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by

Pierre Pestieau and Maria Racionero

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Abstract

Recent evidence suggests that social mobility has declined in many developed countries despite some of them pursuing proactive redistribution policies. In this paper we characterize the optimal mix of income tax and education policies that a government should adopt to maximize a long-term social objective that includes considerations for income redistribution and upward mobility. We show that switching from an elitist to a meritocratic education system, or from a short-term to a long-term vision of social welfare, fosters upward mobility but it can sometimes lead to increased inequality.

Keywords: social mobility, education policy, Great Gatsby curve

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1 Introduction

Low social mobility has been linked to the recent rise of populism in traditional welfare states.[1] Indeed, despite proactive redistribution policies that have helped reduce or maintain income inequality at a stable level, several countries have experienced a

*University of Liege; CORE, UCLouvain; Toulouse School of Economics. E-mail: p.pestieau@uliege.be. https://orcid.org/0000-0002-0452-7278

†Corresponding author: Research School of Economics, College of Business and Economics, Australian National University, Canberra ACT 2601 Australia. E-mail: maria.racionero@anu.edu.au. https://orcid.org/0000-0002-4556-7444

[1]Protzer (2021) shows, using cross-sectional regressions, that low social mobility consistently correlates with the geography of populism, both within and across developed countries, whereas income inequality does not.

decline in social mobility. This trend appears to contradict the Great Gatsby curve, which predicts a negative correlation between income inequality and social mobility.[2]

Chetty et al. (2017) have recently shown that the rate of "absolute income mobility" -the fraction of children who earn more than their parents- has fallen from approximately 90% for children born in 1940 to 50% for children born in the 1980s in the United States. A similar trend can be observed in other countries, albeit to a lesser extent. A recent OECD (2018) study, which analyses the so-called broken social elevator, shows that in a large number of traditional welfare states, upward mobility has declined over the last two decades. Income inequality has remained relatively stable during the same period. This suggests that welfare states may have placed an excessive emphasis on combating income inequality through various income support programs, potentially at the expense of promoting social mobility.

American political philosopher Michael Sandel (2019) and law school professor Daniel Markovits (2019) have recently written about the lack of mobility in the US showing the failure of the meritocratic model, popularly known as the American dream. Markovits writes: "The avenues that once carried people from modest circumstances into the American elite are narrowing dramatically. Middle-class families cannot afford the elaborate schooling that rich families buy, and ordinary schools lag farther and farther behind elite ones." Sandel goes further and questions the concept of meritocracy. In his view, it is important to distinguish between merit understood as competence, which is a good thing, from meritocracy, which is a system of rule, a way of allocating income and wealth and power and honor according to what people are said to deserve.

One might ask why many governments seem to have neglected social mobility. One reason might be that they believe that more redistribution automatically leads to more mobility according to the deceptive Great Gatsby curve. Another reason might be that it is not firmly established what should be considered good mobility. As noted by Gottschalk and Spolaore (2002), the literature on the measurement of mobility does not provide sound welfare foundations as to the right concept of mobility. Finally, the lack of mobility, as discussed by Sandel and Markovits, might stem from complex to tackle causes involving both the educational system and the labor market.

In this paper we formalize the idea of social elevator with a simple probability, that of upward mobility. This probability depends on two factors, the level of ed-

[2]The term Great Gatsby curve was first coined by Krueger (2012) to refer to the positive association between income inequality and intergenerational elasticity of income documented by Corak (2013). See Durlauf et al. (2022) for a recent survey of the literature on the Great Gatsby curve.

ucation and the family or social background.[3] Education spending is expected to increase with family income. In addition, family background can facilitate upward mobility for children of advantaged families, even when they receive the same level of educational investment. This effect significantly contributes to the breakdown of the social elevator. It operates through an educational system that is becoming increasingly elitist and a job market for high-quality positions that is progressively less accessible to outsiders, as Markovits and Sandel have argued.

We characterize the optimal non-linear income tax and education policy mix of a social planner that is concerned with income redistribution and upward mobility. We distinguish between two cases: in the first, which we call meritocratic, children with the same education level have the same probability of becoming high-skilled regardless of family background; in the second, which we call elitist, for the same education level children of high-skilled parents have a higher probability of becoming high-skilled. In other words, we define an education system as meritocratic if the upward mobility probability depends only on the educational investment and not on the economic status of the parents. One may also talk of meritocratic equality of opportunity. In contrast, it will be defined as elitist when the upward mobility probability increases with the economic status of the parents.[4]

We show that the optimal education tax/subsidy policy depends on whether the education system is meritocratic or elitist. We also show that optimal policies differ significantly depending on whether the social planner has a long-term or short-term focus. The maximization of a long-term utilitarian social objective calls for marginal education subsidies because individuals fail to internalize the broader societal impact of their educational investment choices on the population distribution. In the second-best framework, when the social planner is unable to observe the skill of individuals, there is a tendency to impose marginal education taxes on low-skill individuals. This serves the purpose of preventing high-skill individuals from mimicking low-skill ones, particularly when the education system is elitist or when high-skill individuals have higher preferences for upward mobility. If the social planner is short-term focused, the latter effect prevails. However, when the social planner is long-term focused, the two opposing forces come into play when determining the optimal education tax or

[3]In this paper we abstract from ability. Fan et al. (2023) consider the role of innate talent in an overlapping-generations model in which the allocation of the workforce between high-skill and low-skill depends on talent, parental human capital and educational resources, and the wage rate of skilled workers is governed by the average talent. They however do not consider optimal non-linear income and education taxes/subsidies.

