

9. Procreation, migration and tradable quotas

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Tradable quotas or permits as a rule aim at reducing negative externalities at the lowest possible cost.² They are especially suitable in contexts of imperfectly defined or hard-to-delimit (downward) property rights. Air pollution consisting of uniformly mixed pollutants (for example CO²) provides a typical illustration. By the latter, we refer to pollutants such that the location (and sometimes the timing) of emissions does not affect the way the particles end up physically locating themselves in the atmosphere. For such uniformly mixed pollutants, a regulator concerned with reducing pollution levels can perfectly replace a command-and-control tool that imposes uniform targets on each of the polluting entities (typically a plant), with a scheme for trading quotas. Uniform mixing means that there are no risks of hot spots, that is, concentrations in given locations, which are potentially problematic if pollutants are prone to threshold effects. A tradable-quotas scheme thus consists of extending geographically the legal notion of 'source', shifting from a plant-based one to treating a whole area as a single source. In addition, such a scheme can also enlarge the temporal scope of the target by allowing for banking, that is, keeping pollution permits for use at a later period.

At the level of such enlarged spatio-temporal units, the pollution-reduction target can remain exactly the same in the aggregate as under a command-and-control regime. Yet, given the cost-reduction potential allowed for by the tradability of the pollution permits among pollution emitters, the pollution-reduction target can be set at an increasingly low level. For example, if a plant requires for its production a higher set of permits than the one initially received for the relevant period, it can buy additional permits on the market from other plants that have not fully used theirs. While not jeopardizing compliance with the global target of emission reduction, such flexibility granted to each plant, allowing it to better take into account differences in marginal abatement costs, has a clear cost-reduction effect.

Not only does the scheme allow one to take into account such inter-plant differences in marginal abatement costs, it simultaneously generates

financial incentives for some plants to move below their own quotas and develop cleaner technologies. Such incentives will ease the pollution-reduction process by leaving more room for other plants to negotiate their transition in a globally more cost-effective way. In fact, regardless of its initial quota level, each polluter will have an interest in equalizing its marginal pollution-reduction cost with its gain from selling an extra permit. In short, tradable permits, by better taking into account differences in marginal reduction costs among the different emitters involved, allow for at least the same level of pollution reduction to be reached at a lesser cost, provided of course that a set of conditions is met, such as low transaction costs.³ The command-and-control approach toward plants that produce emissions would certainly be stricter with firms, but it is ineffective when dealing with uniformly mixed pollutants. Moreover, it does not generate local incentives to move significantly below the pollution-abatement target.

Tradable permits can be compared with another key incentive-based mode of regulation: taxation. Whereas taxation focuses on price (the quantities emitted adapting accordingly), the tradable permits are focused on quantity (the prices of quotas adapting accordingly). Both allow in their own way taking into account differences in abatement costs among the polluters involved. As with taxation, while allowing for more efficient regulation, tradable-quotas schemes allow governments to take into consideration equity issues at three levels: first, in fixing the level of the global cap for the relevant region; second, in translating this cap into quotas and allocating them on the basis of an appropriate algorithm (when an auction is not relied upon); and, third, in setting restrictions (or not) on their tradability.⁴ Without claiming that tradable quotas should be systematically preferred to other methods of regulation, we shall offer a preliminary account of what such proposals could entail in the field of population policy. One advantage of tradable quotas over taxes is that they require no information as to the responsiveness of households to incentives. The price of quotas will adjust to meet the objective, even if the relevant elasticities are small, yet there is no doubt that tradable quotas have their limitations. This is true whenever there are good reasons to be concerned with hot spots. It is also the case when the number of actors or the nature of the externality involved makes it difficult to administer quotas, when output restrictions are likely to lead to problematic effects at the input level, or when large price fluctuations occur.

Tradable-permits schemes have been widely implemented at the domestic level, especially in the United States, to deal with air pollution (see, for example, Ellerman et al., 2000, on the US Acid Rain Program); and it is now being put in place at the international level, as the Kyoto Protocol illustrates. Beyond the field of pollution control, such schemes have been implemented in the natural resources and agricultural domains to deal with

either overexploitation (for example of fisheries or water reserves – see, for instance, Davide, 1997) or overproduction (for example of milk or sugar beets – see, for instance, Cardwell, 1996). Interestingly, tradable quotas have also been proposed in a variety of other policy domains without being implemented, as far as we know. For example, in the field of inflation control, Lerner (1978) and Lerner and Colander (1980) designed a scheme allocating to firms tradable rights to increase wages not more than proportionally to the increase in general labor productivity. In employment policy, Salais (1994) proposed a scheme allocating to firms quotas limiting their right to ‘workforce adjustment’, aiming at reducing overdismissal and consequently the rate of unemployment.⁵ In the public health field, Smith and Coast (1998) suggested a scheme of tradable permits of antimicrobial prescription to be allocated among general practitioners in order to address the problem of growing resistance to antimicrobials resulting from the overprescription of such drugs. Casella (1999) envisaged a scheme allocating to states tradable deficit permits in order to reach in a more cost-effective way the budget-deficit targets set at the European level.

This chapter is part of a wider project aiming at exploring such nonconventional applications of the mechanism, assessing both its promises and its limitations as precisely as possible. Here, insofar as population policy is concerned, we focus specifically on fertility and migration. Surprisingly, one of the first tradable-quotas proposals ever put forth was made in this field: Boulding’s (1964) scheme of tradable procreation licenses to combat overpopulation. In contrast, in the area of migration, with the exception of imperfect forms of tradable-quotas schemes for dealing with asylum seekers and refugees (Schuck, 1997; Hathaway and Neve, 1997), we know of no tradable-quotas proposal.

