DISCUSSION PAPER SERIES

No. 7838

SOCIAL INSURANCE, EDUCATION, AND WORK ETHICS

Mark Gradstein

PUBLIC POLICY

Centre for Economic Policy Research

www.cepr.org

Available online at: **www.cepr.org/pubs/dps/DP7838.asp**

ISSN 0265-8003

SOCIAL INSURANCE, EDUCATION, AND WORK ETHICS

Mark Gradstein, Ben-Gurion University and CEPR

Discussion Paper No. 7838
May 2010

Centre for Economic Policy Research
53–56 Gt Sutton St, London EC1V 0DG, UK
Tel: (44 20) 7183 8801, Fax: (44 20) 7183 8820
Email: cepr@cepr.org, Website: www.cepr.org

This Discussion Paper is issued under the auspices of the Centre's research programme in **PUBLIC POLICY**. Any opinions expressed here are those of the author(s) and not those of the Centre for Economic Policy Research. Research disseminated by CEPR may include views on policy, but the Centre itself takes no institutional policy positions.

The Centre for Economic Policy Research was established in 1983 as an educational charity, to promote independent analysis and public discussion of open economies and the relations among them. It is pluralist and non-partisan, bringing economic research to bear on the analysis of medium- and long-run policy questions.

These Discussion Papers often represent preliminary or incomplete work, circulated to encourage discussion and comment. Citation and use of such a paper should take account of its provisional character.

Copyright: Mark Gradstein

CEPR Discussion Paper No. 7838

May 2010

ABSTRACT

Social Insurance, Education, and Work Ethics

This research shows that moral hazard associated with extant social insurance arrangements causes underinvestment in human capital, because of government's inability to commit to welfare policies. It then argues that education policies, such as education subsidies or direct public investment in education, may achieve a second best and also help alleviating the deterioration of work norms.

JEL Classification: H1 and I22
Keywords: education policies, moral hazard and social insurance

Mark Gradstein
Department of Economics
Ben-Gurion University
Beer-Sheva 84105
ISRAEL
Email: grade@bgu.ac.il

For further Discussion Papers by this author see:
www.cepr.org/pubs/new-dps/dplist.asp?authorid=129935

Submitted 05 May 2010

1. Introduction

Generous social insurance arrangements and required taxation for their finance have drawn attention to their disincentive effects. Thus, comparing Europe and the US, Prescott, 2004 suggests that higher marginal tax rates in the former adversely affect labor supply and, ultimately, output there. Alesina et al., 2005, argue, however, citing findings from microeconometric literature pertaining to the elasticity of labor supply, that such adverse tax effect is not likely to be substantial. Their explanations for the difference between Europe and the US in work hours have to do with unionization, as well with the generosity of retirement benefits.

A related to the latter explanation but different potential channel, more directly related to this paper's focus, has to do with moral hazard inherent in social insurance. Lindbeck and Nyberg, 2006, suggest that, in anticipation of welfare government support, individuals may underinvest in own future, thus falling burden on the welfare system. Specifically, Lindbeck, 1995, Lindbeck and Nyberg, 2006, speculate that this mechanism may result in a deterioration of work ethics, when parents – in anticipation of generous transfers – fail to instill in their children hard work values. They suggest a slippery slope dynamics whereby welfare dependence and lax work norms may mutually reinforce each other; see also Bisin and Verdier, 2004, for similar arguments as applied, more generally, to redistributive policies.

We, likewise, focus on moral hazard issues associated with social insurance. Our main interest, however, is with government second best policies designed to enhance

efficiency in the light of such inherent moral hazard. In the basic setup, the individuals fail to invest efficiently in human capital, because of moral hazard associated with social insurance. Further, the problem is exacerbated in the presence of economy-wide linkages via human capital though spillover effects. It is then shown that distortive subsidization of human capital accumulation, or its direct provision by the government (each financed by lump sum taxes, to balance the budget), constitute welfare improvement. The equilibrium amount of government intervention increases in government's benevolence toward the poor, which directly translates into generosity of the social insurance system. We also consider instilling work norms as a mechanism to partially ameliorate moral hazard.

An important conclusion that emerges from our analysis is that moral hazard associated with social insurance for working adults provides an important rationale for the government involvement in human capital of the young. Further, such involvement, constituting a second best policy tool, has the potential of rescuing the welfare state. In particular, it has the potential of preventing the deterioration of work ethic.

