# Education funding and the sustainability of diverse societies

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## Introduction

In this paper, I make connections between education, economic sustainability, population dynamics, and segregation outcomes in a society with different ethnic and religious groups. My previous research has addressed questions of growth, education, and population. Though not a specialist on divided societies, I will show that economy approach to modelling these interactions can give useful materials to the scholars working in the other social sciences.

In the other contributions to this book, many aspects of education have been addressed: textbooks production, choice of education language etc… In this contribution we will address the question of education funding, and how it affects the sustainability of a diverse society.

Let me first introduce some definitions I will use in this article. First, one need to define what a diverse society is. In economics, there is the notion of intra generational heterogeneity, which describes a model economy where households differ not only by age but also by another dimension. This other dimension can either be "preferences" or "endowments". Preferences describe how people rank different outcomes, while endowments cover aspects such as abilities. Both can be related to the notions used in other social sciences, such as ideology, culture, or ethnicity. The two dimensions can sometimes be interwaved. For example, imagine a society with two types of people, "traditionals" and "liberals". The two groups will have different preferences for example with respect to the type of public good that should be provided by the government, but could also have different abilities to work with other people: traditional having an advantage when working with other traditional people, because of the high level of trust between them, while liberals being more able to work with any type of person (see e.g. Melindi Ghidi, 2009).

*Definition: a diverse society is one in which there are different types of households; types reflect ideology, culture or ethnicity.*

The topic of this paper is "sustainability of diverse societies". I therefore need to provide a definition of sustainability. A weak notion of sustainability would require that no type disappears in the long-run. In other words, the weight of each group in the society should remain positive for the society to remain diverse. They are two straightforward ways to measure the weight of a group: the demographic weight, and the share in income or wealth.

*Definition: Sustainability is achieved when the population shares and the income shares of all types does not converge to zero in the long run, i.e. when diversity is preserved.*

Imposing that both the population share and the income share remain positive is a way to avoid "repugnant" situations where some type would still have some population but would be infinitely poor.

To analyze whether a diverse society is sustainable, we need to study the dynamics of population and wealth. Four aspects are key for the dynamics of diversity:

1. Income distribution across groups
2. Differential fertility across groups
3. The possibility of oblique transmission of culture
4. The possibility of emigration

The first two points are the most important ones. The dynamics of income distribution will determine how the types' shares in total income evolve over time, and, in particular, whether some group keeps impoverishing over time. Differential fertility is extremely important in the long run in predicting the population shares of the various types. In addition to income and population dynamics, the oblique transmission of culture determines whether it is possible for children of type x parents to become type y. Finally, if emigration is possible, it is an factor that determines the size of the groups in the long run.

The above definitions put a general frame to any analyzis of the sustainability of diverse societies. Here, we are interested in a very precise and narrow aspect of this question. How could education funding systems affect sustainability of diverse societies through these different mechanisms? Let me insist that we are going to look at only one aspect of education, that is education funding. Education funding will act on the ability of each group to accumulate skills, and thereby affects directly the income shares. But we are also going to argue that education funding is important for fertility differential and emigration.

Education funding can be of different sorts.

- Parental funding: when parents pay for the education of their children.

- Market funding: when students borrow from the market to finance their studies, and reimburse later on.

- Public funding at the federal level: education is paid by the government. Resources are provided by a tax levied on the whole country.

- Public funding at the regional level: education is paid by local autorities. Resources are provided by a tax levied on part of the country (a region, a state, a province etc.).

In the rest of the paper, I shall use several results from my previous research to highligh how education funding can affect the dynamics of types. I shall start by discussing the difference between regional public funding and federal public funding. Next I will elaborate the model by introducing a choice between public and private education. Then, some consequences for immigration decisions will be discussed. Finally, we will stress that political power in the long run, which is important to determine how resources are shared between the groups, could be itself a function of differential fertility and education.

## Level of education funding and income convergence

Three different types of education funding are examined by De la Croix and Monfort (2000). The first one is a system under which a community based authority finances the education of its members by means of taxes collected in the community. In the second one, a federal government levies nation-wide taxes to finance education for everybody. Finally, in the market funding system, individuals borrow to finance their education. In both public sector models, the tax rate is endogenized by implicitly assuming this choice to emerge from a voting process.

One specificity of the approach in to assume that human capital in one group has an effect on human capital in the other groups. The extent of this spill-over across groups might be affected by the distance between groups. From this point of view, distance should be interpreted as any obstacle, whether physical or institutional, that prevent the non-market interactions between agents (contacts, exchange of information, face-to-face communication). Economic geography indeed considers these interactions as an important factor in the process of technology or knowledge diffusion. In our framework, the extent by which one group benefits from the others' human capital is affected by a transaction cost which reflects the role of distance in the process of human capital formation.

