capital and cultural identity are acquired through education. The amount of human capital accumulated by a child,  $h_{it+1}$ , is simply equal to spending per pupil in her school. Her cultural orientation is determined by the type of school she attends: schooling at a majority-supported school produces a cultural orientation of  $d_t = 0$  (the majority cultural orientation), while schooling at a minority-supported school produces a cultural orientation determined by the parents of the children in the school. The cost of schooling is not affected by cultural orientation, and both types of schools are assumed to be equally efficient.

Parents make all schooling decisions on behalf of their children, for whom they have an altruistic regard. The utility which the parent of household  $i$  in period  $t$  maximizes is an increasing function of current household consumption,  $c_{it}$ , and of the anticipated income of her child in the next period,  $y_{it+1}$ ; and a decreasing function of the social distance between parent and child,  $C(d_{it} - d_{it+1})$ , where  $C(0) = 0$  and  $C$  is increasing and convex. To fix ideas, we posit

$$U_{it} = (1 - \alpha) \log(c_{it}) - C(d_{it} - d_{it+1}) + \alpha \log(y_{it+1}) \quad (3)$$

where  $0 < \alpha < 1$  is a parameter representing the degree of parental altruism.

## 2.2. Decentralized schooling

It will be useful to begin with the benchmark case of decentralized schooling. In this case, each parent individually determines the type of school her child will attend—majority supported or minority supported—and the desired amount of human capital investment in her child; and minority parents also collectively determine the cultural orientation of their schools. Maximization of the utility function (3) subject to the budget constraint:

$$y_{it} = c_{it} + h_{it+1} \quad (4)$$

over  $h_{it+1}$ , yields

$$h_{it+1} = \alpha y_{it}, \text{ and } c_{it} = (1 - \alpha) y_{it} \quad (5)$$

Because all minority parents initially have the same cultural orientation, and the separable form of the utility function implies that school choice is independent of income, they all want the same cultural orientation for their schools and send their children to the same type of

school. Hence, along the transition path the composition of the two population groups remains the same,  $w_{t+1} = w_t$ , as long as the two groups remain distinct. Utility maximization by minority parents with respect to their desired cultural orientation therefore yields the following first-order conditions along the transition path. Either :

$$C'(d_t - d_{t+1}) + \alpha p'(d_{t+1}) w_0 / [p(d_{t+1}) w_0 + 1 - w_0] = 0 \quad (6)$$

at an interior point on the equilibrium path; or

$$C'(0) + \alpha p'(d_t) w_0 / [p(d_t) w_0 + 1 - w_0] \geq 0 \quad (7)$$

and  $d_{t+1} = d_t$  is a steady state in which some degree of polarization is perpetuated; or

$$C'(d_t) + \alpha p'(0) \leq 0 \quad (8)$$

and  $d_{t+1} = 0$  is a steady state in which the minority is fully assimilated in the majority culture. Equation (6) represents the tradeoff between a parent's desire to bring up her child in her own cultural orientation and her concern about the child's future material well-being, which depends on assimilation in the majority culture.<sup>10</sup> The convexity of  $C$ , the concavity of  $p$ , and the fact that  $p$  decreases in the relevant range guarantee that the second order condition is satisfied and that (6) has at most one solution. Moreover, it follows from the second order condition, that if (8) does not hold if and only if (7) holds for some positive value of  $d_t$ ; and that (7) can have at most one solution. Hence the equilibrium described by (6) has a unique steady state given by either (7) or (8).

The equilibrium path we have described is not efficient. Under decentralized schooling the minority community when making its educational decisions disregards the benefits to the rival community of reducing polarization. A Pareto improvement can be achieved through accelerated cultural assimilation of the minority, by minority parents adopting a cultural orientation in their schools that is closer to the majority culture, and receiving a compensating subsidy from the majority. Summing up:

*Proposition 1.* When schooling is decentralized there exists a unique equilibrium path along which the minority draws culturally closer to the majority, and which converges to a unique steady state. If inequality (8) holds then the minority is entirely assimilated in the majority in the steady state; if it does not hold then the minority retains a separate cultural identity given by (7). In either case, the equilibrium path is not efficient; a Pareto improvement can be achieved through accelerated assimilation of the cultural minority, subsidized by the majority.

A Pareto improving contract, which requires the schools of the cultural minority to adopt a curriculum closer to the mainstream, might be difficult to implement.<sup>11</sup> Alternatively, the majority may use its political power to achieve a unilateral improvement. It would prefer the minority to assimilate as quickly as possible. One way of creating incentives for more rapid assimilation of the minority is through a system of public education in which parents who seek to send their children to private schools are not exempt from paying the education tax. Thus they are required to pay twice for their children's education if they choose private schooling—paying the tax that finances public schools as well as private tuition. We describe such a system in the following section and show that it benefits the majority in two ways: not only does it draw the minority closer to the majority but it also reduces the tax price of public education.

