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Globalization and Human Capital Formation

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ABSTRACT

Globalization and Human Capital Formation*

This paper compares education investment in closed and open economies without government and with a benevolent government. The fact that the time consistency problem in taxation can make labor mobility beneficial even if governments are fully benevolent – which is known from other contexts – is shown to be true in the economies considered. It is further shown that labor mobility is unambiguously beneficial if private insurance for human capital investment is available.

JEL Classification: H21, H23

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1 Introduction

Recently politicians as well as a greater public have been alarmed by two major insights. First, educational investment is essential for gross national income and growth. In a country that cannot draw on major reserves of natural resources or other types of rent income, income from human capital investment is really the major source of national income. Second, this income may become less available as a tax base in the future, due to increased mobility, particularly among the individuals with the highest skills.

Public investment in schooling and higher education is considerable. The mean of public expenditure on educational institutions among OECD countries was 4.9 percent of GDP in 1996 (OECD Figures, 1999, p.67) and this amount exceeds private expenditure on educational institutions by several hundred percent. This may be surprising since human capital is, for most parts, a private good. At the same time, human capital returns are highly taxed. Maximum personal income tax rates of Central Government within the OECD averaged 54.2 percent in 1986, and ranged from 33 percent (New Zealand) to 65 percent (Japan), with an OECD average of 47.8 percent in 1996 (OECD Figures, 1989, 1999). In many OECD countries the tax burden on labor income, including the returns from human capital investment, is higher than on interest income and other capital income: the two types of income are often treated differently, with interest income taxed with a lower rate, and it is a common pattern that the cost of investing in human capital cannot be deducted from the (taxable) returns from such investment.

In this paper we first analyse the incentives for time consistent redistributive taxation of human capital income and equilibrium educational subsidies by a purely benevolent government in a closed economy. As has been pointed out by Boadway, Marceau and Marchand (1996), returns on risky human capital investment are excessively taxed by a benevolent government due to a time consistency problem.[1] They also suggested mandatory education, as well as governmental provision of education goods, as second-best policies to address this problem. We briefly review this problem, and in the ensuing analysis we assume that the government can provide an education subsidy.

[1]Kydland and Prescott (1980) analysed time consistent taxation of investment returns and the hold-up problem it generates in the context of capital income taxation. Boadway, Marceau and Marchand (1996) discuss the time consistency problem in the context of human capital investment, and Gradstein (1998) and Kanniainen and Poutvaara (1999) consider this issue from different directions.

In many analyses of income taxation in situations with income uncertainty, ad hoc assumptions are imposed to guarantee that markets for income insurance are not be viable.[2] As a general rule, and in particular if one also allows for governmental provision of such insurance, it is important to endogenize the reason for the absence of such markets. Here we will address this issue by considering both the case in which private insurance markets are absent for exogenous reasons, and the case with private insurance markets. We find that governmental redistribution will crowd out any private insurance markets. The characterization of the equilibrium in the closed economy serves as a starting point to consider a globalized world in which highly skilled individuals can migrate without cost (or at low cost).

We then ask how globalization—or, more precisely, the increased mobility of individuals—changes the equilibrium outcome. Not surprisingly, we find that the reduction in migration cost reduces the national governments' ability to tax. Only the immobile individuals are subject to redistributive taxation. Accordingly, mobility of labor reduces the time consistency problem of taxes on the returns on human capital investment, much in line with the insights provided by Kehoe (1989) who showed a similar result for time consistent capital income taxation.

The new and perhaps surprising effect analysed in this paper is the interaction between the ability to tax in the globalized economy, private education effort, and governmental provision of educational subsidies. We find that, if there is no private income insurance available, it is not clear whether education subsidies are higher in the globalized economy or in the closed economy. However, for given subsidies, education effort is strictly higher in the globalized economy than in the closed economy.

A similar analysis is carried out considering the case in which private income insurance is available. We show that globalization is strictly welfare increasing under these circumstances. Intuitively, globalization reduces the time consistency problem, the government can still provide the efficient amount of education subsidies, and private insurance takes care of providing the desirable amount of income insurance. In fact, private insurance can even correct for the uneven tax burden that is generated by the fact that governmental subsides must be financed by taxes that must be paid by those

[2] The most convincing reasoning has been made by Sinn (1996): when individuals make major human capital investment decisions, they are often too young to be allowed to participate in business life and write insurance contracts that have a major impact on their future life.

individuals who are immobile.