[4]This definition is consistent with that in Cremer et al. (2010) but is at odds with that in Sandel (2019). Comerford et al. (2021) acknowledge that different people may have different conceptions on what "meritocracy" means (p.253).

subsidy for low-skill individuals.

The rest of the paper is organized as follows. In Section 2 we outline the theoretical model and characterize the laissez-faire and first-best solutions. In Section 3 we characterize the second-best optimum, when the planner is unable to observe the productivity of individuals, both the exogenous and endogenous proportion of high-productivity individuals cases. In Section 4 we provide a numerical example, which we use to illustrate the theoretical results and to explore the relationship between mobility and inequality in different scenarios. In Section 5 we conclude.

2 Theoretical model

We consider a model of successive generations. In each period, that corresponds to a generation, society comprises two types of individuals: those with high productivity/wage (w_H) and those with low productivity(w_L), with $w_L < w_H$. The difference between w_H and w_L denotes the wage gap. Individuals $i = L, H$ care for their own consumption (c_i), their labor supply, (l_i) and the upwatd mobility of their (unique) child (π_i). All individuals have the same separable utility function:

$$U(c, \pi, l) = u(c) + \alpha\pi(e) - v(l)$$

with $u' > 0, u" < 0, v' > 0, v" > 0$.

The parameter α represents the degree of parent's concern for upward mobility of their child. Ascending mobility π measures the child's probability to end up with a high-productivity job. This probability $\pi_i(e_i)$ depends on the parent's productivity level and on e_i, the level of investment by the parent with productivity w_i on their child. By assumption, we have $0 < \pi_i < 1, \pi_i^{'} > 0, \pi_i^{"} < 0$. The size of the population is normalized to 1. In each period t, that lasts the length of a generation, the fraction of high productivity individuals is denoted n_t. This implies that:

$$n_{t+1} = \pi_{Ht}n_t + \pi_{Lt}(1 - n_t).$$

Hence the interior steady state assumed to exist is given by:

$$0 < n = \frac{\pi_L}{1 - \pi_H + \pi_L} < 1.$$

The function π_i summarizes the more or less meritocratic nature of the educational system. If $\pi_L(x) = \pi_H(x)$ we will say that the educational system is egalitarian or meritocratic. In other words, if the child of a high-productivity parent and the child of a low-productivity parent have the same education, they have the same opportunity to become high-productivity. If, instead, $\pi_L(x) < \pi_H(x)$ we will say that the educational system is elitist. Note the relation between π_i and the wage level involves not only the education system but may also involve the labor market as argued by Markowiz (2018). When the gap $\pi_H(x) - \pi_L(x)$ is particularly large, it means that there exist barriers in both the education system and in the labor market that makes it difficult for someone coming from the lower wage class to reach the higher wage class.

We recognize the simplicity of this model, where an individual lives one period, has a labor supply l_i, earns $y_i = w_i l_i$ and devotes part of this earning to educate his child.

2.1 Laissez-faire

We first consider the case of a pure market economy, that is an economy without government. In such a setting, each individual i maximizes

$$U(c_i, l_i, e_i) = u(w_i l_i - e_i) - v(l_i) + \alpha_i \pi_i(e_i)$$

where, as discussed before, $u(.)$ and $\pi(.)$ are strictly increasing and concave functions and $v(.)$ is strictly increasing and convex.

The FOCs are:

$$u'(c_i) = \alpha_i \pi_i^{'}(e_i); u'(c_i) w_i = v'(l_i).$$

From the FOCs, one obtains optimal values for l_i and e_i that are time invariant. This is why we abstract from including time subscripts. As long as $\alpha_L \leq \alpha_H$, we have $\pi_H^{LF} > \pi_L^{LF}$ from which we can obtain the laissez faire value of n, namely n^{LF}. This value is obtained from the dynamic equation:

$$1 > \frac{dn_{t+1}}{dn_t} = \pi_H^{LF} - \pi_L^{LF} > 0.$$

It can be shown that starting from any initial conditions the economy converges to a steady-state.

2.2 Policies

In this paper we consider a number of instruments that can be used to achieve the social optimum. First, we consider non-linear taxes or subsidies on earnings and education. Second, we consider that the government can play on the social elevator not only by subsidizing education but also by reforming the educational system and the job market in such a way that the upward mobility becomes less dependent on the family background. Such reform would decrease the gap between $\pi_H(x)$ and $\pi_L(x)$.