### 3 Public Education

#### 3.1. Institutional description

Assume an education system in which state schools are funded by a proportional income tax of  $\tau_t$  determined by a majority of parents, and that this tax is levied on all parents irrespective of the type of school they choose for their children. The revenue raised through the income tax is used to provide a uniform level of schooling for children in public schools. Letting  $Y_t$  denote the total amount of income in period  $t$ , this implies that the amount of human capital accumulated by a child attending a state school is

$$h_{it+1} = \tau_t Y_t / w_{t+1} \quad (9)$$

The amount of private consumption by a household with income  $y_{it}$  that sends its child to a state school is

$$c_{it} = (1 - \tau_t) y_{it} \quad (10)$$

Private education is then paid for out of after tax income, and to simplify the analysis we assume that private schools must supply the same quality of education as public schools, which in the present context implies that spending per pupil in private schools must equal the level of spending given by equation (9). This implies that majority parents always send their children to public schools. Combining (2), (3), (9) and (10), the utility level of a majority parent is

$$U_{it} = (1 - \alpha) \log[(1 - \tau_t) y_{it}] + \alpha \log\{a_{it+1} (\tau_t Y_t / w_{t+1}) [w_{t+1} + p(d_{t+1}) (1 - w_{t+1})]\} \quad (11)$$

and the utility level of a minority parent choosing to send her child to public school is

$$V_{it}^{pub} = (1 - \alpha) \log[(1 - \tau_t) y_{it}] - C(d_t) + \alpha \log\{a_{it+1} (\tau_t Y_t / w_{t+1}) [w_{t+1} + p(d_{t+1})(1 - w_{t+1})]\} \quad (12)$$

Given that the quality of private schooling is dictated by (9), the private consumption of the parent of a child attending private school is

$$c_{it} = (1 - \tau_t) y_{it} - h_{it+1} = (1 - \tau_t) y_{it} - \tau_t Y_t / w_{t+1} \quad (13)$$

The cultural orientation of private schools,  $d_{t+1}$ , is collectively determined by all parents of children attending these schools. The utility level of these parents can be written as:

$$V_{it}^{pr} = (1 - \alpha) \log[(1 - \tau_t) y_{it} - \tau_t Y_t / w_{t+1}] - C(d_t - d_{t+1}) + \alpha \log\{a_{it+1} (\tau_t Y_t / w_{t+1}) [p(d_{t+1}) w_{t+1} + 1 - w_{t+1}]\} \quad (14)$$

The sequence of events in each period is as follows. First, the majority of parents determine the education tax rate  $\tau_t$ , anticipating the future decisions of the minority. Then each minority parent individually decides whether her child will attend public or private school, anticipating the cultural orientation of private education. Finally, the parents of private school children collectively determine the cultural orientation of private education. The equilibrium is a sequence of such consistent decisions.

### 3.2. *Equilibrium analysis*

We solve the model recursively, beginning our analysis with the choice of cultural orientation in private education after the tax rate and individual school choice have already been

determined. By assumption, the choice of curriculum in private education is made collectively by parents who have committed themselves to opting out of the public school system. As we noted above, our assumption that private schools must supply the same quality of education as public schools implies that only minority parents have an incentive to choose private education. Their preferred cultural orientation is derived by maximizing the utility function in (14), differentiation of which yields the first-order condition:

$$C'(d_t - d_{t+1}) + \alpha p'(d_{t+1}) w_{t+1} / [p(d_{t+1}) w_{t+1} + 1 - w_{t+1}] = 0 \quad (15)$$

Equation (15) determines the collective choice of cultural orientation in private schools.<sup>12</sup> Noting that the left-hand side of (15) increases in  $w_{t+1}$ , total differentiation of the first-order condition reveals that  $d_{t+1}$  is a decreasing function of public school enrollment,  $w_{t+1}$ : the larger is the relative size of the majority the closer to it the minority prefers to locate itself in terms of cultural orientation.

We now turn to minority parents' individual choice of the type of school to which they send their children after the tax rate has been set, anticipating the choice of cultural orientation of minority schools described by equation (15). Parental utility is given by (12) when the child attends public school, and by (14) when she attends private school; parent  $i$  opts for private school if and only if (12) exceeds (14). The utility differential between (12) and (14) is

$$V_{it}^{pub} - V_{it}^{pr} = (1 - \alpha) \log \{ [(1 - \tau_t) y_{it}] / [(1 - \tau_t) y_{it} - \tau_t Y_t / w_{t+1}] \} - [C(d_t) - C(d_t - d_{t+1})] + \alpha \log \{ [w_{t+1} + p(d_{t+1})(1 - w_{t+1})] / [p(d_{t+1}) w_{t+1} + 1 - w_{t+1}] \} \quad (16)$$

and it is immediately apparent that it increases in income, implying that there is a threshold income level,  $\underline{y}(w_{t+1})$  such that all minority parents with income above it send their children to private school, while those with income below it send their children to public school. This is due to the funding structure; parents who opt out of public education must pay twice for their children's education, and poorer parents are less able to afford the added expense. Consequently, only the more affluent parents are able to retain their cultural orientation by sending their children to a private school.