We conclude that the welfare impact of globalization is not clear, a priori. Individuals may gain or lose from globalization, even if the government is strictly benevolent. However, under reasonable conditions the effects of globalization are beneficial.

The paper is organized as follows. In the next section we describe the model, and in Section 3 we analyze the closed economy. In Section 4 we consider a globalized world. Section 5 is a conclusion.

2 The Model

Consider a two-period model[3] with two identical countries A and B, each with a continuum $[0,1]$ of individuals. Individuals live for two periods. In period 1 all individuals are identical. Each makes a private investment in education. The amount of effort invested by individual i is e_i. Individuals earn labor income in period 2. They differ in their productivity. The productivity of each individual is determined (by nature) at the beginning of period 2. The individual's probability of becoming highly productive is $p(e_i)$. Earnings are m_H in this case, and m_L if the human capital investment is not successful. The individual's investment e_i in period 1 increases the probability for the individual to become more productive. If no educational investment is made, the individual will have low productivity with probability one in period 2. The probability $p(e_i)$ is assumed to be a monotonically increasing function in educational investment. More specifically, we assume that $p(0) = 0$, $\lim_{e_i \to 0} p'(e_i) = \infty$, $p'(e_i) > 0$, $p''(e_i) < 0$, and $\lim_{e_i \to \infty} p(e_i) < 1$.[4] We further assume that the individual productivity outcomes for all individuals are mutually stochastically independent.

An individual's (expected) utility will be described as follows

$$U_i = -C(e_i) + e_i + (1 - p(e_i))u(x_L) + p(e_i)u(x_H), \tag{1}$$

[3] This model is a variant of Boadway, Marceau and Marchand (1996) and Konrad (1999) but introduces tax competition and worker mobility. It is straightforward to endogenize labor supply in this model, or to extend this model and its equilibrium results to an overlapping generations model with an infinite horizon.

[4] The two-type assumption is for simplicity only and has been made in the optimal tax literature, e.g., by Stern (1982), Stiglitz (1982) and, in a related context, by Boadway and Marchand (1995).

where x_L and x_H are the individual's incomes if the educational investment is not/is successful. Education effort $C(e_i)$ enters utility as a cost in period 1. This function is assumed to be strictly convex. Later we will assume that the government can spend resources to reduce this cost. There is some possible consumption benefit from education in period 2, which, by appropriate normalization, enters utility linearly. Net income x_i enters utility positively, the utility-of-income function being monotonically increasing and concave.

3 The closed economy

Consider first a situation in which migration is ruled out, for instance, because the cost of migration is extremely high. We will characterize the laissez-faire outcome as a benchmark case, and then study intervention by a welfarist government.

3.1 The laissez-faire equilibrium

Suppose there is no government that could impose taxes, subsidize education, or redistribute income. Individuals choose education effort e_i. Also, they may or may not insure against future income uncertainty on private insurance markets.

3.1.1 No private insurance markets

In the absence of private insurance institutions, the private human capital investment problem is straightforward. Individuals maximize their expected utility, which leads to the first-order condition

$$C'(e_i) - 1 = p'(e_i)[u(m_H) - u(m_L)] \tag{2}$$

characterizing the equilibrium human capital investment. The effort that solves this equation is $e^{*,NI,NG}$, the * denoting laissez-faire equilibrium values throughout, NI denoting the case without availability of private insurance ("no insurance"), and NG denoting the case of a closed economy ("no globalization").

3.1.2 Private insurance

Consider now the case with a private insurance market. We assume that there is perfect competition in this market. Insurance companies offer contracts to individuals in the first period, specifying the net amount which each high-income earner pays and an amount which each low-income earner receives in period 2. To include an important element of realism, we acknowledge the existence of a moral-hazard problem in this market: individual educational effort is typically not observable for the insurance company. Hence, the insurance contract cannot be conditioned on the actual effort chosen by an insurance customer. However, as usual in such contexts, the amount of effort chosen by the insurance customers will depend on the type of the insurance contract, and can be anticipated by the insurance companies.