Under the regional and market funding systems, there is convergence in income of the various groups if and only if there are inter-regional knowledge spill-overs. If those spill-overs are weak, only the federal public funding system gives a chance to income convergence, thereby increasing the chance of promoting sustainability of the income shares of the various groups over time.

The set-up has also implications in terms of long-run growth rates. The equilibrium with federal funding has the same long-run growth rate than the equilibrium with regional funding. The equilibrium with market funding has a higher long-run growth rate.

The analysis suggests that the choice of a particular education system incorporates a possible trade-off between long run growth rate and convergence across groups. The equilibrium with federal funding displays a higher convergence speed than the equilibrium with market funding which itself has a higher convergence speed than the equilibrium with regional funding.

## Education funding, segregation and differentila fertility in divided countries

De la Croix and Doepke (2009) analyze the choice of public spending on education when voters differ in income. Then they look at how this choice maps into segregation, where segregation means a situation where rich and poor do not attend the same type of school.

When the distribution of income and the distribution of types are correlated, which seems to be the case in many countries (the extreme example being probably Namibia, see Weiland, 2010), we can readily apply their results on segregation by income to se-

gration by type. Two factors are key to determine whether some groups will resort on private schools: income inequality and democracy.

The role of income inequality

Consider first the case of a ideal democracy, in which the rich and the poor have equal weight in the political process. Parents send their children to a private school only if they would like to endow their children with an education of a much higher quality than that provided by the public system. This implies that income inequality is the main determinant of the extent of segregation in the schooling system. In a society with little inequality, the preferred education level varies little in the population, so that most or all parents use public schooling. In 2000, countries in such a case include Hungary, the Czech Republic, Denmark, Finland, Germany, Iceland, Latvia, The Netherlands, Norway, Russia, and Sweden. For increasing levels of inequality, an increasing share of richer people choose private education for their children. The five countries (among those in the PISA 2000 survey) with the highest difference in the public subsidization rate of the lowest and the highest social class are Austria, Australia, Brazil, Mexico, and Spain. In this group, the difference between the subsidization rate of schools attended by members of the top and bottom social classes averages 25%, which indicates much bigger reliance on private schools by the top income type.

From a policy perspective, perhaps the most important question is how the extent of private schooling affects the quality of public schooling. In our political economy model, when more and more rich parents send their children to private school, these parents no longer stand to gain from high-quality public education. These parents therefore vote for lower taxes and less spending on public schools. It does not necessarily follow, however, that the quality of public schools will decline as the share of private education increases. When rich parents opt out of the public system, the remaining funding of the public system can be concentrated on fewer students. Thus, even when there is a decline in total funding, spending per student (which is one measure of the quality of education) may well go up. This is the case for example in the USA, where three different measures of the quality of public education are positively correlated with inequality across States (see Table 1 of De la Croix and Doepke 2009).

Hence, as long as the poor carry equal weight in the political system, the relationship between the share of private schooling and the quality of public schooling is positive.

The importance of endogenous fertility

An additional benefit from private education arises because fertility decisions are endogenous. Consistent with empirical evidence, the theory predicts that poorer parents who use public schools have more children than those opting for costly private schools. By raising their fertility rate relative to what they would choose if they were paying for their children's education, the public school parents impose a fiscal externality on all taxpayers. This externality is absent if parents send their children to private schools and therefore fully take into account the education cost of the marginal child.

This feature is particularly relevant for the dynamics of the groups within society. In a divided society, the poor ethnic group relying on public education will have a higher fertility rate than the rich relying on private schools. They will accordingly multiply faster over time and their share in the population will grow. In the absence of any other regulatory mechanism, the relative size of the group of the rich households will become negligible, and the diverse society is not sustainable. We will see below that this possibility is even more likely when we move away from the democratic ideal.

The role of the distribution of political power

The findings described so far apply to countries with equal political representation for all. But what about countries farther away from the democratic ideal? Consider a non-democratic country in which only the political views of an entrenched, rich elite matter. If inequality is not too severe, one possibility is that most families, including the elite, use public schools. In this case, the political elite has a direct interest in the quality of public schools, and the outcomes in terms of education spending and the quality of schooling are similar to those of an otherwise identical democracy. However, a second possibility is that most or all the political elite uses private schools. Public education spending and the quality of public schools are then low because the political elite has no vested interest in public schooling. Thus, unlike in democracies, a high share of private schooling will generally lead to a low quality of public schools.