In this chapter we shall thus proceed in two steps. In the area of fertility we shall first define the problem at issue and then draw upon Boulding’s proposal, developing our own view on the matter. We shall describe our own proposal and spell out its likely effects. In the area of migration we shall again first specify the nature of the problem. Then we shall present two proposals, conjecturing some of the effects of one of them, comparing it more specifically with a Bhagwati tax.⁶ As we go along we shall also keep an eye on parallels and differences between the schemes proposed in the fertility and migration fields.

Before proceeding, we should mention that our proposals may startle or shock some readers, for a variety of reasons. Let us mention just four of the possible objections and address each of them briefly. The first is that tradable-quotas proposals, insofar as they imply setting up markets, would be part of a hidden deregulation agenda. This does not need to be the case, once we consider both the fact that such proposals sometimes apply to areas

that have not been regulated so far,⁷ and the fact that the target-setting side of the scheme is as central as its market element, the latter being just a means of reaching the former in a more cost-effective way. The second objection is that, in the view of many, freedom of movement within a very large geographical area is a self-evident fundamental right. And many equally claim that the right to procreate should remain unrestricted. There is much to discuss about such an objection to tradable quotas on the grounds of their violating fundamental rights, but the discussion would probably revolve around two central issues. One reason for regarding a right as limited simply has to do with the fact that the interests it protects may be extended so broadly that those interests are not regarded as fundamental anymore.⁸ Examples are having a very large number of children or claiming the right to visit any country in the world without restrictions. Another reason to limit the scope of rights, even when we remain within their core scope, is their possible conflict with the exercise of the very same right by others or with other rights. Moreover, other things than fundamental rights may also matter (such as equal opportunity for welfare). To be sure, at some level, a case can even be made for a fundamental right to pollute, since even our most basic survival activities necessarily entail emissions of pollutants such as CO₂. This does not mean that our right to pollute should have no limits, even if we argue that it constitutes a fundamental right.

The third and fourth sources of worries relate specifically to the two areas to which we propose to apply the idea of tradable quotas. One can be referred to as the 'people-as-pollution' objection. In the case of pollution permits, many people object to the very idea of allowing firms to make money out of what they may regard as an unconditionally bad behavior, that is, polluting. Conversely, many would object to regarding immigrants or newborns, both clearly persons worthy of moral respect, through the prism of negative externalities. As we shall see below, defining a level at which migration and procreation may be regarded as undesirable from the perspective of an impartial social planner is not an easy task. Even the notion that immigrants are costly to their host countries is challenged to a large extent by the available evidence. Still, targets for socially justifiable fertility rates or migration levels can make sense, whatever the difficulties involved in deciding what they should be. And if they do, they do not need to imply that human beings should be treated as particles of pollutants. Such targets would just mean that individuals' very existence (in the case of procreation) or their movements from one country to another (in the case of migration) have effects on others that should be given due consideration, out of the same basic respect for persons.

There is a final objection to tradable quotas that could be termed the 'people-as-commodities' one, which focuses on the tradability of quotas

itself and what it means. Does it necessarily imply that people as such should be treated as mere tradable goods? The answer is, not more than when we pay a worker a wage for her labor, or when we ask someone for a price of a house, or when we grant subsidies to parents who decide to reproduce more than others.⁹

These are just a few of the possible objections to the proposals we discuss below. Boulding (1964) anticipated such reactions, admitting that his own proposal would be seen as 'far fetched', and to us it is an interesting sociological question why people may have such a reaction. One point is certain: the belief that such a proposal is 'unrealistic' is due in part to concerns of a normative nature that should be properly identified and considered. This means that what we are doing here is only – and necessarily – part of a larger picture.

FERTILITY

In this section we summarize in nonmathematical terms our main findings from an earlier study (de la Croix and Gosseries, 2006). For a more comprehensive and technical treatment, the reader is referred to that paper.

Under- and Overprocreation

In many countries the actual fertility rate is viewed as too high or too low. The perception of a gap between the actual rate and a preferred one, given the local or general circumstances, is triggered by various possible concerns. Typically concerns about overprocreation are related to concerns about the Earth's carrying and feeding capacity. This environmentalist perspective is especially vivid when it comes to the planet's global population. Other concerns may lead to an assessment of underprocreation, usually at the local level.

They may have to do with the relative sizes of various coexisting birth cohorts, which threaten the financial viability of pension schemes or health care systems. This is especially likely in cases of declining fertility or when other demographic factors (such as increases in life expectancy) require higher fertility to preserve appropriate relative sizes among cohorts. Population aging is not the only reason for concern about the fertility rates of a given population. Differential fertility among ethnic groups (such as among Roman Catholics and Protestants in Northern Ireland, or among first-generation immigrants and natives in many European capitals), or among groups with different educational levels may feed some people's concerns as well.

In short, there are concerns about the environment and natural resources that focus mostly (but not only) on the current global absolute fertility rate. And there is a whole set of concerns about relative fertility rates (differences in fertility among birth cohorts, age groups, ethnic groups, educational groups and so on) often at a regional or local level. Yet not all such concerns are well-informed or legitimate. For example, some of the concerns about the relative fertility of coexisting ethnic groups are clearly fed by attachment to inherited privileges, if not by xenophobic motives, that should be dealt with before we even consider regarding differential fertility rates as a legitimate source of concern.