Let q be the net payment by a high-income earner, and Q the insurance company's net payment to a low-income earner, e the education effort chosen by individuals, and $p(e)$ the probability for individuals to end up with high productivity, and also the share of highly productive individuals. An equilibrium in the insurance market is characterized by the following conditions.

First, insurance companies offering a contract (q, Q) break even. In order for this to be true, the net payment to a low-income earner must be

$$Q = \frac{p}{1-p}q, \tag{3}$$

with

$$p = p(e) \tag{4}$$

the correctly anticipated share of high-income earners in the equilibrium.

Second, given the contract (q, Q), the individuals choose the effort that maximizes their individual expected utility. This effort is implicitly determined by the first-order condition

$$C'(e) - 1 = p'(e)[u(x_H) - u(x_L)], \tag{5}$$

with $x_H = m_H - q$ and $x_L = m_L + Q$. This e is anticipated by the insurance companies and used to calculate the the payments for insurance contracts to break even.

Note that a choice of q induces e, $p(e)$, and Q. Hence, an insurance market equilibrium is fully characterized by q (and the resulting $Q(q)$ and $e(q)$ determined by (3), (4) and (5)) that maximizes the individuals' expected

utility among all $q \in [0, m_H - m_L]$. This insurance equilibrium is similar to that characterized in Shavell (1979). Some of the problems that appear there can be avoided by the additively separability between education cost and utility from income. Note that:

Proposition 1 *$m_H > x_H > x_L > m_L$ in the laissez-faire equilibrium with private insurance.*

We prove that full insurance is not optimal ($x_H > x_L$); the proof that optimal insurance is non-zero follows similar lines. To prove that $x_H > x_L$ we assume the opposite: $x_H = x_L \equiv x$. Then, equilibrium effort e is determined by $C'(e) - 1 = 0$, and $m_H - q = m_L + \frac{p(e)}{1-p(e)}q$. Now assume that there is an insurance company that offers a contract with payment $q - \Delta$ by H-types and payments to L-types induced by the break-even condition and the effort that is induced by this insurance contract. This contract is more attractive than q because

$$\frac{dU_i}{d\Delta}_{\text{at } \Delta=0} = u'(x_L) \cdot \frac{p'(e)}{1-p(e)} \cdot q \cdot \frac{de}{d\Delta} > 0.$$

□

Comparing the equilibrium with and without private insurance, we have:

Proposition 2 *(i) Education effort in the laissez-faire equilibrium is higher if no private insurance is available, leading to a higher average income. (ii) Expected utility in the laissez-faire equilibrium is higher if private insurance is available.*

Proof. (i) follows from comparing (1) and (5) with $m_H > x_H > x_L > m_L$. (ii) follows from revealed preferences.[5] Each individual can obtain the laissez-faire outcome without insurance simply by not buying insurance. □

The laissez-faire equilibrium outcome with insurance and moral hazard is not first-best here for two reasons. First, marginal utilities of high-income earners and low-income earners are not equalized (see Proposition 1). Second, a co-ordinated increase in education effort by all individuals would increase utility, even for a given q, because, at the equilibrium $(q^* , e^{*,I,NG})$,

$$\frac{\partial U_i}{\partial e} = u'(x_L) \cdot \frac{p'(e)}{1-p(e)} \cdot q > 0,$$

[5]Note that the outcome is less clear if effort and monetary income are not additively separable.

if Q is adjusted such that insurance companies make zero profit.

It is worth noting that the first-best optimum would be attainable if individuals could commit to the appropriate level of educational effort. This optimum is characterized by education investment and redistribution such that

$$-C'(e) + 1 = p'(e)(m_H - m_L)u'(x),$$

with

$$x_L = x_H = x = p(e)m_H + (1 - p(e))m_L.$$

This first-best optimum would require an insurance contract that makes each individual's payments contingent on this individual's actual choice of educational effort. Given the unobservability of actual individual educational effort, this is not possible.