We use the following notation for the two marginal tax rates: a marginal tax on labor τ_i, and a marginal tax on education θ_i. T_i represents the lump-sum tax. We insert these in the individual utility function:

$$U(c_i, l_i, e_i) = u\left(T_i + wl_i\left(1 - \tau_i\right) - e_i(1 + \theta_i)\right) - v(l_i) + \alpha_i \pi_i(e_i).$$

Maximising this utility, we obtain the following marginal rates of substitution (MRS):

$$\frac{\alpha_i^{'} \pi_i(e_i)}{u'(c_i)} = 1 + \theta_i; \frac{v'(l_i)}{u'(c_i)} = \left(1 - \tau_i\right) w_i.$$

2.3 First-best social optimum

We now turn to the design of optimal policies. At the outset, we assume that we are at the steady state with

$$n_H = n = \frac{\pi_L(e_L)}{1 + \pi_L(e_L) - \pi_H(e_H)}$$

and

$$n_L = 1 - n = \frac{1 - \pi_H(e_H)}{1 + \pi_L(e_L) - \pi_H(e_H)}.$$

We adopt a utilitarian social welfare function. Thus the social optimum can be obtained by choosing the values of $c_i, l_i,$ and e_i that maximize the following Lagrangian:

$$\mathcal{L} = \sum_{L,H} n_i \left[u(c_i) - v(\frac{y_i}{w_i}) + \alpha_i \pi_i(e_i) - v(l_i)) - \mu\left(c_i + e_i - y_i\right) \right]$$

where μ is the multiplier associated with the revenue constraint, $y_i = w_i l_i$ and n is a function of e_L and e_H. We obtain the following six FOCs:

$$u'(c_H)n - \mu n = 0$$

$$-v'(\frac{y_H}{w_H})\frac{1}{w_H} n + \mu n = 0$$

$$\alpha_H \pi'_H(e_H)n - \mu n + \frac{dn}{de_H}\Delta = 0$$

$$u'(c_L)(1-n) - \mu(1-n) = 0$$

$$-v'(\frac{y_L}{w_L})\frac{1}{w_L}(1-n) - \mu(1-n) = 0$$

$$\alpha_L \pi'_L(e_L)(1-n) - \mu(1-n) + \frac{dn}{de_L}\Delta = 0$$

where

$$\Delta = \frac{d\mathcal{L}}{dn} = U(c_H, y_h, e_h) - U(c_L, y_L, e_L) - \mu\left(c_H + e_h - y_H\right) + \mu\left(c_L + e_L - y_L\right)$$

or, using the equality $u'(c_H) = u'(c_L) = \mu$ in the first best,

$$\Delta_{FB} = \alpha_H \pi_H(e_H) - v(y_H/w_H) - \alpha_L \pi_L(e_L) + v(y_L/w_L) + u'(c^{FB})\left(y_H + y_L - e_H - e_L\right).$$

Δ denotes the effect of an increase in the number of skilled individuals on social welfare. This term is positive and represents the externality that education generates and that is not taken into account by neither individuals nor social planners that take the population composition $(n, 1-n)$ as given.

From the above FOCs, we obtain:

$$u'(c_i) = v'(\frac{y_i}{w_i})\frac{1}{w_i} = \alpha_i \pi'_i(e_i) + \frac{dn}{de_i}\frac{\Delta}{n_i} = \mu.$$

Given the above definition of n, we have:

$$\frac{dn}{de_H} = \frac{\pi_L(e_L)\pi'_H(e_H)}{\left(1 + \pi_L(e_L) - \pi_H(e_H)\right)^2}$$

and

$$\frac{dn}{de_L} = \frac{\pi'_L(e_L)\left(1 - \pi_H(e_H)\right)}{\left(1 + \pi_L(e_L) - \pi_H(e_H)\right)^2}.$$

Both derivatives are naturally positive.

2.3.1 Exogenous n

We first consider the case where the social planner takes the proportion of skilled workers as given. In that case the above FOCs imply:

$$u'(c_L) = u'(c_H) = \frac{v'(l_L)}{w_L} = \frac{v'(l_H)}{w_H} = \alpha_L \pi_L^{'}(e_L) = \alpha_H \pi_H^{'}(e_H) = \mu.$$

The marginal rates of substitution are both equal to 1, i.e.

$$\frac{\alpha_i \pi_i^{'}(e_i)}{u'(c_i)} = \frac{v'(l_i)}{w_i u'(c_i)} = 1.$$

In other words, the optimum can be decentralized by using lump-sum transfers from type-H to type-L individuals and the choices of either l_i or e_i are not distorted.