Indeed, there appears to be a strong negative correlation between welfare state dependency and skill level across OECD countries (Heckman and Jacobs, 2010, OECD, 2006a, 2006b, 2006c). Additionally, unskilled individuals receive little job training, see Figure 7, in Heckman and Jacobs, 2010. Further, social insurance and government involvement in human capital are highly and significantly correlated. For example, the correlation between welfare expenditure and spending on public education as a percentage of GDP for OECD countries (PPP US dollars, 2001) is 0.41, see Figure 1.

INSERT FIGURE 1 HERE

To further illustrate, countries with generous social insurance system (such as Denmark, Sweden) spend almost 30 percent of the GDP on welfare, as well as some 10 percent of the GDP on public education, whereas countries less committed to social insurance (such as Australia, Japan, USA) spend less than 20 percent of the GDP on welfare, and around 5 percent or less on public education (Barr, 2004, contains more details). In European welfare states higher education is overwhelmingly publicly financed (more than 95 percent in Denmark and Sweden), whereas government participation in the US is much smaller, less than 50 percent (OECD, recent years). These patterns have been quite stable over recent decades, hence not likely to have been caused by business cycles or economic fluctuations.

Existing explanations for public involvement in education can hardly be reconciled with these figures. Empirical evidence on human capital externalities, especially at higher education levels, is weak (Krueger and Lindahl, 2002), and it is unclear why they would display any significant cross country variation.[1] Credit market imperfections would appear to be better addressed by loans rather than education subsidies or public provision. One interpretation of these figures, of course, is the "from cradle to grave" ideological stance of welfare states that implies individual rights to benefits from public services during various life periods. This paper argues that, ideology apart, a causal mechanism may explain the prevalence of public involvement in education in welfare oriented countries. Under this view, public education is a rational policy response to underinvestment in human capital that

[1] Note that, from Figure 1, public education spending constitutes almost 10 percent of the GDP in Sweden, but less than 2 percent in Japan.

is implied by the moral hazard of social insurance. Indeed, government intervention in education that would otherwise be distortive, emerges in the context of the government inability to commit to social insurance as a second best policy. In an extension of the basic model, labor market inequality is shown to be positively related to human capital investment, which is consistent with available evidence on the effect of skill premium on educational attainment.

In addition to the above referenced work, the paper is related work that views public education as a remedy to time inconsistencies, such as in Anderberg and Balestrino, 2003, Anderberg and Andersson, 2003, Andersson and Konrad, 2003, Gradstein, 2000, Haupt and Janeba, 2009.[2] Proceeding from a different perspective, Bovenberg and Jacobs, 2005, examines the role of public education in the optimal taxation framework; the informational assumptions (such as pertaining to individual abilities, for example) in this type of work are very much different from the ones maintained here, and the two approaches should be viewed as complementary to each other.

The plan of the paper is as follows. The basic model is presented in the next section, followed by its analysis in Section 3. Section 4 explores various government policies toward human capital. Section 5 extends the analysis to incorporate instilling of work norms, to argue that the case for government education policies is strengthened, and Section 6 extends the basic model to consider the effect of inequality on human capital investment. Finally, Section 6 concludes with brief remarks.

[2] Gradstein and Kaganovich, 2004, explore a different, demographic link between public support for the elderly and public education.

2. Basic model

We begin by considering an economy with a unit measure of households, each consisting of a parent and a child, that operates over two periods.[3] All families are initially endowed with identical income z. Initially, the parents allocate this initial income between family consumption, c_{i1}, and human capital investment in the child, k_i, respecting the budget constraint

$$z = c_{i1} + k_i \tag{1}$$

While the formulation of human capital investment is in pecuniary terms, we would like to think about it more generally as an effort toward human capital accumulation.[4]

Human capital enhances children future earnings prospects. Specifically, it is assumed that in adulthood, in period 2, these can be productive and earn high income Y, $Y>z$, or not productive and earn a minimal income of 0, and the probability of the former event, $p(k_i)$, increases in human capital.[5] It is assumed that $p'>0$, $p''<0$, and that Inada conditions hold. While broader interpretations are definitely possible, for concreteness we interpret being productive as being successful on the labor market, for example, being employed, whereas unproductive would mean unemployed (or, in a later extension, earning the

[3] An alternative interpretation of the model could be given in terms of a single generation that lives through two periods. The current formulation is favored primarily to make it consistent with existing literature, e.g., Lindbeck and Nyberg, 2006.