3.2 Time consistent taxation

As has been pointed out by Boadway, Marceau and Marchand (1996), a benevolent government faces a serious time consistency problem regarding redistributive optimal income taxation. Education investment determines individuals' incomes, and the government may choose the actual tax rules after all individuals' final gross labor incomes m_H or m_L are fully determined. Any ex-post optimal redistributive tax policy in this case must equate marginal utilities of high- and low-income earners. Hence, individuals anticipate that $x_L = x_H$. This implies that $u(x_H) = u(x_L)$. Accordingly, individuals' incentives to invest in education are determined by the first-order condition

$$-C'(e_i) + 1 = 0. \tag{6}$$

This defines a unique level of investment, $e_i = \hat{e}^{NG}$, which is smaller than in the laissez-faire equilibrium both for the case with and without insurance, since the optimal private insurance contract has $u(x_H) > u(x_L)$ to leave some incentives for additional educational effort (Proposition 1), and $u(m_H) > u(m_L)$ in the case without insurance.

Proposition 3 *The equilibrium education efforts are ordered as follows:* $\hat{e}^{NG} < e^{*,I,NG} < e^{*,NI,NG}$. *Further, expected utility in the equilibrium with time consistent redistributive taxation is lower than in the laissez-faire equilibrium* with private insurance.

The welfare comparison with the laissez-faire quilibrium without private insurance is ambiguous; we will discuss this in the end of this section. Note that the ex-post redistribution by the government makes any partial private insurance redundant. This is an important observation because it may explain why private insurance contracts on future income uncertainty or career uncertainty are rarely observed. Whatever level of such insurance would be privately desirable, it would be less than what is provided by an ex-post optimizing benevolent government. So it does not make sense to incur any private transaction cost in buying such insurance on private markets. This is also a possible explanation for the fact that private insurance markets for human capital risks are rarely observed.

Proposition 3 should also be contrasted with analyses that start with the assumption that there is no private insurance available for income or career risks and then argue that governmental redistribution increases welfare because it provides precisely this kind of insurance (see, e.g., Eaton and Rosen 1980, Varian 1980, and Sinn 1996). Proposition 3 shows that the amount of "insurance" provided by a benevolent government in a time consistent decision framework is more than what would be desirable from the perspective of private individuals.

3.3 Education policy

Taking the excessive but time consistent redistribution as given, we can ask what would be the optimal education policy that could be pursued by a benevolent government. Boadway, Marceau and Marchand (1996) recommend mandatory education. This is an important insight because it shows the possible direction of a corrective government policy. However, to implement mandatory educational effort, it seems that education effort must be enforceable, and hence, must be observable.

We assume, instead, that the government can provide subsidies or complementary education goods for an amount s that change the private cost of acquiring education from $C(e)$ to $\psi(s)C(e)$, with $\psi(0) = 1$, and $\psi'(s) < 0$, $\psi''(s) > 0$, and $\lim_{s\to\infty} \psi(s) = a > 0$; we allow for $s < 0$ (with the same assumptions about derivatives) corresponding to education being taxed. If the government can choose the optimal lump-sum taxation s and use this money to transform the cost function to $\psi(s)C(e_i)$, the ex-ante expected utility of individuals cannot be smaller, because $s = 0$ is a possible choice, and utility will typically be strictly higher than in the laissez-faire equilibrium. The

optimal subsidy policy maximizes

$$-\psi(s)C(e) + e + u[p(e)m_H + (1 - p(e))m_L - s] \tag{7}$$

subject to

$$-\psi(s)C'(e) + 1 = 0, \tag{8}$$

where (7) and (8) take into account that time consistent redistributive taxation will lead to $x_H = x_L$. We use $\hat{e}^{NG}(s)$ to denote the solution of (8). Note that $\hat{e}^{NG}(s)$ is independent of whether private insurance is available or not, because time consistent redistribution fully crowds out any such insurance. The equilibrium may have higher or lower ex-ante welfare for individuals than the laissez-faire outcome. This can be seen by considering extreme cases: if e.g., $\psi'(0) << 0$ and $p'(e^*) = 0$ (and therefore, $e^* = \hat{e}^{NG}(0)$), welfare is obviously higher with a subsidy; if, on the other hand, $\psi'(s) = 0$ for $s \geq 0$, $\psi'(s) << 0$ for $s < 0$, and $p'(e^*) >> 0$, it is lower. There are two countervailing effects. First, the time-consistent overprovision of insurance leads to underinvestment in education and this reduces ex-ante welfare. Second, the educational subsidy increases welfare.[6] The evaluation would be clear if the private sector had access to a credit market and to the same cost-reducing technology as regards education: welfare would be higher in the absence of government. Also, welfare would be higher if the government could abstain from excessive redistributive taxation and simply chooses the optimal investment subsidy.