There is also a philosophical problem that makes it especially difficult to set a meaningful target for an 'optimal' population size or composition. This problem, which Parfit (1984) called the 'repugnant conclusion', is absent when we decide to reduce or increase fertility rates strictly out of concern for already existing people. But excluding the people to come from any moral concern in this respect seems problematic. In contrast, if we are concerned about defining an optimal population, not merely with reference to already existing people, but also taking into account the welfare of the additional people who might exist as a result of our demographic choices, things become extremely tricky. Under a veil of ignorance, for example, it is unclear whether a 'representative individual' would prefer to take the risk of not coming to existence unless her life were to have a minimal quality.

To put it differently, it makes sense to consider that an action can be bad only if it negatively affects at least one person. Following this 'person-affecting' intuition, and adding a requirement of impartiality to it, there seems to be no reason to look only at the effect on already existing people (hence excluding future people) when asking whether a population size should be seen as optimal. If this is true, then the problem is that what we should decide and the beings with reference to whom we should make our decision could be mutually dependent.

In other words, should I take into consideration the well-being of Paul in deciding whether I should bring Paul into existence, even if I am sure that Paul would lead a minimally decent life and also knowing that, if Paul were not conceived, he could not possibly be harmed? We shall not attempt to answer this question here. The point is simply that defining a proper fertility rate with reference to an optimal population target, taking the well-being of future people into consideration, is not an easy task and may even be an impossible one.¹⁰ In contrast, in the migration case that will be dealt with below, such a philosophical problem does not necessarily occur since it makes sense to assess migration targets merely with reference to how *existing* individuals are likely to fare as a result. Fixing the population of reference (those already alive as well as future people), the well-being of which

should be our focus in deciding about procreation, is thus especially difficult. It is fundamentally more challenging than deciding about the population of reference (for example, all our contemporaries) when it comes to deciding about the desirability of a given migration pattern. This does not mean that defining a migration target will be devoid of other problems.

That said, different means can be envisaged for reaching desired fertility rates. And, while taking seriously the tradable-quotas proposal, we do not endorse the narrow view that this tool should be adopted as the exclusive one at all levels to deal with overpopulation, underprocreation, or both. To name but a few alternatives, in the case of underprocreation, we have seen, especially after World War II (and sometimes before) the introduction of generous family benefits, partly justified on pronatalist grounds. Extensive paid or unpaid parental leave, the public provision of day care and the availability of parent-friendly workplaces are also effective means for increasing fertility rates. In the case of overprocreation, information campaigns, free contraceptives, the improvement of women's education and access to the labor market (thus raising the age at which women have their first child) are common strategies.

Two remarks are in order here. First, it is clear that fertility is the only acceptable demographic variable that policymakers can influence when dealing with global overpopulation. Causing mortality to rise is morally unacceptable and relying upon migration is useless. In the case of underpopulation at the local level, all three demographic variables can be influenced: increasing fertility, reducing mortality and, for some of the problems listed above, increasing immigration. Second, in the case of overpopulation, as the means to reduce fertility become more coercive, serious concerns arise as to their effectiveness and fairness. Fairness in this case can be understood to refer to parents or to prospective parents, given the possibly unfair restriction of their interest in having children (with the qualifications mentioned above¹¹) and to children, since any significant sanctions on parents who violate strict rules are likely to affect their dependent children, who did not choose to be born. One way of addressing these concerns could be to combine a tradable-quotas scheme at the international level with noncoercive, yet effective, measures at the domestic level.

Taking Boulding Seriously

Let us now move to Boulding's original proposal, advanced out of concern about overpopulation. He stated it as follows:

I have only one positive suggestion to make, a proposal which now seems so far-fetched that I find it creates only amusement when I propose it. I think in all

seriousness, however, that a system of marketable licenses to have children is the only one which will combine the minimum of social control necessary to the solution to this problem with a maximum of individual liberty and ethical choice. Each girl on approaching maturity would be presented with a certificate which will entitle its owner to have, say, 2.2 children, or whatever number would ensure a reproductive rate of one. The unit of these certificates might be the 'deci-child,' and accumulation of ten of these units by purchase, inheritance, or gift would permit a woman in maturity to have one legal child. We would then set up a market in these units in which the rich and the philoprogenitive would purchase them from the poor, the nuns, the maiden aunts, and so on. The men perhaps could be left out of these arrangements, as it is only the fertility of women which is strictly relevant to population control. However, it may be found socially desirable to have them in the plan, in which case all children both male and female would receive, say, eleven or twelve deci-child certificates at birth or at maturity, and a woman could then accumulate these through marriage.

This plan would have the traditional advantage of developing a long-run tendency toward equality in income, for the rich would have many children and become poor and the poor would have few children and become rich. The price of the certificate would of course reflect the general desire in a society to have children. Where the desire is very high the price would be bid up; where it was low the price would also be low. Perhaps the ideal situation would be found when the price was naturally zero, in which case those who wanted children would have them without extra cost. If the price were very high the system would probably have to be supplemented by some sort of grants to enable the deserving but impecunious to have children, while cutting off the desires of the less deserving through taxation. The sheer unfamiliarity of a scheme of this kind makes it seem absurd at the moment. The fact that it seems absurd, however, is merely a reflection of the total unwillingness of mankind to face up to what is perhaps its most serious long-run problem. (Boulding, 1964, 135-6)

Heer (1975) and Daly (1991, 1993) discuss Boulding's proposal. Tobin (1970) makes a similar one.¹² Without discussing in detail each of the features of his proposal,¹³ we wish to stress two significant ones. First, licenses would be allocated in principle to women only. While Boulding envisages making them accessible to men as well, through an initial allocation, purchase, inheritance or gift, he does not envisage the possibility that the state or another entity, such as an NGO, combating overpopulation, would be entitled to purchase them (see Heer, 1975 for a discussion of this point). Second, as to the distribution of the licenses, Boulding conjectures which categories of people would buy them and from whom (the rich from the poor but also from the philoprogenitive – among whom the poor may be overrepresented – and from nuns and maiden aunts); what its effects on inequalities of income would be (it would reduce them in the long run, possibly because the poor would sell some of their licenses to the rich and hence have fewer children themselves, the average income within the coming generations rising accordingly); and what should be done if license prices were to rise too much ('grants to enable the deserving but impecunious to have children').