[4] The cost of effort could be generalized to any increasing convex function, as opposed to the assumed constant marginal cost of one unit, without changing any qualitative conclusions.

[5] The assumption of a zero income in case of a bad outcome is made merely for simplicity and will be subsequently relaxed.

minimum wage).

The social insurance system operates on a balanced budget basis as follows.[6] All working adults pay a proportional income tax, T being the tax rate, and the tax proceeds finance welfare payments to poor (low income) adults. We also assume existence of a tax collection cost of α, $0<\alpha<1$, per unit of taxable income. It then follows that net income, hence, the consumption level of high income adults is

$$c_{H2} = Y(1-T) \tag{2}$$

and of low income adults, who live off welfare, it is

$$c_{L2} = (1-\alpha)THY/L \tag{3}$$

where H (L) is the fraction of high (low) income adults.

Our assumptions link, therefore, human capital investment to the likelihood of being productive, whereas, in contrast, lower skilled individuals tend to live off welfare. Indeed, existing evidence offers overwhelming support for these stipulations, see Heckman and Jacobs, 2010, for a recent survey.

Parents make all decisions and are altruistic toward their children. We assume for analytical simplicity that their utility from family consumption is linear and the utility from children consumption when adults is logarithmic, and write parental expected utility over the

[6] The ensuing analysis is robust to various specifications of the system's operation.

two periods as follows:

$$U_i = c_{i1} + p(k_i)\ln(c_{H2}) + [1- p(k_i)]\ln(c_{L2}) =$$

$$c_{i1} + p(k_i)\ln[Y(1-T)] + [1- p(k_i)]\ln[(1- \alpha)THY/L] \quad (4)$$

We assume a benevolent government that maximizes the aggregate of parental utilities,

$$W = \int U_i di \quad (5)$$

The parents first allocate their initial income between consumption and human capital investment. Then, in period 2, children income – high or low - is realized, upon which the government determines the scope of social insurance by setting the tax rate T. This leads then to second-period consumption levels. We will be interested in the resulting subgame perfect equilibrium, whereby decisions made at each stage correctly anticipate subsequent developments.

We note that some of the above assumptions, specifically, the precise nature of the social insurance scheme, are made merely for expositional simplicity. Some of these assumptions can be easily relaxed without changing qualitative results. Subsequently, for example, the analysis is extended to incorporate spillover effect of human capital accumulation and considers the possibility of unsuccessful individuals earning a positive amount of income.

3. Analysis

Proceeding backwards, we first study the determination of the tax rate in period 2 by the benevolent government, taking individual human capital investments and the resulting income realizations as given. This leads to the following first order condition:

$$-\int p(k_i)di/(1-T) + \int[1-p(k_i)]di\ /T = 0 \qquad (6)$$

In anticipation of such determined government policy, in period 1 the parents make human capital investments. Utility maximization subject to budget constraint yields then the first order condition:

$$-1 + p'(k_i) \ln [(1-T)/ (1- \alpha)TH/L] = 0 \qquad (7)$$

It then follows that, all families being initially identical, $k_i = k$; $H = p(k)$, $L = 1-p(k)$. The equilibrium equations can then be rewritten as follows:

$$- p(k)/(1-T) + [1- p(k)] / T = 0, \text{ or } T = 1- p(k) \qquad (8)$$

The inverse relationship between the success probability – or, the fraction of high income individuals – and the tax rate reflects moral hazard incentives.

Further,

$$-1 + p'(k) \ln [1/ (1- \alpha)] = 0, \text{ or } p'(k) = 1/ \ln [1/ (1- \alpha)] \quad (9)$$

Our assumptions guarantee existence of a unique equilibrium (the tax rate and individual investments), given by (8) and (9).