4 A global world

As has been pointed out in the introduction, high educational subsidies and progressive taxation of labor income with high marginal tax rates for top earners are indeed characteristics of the welfare states in Europe. Presently transaction costs of migration seem to be declining in Europe, for instance, due to the introduction of the common market in 1992 that granted free mobility for factors. This step did not eliminate all costs of migration. Language barriers, asymmetric information as regards local customs, laws and regulation, and partially incompatible, or at least incompletely harmonized,

[6] Although it is possible that the optimal subsidy is negative, this seems a rather pathological case in the closed economy. With globalization however, this case will be more interesting.

social security provisions still generate considerable migration costs for those considering to move from one member state to another. However, there is a clear trend by which these costs are falling, and this makes it interesting to consider as a benchmark case a situation in which individuals with high productivity have uniform migration cost equal to zero, whereas, for simplicity, we keep the migration cost of workers with low productivity at infinity.[7]

4.1 The laissez-faire equilibrium

Note first that the laissez-faire outcomes with private insurance and without private insurance do not change if migration is feasible (we therefore drop G/NG superscripts on laissez-faire values). Individuals' income in the laissez-faire depends only on their productivity and is the same in both countries, whether they migrate or not.

4.2 Benevolent national governments

Consider now the situation with benevolent governments. The game structure is as follows. In period 1, in stage 1, the governments in both countries choose their education subsidies, s^A and s^B; again, these can be positive or negative. At this stage, governments strictly maximize the expected utility of their inhabitants at that time. Of course, the subsidies that can be chosen here will be restricted by the ability to raise tax revenue, independent of the other country's subsidy and tax policy, or the individuals' migration choices. The countries' tax bases will never vanish because the less productive individuals cannot migrate. We can therefore disregard this constraint in what follows, assuming that the desired subsidies can always be financed. In stage 2 individuals choose their education effort.

In period 2, in stage 3, nature reveals each individual's productivity type; that is, individual earnings. In stage 4, countries choose the redistributive taxes. In stage 5 productive individuals choose their country of residence.

A serious problem in models with labor migration and benevolent governments is the appropriate characterization of the objective function of the government. For instance, the government may try to continue to maximize the welfare of the individuals who are located in the country prior to the

[7]This assumption is, for instance, also pursued in Poutvaara (1999a) who considers labor tax competition when taxes are used for redistribution. He assumes, however, that the government can fully commit to an ex-ante optimal tax policy.

migration choice, or it may try to maximize the welfare of individuals who are in the country once the migration decision has been made. In our setup this trade-off will not show up, partially due to the assumed symmetry as the ex-ante allocation of individuals will be the same as the allocation after migration. In order to achieve this we will assume, however, that individuals stay in their country of origin if they have the same utility in this country as in the other country. Hence, we will assume that the government in country i maximizes a welfare function

$$p_i u(x_H^i) + (1 - p_i)u(x_L^i)$$

with

$$x_H^i = m_H - t^i,$$
$$x_L^i = m_L - \frac{1}{1-p_i}s^i + \frac{\gamma_i}{1-p_i}t^i,$$

where γ^i is the number of mobile workers in country i in period 2,

$$\gamma^i = \gamma^i(t^A, t^B).$$

This assumes that the government finances all educational subsidies by taxes paid by the immobile residents, and uses taxes t^i for redistributing income between residents with high and low productivities, respectively. Obviously, this set-up does not rule out a full equalization of incomes; equalization obtains for sufficiently high t^i. The separation between taxes financing the educational subsidies and the redistributive taxes is for two reasons. First, as will be seen below, t^i will be zero in the equilibrium. This implies that not only the scope for redistribution vanishes in a globalized economy. Also, the full net burden of financing the subsidies must be born by the immobile individuals in the equilibrium. Second, this allows to make sure that the government budget is always balanced, whether individuals choose their equilibrium strategies or not.