2.3.2 Endogenous n

When n is endogenous, the FOCs concerning l_i and c_i are unchanged. Those with respect to e_i differ and the marginal rates of substitution in the (education, consumption)-space are different from 1 for both type-i individuals. We have:

$$\frac{\alpha_i \pi_i^{'}(e_i)}{u'(c_i)} = 1 - \frac{\Delta}{n_i \mu} \frac{dn}{de_i} < 1 \Rightarrow \theta_i = -\frac{\Delta}{n_i \mu} \frac{dn}{de_i} < 0,$$

or

$$\theta_i = -\frac{\Delta}{\mu} \frac{\pi_i^{'}(e_i)}{1 + \pi_L(e_L) - \pi_H(e_H)} < 0.$$

To compare the two subsidies, we write:

$$\frac{\alpha_H \pi_H^{'}(e_H)}{\alpha_L \pi_L^{'}(e_L)} = \frac{1+\theta_H}{1+\theta_L} = \frac{1 - \frac{\Delta}{\mu} \frac{\pi_H^{'}(e_H)}{1+\pi_L(e_L)-\pi_H(e_H)}}{1 - \frac{\Delta}{\mu} \frac{\pi_L^{'}(e_L)}{1+\pi_L(e_L)-\pi_H(e_H)}} \gtrless 1 \Leftrightarrow n \gtrless 1/2. \quad (1)$$

We distinguish between two cases depending on whether the degree of the parent's concern for the child's upward mobility α_i are the same or different.

When preferences for upward mobility are the same we obtain that $\theta_H = \theta_L$. By contradiction, if $\pi_L(e_L) < \pi_H(e_H)$, the LHS of equation (1) would be larger than 1 but the RHS would be smaller than 1. The same contradiction appears in the case where $\pi_L^{'}(e_L) > \pi_H^{'}(e_H)$. This implies that the two subsidy rates are equal.

When preferences for upward mobility are not the same, namely $\alpha_H \neq \alpha_L$, the subsidies will differ. Assume that $\alpha_H > \alpha_L$. By contradiction, if $\pi_L^{'}(e_L) = \pi_H^{'}(e_H)$, the LHS of equation (1) would be larger than 1 but the RHS would be equal to 1. On the other hand, if $\pi_L(e_L) < \pi_H(e_H)$, the LHS would be larger than 1, but the RHS would be smaller than 1. As a consequence, if $\alpha_H > \alpha_L$, e_H and e_L in the first best are chosen in such a way that $\pi'_L(e_L) > \pi'_H(e_H)$ and the subsidy on type-L individuals is larger.

Proposition 1. When the social planner takes into account the endogeneity of n, the decentralization of the first best implies a subsidy on education. If $\alpha_H < (>)\alpha_L$, the subsidy on e_H will be larger (smaller) than the subsidy on e_L.

Taking into account the effect of policy tools on the relative numbers of type-H and type-L individuals implies a marginal subsidy on education investments and, hence, a higher proportion of high-productivity individuals in equilibrium. As a consequence, social welfare increases when the social planner recognises that the population skill distribution is endogenous.

It is not possible to determine analytically and unambiguously the effect that switching from an elitist to a meritocratic setting may have on various outcomes. In section 4 we provide numerical examples where switching from an elitist to a meritocratic education system results in increased mobility but also higher inequality, thus contradicting the Great Gatsby curve.

3 Second-best social optimum

In the first-best setting, we assumed that the social planner was able to observe the productivity of the individuals. When this is not the case, we have to acknowledge the possibility that type-H individuals mimic type-L individuals. To avoid this, we have to account, in the social planner's problem, for the following self-selection constraint:

$$u(c_H) + \pi_H(e_H) - v(\frac{y_H}{w_H}) - u(c_L) - \pi_H(e_L) + v(\frac{y_L}{w_H}) \geq 0.$$

We thus write the Lagrangian expression as:

$$\mathcal{L} = \sum n_i \left[u(c_i) - v(\frac{y_i}{w_i}) + \pi_i(e_i) - h(l_i)) - \mu\left(c_i + e_i - y_i\right) \right]$$

$$+\lambda \left[u(c_H) + \pi_H(e_H) - v(\frac{y_H}{w_H}) - u(c_L) - \pi_H(e_L) + v(\frac{y_L}{w_H}) \right]$$

where μ and λ are, respectively, the Lagrange multipliers associated with the budget and the self-selection constraints. Maximizing $\mathcal{L}$ with respect to $c_H, y_H, e_H, c_L, y_L, e_L$ yield the following FOCs :

$$u'(c_H)\,(n+\lambda) - \mu n = 0$$

$$-v'(\frac{y_H}{w_H})\frac{1}{w_H}\,(n+\lambda) + \mu n = 0$$

$$\alpha_H \pi_H^{'}(e_H)\,(n+\lambda) - \mu n + \frac{dn}{de_H}\Delta = 0$$

$$u'(c_L)(1-n-\lambda)n - \mu(1-n) = 0$$

$$v'(\frac{y_L}{w_L})\frac{1}{w_L}(1-n) - \mu(1-n) - \lambda v'(\frac{y_L}{w_H})\frac{1}{w_H} = 0$$

$$\alpha_L \pi_L^{'}(e_L)(1-n) - \mu(1-n) - \lambda \pi_H^{'}(e_L) + \frac{dn}{de_L}\Delta = 0.$$

Like in the previous section, we consider the cases with n exogenously given and with n endogenous.