Differentiation of (16), the utility differential between public and private education, reveals that the anticipated fraction of population attending public schools,  $w_{t+1}$ , has a mixed effect on this threshold income level. An increase in public enrollment reduces spending per pupil in public education, which also lowers the cost of private schooling, favoring private education and lowering the threshold. At the same time, the larger is the cultural majority in the next period the greater the productivity loss from sending one's child to a minority school.<sup>13</sup>

We require that in equilibrium parents' anticipations regarding public enrollment are realized. Recalling that  $G_t(y)$  denotes the distribution of income in period  $t$  among minority parents,  $G_t(\underline{y}(w_{t+1}))$  is the fraction of these parents who send their children to public school. As all majority parents send their children to public school, in equilibrium we must have

$$w_{t+1} = w_t + G_t(\underline{y}(w_{t+1})) \tag{17}$$

A sufficient condition for (17) to have a unique solution is that the derivative of the right-hand side is less than one:

$$g_t(\underline{y}(w_{t+1})) \underline{y}'(w_{t+1}) < 1 \tag{18}$$

where  $g_t$  is the density function of  $G_t$ . This holds when the impact of an increase in anticipated public enrollment on school choice through its effect on the productivity loss from sending one's child to a minority school is large enough in relation to its effect on the cost of private schooling. We will assume that this is the case.

Differentiation of the utility differential between private and public schooling given by (16) with respect to the tax rate  $\tau_t$  reveals that it is decreasing in the tax rate. It follows that there is a positive relationship between the tax rate and the equilibrium level of public school enrollment, as an increase in the tax rate causes a greater marginal loss of utility from private consumption for parents who send their children to private schools than for those who send their children to public schools. This increases the incentive for minority parents to send their children to public schools.

We complete our analysis by characterizing the education tax rate chosen by a majority of parents. It is the preferred tax rate of a parent in the cultural majority, which is derived by maximizing (11) with respect to  $\tau_t$ , while anticipating the equilibrium determination of  $d_{t+1}$  and  $w_{t+1}$ . The first-order condition is then

$$\begin{aligned}
& - (1-\alpha)/(1-\tau_t) + \alpha/\tau_t + \alpha \{ [1 - p(d_{t+1}) + (1 - w_{t+1}) p'(d_{t+1})(\partial d_{t+1}/\partial w_{t+1})](\partial w_{t+1}/\partial \tau_t) \} \\
& / [w_{t+1} + p(d_{t+1})(1 - w_{t+1})] = 0
\end{aligned} \tag{19}$$

Absent the effect of the tax rate on public enrollment, the chosen tax rate would be  $\tau_t = \alpha$ . The positive effect of the tax rate on enrollment in public schools, which also indirectly draws the cultural orientation of the minority closer to the majority, leads to the adoption of a lower tax rate,  $\tau_t < \alpha$ .

The above analysis indicates a dynamic equilibrium path along which the share of public enrollment grows continually while minority schools draw closer to the majority culture. Comparing it to the decentralized equilibrium, we observe that  $w_t$ , the fraction of the population subscribing to the majority culture, is higher in each period under public education than under decentralized private education. Consequently, because of the inverse relationship between  $w_t$  and  $d_t$ , the cultural distance between the two groups is smaller under public education than under a decentralized school system.<sup>14</sup> Thus public education achieves a higher degree of cultural homogeneity than the decentralized school system in regard to both the relative size of the majority and the cultural proximity between the two groups. Finally, note that revealed preference implies that the cultural majority favors public education over decentralized private education, as a tax rate of  $\tau_t = \alpha$ , this would still result in some cultural assimilation of the minority as well as higher spending per pupil in public education, which is a welfare improvement for the majority; the preferred, lower tax rate can only result in yet greater improvement. Collecting results:

*Proposition 2:* Under a system of public schooling in which sending one's child to private school does not reduce one's education tax liability there exists a unique equilibrium path along which the economy is less culturally polarized than along the path that results when schooling is decentralized. The majority prefers this system to decentralized schooling.

This equilibrium, too, is not efficient. As private school parents determine their school curriculum unilaterally, first-order conditions imply that the marginal effect of a small reduction in  $d_{t+1}$  on minority school parents is negligible. However the same change will have a non-negligible benefit for majority parents. It follows that both the minority and the majority can gain from the majority subsidizing private education contingent on the minority moving the cultural orientation of its schools more closely to the majority culture. The

possibility of a Pareto improving contract follows from the fact that the majority determination of school financing and the decisions of the minority whether to attend public or private schools are uncoordinated; coordinating these decisions can make everyone better off. Summing up,

*Proposition 3.* This equilibrium path is not efficient. The minority and the majority can both gain if the majority subsidizes private education to some extent and the minority reciprocates by increasing the rate at which its schools draws culturally closer to the majority.

We have seen that contingent contracts under which the majority subsidizes private schooling of the minority in return for changes in the private school curriculum can constitute a Pareto improvement over the public education system.<sup>15</sup> Because of enforcement problems, such contracts may be difficult to implement.<sup>16</sup> It may however be the case that such a subsidy is desirable for the majority—and hence a Pareto improvement—even without a reciprocal change in the cultural orientation of minority schooling. The introduction of such a subsidy may increase spending per pupil in the public system without raising the tax rate provided the gains from reduced public enrolment outweigh the cost of the subsidy. However, our analysis suggests that any such gains must be weighed against its adverse impact on cultural homogeneity.