4.2.1 Choice of taxation

We can solve the subgame for given s^A and s^B for the remaining stages. It is evident that, in this case, countries are in a Bertrand competition situation as regards their choices of the redistributive taxes t^A and t^B. If one country, say, country A, chooses a higher tax than the other country B, all individuals with high productivity migrate to the other country. With e^A and e^B denoting appropriate first-stage equilibrium values, we have:

Proposition 4 *The only equilibrium tax and population structure has*

$$t^{A*} = t^{B*} = 0,\ \gamma^{A*} = p(e^A)\ \textit{and}\ \gamma^{B*} = p(e^B).$$

The first property follows from the fact that all individuals with high productivity move to the country i with the lower tax t^i. For the second property we note that the tie-breaking assumption we made implies that individuals stay in the country of origin if they are indifferent whether to migrate or not. □

The proposition has an important message. Globalization does not only reduce the scope for redistribution. It may make the resulting equilibrium distribution of incomes in a world with benevolent governments even more unequal than in a laissez-faire equilibrium. In the stylized model we consider, high-income earners earn a net income m_H in the laissez-faire, and in a globalized world with benevolent governments, but the net income of low-income earners in the globalized economy with benevolent governments may be lower than m_L—viz. if education subsidies are positive—because this group also pays for the education subsidies. The result adds to the general observations by Wildasin (1999) who presents a number of examples showing that globalization may have surprising redistributional consequences.

We can now turn to the choice of education and, possibly, educational subsidies. We first note that anticipated tax rates equal to zero imply that individuals have a desire for private insurance, just like in the laissez-faire. In a fully globalized economy, once the redistributive taxation of human capital returns has vanished we should observe that private insurance markets emerge. In order to separate various effects here, it makes sense to disentangle these problems, first assuming that individuals cannot purchase private income insurance, and then allowing for optimal private insurance contracts against individual productivity risks.

4.2.2 Human capital investment without private insurance

Consider the individual human capital investment decision for given educational subsidies s^A and s^B without private insurance. We concentrate on a single country—say, A—because we already confirmed that the equilibrium in the taxation and migration subgame has zero migration. Each individual in A anticipates that the cost for education subsidies s^A will be born by the equilibrium number $(1 - \bar{p}^A)$ of low-productivity persons in country A and hence, anticipates a tax in case of becoming an L-type equal to

$\zeta^A = s^A/(1-\bar{p}^A)$. Accordingly, individual j maximizes

$$-\psi(s^A)C(e_j) + e_j + p(e_j)u(m_H) + (1-p(e_j))u(m_L - s^A/(1-\bar{p}^A)). \quad (9)$$

The equilibrium education effort $\hat{e}^{NI,G}$ (with 'hat' characterizing the equilibrium with government intervention, NI for no private insurance, and G for the case with globalized labor markets and free migration of H-types) is characterized by the first-order condition

$$-\psi(s^A)C'(e_j) + 1 + p'(e_j)[u(m_H) - u(m_L - s^A/(1-\bar{p}^A))] = 0, \quad (10)$$

and by the consistency requirement

$$\bar{p}^A = p(\hat{e}^{NI,G}). \quad (11)$$

The solution of this problem is a function $\hat{e}^{NI,G} = e(s^A)$ which is monotonically increasing in the subsidy. Governmental subsidies increase the individual investment incentives by two channels. First, these subsidies reduce the individual marginal cost of education effort. Second, the taxes needed to finance the subsidies are paid by the individuals with low income. This makes it more desirable to become highly productive. We should note that this outcome depends on the assumption that mobility is correlated with income type here.

When the government chooses educational subsidies, it anticipates this investment behavior and chooses s^A in order to maximize (9) for $e_i = e(s^A)$. An important observation is that the optimal education subsidies can be negative.