This equilibrium is, however, suboptimal. For suppose that the government could precommit to a social insurance policy in anticipation of individual investments. The latter are given by the following first order conditions:

$$-1 + p'(k_i)\ln[(1-T)/(1- \alpha)TH/L] = 0$$

or, $k_i=k$, and

$$-1 + p'(k)\ln[(1-T) (1- p(k))/(1- \alpha)T p(k)] = 0 \quad (10)$$

and differentiation of (10) reveals that $dk/dT < 0$, which reflects the adverse effect of social insurance generosity on human capital accumulation incentives.

Taking into account the envelope theorem, the optimal tax rate that maximizes (5) is then given by the following first order condition:

$$- p(k)/(1-T) + [1- p(k)] / T + [1- p(k)] [1/ p(k) + 1/(1- p(k))] p'(k) dk/dT =$$

$$- p(k)/(1-T) + [1- p(k)] / T + [p'(k)/ p(k)] dk/dT = 0 \quad (11)$$

The second order condition implies that the left hand side in (11) decreases in T. Equations (10) and (11) define the socially optimal outcome with policy commitment. Comparing this outcome with the equilibrium equations, (8) and (9), leads to

Proposition 1. The equilibrium generates a higher tax rate and a lower level of investment by the individuals, hence a higher fraction of low income adults, relative to the optimal solution.

Furthermore, the second-period average net income, given by the weighted average of (2) and (3), is $Y[1-T+(1-\alpha)T]H$, which obviously decreases in the tax rate and increases in the fraction of high income adults. It is then clear that Proposition 1 also implies that the equilibrium generates a lower second period income level relative to the optimum.

These results are not surprising and follow from the insights provided in Kydland and Prescott, 1977. As such they can be generalized to various changes in functional specifications. One interesting variation pertains to potential externalities in generating success in the labor market. Suppose, for example, that the probability of success hinges on the economy-wide, as well as on own, investment in human capital, $P(k_i, \{k\}_j)$, such as, $P(k_i, \{k\}_j) = [p(k_i) + \int p(k_j)dj\,]/2$. Proceeding in a manner similar to the above, the equilibrium tax rate and the level of human capital investment are given by the following two equations:

$$T = 1 - p(k) \text{ and } p'(k)/2 = 1/\ln[1/(1-\alpha)]$$

Comparing with (8) and (9), it follows that the inefficiently low level of human capital investment is now reinforced, as individual disregard for spillovers adds to lack of policy commitment by the government as a source of inefficiency. Consequently, the spillover effect causes a decrease in human capital investment, a decrease in the likelihood of success, and an increase in the tax rate and welfare payments, ultimately decreasing social welfare.

To sum up,

Proposition 2. Spillover effects of human capital reduce its investment and increase the tax rate to finance welfare payments, causing a further reduction in efficiency.

Thus, human capital linkages exacerbate the moral hazard consequences of social insurance. While such linkages will be assumed away in the next sections that focus on education policies, their obvious implication is the reinforcement of the case for public intervention in education.

Another extension pertains to potentially different weights the government attaches ex post to the individual welfare, depending on the labor market outcomes. Thus, let w and 1-w denote the respective weights of the poor and the successful ones, $0<w<1$; the above considered case corresponds to equal weighting, $w=1/2$. The equilibrium condition characterizing the tax rate is then modifies as follows:

$$(1-w)\int p(k_i)di/(1-T) + w\int[1-p(k_i)]di/T = 0 \qquad (6')$$

whereas equation (7) that characterizes the equilibrium human capital investments remains unchanged. Proceeding as above, we then obtain that

$$T = w[1- p(k)] / [(1-w) p(k) + w(1- p(k))]$$

where k is the common level of human capital investment. In particular, the equilibrium tax rate increases in the relative weight the government places on the poor.

Equation (9) is then written as follows:

$$p'(k) = 1/ \ln [(1-w)/ w(1- \alpha)] \qquad (9')$$

and its total differentiation yields that the equilibrium level of human capital investment decreases in w. We then obtain

Proposition 3. The moral hazard implications of generous social insurance on underinvestment in human capital are exacerbated when the government is more benevolent toward the unsuccessful individuals.

In particular, note that when the government is indifferent toward the poor, w=0, there is no moral hazard, and the resulting human capital investment is efficient.