#### **4 Vouchers: Subsidized Decentralization**

The cultural majority can subsidize those parents who choose to opt out of the public school system and send their children to a private school through a variety of means such as tax credits for private tuition, education vouchers at various levels, or, more generally, defraying part of the cost of private education out of the education tax.<sup>17</sup> Such a subsidy reduces the tax

price of education spending, and can thus increase spending per pupil in the public system provided private enrollment is sufficiently elastic with respect to the rate of subsidization. Indeed, previous analyses have shown that such an increase is indicated for typical parameter values that prevail in the United States.<sup>18</sup> If this were the only consideration, such a subsidy would be a Pareto improvement—and we would expect to see broader popular support for school vouchers than is actually observed. Our analysis suggests that this lack of support may be attributed, at least in part, to the countervailing detrimental effect that subsidizing private education has on increased cultural polarization. Vouchers, or other forms of private school subsidies, can expect to find broad popular support only when the cost of increased polarization is small and outweighed by the benefits of subsidized private schooling.

To demonstrate these effects formally, let  $s$  denote the amount of a voucher that households can use to partially defray the cost of sending their children to private school.<sup>19</sup> For a given tax rate, the quality of human capital of a child attending a state school is then

$$h_{it+1} = [\tau_t Y_t - s(1 - w_{t+1})]/w_{t+1} \quad (9')$$

where  $w_{t+1} = w_{t+1}(s)$  is itself a function of the subsidy. The utility level of a member of the cultural majority can then be written as follows:

$$U_{it}^{pub} = (1 - \alpha) \log[(1 - \tau_t) y_{it}] + \alpha \log\{a_{it+1}[(\tau_t Y_t - s(1 - w_{t+1}))/w_{t+1}][w_{t+1} + p(d_{t+1})(1 - w_{t+1})]\} \quad (11')$$

and that of a minority parent who sends her child to public school is

$$V_{it}^{pub} = (1 - \alpha) \log[(1 - \tau_t) y_{it}] - C(d_t) +$$

$$\alpha \log\{a_{it+1}[(\tau_t Y_t - s(1 - w_{t+1}))/w_{t+1}][w_{t+1} + p(d_{t+1})(1 - w_{t+1})]\} \quad (12')$$

Retaining our assumption that investment in human capital must be equal in both types of school, (9') also represents the quality of human capital of a child attending private school. The parent of such a child then has private consumption of

$$c_{it} = (1 - \tau_t) y_{it} - h_{it+1} + s = (1 - \tau_t) y_{it} - [\tau_t Y_t - s(1 - w_{t+1})]/w_{t+1} + s \quad (13')$$

The utility level of a parent who chooses to send her child to a private school is therefore

$$\begin{aligned} U_{it}^{pr} = & (1 - \alpha) \log[(1 - \tau_t) y_{it} - (\tau_t Y_t - s(1 - w_{t+1}))/w_{t+1} + s] - C(d_t - d_{t+1}) \\ & + \alpha \log[a_{it+1} (\tau_t Y_t - s(1 - w_{t+1}))/w_{t+1}](w_{t+1}p(d_{t+1}) + 1 - w_{t+1}) \end{aligned} \quad (14')$$

This implies that the condition which determines cultural orientation in private schools is the same as before and given by (15).

Comparing (12') and (14'), a minority parent will send her child to private school if and only if<sup>20</sup>

$$\begin{aligned} (1 - \alpha) \log[(1 - \tau_t) y_{it} - (\tau_t Y_t - s(1 - w_{t+1}))/w_{t+1} + s] - C(d_t - d_{t+1}) + \\ \alpha \log[(w_{t+1}p(d_{t+1}) + 1 - w_{t+1})] > \\ (1 - \alpha) \log[(1 - \tau_t) y_{it}] - C(d_t) + \alpha \log[w_{t+1} + p(d_{t+1})(1 - w_{t+1})] \end{aligned} \quad (16')$$

As in the earlier discussion, for a given tax rate, this uniquely determines an income threshold such that minority parents whose income is below this level send their children to public school and those with income above the threshold send their children to private school. This

cutoff level is the value of  $y_{it}$  that satisfies (18) with equality, where  $d_{t+1}$  is determined by equation (15). Differentiation reveals that enrollment in public schools,  $w_{t+1}$ , is a decreasing function of the private school voucher,  $s$ , as would be expected. The majority determines the education tax rate anticipating the decisions of the cultural minority as described by equations (15) and (17), much as before. The first-order condition that the majority's decision satisfies is similar to (19).

We now consider conditions under which a voucher benefits the majority by examining its effect on the utility of the median voter, given by (11'). Differentiating (11') with respect to  $s$  we note first that a voucher is beneficial to the majority if and only if it leads to a higher future income, both of the cultural majority and of the minority.<sup>21</sup> Equation (11') highlights the two channels through which the voucher exerts its effect: spending per student,  $[\tau_t Y_t - s(1 - w_{t+1})]/w_{t+1}$ , and the cost of polarization,  $w_{t+1} + p(d_{t+1})(1 - w_{t+1})$ .