Proposition 5 *If private insurance is not available, in a globalized economy benevolent governments may want to tax private education and redistribute the revenue to low-productivity workers.*

Proposition 5 follows from the fact that $-\psi'(0)C(e(0)) - \psi(0)C'(e)e'(0) + e'(0) + p'(e(0))e'(0)(u(m_H) - u(m_L)) - u'(m_L)\frac{1}{1-p(e)} < 0$ can hold. □

The role of the education subsidies, s^i, in the globalized world is worth some comment. It may seem surprising that both a positive and a negative subsidy are potential outcomes; both outcomes seem in some sense offensive, a (positive) subsidy because its adverse consequences for distribution, and a tax (negative subsidy) because its extremely poor properties as a

means of taxing successful individuals. This, however, reflects a rather cruel trade-off between efficiency and distribution in the global economy which, although somewhat exaggerated in the model, we believe is real. If there is tax competition and if income insurance is unavailable, any instrument for redistribution is destined to be very blunt.[8]

Proposition 6 *(i) For zero education subsidies, the equilibrium education effort with benevolent governments in a globalized economy is the same as in the laissez-faire equilibrium without insurance. (ii) For given positive (negative) subsidies the equilibrium education effort is higher (lower) in the equilibrium with benevolent governments in a globalized economy than in the laissez-faire equilibrium without insurance:* $e^{*,NI} < \hat{e}^{NI,G}$ *(*$e^{*,NI} > \hat{e}^{NI,G}$*).*

For a proof of (i) and (ii) compare (2), (8) and (10). □

We can also make the following welfare comparison:

Proposition 7 *Welfare is higher in the globalized economy with benevolent governments than in the laissez-faire economy if private insurance is unavailable.*

For a proof of Proposition 7 note that the government chooses s^A to maximize individuals' ex-ante utility. A choice $s^A = 0$ is feasible and leads to the laissez-faire outcome. Since s^A is the only governmental action and is taken prior to private choices of education, $s^A \neq 0$ must imply that expected utility is higher if the government subsidizes education. □

As has already been seen, welfare in the laissez-faire without insurance can be higher than in the closed economy with benevolent governments. For these cases it follows from Proposition 5 that welfare with benevolent governments is higher in the globalized world than in closed countries. Most other comparisons are inconclusive: Benevolent governments' subsidies may be higher or lower in the globalized world than in closed economies in the absence of private insurance, and welfare can be higher or lower in the closed economy than in the globalized world. The reason for these ambiguities is the fact that globalization magnifies both the cost and the benefit of subsidizing education: *the benefit* is magnified because increasing s not only makes

[8]This observation parallells the conclusions in Wildasin (1996) where workers invest in risky education, and integration creates tax competition and reduces idiosyncratic risk. The conclusion is that integration is beneficial if education can be financed by private borrowing, but detrimental to low-income workers if this is not possible.

education investments less costly, but also strengthens monetary incentives for education due to its financing; *the cost* is magnified because low-income workers, valuing income more highly, pay the subsidy.

4.2.3 Human capital investment with private insurance

The issue of availability of insurance for human capital investment risks has already been discussed. If we do not observe this type of insurance, this does not mean that such insurance could not be offered on private markets. As mentioned, excessive (time consistent) redistributive taxation is a substitute for this type of insurance, and may have crowded out the amount of insurance that would be chosen on private markets.

We consider now the case in which private insurance is available. Of course, we assume that it suffers from the same unobservability problems as governmental policy. We analyse first the choice of education effort for given insurance decisions q and for given subsidies in country A. We suppress the country superscript here. Individuals maximize

$$-\psi(s)C(e_j)+e_j+p(e_j)u(m_H-q)+(1-p(e_j))u(m_L+\frac{\bar{p}q}{1-\bar{p}}-\frac{s}{1-\bar{p}}). \quad (12)$$

The solution of the first-order condition to this problem yields some function $e(s,q)$ and some equilibrium share of H-types, $\bar{p} = p(e(s,q))$. The insurance equilibrium with moral hazard, (i.e., with unobservable or non-contractible individual effort) is characterized by the amount of insurance $q(s)$ such that this amount maximizes (12) for given s and subject to $e(s,q)$ and $\bar{p} = p(e(s,q))$ being functions of s and q. Finally, the government chooses a subsidy that maximizes this expected utility, given that q is a function of this subsidy, e is a function of s and q, and the share of H-types is a function of e.

Proposition 8 *(i) For a given education subsidy s, the education effort is smaller with insurance than without insurance. (ii) Welfare in the equilibrium with private insurance is higher than in the equilibrium in which this insurance is unavailable, and higher than in the closed economy with subsidies and redistributive taxation.*

For a proof of (i), we note that insurance decreases the utility difference for H-types and L-types. Hence, for any given subsidies, individuals invest

more if they are not insured. For (ii), note first that, for given subsidies, welfare in the equilibrium with private insurance is higher than in the equilibrium without insurance. Suppose the government chooses the equilibrium subsidies as in the case without insurance. Welfare is higher for this subsidy level, due to the availability of insurance. If, in addition, the government chooses a different subsidy level, this is because this further increases expected utility of the individuals.