3.1 Exogenous n

As it is standard, type-H individuals are not distorted in their choice of education or labor supply:

$$u'(c_H) = \frac{v'(l_H)}{w_H} = \alpha_H \pi_H(e_H) = \mu.$$

As to type-L individuals, both their choice of labor and education are distorted. As to the tax treatment of labor, we have:

$$\frac{v'(\frac{y_L}{w_L})}{u'(c_L)} = w_L + \frac{\lambda w_L}{\mu\,(1-n)}\left[v'(\frac{y_L}{w_H})\frac{1}{w_H} - v'(\frac{y_L}{w_L})\frac{1}{w_L}\right] = (1-\tau_L)\,w_L < w_L.$$

The tax rate on labor is thus given by:

$$\tau_L = \frac{\lambda}{\mu\,(1-n)}\left[v'(\frac{y_L}{w_L})\frac{1}{w_L} - v'(\frac{y_L}{w_H})\frac{1}{w_H}\right] > 0.$$

As to the tax treatment of education, we have:

$$\frac{\alpha_L \pi_L^{'}(e_L)}{u'(c_L)} = 1 + \frac{\lambda}{\mu\,(1-n)}\left[\alpha_H \pi_H^{'}(e_L) - \alpha_L \pi_L^{'}(e_L)\right] = 1 + \theta_L.$$

Hence:

$$\theta_L = \frac{\lambda}{\mu(1-n)}\left[\alpha_H \pi'_H(e_L) - \alpha_L \pi'_L(e_L)\right] \lesseqgtr 0.$$

Whether there is a tax or a subsidy on the education of type-L individuals depends on the sign of $\alpha_H \pi'_H(e_H) - \alpha_L \pi'_L(e_L)$. In the particular case where $\alpha_H \pi'_H(e) = \alpha_L \pi'_L(e)$, for any e, the tax would be nil. This would occur with a meritocratic system and identical preferences for upward mobility. If both types have the same preference and the system is elitist there is a tax on the education of type-L individuals to prevent mimicking from type-H individuals. If both types have the same $\pi_i(e)$ (i.e. the education system is meritocratic) and $\alpha_H > \alpha_L$, there is a tax on the education of type-L individuals to prevent mimicking from type-H individuals. These results can be summarized in the next proposition.

Proposition 2. In the second-best where n is exogenously given, we should have the following tax structure:

$$\tau_H = 0; \tau_L > 0; \theta_H = 0; \theta_L \lesseqgtr 0 \left(\Longleftrightarrow \alpha_H \pi'_H(e_H) - \alpha_L \pi'_L(e_L) \lesseqgtr 0\right).$$

3.2 Endogenous n

When n is taken as endogenous, the choice of labor supply is not affected by the endogeneity of n. In other words, we keep the above result that $\tau_H = 0; \tau_L > 0$. The education investment choices are, however, modified. The FOCs concerning e_i are different. For type-H individuals, we have:

$$\frac{\alpha_H \pi'_H(e_H)}{u'(c_H)} = 1 - \frac{dn}{de_H}\frac{\Delta}{\mu n}.$$

Hence:

$$\theta_H = \frac{dn}{de_H}\frac{\Delta}{\mu n} = \frac{\pi'_H(e_H)}{1 + \pi_L(e_L) - \pi_H(e_H)}\frac{\Delta}{\mu n} < 0.$$

There is a subsidy on type-H education expenses. Note that this is the same expression as in the first best (although obviously the value of the Lagrange multipliers and Δ would differ).

For type-L individuals, we have:

$$\frac{\alpha_L \pi'_L(e_L)}{u'(c_L)} = 1 - \frac{dn}{de_L}\frac{\Delta}{\mu(1-n)} + \frac{\lambda}{\mu(1-n)}\left[\alpha_H \pi'_H(e_L) - \alpha_L \pi'_L(e_L)\right].$$

Hence

$$\theta_L = \frac{\lambda}{\mu(1-n)} \left[\alpha_H \pi'_H(e_L) - \alpha_L \pi'_L(e_L)\right] - \frac{dn}{de_L} \frac{\Delta}{\mu(1-n)}$$

or

$$\theta_L = \frac{\lambda}{\mu(1-n)} \left[\alpha_H \pi'_H(e_L) - \alpha_L \pi'_L(e_L)\right] - \left(\frac{\pi'_L(e_L)}{1+\pi_L(e_L)-\pi_H(e_H)}\right) \frac{\Delta}{\mu(1-n)} \lesseqgtr 0. \tag{2}$$

The first part of equation (2) stems from the self-selection constraint and implies a tendency to impose a marginal tax on educational expenditures of type-L individuals to prevent mimicking from type-H individuals. The second part stems from the effect of the education of type-L individuals on social welfare through changes in the total number of high-productivity individuals and implies a tendency to provide a subsidy on education expenditures of type-L individuals already present in the first best. The sign is hence in principle ambiguous. In the numerical simulations, with the particular functional forms and parameter values we have chosen, we systematically obtain subsidies on education expenditures of both type-L and type-H individuals, and these subsidies tend to be larger on the education expenditures of type-L individuals.