4. Education policies to alleviate equilibrium inefficiency

Given the equilibrium inefficiency and, in particular, the obtained underinvestment in human capital, we now consider education policies designed to (partially) correct for this inefficiency. We focus on education subsidization by the benevolent government, relegating to the appendix the conceptually similar case of public education. Thus, suppose that parental human capital investment is subsidized at the rate of s. We also assume that the subsidy is financed by lump sum taxation, τ being the tax amount; assuming that the government budget is balanced in each period, the condition balancing the budget is

$$\tau(1-\alpha) = sK \tag{12}$$

where K is the aggregate amount of human capital investment.

This modifies the budget constraint as follows:

$$z = \tau + c_{i1} + (1-s)k_i$$

It is assumed that, first the benevolent government determines the subsidy rate, which is followed by parental human capital investment decisions. Success or failure in the labor market are then materialized, and the government selects the social insurance policy by setting the tax rate T. As before, we will be interested in the subgame perfect equilibrium, whereby rational agents correctly anticipate future actions.

Generally, when the equilibrium is efficient, distortive policies are expected to lead to

suboptimal allocations. In this case, however, the laissez faire equilibrium is inefficient as a consequence of the government inability to effectively commit to a social insurance policy. As will be shown in the ensuing analysis, this potentially causes distortive subsidization of human capital investment to lead to a second best optimum.

It is easy to confirm that, for a given level of s, the equilibrium analysis proceeds very similarly to the above. Consequently, the equilibrium condition (8) remains intact, whereas (9) is now modified as follows:

$$-(1-s) + p'(k) \ln [1/ (1- \alpha)] = 0, \text{ or } p'(k) = (1-s)/ \ln (1/ (1- \alpha)) \qquad (9'')$$

Differentiation reveals that $dk/ds = -1 / p''\ln(1/(1-\alpha)) > 0$, so that a higher subsidy rate spurs a larger level of private investment. Inverting (9") we obtain:

$$k = K = f(\beta(1-s)), f = p'^{-1} \qquad (13)$$

where $\beta = 1/ \ln (1/ (1- \alpha))$.

From (12), therefore,

$$\tau (1-\alpha) = s f(\beta(1-s)) \qquad (14)$$

The government now chooses s to maximize aggregate individual utilities, which upon substitutions can be written thus:

$$z - sk/(1-\alpha) - (1-s)k + p(k)\ln[Y(1-T)] + [1- p(k)] \ln [(1- \alpha)T\, p(k)Y /(1-p(k))]$$

Making use of the envelope theorem, the first order condition for the internal solution is:

$$- [\alpha /(1-\alpha)][k + sdk/ds] + [1- p(k)] [1/ p(k) + 1/(1- p(k))]p'(k)dk/ds =$$

$$-[\alpha /(1-\alpha)][k + sdk/ds] + [p'(k)/ p(k)]\, dk/ds = 0 \qquad (15)$$

where k is determined from (13) and $dk/ds = -\beta f'(\beta(1-s))$.

We then obtain

Proposition 4. Subsidization of human capital investment has the potential to enhance aggregate welfare relative to the laissez faire, hence the subsidy rate explicitly given by (15) can be considered a second best optimal policy.

Subsidization of human capital investment increases the latter, reducing the fraction of economically unsuccessful individuals, thus lowering the welfare burden. Note that the beneficial effect of distortive education subsidies stems because of the (partial) correction of the moral hazard inefficiency. As the social insurance tax rate decreases the larger is the fraction of economically successful adults, we also obtain that the second-period average income, $Y[1-T+(1-\alpha)T]H$, increases as a result of the education subsidy. In the Appendix we consider direct public investment in education and similarly show that this tool likewise has

the potential of welfare improvement.

This analysis assumed that the government treats all adult individuals equally. Consider now an extension of the government objective function, assuming that as in the discussion leading to Proposition 3, ex post, it places the weights of 1-w and w ($0 \leq w \leq 1$) on economically successful and unsuccessful adults, respectively. Proceeding as above, it can be shown that[7]

$$T = [1- p(k)] / [1-2p(k)+p(k)/ w]$$

whereas k is now determined from the following first order condition:

$$-1 + p'(k) \ln [(-1+1/ w)/ (1- \alpha)] = 0$$

and differentiation reveals that $dk/ dw < 0$, indicating that adverse moral hazard implications for human capital accumulation become more severe when the government places more weight on the plight of unsuccessful individuals. It then follows from differentiating (15) – the first order condition determining the subsidy amount – that $ds/ dw > 0$, in other words, the amount of public subsidization of human capital investment increases in the relative weight assigned to the poor.