The comparison between the private insurance equilibrium with subsidies and subsidies with excessive redistributive taxation in the closed economy is also straightforward. Let $s^*(q)$ be the welfare maximizing subsidy, given an insurance level q, and $q^*(s)$ be the optimal insurance level for given s. Then it holds that (s, q) with $s = s^*(q^*)$ and $q = q^*(s^*)$ maximize ex-ante expected utility and this combination is the combination that is obtained in the equilibrium with private insurance and public education subsidies in the globalized economy. Accordingly, any redistributive policy that deviates from this (e.g., perfect equalization of net incomes ex-post) yields lower ex-ante expected utility, even if the subsidy is optimized for this amount of redistribution. □

4.3 Political-economy foundations

As we have mentioned, migration between countries with separate welfare-maximizing governments raises issues about the governments' objective functions in the face of migration. An alternative foundation for the objective functions of governments is provided by political-economy considerations. If citizens determine government objectives, the responsiveness of policies is endogenized in a potentially attractive way. It is far beyond the scope of this paper to go deeply into exploring such an environment. We will, however, briefly consider an important special case, viz. that where policies are decided by majority vote and the policy therefore decided by the median voter.[9]

We consider voting at two points, first ex ante over the education subsidies, s^i, and then in period 2—when education investments have been made, types are realized, and migration has taken place—over t^i. Since all individuals are identical ex ante, the policy of the median voter coincides with the

[9]Poutvaara (1999b) considers a model with voting over a *proportional* tax after educational investments but *prior to* individuals learning the outcome of their investments. He shows that the effect on education relative to a situation witn no taxation is ambiguous.

previously considered welfare optimum. Consider, next, voting in period 2. The important observation is that the outcome described above ($t^i = 0$) will result in any country where the median voter is a low-productivity individual. For instance, as long as $p(e) < 1/3$ for all e, this will be the case independently of migration. Also, even if the high-ability types were to constitute the majority in country i and impose $t^i < 0$, the low-income individuals in the other country j would vote for $t^j = 0$.

5 Summary

Summarizing the discussion of benevolent governments, globalization has two effects. First, it reduces the government's ex-post incentive to tax the returns on human capital investment excessively and overcomes the problem of time consistent taxation. While this observation is not new and has been emphasized by Kehoe (1989) in the context of taxation of physical capital, we think that the mechanism is far more important and appropriate in the context of excessive taxation of human capital investment. In essence, the argument requires that the taxed factor can actually move once the tax rates are decided. This may be rather difficult for installed physical capital, and much easier for persons who just carry their human capital with them.[10]

Second, globalization does not prevent the government from using education subsidies to improve the welfare properties of the equilibrium. This amount of subsidies is not necessarily lower than in the closed economy. This is true in spite of the fact that the full financial burden of financing these subsidies must be born by the less productive (less mobile) individuals, here, because the fully mobile individuals pay no taxes in the equilibrium. This further increases the existing income differences between individuals whose education investment have succeeded and individuals for whom they have failed.

If private insurance markets are unavailable, this increase in the income spread between successful and unsuccessful individuals makes the welfare

[10]This discussion leads to an interesting distinction. It may be necessary to distinguish between different types of human capital. For instance, the know-how of a tax adviser or a lawyer depreciates if the person migrates, whereas a manager's or physician's human capital is almost perfectly mobile. What we expect to observe in the future is a tendency for a differential tax treatment of different professions, according to the transferability of their human capital. Hagen, Osmundsen and Schjelderup (1998).

comparison between a globalized economy without private insurance and a closed economy with governmental subsidies and excessive redistribution ambiguous.

When private insurance becomes available, however, insurance can be used to overcome this problem. Individuals anticipate the high tax burden for individuals with low productivity and, hence, partially insure for the risk of becoming one of them. Accordingly, welfare is highest in the globalized economy with education subsidies and private provision of insurance.

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