To sum up this general case, we have that:

$$\tau_H = 0; \tau_L > 0; \theta_H < 0; \theta_L \gtrless 0.$$

These results can be summarized in the following proposition.

Proposition 3. When the individual characteristics (w_i, π_i) are not observable and n is taken as endogenous, the choice of labor by type-H individuals should not be distorted; labor earnings of type-L individuals should be taxed; education expenses of type-H individuals should be subsidized but those of type-L should be either taxed or subsidized.

4 Numerical example

4.1 Functional forms and the Great Gatsby curve indicators

We adopt the following utility function:

$$U(c_i, e_i, l_i) = \log c_i + \alpha_i \left[\underline{\pi}_i + \beta_i \log e_i\right] - l_i^2/2$$

where $\underline{\pi}_i$ captures a lower bound of the upward mobility, independent of education investments. These bounds are allowed to differ, such that $\underline{\pi}_H \geq \underline{\pi}_L$, to reflect for example elitism in the labor market. The parameter β_i measures the efficiency of education investments and is also allowed to differ across types to reflect elitism in the education system. With this specification, we have to select parameters in such a way that the upward mobility probability is comprised in the interval $(0,1)$.

One of the objectives of this paper is to analyze the impact of policies on the Great Gatsby curve. This curve relies on two key indicators: income inequality and social mobility. We use the Gini coefficient denoted G for inequality and an indicator of upward mobility denoted M. Given our simple two-type setting, these two measures can be expressed simply. For social mobility, we have:

$$M = \pi_L / \pi_H.$$

As to the Gini, we focus on consumption levels net of education expenditures. This yields :

$$G = \frac{nc_H}{nc_H + (1\text{-}n)c_L} - n.$$

4.2 Results and interpretation

Table 1 presents the benchmark case when the education system is either meritocratic or elitist for a set of benchmark parameter values.[5] In the meritocratic education system we assume that both productivity types have the same efficiency of education investment ($\beta_L = \beta_H = 0.15$) whereas in the elitist education system the efficiency of education investments of lower productivity types is lower ($\beta_L = 0.1 < \beta_H = 0.2$). We maintain the average efficiency of education investment across types constant.[6]

Comparing the two first-best solutions, we observe that switching from meritocracy to elitism results in a lower proportion of high-productivity individuals n and lower mobility M. Actually, meritocracy yields perfect mobility in the first best. In both settings, we obtain equality of consumption. Turning to the second-best solutions, we observe that switching from meritocracy to elitism results in lower inequality but also a lower proportion of high-productivity individuals n and lower mobility M. In the two settings, the second best is characterized by lower mobility M and higher inequality G than the first best.

[5] We use $\alpha_H = \alpha_L = 1$ and $w_H = 100 > w_L = 50$ throughout. We use $\beta = 0.15$ and $\underline{\pi} = 0.15$ for the benchmark meritocratic case. We then investigate the effect of differences in β_i (in the main text) and differences in $\underline{\pi}_i$ (in the Appendix).

[6] We do so for consistency, in a similar manner as Arenas and Hindriks (2022) maintain the average school productivity/quality constant in their paper on intergenerational mobility and unequal school opportunity, with high- and low-quality schools.

Table 1: Meritocracy and elitism: First-best and second-best solutions

	Meritocracy: $\beta_L = \beta_H = 0.15$			Elitism: $\beta_L = 0.1, \beta_H = 0.2$		
	SW	M	G	SW	M	G
FB	4.27	1	0	4.39	0.51	0
SB	4.22	0.92	0.13	4.37	0.47	0.07

As mentioned above, for these parameter values, in the second best switching from meritocracy to elitismn leads to lower inequality but also lower mobility, thus contradicting the Great Gatsby curve. This could explain why in nations where the education system has become more elitist, social mobility may decline even if inequality decreases. Consider that we wish to depart from an observed elitist education system and make it progressively more meritocratic (i.e. decrease the gap in effciency of education investments of high- and low-productivity parents) by transfering resources devoted to children with high-productivity parents to children with low-productivity parents. Table 2 presents the effect on social welfare, mobility M and inequality G of progressively switching from an elitist education system ($\beta_L = 0.1, \beta_H = 0.2$) to a meritocratic education system ($\beta_L = \beta_H = 0.15$) in which the increases in the efficiency of education investments of low-productivity parents are obtained at the expense of decreases in efficiency of education investments of high-productivity parents.[7] Social welfare decreases as the proportion of high-productivity individuals in equilibrium decreases. Mobility increases but inequality also increases. As for the optimal tax policies, there is a marginal tax on type-L individuals and a marginal subsidy on education investments for both types of individuals, with the marginal subsidy larger for type-L individuals. Both the marginal tax and the marginal subsidies decrease in absolute value when the education system becomes progressively less elitist.