Moreover, in dictatorship, there can be multiple equilibria. Similar economies could end in different situations, depending on which equilibrium the elite coordinates. When everyone with political power uses private schools, a given individual does not want to switch to the public system since the quality of the public schooling is low. If, however, all (rich) voters were to switch together to the public system, they would vote for a much higher quality of public schools, in which case it would be rational to stay in the public system.

Multiplicity arises because, there is a strategic complementarity between the education choices of skilled people through the quality of public schools. It means that the utility of those taking the action depends positively on how many people take the action – we say that actions are strategic complements. In popular terms, there are here vicious and virtuous circles.

Introducing the ethnic variable

Introducing the ethnic variable into the model would lead to at least one important conclusion. It should still be true that parents sending their children to private schools have fewer children – because they face a tradeoff between quality and quantity of children through their budget constraint. This is important for the dynamics of population described in the introduction. The ethnic group that relies on public school multiplies faster – and its population share in the economy thus increases over time.

Taking ethnicity into account, it would be relevant to introduce peer effects into the production of education. This means that people like to send their children in schools

populated by children of the same "type". This would reinforce the strategic comple-
mentarities introduced above. When everyone of a given type with political power uses
private schools, a given individual does not want to switch to the public system since
both the quality of the public schooling is low and the other persons of its type are not
in public schools. We may therefore expect peer effects to enlarge the scope for mul-
tiple equilibria. Vicious and virtuous circles would be stronger in a divided society.

An ethnic minority

Dottori – Shen (2008) extend the paper by De la Croix and Doepke (2009) by consider-
ing a migrant population which is not entitled to vote. Their conclusions could be ap-
plied in a context where there is a poor population of an ethnic minority which is ex-
cluded from the political system. When the size of this low-skilled minority is large,
they find that wealthy households from the majority group are likely to opt out from
public into private schools. Four main effects of the presence of the minority are taken
into account: (1) greater congestion in public school; (2) lower average tax base for
education funding; (3) reduced low-skilled wage and so more low-skilled majority
households dependence on public education; (4) higher skill premium, which induces
high-skilled majority households to privately invest in their children's education and
hence weakens their support to finance public school. Moreover, with endogenous fer-
tility, the opting-out decision taken by some majority parents results in a fertility diffe-
rential between majority and minority households: the minority will grow is size but be-
come relatively poorer and poorer.

Emigration and coordination failures

Emigration is another channel through which the relative size of the groups is affected.
The literature that has studied the main determinants of emigration, and in particular
emigration of the most skilled, agrees that poverty, instability and fractionalization in
the home country are important factors.
    Here too there are strategic complementarities between the choices of the different
members of a group. When skilled households expect their home country to have low
productivity, to be poorly governed, or to have a low quality education system, the most
mobile of them will move to a better place. History is full of example of such flights
(see for example Benrabah (2010) and the Berber decline in Algeria). This can only
reinforce the bad features of the home country. On the contrary, if people expect high
productivity and good governance, they will stay, promoting thereby high productivity,
good schools, right governance, and strong wealth accumulation.
    Such vicious or virtuous circles seem to arise very naturally when one takes into ac-
count the relationship between brain drain and development level in the home country.
Along these lines, De la Croix and Docquier (2010) built a model which is open to the
possibility of multiple equilibria. They derive theoretical conditions under which they
effectively arise. Identifying country-specific parameters in the data, they classify coun-

tries into different categories depending on whether the observed situation might be one of high brain drain and high poverty. Introducing an ethnic or religious factor into the model could only reinforce the interdependencies between individual choices. Assuming that people of the same group like to stay together, massive waves of emigration could be obversed if individuals in this group expect the other members to move abroad.

## Differential fertility and the distribution of political power

We have seen so far that the distribution of income and of political power in a society affects the educational system, which in turn affects differential fertility between groups and the decisions of members of a group to emigrate, and thus population dynamics. Population dynamics describe the growth or decline of a particular group, and are thus related to the dynamics of diversity in a society.

Let us now consider on top of these mechanisms that the distribution of political power itself, considered exogenous until now, is correlated with the demographic weight of ethnic or religious groups. Let us motivate such a dependency and show that it can introduce another vicious circle leading to unsustainable outcomes using a picturesque allegory: Easter Island.