The derivative of the latter term, the cost of polarization, is

$$\begin{aligned} \partial [(w_{t+1} + p(d_{t+1})(1 - w_{t+1}))] / \partial s = \\ \{[1 - p(d_{t+1})] + (1 - w_{t+1}) [\partial p(d_{t+1}) / \partial d_{t+1}] [\partial d_{t+1} / \partial w_{t+1}]\} [\partial w_{t+1} / \partial s] \end{aligned} \quad (20)$$

Note that  $\partial d_{t+1} / \partial w_{t+1}$  is determined from (15) and is negative as was established earlier, and that  $\partial p(d_{t+1}) / \partial d_{t+1}$  is negative by assumption in the relevant range. As  $\partial w_{t+1} / \partial s$  is also negative, it follows that (20) is negative, illustrating the voucher's detrimental impact on the utility of majority households that derives from its inhibiting effect on the rate of cultural assimilation. The derivative of the former term, spending per student, is

$$\partial [(\tau_t Y_t - s(1 - w_{t+1})) / w_{t+1}] / \partial s = -(1 - w_{t+1}) / w_{t+1} - (\tau_t Y_t - s)(\partial w_{t+1} / \partial s) / w_{t+1}^2 \quad (21)$$

In general, this has an ambiguous sign that depends on  $\partial w_{t+1}/\partial s$ , the degree in which public and private enrollment rates are responsive to the size of the voucher. When the response is relatively inelastic, the voucher is ineffective in reducing the number of students attending public school, and therefore reduces spending per student in public education, given the tax rate; this harms the majority. In this case the voucher has a detrimental effect on the utility of majority households through both channels. Only when private enrollment responds elastically to the size of the voucher can it increase public school spending per student, and only when this positive effect outweighs the detrimental effect of the voucher on social cohesion will the majority support a voucher system that subsidizes private education.

Equations (20) and (21) indicate when this might be the case. As a larger and larger fraction of the population is enrolled in public schools and is assimilated in the majority culture, i.e., as  $w_{t+1}$  tends to unity, or as the degree of polarization of the remaining minority,  $d_{t+1}$ , tends to zero, so that  $p$  tends to one, the marginal effect of a voucher on cultural assimilation is negligible. Then, if the elasticity of enrollment with respect to the size of the voucher is large enough so that the voucher has a positive effect on the quality of public schooling, the net effect will be positive. Vouchers are more likely to benefit the majority the smaller is the minority and the less polarized it is.<sup>22</sup>

Suppose now that the amount of the voucher is also endogenously determined by the politically decisive cultural majority of the parents, in addition to the education tax rate. The optimal voucher should then satisfy the following first order condition:

$$\partial[(\tau_t Y_t - s(1 - w_{t+1}))/w_{t+1}][w_{t+1} + p(d_{t+1})(1 - w_{t+1})] / \partial s \leq 0 \quad (22)$$

with equality when the optimal voucher is positive.

The equilibrium in this case – which consists of the education tax rate and the voucher determined by the majority, and the cultural orientation of private schools and enrollment in public schools determined by the minority – is in general still inefficient, because these

decisions are uncoordinated. In particular, marginally increasing the voucher above the level determined from (22), and at the same time properly limiting the enrollment in public schools and/or moving the private schools' curricula closer to the mainstream could benefit all parents. To sum up,

*Proposition 4.* Vouchers benefit the majority provided only that they lead to higher future income, hence faster growth. This is more likely to happen when public school enrollment is elastic with respect to the size of the voucher, and when the minority is small or less polarized. When the majority determines the amount of the voucher so as to maximize its utility, the result is an inefficiently small voucher.

## 5 Immigration and Public Education

Large waves of immigration in the mid-nineteenth century provided a major impetus for the emergence of public education in the US, which continues to play an important role in assimilating new immigrants.<sup>23</sup> In this section we extend the basic model so as to study the interaction between explicit migration flows and the assimilating effect of public education.<sup>24</sup> Population is no longer constant over time, but grows and changes its composition.

To fix ideas, let  $N_t$  denote the measure of the population in period  $t$ , where the initial population size is normalized,  $N_0 = 1$ , and assume that there is positive population growth from immigration, but no natural growth, every year,  $N_t > N_{t-1}$ .<sup>25</sup> All immigrants enter the country with the same cultural orientation  $\underline{d}$ , which is at least as far removed from the mainstream culture as the cultural orientation of the minority in the initial period,  $\underline{d} \geq d_0$ . Thus, extending our previous line of analysis, in each period there are three types of parents: majority culture parents in measure  $w_t$ , veteran minority parents in measure  $m_t$ , and newcomers in measure  $n_t = N_t - N_{t-1}$ . The effect of cultural polarization of productivity is

then modified as follows (where it is assumed that all veteran minority parents have the same cultural orientation,  $d_t$ ):

$$P_{it} = \begin{cases} [w_t + p(d_t) m_t + p(\underline{d}) n_t] / N_t & \text{if individual } i \text{ belongs to the majority} \\ [p(d_t) w_t + m_t + p(\underline{d} - d_t) n_t] / N_t & \text{if individual } i \text{ belongs to the minority} \\ [p(\underline{d}) w_t + p(\underline{d} - d_t) m_t + n_t] / N_t & \text{if individual } i \text{ is a newcomer} \end{cases} \quad (2')$$