We propose to modify and generalize Boulding's proposal. We first describe the model economy in which we are operating. It is populated by households differentiated by their productivity. Highly productive households (highly skilled workers) receive a higher wage income than the less productive (low-skilled) workers.¹⁴ Households have the same preferences for consumption, number of children and education of their children. They have to decide how to spend their labor income by determining how much to consume for themselves, how many children to rear, and how much education to provide for each of them. Apart from education costs, the only cost related to childrearing is an opportunity cost: the more children they have, the more time they must spend rearing them instead of working in the labor market.¹⁵ For highly skilled persons the opportunity cost of having children is relatively high compared with the cost of education. For low-skilled parents, the opposite holds. As a consequence, it will be optimal for highly skilled parents to have fewer children but to invest more in their children's education. This differential fertility pattern is in line with what is found in the data, both within countries and across countries if one considers national income levels. Differences in educational level have consequences for social mobility. Better-educated children have a greater probability of becoming highly skilled parents in the future than do less-educated ones, and this probability allows us to address issues of intergenerational equity.

Against this background, our twofold proposal can be summarized as follows. We envisage here a domestic form of the proposal. A government would set for each birth cohort a fertility objective of v children per person. This fertility objective would be pursued through the (possibly joint) operation of permits to procreate ('allowances') and permits not to procreate ('exemptions'). Coupling the two instruments (allowances for dealing with overprocreation and exemptions for dealing with underprocreation) gives room for more systematization of our theoretical exploration. In practice, their simultaneous operation in a given jurisdiction would allow the regulator to reach the fertility objective strictly (neither less nor more).¹⁶

We now detail the implementation sequence of procreation entitlements, considering first the sequence for allowances, which are designed to prevent fertility from being above the target. At her majority, every woman receives for nothing (not through an auction) v procreation permits, each of them corresponding to the right to give birth to one child. Each time she gives birth to a child, she must cede one procreation allowance back to the procreation agency. Procreation rights can be sold and purchased at any time at a market price. Next we consider the sequence for exemptions, which are designed to prevent fertility from remaining below the target. Each time a woman gives birth to a child, and as soon as her fertility becomes larger

than the target ν , she will receive free of charge from the procreation agency one exemption right per additional child. At the standard menopausal age, each woman who has fewer biological children than the target must give the procreation agency exemptions for the difference between the target and observed fertility, which she will have purchased on the procreation-exemptions market. Parents with more children than the target can sell on the market the unused exemptions. For example, if ν were set at 1.1 child per parent, a couple would dispose of 2.2 permits to procreate. Imagine that they decide to have only one child. At that child's birth they will cede to the state one allowance. At the end of the mother's reproductive age span they will have had to buy 1.2 exemptions on the market. In contrast, if they end up having three children, they will have had to buy on the market 0.8 extra allowances. But they will also have received from the procreation agency 0.8 tradable exemptions.

Three Effects

Our concern is with the twofold impact of introducing such a scheme, that is, on the parents' income and on the educational level of their children. Exploring the model allows us to identify three key effects that we shall briefly discuss below. To emphasize the two first effects on income inequalities, we start with the plainest case of fixed, rather than tradable, quotas allocated on an equality per capita basis. A third effect will then become apparent as we take into consideration the tradable nature of allowances and exemptions.¹⁷

The first effect we single out can be called the 'differential-productivity effect'. In describing it we restrict ourselves to a case in which we aim at combating overpopulation and assume for a moment that low-income and high-income people have the same fertility level (we call this a 'uniform-fertility world'). We now introduce a population target lower than the business-as-usual fertility level. Such a target is translated in turn through equal per capita nontradable allowances. The fertility level of our two classes of people, that is, the skilled (high-income) and the unskilled (low-income), will be reduced to the same extent. This means that both the skilled and the unskilled will increase their income as a result of the increased working time made available through the reduction of their fertility. However, although both are reducing their fertility and increasing as a result the time they spend working to the same extent, the hourly wages of the skilled are greater than those of the unskilled. This means that, in such a world of uniform fertility, the introduction of a fixed-quota scheme on a per capita basis will actually increase income inequalities between the unskilled and the skilled. The incomes of the skilled will increase relatively more than those of the unskilled.

Let us now relax the 'uniform-fertility' assumption and shift to a more realistic world in which unskilled people tend to have more children than skilled people. This will allow us to consider a second type of effect, the 'initial differential-fertility effect'. Given the assumption that quotas are allocated on a per capita basis and that they are fixed, imposing our global population target will require that skilled and unskilled people adopt the same fertility level. Since, in the business-as-usual case, skilled people have fewer children than unskilled people, the unskilled people will have to reduce their fertility more than skilled ones. Doing so in turn means that the unskilled will increase their working time more than the skilled people. Hence, if this were the only effect at work, introducing a fixed and equal per capita quota regime in a context of differential fertility would tend to reduce income inequalities.