In the numerical examples above it was assumed that the social planner is aware and appropriately accounts for the effect of the income tax and education policies on the proportion of high-productivity individuals n. We contrast in Table 3 the income tax and education policies of a forward-looking social planner, that takes into account the effect of optimal policies on the proportion of high-productivity

[7]Note that in this paper we are not considering the precise mechanism by which an elitist education system may become meritocratic. In reality, such a switch may come at a cost, and the cost may be so large that complete equalization of the efficiency of education investments β_i across types may not be feasible. Del Rey and Racionero (2002) assume that it is more costly to educate children of less educated parents. Those higher costs of educating children from less educated parents stem from a combination of socioeconomic, enviromental and educational factors that the education system alone may be unable to fully redress.

Table 2: Second-best switching from elitist ($\beta_L = 0.1, \beta_H = 0.2$) to meritocratic ($\beta_L = \beta_H = 0.15$)

β_L, β_H	SW	n	M	G	τ_H	τ_L	θ_H	θ_L
0.1,0.2	4.37	0.79	0.47	0.0726	0	0.2881	-0.61	-0.68
0.11,0.19	4.31	0.72	0.54	0.0953	0	0.2747	-0.56	-0.64
0.12,0.18	4.28	0.67	0.62	0.1094	0	0.2676	-0.51	-0.61
0.13,0.17	4.25	0.63	0.71	0.1193	0	0.2639	-0.47	-0.59
0.14,0.16	4.23	0.61	0.81	0.1267	0	0.2621	-0.44	-0.57
0.15,0.15	4.22	0.59	0.92	0.1326	0	0.2616	-0.40	-0.55

individuals (endogenous n), with a myopic social planner, that disregards the effect of policies on the proportion of high-productivity individuals (exogenous n). We consider alternative values for the exogenous n: n =0.33 and n =0.5.[8]

Table 3: Second-best: elitist versus meritocratic education, endogenous versus exogenous n

Regime	SW	n	M	G	π_H	π_L	τ_H	τ_L	θ_H	θ_L
Elitism: $\beta_L = 0.1, \beta_H = 0.2$										
Endogenous n	4.37	0.79	0.47	0.07	0.89	0.42	0	0.29	-0.61	-0.68
Exogenous n =0.33	4.02	0.33	0.42	0.10	0.70	0.30	0	0.12	0	0.21
Exogenous n =0.5	4.20	0.5	0.41	0.10	0.71	0.29	0	0.15	0	0.31
Meritocracy: $\beta_L = \beta_H = 0.15$										
Endogenous n	4.22	0.59	0.92	0.13	0.61	0.56	0	0.26	-0.40	-0.55
Exogenous n =0.33	4.04	0.33	0.85	0.13	0.53	0.45	0	0.15	0	0
Exogenous n =0.5	4.18	0.5	0.85	0.13	0.53	0.45	0	0.21	0	0

The optimal policy in the endogenous n cases, whether with elitist or meritocratic education system, is characterized, for these parameter values, by a marginal tax on type-L individuals and marginal subsidies on the education investments of both types, with higher marginal subsidies on type-L individuals. In the exogenous n case, however, there is a marginal tax on the education investments of type-L individuals in the elitist education case. As mentioned in section 3.1, if both types have the same preference for upward mobility and the education system is elitist there is a

[8]These values correspond approximatively to the OECD average percentage of population with tertiary education in 2022, or latest available, among 55-64 year-olds (30.3) and among 25-34 year-olds (47.4) as % in same age group.

marginal tax on the education spending of type-L individuals to prevent mimicking from type-H individuals. In the meritocratic education case education spending is neither taxed nor subsidsed at the margin. This is in line with the analytical results for the exogenous n case.

The endogenous n solutions are associated with higher mobility and lower inequality than the exogenous n solutions. In both elitist and meritocratic education cases, if the social planner becomes more myopic (i.e. more focused on short-term rather than long-term outcomes) mobility decreases and inequality increases, consistent with the Great Gatsby curve. In terms of mobility and inequality indicators the exogenous n solutions are remarkably similar, despite the relatively different values of exogenous n considered, suggesting that the endogeneity of n plays a more critical role than the precise value of exogenous n assumed.

In Table 4 we perform the same exercise as in Table 3 for a lower value of $\underline{\pi}$ (in particular $\underline{\pi} = 0.1$, versus benchmark value $\underline{\pi} = 0.15$) and exogenous n =0.5. The qualitative optimal policy results remain the same but in this case if the social planner becomes more short-term focused mobility decreases and inequality remains the same or decreases, contrary to the Great Gatsby curve. The equilibrium value with endogenous n is lower for $\underline{\pi} = 0.1$ than $\underline{\pi} = 0.15$. While not surprising in itself, this factor may play a significant role in determining whether a Great Gatsby pattern emerges in the comparison between endogenous and exogenous n cases.