We will assume, as before, that majority parents determine tax rates (or education quality) and veteran minority parents determine the orientation of minority schools; newcomer parents only choose which school their children will attend. The children of newcomers are then no longer newcomers, but either veteran minority or majority, depending on the school their parents chose for them.

Under decentralized education veteran minority parents choose to send their children to schools of their own cultural orientation, as indicated by the previous analysis. Newcomers must then choose between majority and minority schools. The utility differential between minority and majority schooling for a newcomer parent arriving in period  $t$  is

$$\begin{aligned} \Delta U^n = & -C(\underline{d} - d_{t+1}) + C(\underline{d}) \\ & + \alpha \log\{ [p(d_{t+1}) w_{t+1} + m_{t+1} + p(\underline{d} - d_{t+1}) n_{t+1}] / [w_{t+1} + p(d_{t+1}) m_{t+1} + p(\underline{d}) n_{t+1}] \} \end{aligned}$$

which must be positive from the convexity of  $C$  and the revealed preference of veteran minority parents.<sup>26</sup> Thus newcomers also choose minority schools, and consequently  $w_t = w_0$  and  $m_t = N_{t-1} - w_0$  for all  $t$ .

The growing veteran minority population reduces the incentive to minority parents to move towards the mainstream majority. Assume a fixed measure of migrants,  $n_t = n$ , in each

period, so that  $m_t = 1 - w_0 + (t-1)n$ . The first-order condition determining the minority parents' choice of cultural orientation at an interior point can then be written in the form:

$$C'(d_t - d_{t+1}) + \alpha [p'(d_{t+1}) w_0 - p'(\underline{d} - d_{t+1})n] / [p(d_{t+1})w_0 + 1 - w_0 + t n + p(\underline{d} - d_{t+1})n] = 0 \quad (23)$$

from which it follows by total differentiation that  $d_{t+1}$  is an increasing function of  $n$ . Thus a larger flow of immigration, absent public education, exacerbates the negative effect of polarization on the majority of parents.<sup>27</sup>

The equilibrium analysis of public education proceeds similarly to that presented in section 3, with some modifications. The condition determining the cultural orientation of the minority is:

$$C'(d_t - d_{t+1}) + \alpha [p'(d_{t+1})w_{t+1} - p'(\underline{d} - d_{t+1})n_{t+1}] / [p(d_{t+1})w_{t+1} + m_{t+1} + p(\underline{d} - d_{t+1})n_{t+1}] = 0 \quad (24)$$

As above, differentiation reveals that the larger is the number of immigrants the less closely will the minority move towards the cultural orientation of the majority. The threshold income level above which parents pursue private schooling is given by:

$$V_{it}^{pub} - V_{it}^{pr} = (1 - \alpha) \log\{ [(1 - \tau_i) y_{it}] / [(1 - \tau_i) y_{it} - \tau_i Y_t / w_{t+1}] \} - [C(d_t) - C(d_t - d_{t+1})] \\ + \alpha \log\{ [w_{t+1} + p(d_{t+1}) m_{t+1} + p(\underline{d}) n_{t+1}] / [p(d_{t+1}) w_{t+1} + m_{t+1} + p(\underline{d} - d_{t+1}) n_{t+1}] \} = 0 \quad (25)$$

where for immigrant families,  $d_t = \underline{d}$ .

Differentiation of (25) reveals that this difference is decreasing in  $n_{t+1}$ . Thus the larger is the number of immigrants the lower is the threshold income level and the larger the number of minority parents, both veteran and new immigrants, who choose private schooling for their

children. This is indirectly corroborated by Lazear (1998, 1999), who reports that the likelihood of an immigrant to the US learning English is inversely related to the proportion of local population that speaks her/his language.

Convexity of  $C$  ensures that (25) decreases in  $d_t$  as well, which implies that veteran minority members are readier to send that children to a public school than new immigrants with similar income. The cultural assimilation effect of public education depends, therefore, on the income distribution among the new immigrants relative to that of the veteran minority. If the distribution of income among these two groups is similar and the rate of immigration is high enough, then the fraction of the population opting out for private schools may actually increase over time, and public education will not achieve cultural assimilation. If, however, as is more likely, new immigrants have relatively low incomes, then public education provides precisely the right incentives that motivate new immigrants to have their children attend public schools where they will be more rapidly assimilated in the mainstream culture. Summing up,

*Proposition 5.* If education is decentralized, a higher rate of immigration increases cultural polarization. Public education is an effective tool of cultural assimilation when immigrants are poor or few in number, but may not be effective in dealing with large numbers of high-income immigrants.