In short, if a fixed and equal per capita quota regime were introduced, the effect of differential productivity on relative income is such that income inequalities could be expected to increase, whereas the effect of differential initial fertility on relative income would tend to reduce income inequalities between the two groups. Since the two effects point in opposite directions, which of them is likely to dominate? Given our account of the background economy, the initial differential fertility will be the key variable. If it is large, the differential-fertility effect could well dominate the differential-productivity effect, rendering our nontradable-quotas scheme redistributive. One parameter affecting the initial discrepancy between the fertility of the rich and that of the poor is the elasticity of educational outcomes in response to investment in education. If this elasticity is large, that is, if educational outcomes tend to react significantly enough to marginal increases in educational investments, the incentive for the highly skilled parents to educate their children is strong, causing them to choose a small number of children.

A third effect on income inequalities arises from the introduction of tradability. Let us imagine that we move from fixed quotas, allocated on an equal per capita basis, to a scheme allowing for the tradability of such quotas. To determine the effect of this change on inequality, it is first necessary to identify the sign of the procreation price. The procreation price is the market value of procreation entitlements. A negative price implies that fertility is encouraged, that is, exemptions have a positive value while allowances have no value. A positive price implies that fertility is discouraged: exemptions have no value whereas allowances are costly. Depending on the price of the allowances and of the exemptions, this effect will tend either to reduce income inequalities or to increase them, owing to the interplay of tradability with differential fertility and differential productivity. More precisely, there are actually three relevant scenarios in this respect.

First, if the procreation price is negative, fertility is encouraged, which means that the unskilled will tend to have more children than the fertility target and the skilled will tend to have fewer. In such a case tradability will lead to rich-to-poor cash transfers, the unskilled selling their exemptions to skilled people.

Second, when the procreation price is positive and large, the cost of having children becomes very significant. And this cost as a fraction of income is larger for the poor than for the rich, given the productivity differential. This leads to a situation in which skilled people actually have more children than the population target and unskilled people have fewer. The former will thus buy allowances from the latter, leading to significant rich-to-poor cash transfers.

Third, there is an intermediate scenario in which the price of allowances is both positive and small. In such a case the productivity differential is not sufficient to make the low price of allowances attractive enough for the unskilled to change their business-as-usual fertility level. Given the business-as-usual fertility differential, they will buy allowances from skilled people, and this in turn will lead to poor-to-rich cash transfers, hence to an increase in income inequalities. Is this third scenario of practical importance? Yes, because, in the case of reform aiming at reducing population, the need for political feasibility will require the fertility target to be set at a level not much lower than the actual average fertility rate. In such a case, the price of allowances is unlikely to be high. This means that, if we consider the tradability effect alone, a population control policy will tend, in practice, to be anti-redistributive. However, knowing whether this is the case once we consider the three effects examined here is a different matter.

So far we have considered three possible effects on income of introducing a scheme for tradable procreation allowances and exemptions. A full empirical and normative assessment of the effects of such a scheme would of course require much more than that. One would need to find out which of the three effects dominates in actual circumstances. One would have to determine as well the extent to which the overall impact on income inequalities is actually relevant to analyzing the scheme's impact on welfare inequalities of skilled and unskilled people. Moreover, one would have to look at the interplay between the scheme's overall impact on income differentials and its impact on educational achievements of the next generation. One situation that may occur is that, with a pronatalist policy, tradability may reduce income inequalities within the generation of parents but worsen the average educational level of their children; and this in turn could increase the income inequalities between the two generations. Finally, a crucial variation in the scheme would consist of setting quotas for

countries rather than for individuals. This would possibly permit the implementation of effective domestic policies that would not be quota-based (for example, raising the educational level of women in poor countries) and simultaneously a tradable-quotas scheme at the interstate level, with the hope of achieving the best of both worlds.

MIGRATION

Under- and Overmigration

We now briefly explore the tradable-quotas idea as a tool for migration policy. As in the case of procreation, it is crucial to understand, among all the possible goals, which one the proposed scheme would be pursuing here. First, one may want to reach a certain level of migration out of concern for protecting the environment and natural resources. Both the frequency of migratory moves and the dispersion of residences and firms they may lead to can be environmentally unfriendly. Second, migrations may raise concerns of a cultural nature.¹⁸ Admittedly, they sometimes reduce cultural and linguistic heterogeneity: for example, when driven by family-grouping motives or when members of Diasporas move back to their motherland. Yet in many cases the perception is that migration increases local cultural and linguistic heterogeneity, requiring the accommodation of very different practices, the coexistence (compossibility) of which cannot be guaranteed a priori.

Without prejudging the importance and (absence of) legitimacy of such environmental and cultural sources of concern about migration, we focus here on the impact of emigration on the wealth of the countries of origin. Migration targets may be set with the aim of maximizing aggregate global wealth or with the view of reducing inequalities of wealth between poorer countries of migrants' origin and richer countries of their destination. To be sure, there may be an economic case for concentrating certain activities involving skilled workers in some areas of the globe (see, for example, Fujita and Thisse, 2002). Doing so could increase aggregate global wealth. In the absence of a global fiscal jurisdiction, however, the usual tax-and-transfers channel is not available for translating such an increase in global wealth into redistributive transfers. Moreover, if we were concerned about equalizing wages only, *ceteris paribus* there could be a case for fully open borders, which would go against the idea of tradable quotas since the latter presupposes a target. Yet there could be other reasons not to opt for fully open borders, for example the loss of human capital generated positive externalities and concerns for the

viability of fragile democracies or of advanced social security systems. If some of these reasons for restricting free movement are legitimate, tradable quotas may be part of the second-best set of options that could serve the purpose of reducing global inequalities through the engineering of each of the scheme's three components (target, allocation of quotas and tradability).