Bouchard St-Amand et al. (2020) emphasize that the Gini coefficient is a non-monotonic function of the proportion of high-productivity individuals. They distinguish between low-income and high-income economies depending on whether the proportion of high-productivity individuals is lower or higher, respectively, than a threshold. They classify and characterize Gastbian and non-Gastbian economies. Whether the economy is low-income or high-income plays an important role, in part due to the different effect that a change in n has on the Gini coefficient. Another relevant factor is the structure of probabilities and, in particular, whether the increase in n is achieved mainly through π_L, which they call upward mobility channel, or through π_H, which they call sticky cealings.

5 Conclusion

At the outset of this paper, we raised the question of why so many traditional welfare states seem to have disregarded social mobility despite pursuing redistributive policies that have resulted in lower, or at least stable, inequality in many of them. To answer this question we have characterized the optimal non-linear income tax and education policy mix of a social planner that is concerned with income redistribution

Table 4: Second-best: elitist versus meritocratic education, endogenous versus exogenous n, $\underline{\pi} = 0.1$

Regime	SW	n	M	G	π_H	π_L	τ_H	τ_L	θ_H	θ_L
Elitism: $\beta_L = 0.1, \beta_H = 0.2$										
Endogenous n	4.23	0.69	0.44	0.10	0.84	0.37	0	0.27	-0.61	-0.68
Exogenous n =0.5	4.16	0.5	0.37	0.10	0.66	0.24	0	0.15	0	0.31
Meritocracy: $\beta_L = \beta_H = 0.15$										
Endogenous n	4.12	0.53	0.92	0.14	0.56	0.51	0	0.25	-0.40	-0.55
Exogenous n =0.5	4.13	0.5	0.84	0.13	0.48	0.40	0	0.21	0	0

and upward mobility. We have contrasted the optimal policy when the social planner takes the proportion of skilled workers as given versus when it considers the population distribution as endogenous. We have also compared optimal policies under meritocratic or elititist education and labor systems. We have shown that switching from a meritocratic to an elitist system, or from a long-term to a short-term focus of social welfare, reduces social mobility even if it can sometimes lead to lower inequality.

Lack of social mobility has been linked to the rise of populism. In this context, redistributive policies that overly prioritize income inequality without fostering social mobility may prove ineffective to counter the rise in populism. Recognizing that the relationship between inequality and social mobility may be more complex than what the Great Gatsby curve suggests, as well as understanding the role that income taxation and education policies play in striving for reduced inequality and improved social mobility, is of critical importance.

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Appendix

In this Appendix we compare the second best results when the education efficiency β is the same across individuals (i.e. education system is meritocratic) but the lower bound component of upward mobility $\underline{\pi}_i$ is allowed to differ, such that $\underline{\pi}_H \geq \underline{\pi}_L$, to reflect for example elitism in the labor market.

Table A1 presents the effect on social welfare, mobility M and inequality G of switching from an elitist labor market ($\underline{\pi}_L = 0.1, \underline{\pi}_H = 0.2$) to a meritocratic labor market ($\underline{\pi}_L = \underline{\pi}_H = 0.15$) for common $\beta = 0.15$. It also contrasts the optimal income tax and education policies of a forward-looking social planner, that takes the effect of optimal policies on the proportion of high-productivity individuals into account (endogenous n), with those of a myopic social planner, that ignores the effect of policies on the proportion of high-productivity individuals (exogenous n) for n =0.5.

Switching from elitist to meritocractic labor market with endogenous n leads to increased mobility but lower social welfare, since the proportion of high-productivity individuals in equilibrium decreases. Regarding optimal policies, there is a marginal tax on type-L individuals and a marginal subsidy on education investments for both types of individuals, with the marginal subsidy larger for type-L individuals. Both the marginal tax and the marginal subsidies decrease in absolute value when the labor market becomes less elitist. In the exogenous n case, however, there is only a marginal income tax on type-L individuals. There is no reason to impose a marginal tax on education investments of type-L individuals when the education system is meritocratic, and the individual preferences for upward mobility are the same. The endogenous n solutions result in higher mobility than exogenous n solutions, with relatively similar levels of inequality across all scenarios.

Table A1: Second-best: elitist versus meritocratic, endogenous versus exogenous n

Regime	SW	n	M	G	π_H	π_L	τ_H	τ_L	θ_H	θ_L
Elitism: $\underline{\pi}_L = 0.1, \underline{\pi}_H = 0.2$										
Endogenous n	4.24	0.62	0.79	0.13	0.67	0.53	0	0.28	-0.46	-0.61
Exogenous n =0.5	4.18	0.5	0.69	0.13	0.58	0.40	0	0.21	0	0
Meritocracy: $\underline{\pi}_L = \underline{\pi}_H = 0.15$										
Endogenous n	4.22	0.59	0.92	0.13	0.61	0.56	0	0.26	-0.40	-0.55
Exogenous n =0.5	4.18	0.5	0.85	0.13	0.53	0.45	0	0.21	0	0