Thus, at least with regard to the cultural dimension, poor immigrants may be less of a burden for the absorbing economy than rich immigrants, as they may be readier to blend into the mainstream culture. Furthermore, merging these results with Proposition 4 leads us to the conclusion that decentralizing reforms of the education system through vouchers or similar means may be politically incompatible with large inflows of immigrants.

## 6 Concluding Remarks

Public education has traditionally been viewed as a key element of the melting pot, a vehicle for the cultural integration of new immigrants, that smoothes ethnic tensions and promotes common modes of communication. A public school system that does not reduce the tax liability of those seeking to educate their children privately, requiring them to pay twice for their schooling, creates a strong incentive for social integration. In this context, education reforms aiming at improving scholastic achievements through vouchers and education tax credits that subsidize private education from public funds countervail this effect and consequently have an adverse effect on social cohesion.

The simple analytical model presented in this paper highlights this dual role of education, in building human capital and fostering social cohesion. It shows, in the first instance, that both decentralized and uniform public education are inefficient in this regard: decentralized education is too slow in assimilating the minority while mandatory public education in the majority culture is too rapid. There is scope for a mutually beneficial contract under which private education is both subsidized and regulated.

Recognizing, however, that centralized regulation of private schooling may be difficult to enforce, we then consider the effect of a voucher program that subsidizes private education without regulating its content, identifying conditions under which the majority will find in its best interest to offer such a program. As previous analyses have shown, vouchers are beneficial for the majority attending public education when the elasticity of enrollment with respect to the size of the voucher is large enough. To this we add that this effect must be weighed against their adverse cultural impact, which increases the more polarized is the society. We also show that without regulation of private school curricula the amount of the voucher is inefficiently low.

Finally, we consider the impact of the rate of immigration and its composition on

cultural homogeneity. We show that public education is an effective tool of cultural assimilation, especially when immigrants are poor or few in number, but may not be effective in dealing with large numbers of high-income immigrants. Thus, from a cultural perspective, poor immigrants readier to blend into the mainstream culture may be less of a burden for the absorbing economy than wealthier immigrants.

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<sup>1</sup> This applies to voluntary migration from Europe and East Asia. The forced migration of slaves from Africa has left a much more difficult legacy, and the mass migration from Latin America has also proved difficult to absorb. Substantial progress has been achieved in the last fifty years, but racial tensions continue to leave their mark. Thus, for example, Alesina et al. (1997) recently found that racially heterogeneous communities tend to spend less on productive public services, including education. The image of the US society as a melting pot goes back at least to Zangwill (1908).

<sup>2</sup> See Glazer (1983) for an authoritative account of ethnic cleavages in the US, and DiPasquale and Glaeser (1996) for a more recent economic perspective. See also Edward and Richey (1963) and Green (1990) for excellent historical accounts of the central role that public schooling has played assimilating the large numbers of immigrants that the United States has absorbed in the last century. The emergence of government intervention in schooling in the eighteenth and nineteenth century in continental Europe was also closely tied to its socializing role in the course of nation building (Good and Teller, 1969, and Green, 1990), and public education has played an important role in efforts to forge new national identities in the multi-ethnic developing countries that emerged in the second half of the twentieth century.

<sup>3</sup> In the formal analysis we focus on the direct fiscal effect, abstracting from other important factors such as the beneficial effect of increased competition, or peer-group effects that may have an adverse impact on the quality of public schooling.

<sup>4</sup> See West (1997) for a useful survey of the limited experience with vouchers, which have never been adopted on any significant scale in the United States; in November 2000, voucher proposals were overwhelmingly voted down in Michigan (Proposal 00-1) and California (Proposition 38). See Chubb and Moe (1990) for a comprehensive statement of the case for education vouchers, and Peterson (1999) for a succinct argument in favor of further experimentation. Quantitative analyses indicate that vouchers should have little or no detrimental effect on public school spending per pupil (Hoyt and Lee, 1998; Cohen-Zada and Justman, 2000; among others), especially if they are means-tested (Chen and West, 2000; Bearse, et al., 2000)

<sup>5</sup> After examining the results of an early voucher experiment in San Jose, California, one study concluded that, "... education vouchers stand little chance of succeeding in America elementary and secondary schools ... Specifically, there is some concern that parents pick

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programs which reinforce their class-related social values, so that poor children have little opportunity to acquire the beliefs, attitudes, and social competencies necessary for social mobility to the middle class...” (Bridge, 1977; quoted in Stiglitz, 1988). Concern regarding increased social polarization that may arise from increased school choice is also reflected in the constitutional ban on directing public funds to parochial schools that account for 85% of the roughly 10% of students attending elementary and secondary private schools in the United States (Digest of Education Statistics, 1993/4). For further discussion of the importance of ideology for the relationship between public and private schooling see James (1993) and references therein.

<sup>6</sup> A more general approach would consider an endogenous determination of the cultural orientation of the majority as well as of the minority; this is ignored in the current analysis for simplicity.