In the case of procreation, one of the options is to have a joint policy addressing both local underprocreation and global overprocreation. In the case of migration the problem is not that local and global policies operate in opposition. Rather, it is that we must deal with two sides of the same coin simultaneously: that is, the possible undermigration of unskilled workers and the risk of overmigration of skilled workers beyond the point at which brain drain would worsen the situation in the poor country of origin. To put it differently, although the introduction of a scheme of tradable procreation quotas would definitely affect the educational level of the next generation, that effect does not need to be its very goal (rather than a mere side-effect). In contrast, in the migration case, achieving a certain global distribution of skilled and unskilled people would be regarded as the scheme's central goal. Moreover, in the case of procreation, we are concerned about achieving both a global cap on population size and the distribution of the corresponding quotas among countries. In the migration case, while environmentalists or others may want to impose a global cap on the amount of international migration for a given period, we limit ourselves here to focusing on net movements of skilled and unskilled people between poor and rich countries.

More precisely, we start by conjecturing that the current level of migration by unskilled workers is lower than what is good for the countries of origin.¹⁹ As to the levels of migration of skilled workers, it could at some point exceed a level of brain drain viewed as desirable from the point of view of reducing global inequalities. The proposed scheme, or set of measures, would aim at allowing the productivity-enhancing concentration of highly skilled people while limiting it out of concern for the need to retain a certain proportion of skilled workers in their countries of origin – a concern for having a ratio of skilled to unskilled workers similar to the concern for preserving a certain ratio of working to nonworking people through a tradable procreation quotas scheme. Whereas countries experiencing aging are mostly concerned about the shrinking proportion of workers in relation to children or pensioners, countries experiencing massive emigration tend to be concerned about the shrinking proportion of skilled workers. Before describing the actual proposals, we note that they can be coupled with other measures, such as an increase in official development aid or the relaxation of trade barriers.

Proposal 1: tradable emigration permits among skilled individuals

The traditional view is that brain drain is a threat to the country of origin because it deprives it of its most talented citizens. Yet a recent literature argues that, up to a certain level, brain drain is actually beneficial to the country of origin. At least three mechanisms underlie such a beneficial effect. First, remittances sent back to the country of origin by working emigrants constitute a nonnegligible transfer (Faini, 2006; Cinar and Docquier, 2004). Second, a real chance of emigrating may have a positive influence on schooling decisions by households, among which some will stay at home: people may be willing to improve their skills in the expectation of earning a better income abroad (Beine, Docquier and Rapoport, 2003). Third, besides affecting the decision of whether or not to invest in higher education, enhanced opportunities for skilled people to work abroad may also affect the types of skills in which they invest. Mariani (2006) argues, for example, that increased chances of skilled migration raise the expected profits from investing in skills valued abroad and simultaneously decrease rents from rent-seeking activities. Given such effects, it is possible, at least in theory, to identify an emigration rate that maximizes some wealth, income or welfare objective for the poor country. Calculating this figure would require not just identifying the factors that would maximize human capital production at home, but also taking into account such things as remittances and positive Diaspora externalities. It may well be that brain drain is detrimental to the wealth of the poor country of origin only once a high threshold has been crossed (Beine, Docquier and Rapoport, 2003). We call such a threshold a 'fair brain-drain threshold'. Whereas the nondetrimental level of brain drain may be within the range of 15 to 20 percent, on average, of the native skilled labor force, the maximizing target may possibly range from 5 to 10 percent. Beyond this level, brain drain is likely to start having adverse effects on the country of origin. Below it, the net social return of the emigration of skilled workers remains positive in the generally poor country of origin, while not being as high as it could be.

So, each country of emigration would have to specify a domestic cap on annual or quinquennial skilled emigration. Once this 'fair brain-drain' cap has been identified, our first proposal consists in setting up at the domestic level, that is in the country of origin, a scheme of tradable emigration rights among skilled individuals only. Whether citizens belong to the skilled category could be decided by reference to their educational level or an equivalent recognition of skills. The cap would be stated in terms of the number of skilled people allowed to work abroad over a given period. The total number of skilled people in the population would be divided by the number of people allowed to emigrate. This fraction would yield the quota that

each skilled citizen would be granted for a given period. For example, if the number of skilled people in the population were 1000 (we assume counterfactually that this figure is exogenous) and only 100 of them were allowed to leave the country, each skilled person would be granted a tradable emigration permit having a value of 0.1. Someone wishing to emigrate would thus have to buy nine extra permits to be entitled to work abroad. There would be a market for such permits.

Unskilled people would not be subject to this scheme, emigration being thus freer in their case, at least on the exit side. Among the important design issues, one would have to decide whether the permits for skilled workers were to be for permanent or temporary emigration, a possible variation that does not obtain in the procreation case, for obvious moral reasons.

How does this proposal for tradable emigration permits compare with a Bhagwati tax? The latter typically consists of an income tax levied by the country of residence on a skilled immigrant, the proceeds of which are sent back to the immigrant's country of origin (Bhagwati and Partington, 1976; Bhagwati and Hamada, 1982). It is thus an income tax that applies abroad to a country's nationals who emigrate, and therefore belongs to the 'global', citizenship-based model of income tax as opposed to the 'schedular', or residence-based model.²⁰ What makes it special is that it is aimed specifically at skilled workers, pursuing the specific purpose of addressing the problem of brain drain. Tradable emigration quotas would differ in several respects. First, under our proposal, the tax money would not need to be collected abroad. Hence a quota would not be vulnerable to income-tax paradise problems. Admittedly, however, a fiscal substitute for our tradable emigration permits proposal could take the form of an exit tax, to be collected by the country of origin before the emigrant crossed the border.²¹ It would be difficult, however, to make an exit tax sensitive to the emigrant's expected income in the host country. This point connects with a second difference between our proposal and the Bhagwati tax. In the tax case the amount paid by each emigrant fluctuates with the income received in the host country. Under our proposal the market price for permits would rise with the income level abroad (as a general equilibrium effect), but the amount paid to emigrate would not be so closely connected to a worker's actual income in the host country as in the case of a progressive Bhagwati tax. Third, with our proposal the level of emigration would not be sensitive to fluctuations of expected return from emigration, but the price of permits would be. Fourth, in principle – at least if the emigration quotas were subject to a free-of-charge initial allocation rather than to an auction – the money paid would go into the pockets of only skilled people, rather than into the general budget of the state, which would then decide about its use.