In De la Croix and Dottori (2008) we provide a model of a population race that we apply to the Easter Island case, which has now become an synonym for ecological catastrophe following Diamond's (2005) book, and a warning for the future. We propose a story involving non-cooperative bargaining between clans to share the crop. Each clan's bargaining power depends on its threat level when fighting a war. The biggest group has the highest probability of winning. A clan's fertility is determined *ex ante* by each group. In the quest for greater bargaining power, each clan's optimal size depends on that of the other clan, and a population race follows. This race may exhaust the natural resources and lead to the ultimate collapse of the society.

This model provides a new way of looking at fertility choices. The mechanism through which being larger yields an advantage provides a further motive for fertility choices, in addition to those generally highlighted (old age support, family altruism, etc.). In our model this motive can be traced back to the absence of property rights over output, but the principle can easily be extended to any situation where the relative size of a group influences its expected payoffs. Consider, for instance, tensions between two groups where one feels much weaker in war or weapon technology: enlarging its population can be seen as a means to increase its power and partly bridge the gap. Moreover, in many bargaining situations the bigger group can take advantage of its size by making its voice louder (for example, in subsidy seeking).

De la Croix and Dottori's model has possible extensions to modern episodes of conflicts involving poor societies. The notion of suboptimal population race, related to the possibility of vicious circles, shows the rationale for social problems being increased instead of being solved. In considering what the effect of introducing education is, the key variable would be the relative importance of education versus number of people in gain-

ing political power. A priori, if education is relatively important in getting power compared to population, the framework should lead to an "education race", which would be a better outcome than a "population race". The possibility of an education race will depend on the availability (funding) of education for all groups. A public funding scheme at the federal level seems an appropriate set-up to frame an education race between groups, as it would incite everyone to participate.

## Conclusion

In this paper, we considered the effect of education funding on the sustainability of a diverse society, where sustainability is defined as a situation in which the population shares of different groups does not converge to zero in the long run, i.e. when diversity is preserved. We identified several key characteristics. The level of education funding (regional vs national vs private) affects income distribution across groups and long-run growth. The distribution of income and of political power determine whether some groups will resort on private schools. This in turn matters for differential fertility and the dynamics of group sizes. When emigration is possible, there is room for multiple equilibria and coordination failures. Finally, we stressed that group size is a determinant of political power.

Throughout this paper we have seen the emergence of vicious circles, which are reinforced by a presence of an ethnic or religious dimension. As each member of group attached a particular importance to the decisions of the other members of the same group, multiple equilibria arise. The rationale for multiplicity is well explained by Shell (2008): "The market economy is a social system. In attempting to optimize her own actions, each agent must attempt to predict the actions of the other agents. A, in forecasting the market strategy of B, must forecast B's forecasts of the forecasts of others including those of A herself. (…) It is not surprising that this process may generate uncertainty in outcomes even in the extreme case in which the fundamentals are non-stochastic."

In order to conclude with a positive note, I can stress one feature of vicious or virtuous circle. To break them, or to use them, one does not necessarily need big changes. Small steps could be enough to initiate a change that will be amplified over time by the internal propagation mechanisms of the society.

## References

Benrabah, M., "The 'Impossible' Reform of Education in Algeria: The weight of politics", this volume, 2010.

De la Croix D. and F. Docquier, "Do Brain Drain and Poverty Result from Coordination Failures ?", IRES discussion paper 2010/16, 2010.

De la Croix D. and M. Doepke, "To Segregate or to Integrate: Education Politics and Democracy", *Review of Economic Studies*, **76**, 597–628, 2009.

De la Croix D. and D. Dottori, "Easter Island Collapse: a Tale of Population Race", *Journal of Economic Growth*, 13, 27–55, 2008.

De la Croix D. and P. Monfort, "Regional convergence and education funding", *Journal of Population Economics*, **13**, 403–424, 2000.

Diamond J, "Collapse. How societies choose to fail or survive", Penguin, London, 2005.

Dottori, D., Shen, I.-L.. "Low-skilled immigration and the expansion of private schools", Bank of Italy Working Paper No. 726. (Revise & Resubmit at the Journal of Economic Theory)

Melindi Ghidi P., "A Model of Ideological Transmission with Endogenous Paternalism", Discussion Papers (IRES – Institut de Recherches Economiques et Sociales), Université catholique de Louvain, Institut de Recherches Economiques et Sociales (IRES), 2009.

Shell K, "Sunspot Equilibrium", The New Palgrave Dictionary of Economics, Second Edition, Edited by Steven N. Durlauf and Lawrence E. Blume, 2008.

Weiland, H. "Education and Politics in Namibia", this volume, 2010.