<sup>7</sup> In general, one can think of several channels through which cultural polarization can affect income, some of which are discussed in Gradstein and Justman (2000, 2001). Here we simply assume this effect exists without dwelling on its origins.

<sup>8</sup> Thus, we disregard at the present stage any intergenerational correlation in incomes.

<sup>9</sup> We assume that  $p$  is declining from some point on, and specifically that it is declining at the initial distance  $d$ . This does not rule out the possibility that some measure of cultural distance is beneficial, i.e., we allow  $p'(0)$  to be positive. Gradstein and Justman (2001) derive  $p$  as the product of the probability that two individuals separated by cultural distance  $d$  will succeed in cooperating with each other, which is a monotonically decreasing, concave function of  $d$ ; and of the economic output that their cooperation will produce if they succeed, which is weakly increasing and concave in  $d$  (reflecting the potential benefits of diversity).

<sup>10</sup> Several papers, notably, Chiswick (1978, 1991), have shown that cultural (more specifically, linguistic) assimilation positively affects immigrants’ earnings. This is the relationship captured in the second term of equation (6).

<sup>11</sup> We expand on this difficulty in Gradstein and Justman (2001).

<sup>12</sup> Differentiation of the left-hand side of (15) with respect to  $d_{t+1}$  reveals that it is negative, thus ensuring that the second order condition holds.

<sup>13</sup> The envelope theorem implies that the indirect effect of a change in  $w_{t+1}$  through its effect on the orientation of minority schools can be ignored.

<sup>14</sup> This can also be seen directly by comparing (6) and (15).

<sup>15</sup> From the majority point of view, the situation where it not only controls the financing but

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also fully regulates private schools is ideal. We, however, rule out such overwhelming imposition.

<sup>16</sup> Attempts at centralized supervision and regulation of private schooling can be viewed as a part of such contract, whereby the curriculum content is to a degree centrally monitored. In the US context at least, the state supervision of private schooling has caused much controversy. In the so-called Oregon case, 268 U.S. 510, in 1923, for example, the Supreme Court denied the state the right to prohibit private schools. Similarly, several Southern states have allowed the teaching of both creationism and evolution, whereas other states have prohibited the former. The constitutional separation between religion and state has profoundly affected the ability of the state to intervene in private schooling.

<sup>17</sup> In practice, each of these methods of subsidizing private education has different implications that must be carefully distinguished, however for the purpose of the present analysis they are equivalent.

<sup>18</sup> Rangazas (1995), Glazer and Niskanen (1996), Epple and Romano (1996), Hoyt and Lee (1998), Glomm and Ravikumar (1998).

<sup>19</sup> The time period subscript is omitted for brevity.

<sup>20</sup> Majority parents have no incentive to send their children to private school in our model because of the stipulation that the quality  $h$  must be the same in all schools.

<sup>21</sup> Note that the envelope theorem allows us to ignore the effect of the voucher on the tax rate, as the tax rate is chosen by the median voter so as to maximize her utility.

<sup>22</sup> This is possibly reflected in the difference between relatively ethnically homogeneous European countries, such as France, Germany, and Sweden, where private education is subsidized, and the more diverse US, where it is not.

<sup>23</sup> One indication of this role is the controversy surrounding bilingual instruction in schools.

<sup>24</sup> Different aspects of immigration policy testify to the significance of cultural assimilation, such as the long naturalization process required by many host countries. In the US, for example, a basic knowledge of English and of American history is part of this process. Also, the US approach to immigration emphasizes relative-based preferences, and the quotas for permanent residency are partly allocated in proportion to the composition of the US population by the country of origin, thus restricting cultural diversity (see Lazear, 1998, for an empirical evidence on this policy feature). The present analysis with its focus on education abstracts, however, from issues pertaining to immigration policies.

<sup>25</sup> A further interesting issue left for future work is endogenization of the immigration

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decisions.

<sup>26</sup> A veteran minority parent's utility differential between minority and majority schooling is

given by  $\Delta U^v = -C(0) + C(d_{t+1}) + \alpha \log\{[p(d_{t+1}) w_{t+1} + m_{t+1} + p(\underline{d} - d_{t+1}) n_{t+1}] /$

$[w_{t+1} + p(d_{t+1}) m_{t+1} + p(\underline{d}) n_t]\}$ , which is positive by revealed preference. And  $\Delta U^n - \Delta U^v =$

$[C(d_t) - C(\underline{d} - d_t)] - [C(d_t) - C(0)]$  must be positive from the convexity of  $C$  (and the mean

value theorem).

<sup>27</sup> The derivative of  $d_{t+1}$  with respect to  $n$  has the sign of:  $-p'(\underline{d} - d_{t+1}) [p(d_{t+1})w_0 + 1 - w_0]$

$- p'(d_{t+1}) w_0 + [t + p(\underline{d} - d_{t+1})]$  which is positive because  $p$  is declining in the relevant range.

Only when the minority is fully assimilated does this effect disappear, but migration also has the effect of postponing and possibly preventing full assimilation. This, in fact, is one of the rationales for the majority to adopt immigration policies that restrict and monitor the inflow of immigrants, which are ignored in the present analysis.