Our proposal also differs in at least two ways from Becker's proposal of an entrance fee in potential countries of immigration (Becker, 2005).²² First, as in the tax case, the fee mechanism is price-focused rather than quantity-focused. Second, the fee, given its supposed uniformity, is unlikely to translate the different national emigration optima obtaining in the countries of origin. In other words, the fee will be the same regardless of the country of origin and regardless of the fact that one country of origin would already have reached its optimal emigration target, or 'fair brain-drain target', whereas another would not.

What are the likely effects of our emigration-permits proposal? Let us compare them with the well-documented effects of a Bhagwati tax. In doing so we first concentrate on the proposal's effect on income inequalities in the country of origin. As we have said, one specific feature of the permits proposal is that the permits would be allocated to skilled workers only, as if, in the case of a tax, the proceeds were distributed to skilled people only.²³ Hence, because of this allocation to skilled workers only, tradable permits are likely to increase income inequalities between skilled and unskilled workers, in contrast with a world of free movement. That is not the case with a Bhagwati tax, unless the proceeds are distributed in an anti-redistributive manner (which we exclude here). This is true at least if we leave aside general-equilibrium effects on the wage differential via the local labor market (see, for example, Bhagwati and Hamada, 1974).

A second type of effect is the one on incentives to invest in higher education. Let us suppose that the taste for migration differs among the population. When it comes to deciding whether or not to invest in higher education, those with little taste for migration (home-loving people) are likely to stay home anyway, whatever policy is put in place (free movement, Bhagwati tax or tradable emigration permits). In their case, the Bhagwati tax will not affect their incentive to educate themselves. This is so because the tax affects only foreign income and the proceeds are distributed independently of the skill level of recipients. In the case of permits, they would accrue only to skilled workers. That being so, they would raise the skill premium at home, generating an incentive to acquire an education. The situation is reversed when we shift from the home-loving to those having a strong taste for migration (or a low mobility cost). If we abandoned free movement, the skilled persons going abroad would see a reduction in their income prospects, regardless of whether we are dealing with permits or with a Bhagwati tax. For those persons, both systems reduce the incentive to pursue an education.

These are just two effects of the proposed scheme. Many more should be looked at, including the effects on social mobility in the country of origin, the difference it makes if higher education is publicly funded or not, and

the effect on incentives to education resulting from the fact that, in our model, unskilled people are freer to move than skilled ones. Moreover, an assessment of the overall effect of the proposal on income inequalities would be needed. This would require an assessment of the interplay between the reduction of international income inequalities pursued by the target on emigration set by the country of origin, and the likely increase in domestic income inequalities generated by the proposal. The effect on education should also be assessed through its consequences on international income inequalities.

Proposal 2: tradable reception duties among host countries for unskilled immigrants

The emigration of unskilled, as opposed to skilled, migrants may also have a beneficial effect on poor countries of origin (World Bank, 2005, 64–6). Above and beyond the benefits from remittances, the mere fact of reducing the supply of unskilled labor locally raises the wages of those who stay. Moreover, in the case of temporary emigration, a skill-upgrade effect may result when workers are confronted with different work practices abroad. This skill upgrade will benefit productivity back home once the emigrants return to resume working at home. In many cases, however, potential host countries are reluctant to accept large numbers of unskilled migrants.

One way of increasing access by unskilled workers from poor countries to jobs in rich ones is analogous to the process that Hathaway and Neve (1997) and Schuck (1997) propose for dealing with asylum-seekers. For a given regional area (such as the European Union) the current amount of immigration by unskilled workers would be assessed. This assessment would serve as a baseline aggregate immigration level. The introduction of a scheme involving tradable reception duties could achieve a threefold goal. First, to the extent that unskilled workers are seen as a burden for the host countries (which is admittedly very disputable), the initial allocation of such quotas could be done in such a way as to distribute the ‘burden’ more fairly than is currently done.²⁴ Possible allocation criteria would include population size, GDP per capita and the territorial size of the receiving country. Second, one could move away from the baseline and set the number of unskilled immigrants allowed to enter progressively higher, up to a level at which immigration would become detrimental to the country or countries of origin or undesirable for other reasons. Here again a tradable-quotas scheme can serve the goal of increasing immigration rather than restricting it. Third, the tradability of such quotas would allow fairer burden sharing among receiving countries while introducing some flexibility into the system, and would tend to reduce the aggregate costs (if any) of accepting a certain number of unskilled workers. There would

be an international market in which some countries would pay other countries to welcome more unskilled workers than their quotas in exchange for money. In the case of asylum-seekers, such a scheme, limited to receiving countries, could be said to be incomplete because quotas would be allocated to states not directly responsible for the creation of refugees. They would thus need to be ‘percentage quotas’ since the number of people seeking asylum or qualifying as refugees could not be determined beforehand by the prospective host countries, the criteria used to determine which people qualify as refugees being defined independently. In contrast, with our proposal there is no such problem of incompleteness since the goal is not primarily to make sure that as few people as possible remain unskilled and since the receiving countries could freely decide on the aggregate level of unskilled immigrants that would be fair for them to accept.

CONCLUSION

Throughout this chapter we have emphasized the many differences between issues of procreation and migration. And we have stressed the fact that tradable-quotas schemes have limitations, like any other policy mechanism. Yet we believe that the properties of such schemes, including the distributive ones, should be investigated by social scientists, even in unusual applications such as moderating fertility and optimizing brain-drain policies. At this stage it would be premature to draw general conclusions as to the desirability of setting up such schemes. Several points deserve emphasis, however.

Tradable procreation quotas should be considered first. An international rather than a domestic regime, coupled with effective but noncoercive domestic measures, such as raising women’s educational level as well as their access to the labor market, may be politically the most promising avenue for tradable quotas in that area. We have focused here on three effects. The initial differential-fertility effect and the productivity-differential effect have opposite signs. Moreover, the tradability effect, if political constraints are taken seriously, is likely to be anti-redistributive. Its relative weight, however, is not totally clear. These three effects on income inequalities need to be carefully studied in connection with their effects on educational levels.

When we consider the case of tradable emigration quotas, we see again that a great deal of complexity is involved. We find significant differences between it and a Bhagwati tax at various levels. The possibility exists that the scheme for tradable emigration quotas will end up having significant strengths when compared with the Bhagwati tax proposal. In our future

research we plan to address the issues raised by tradable emigration rights and tradable reception duties within the framework of general equilibrium models.

NOTES

1. We warmly thank Gustaf Arrhenius, Thierry Bréchet, Alexandra Casella, Frédéric Docquier, Gregory Ponthière, Edoardo Traversa and Yannick Vanderborght for comments on earlier drafts of this chapter.
2. On the difference between efficiency and cost-effectiveness, see Smith and Coast (1998, 221).
3. For detailed information on tradable pollution permits, see Dales (1968), Montgomery (1972) and Tietenberg (2001). For an introductory piece, see Ellerman (2005).
4. For a discussion of fairness issues in the context of climate change, see Gosseries (2006).
5. For a different scheme in the employment field, see Hamminga (1995).
6. A Bhagwati tax is a tax by a developing country on the income of emigrants residing in developed countries. This idea was proposed by economist Jagdish Bhagwati as a method for a developing country to recover its investment in the human capital of citizens who, after receiving educational subsidies, migrate to developed countries in order to earn higher incomes.
7. See Ellerman (2005, 129) on *de novo* regulation.
8. On the right to procreate, see, e.g., Statman (2003).
9. For an interesting treatment of the commodification debate, see Sandel (1998).
10. For a philosophical treatment of this matter, see Arrhenius (2000a, 2000b). For economic discussions see Nerlove, Razin and Sadka (1989); Blackorby, Bossert and Donaldson (1995); Golosov and Tertilt (2006); Michel and Wigniolle (2007).
11. See Sen (1996).
12. LaFollette (1980) proposed licensing parenthood out of concern for making sure that people would be able to meet the high demands of parental responsibility. His proposal leads to a restriction on the freedom to procreate, with two significant differences from our proposal. On the one hand, it would go against the proposal's very spirit to make such licenses tradable. On the other hand, once the license is granted under LaFollette's scheme, there is no limit to the number of children one would be entitled to have.
13. For such a discussion, see de la Croix and Gosseries (2006).
14. For the purposes of this discussion we use the words 'skilled' and 'highly skilled' as synonyms, and 'unskilled' and 'low-skilled' as synonyms as well.
15. Allowing for low-skilled nannies would mitigate this effect but could not remove it entirely.
16. We do not discuss in detail here how to deal with such questions as how child mortality should be taken into account, whether the model can address the possibility of divorce, whether it will too strongly disadvantage single parents, whether it might encourage fathers not to recognize their paternity so as not to have to cede their allowances, whether cohort-specific population targets allow for less flexibility than period-based targets, what to do about women able to have children beyond the normal childbearing period, and so on.
17. Here we leave aside a fourth possible effect that occurs in the case of a grandfathered allocation (that is, based on the procreation level as reached in a given base year), rather than made initially on an equal per capita basis. Such an allocation is plausible in the case of an interstate scheme. Compared with the pollution-control case, the initial differential fertility rate is such that the grandfathering effect, taken alone, would be more redistributive than an equal per capita allocation: contrary to the pollution case, in which richer people generally lead more energy-intensive lives. See de la Croix and Gosseries (2006) for further discussion of this effect.

18. Such a cultural concern, beyond the ethnic one, is present in the procreation debate too. One aspect of the concern about an aging population is that a society with a higher proportion of old people will have different values from those of a younger society, likely as a result of both age and cohort effects. What is at stake in this case is not too great a cultural diversity, but rather the reverse risk of cultural domination by a specific age group or birth cohort. See, for example, Hinrichs (2002).
19. For the view that it also turns out to be lower than what is good for host countries, see Pritchett (2006).
20. On the distinction between global and schedular models of income taxation, see Bhagwati (1982).
21. For an example of exit tax, see Colombo (1998).
22. See Becker's blog, 'Sell the Right to Immigrate', http://www.becker-posner-blog.com/archives/2005/02/sell_the_right.html.
23. We concentrate on the proceeds-distribution side only insofar as the effects on income inequalities are concerned, leaving aside the levying dimension.
24. Drinkwater et al. (2003) describe in detail the conditions under which the immigration of unskilled labor is actually beneficial to host countries.

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