Summarizing,

[7] Details are available on request.

Proposition 5. The larger is the relative weight assigned to poor adults by the benevolent government, the stronger are disincentives for human capital investment as a result of moral hazard effects of social insurance, and the larger is the implied public subsidy for human capital accumulation.

This result implies that involvement in education by the government will be more extensive in countries where the weight of the poor is larger. The reason for this is indirect and has to do with the use of education as a tool of alleviating moral hazard.

5. Education subsidies and productive norms

We now extend the above analysis to consider endogenous productive norms. Thus, suppose that working adults derive additional utility, b_i, from being productive, or employed. Further, suppose that this is determined endogenously, in period 1, at the cost of $C(b_i)$, $C' , C'' > 0$. This implies that, substituting the budget constraints, parental utilities take the following form:

$$U_i = z - C(b_i) - k_i + p(k_i)\{\ln[Y(1-T)] + b_i\} + [1- p(k_i)] \ln [(1- \alpha)THY/L]$$

We first turn to individually determined work values, assuming that each parent, along with human capital investment can invest in instilling a work value in her child. Bisin and Verdier, 2004, Lindbeck and Nyberg, 2006, study this issue in an analogous context and

express concerns that the generosity of social insurance may lead to deterioration of work norms. Our goal here is to shed light on the potential of education policies to alleviate these concerns.

To this end we assume, following the previous section's analysis, that education is subsidized at the rate of s, and that the government budget is balanced as expressed in equation (12). With endogenous determination of productive norms, parental budget constraint assumes the following form:

$$z = \tau + c_{i1} + (1-s)k_i + C(b_i)$$

The model is similar to that of the previous section, except that, upon the government determination of the subsidy rate, the parents both invest in human capital and also instill work norms.

It can be easily seen that, in the last stage, equation (8) still determines the tax rate. The first order conditions determining parental decisions in regard to human capital and work values, respectively, are then as follows:

$$-(1-s) + p'(k) \ln [1/ (1- \alpha) + b] = 0 \qquad (16)$$

and

$$- C'(b) + p(k) = 0 \qquad (17)$$

where $b_i = b$ and $k_i = k$. Totally differentiating (16) and (17), we obtain: dk/ds, $db/ds > 0$, so

that subsidization of human capital investment also increases the work norm. Proceeding as in the previous section, it can then be shown that the equilibrium subsidy rate is larger than before because of its positive effect on work norms.[8]

We then obtain

Proposition 6. The case for subsidization of education is reinforced when parents instill work norms in their children. This causes an increase in human capital investment, as well as instilling better work norms.

This result qualifies somewhat the concerns in earlier work, such as Bisin and Verdier, 2004, Lindbeck, 1995, and Lindbeck and Nyberg, 2006, and shows that deterioration of work ethics can be at least partially prevented via education subsidies. Its intuition is intimately related to moral hazard incentives, which are alleviated through education subsidies. This then incentivizes the parents to instill work norms.

We now extend the analysis by assuming that the productive norm is determined by the benevolent government through public schooling, for example, that teaches the virtues of work and the adverse consequences of laziness; we assume that the cost is financed by lump sum taxation on the parents.[9] These assumptions imply that $b_i = b$. The government policy, b, is determined first, followed by individual investments. Finally, the government chooses and applies a social insurance scheme.

It is easy to see that the tax rate is as before, $T = 1 - p(k)$. The first order conditions

[8] Derivational details are skipped, but can be obtained upon request.
[9] For simplicity, tax collection costs needed to this end are ignored here.

determining individual investments are now modified somewhat:

$$-1 + p'(k) \{\ln [(1/ (1- \alpha)] + b\} = 0 \qquad (7')$$

implying that $dk / db = -p' / p''$ $\ln(1/(1-\alpha)) > 0$; the larger is the level of satisfaction from being productive the larger is investment in human capital.

Maximization of aggregate welfare with respect to productive values, while employing the envelope theorem, yields the following first order condition:

$$- \quad C'(b) + p(k) + [1- p(k)] [1/ p(k) + 1/(1- p(k))] p'(k) dk / db =$$

$$- C'(b) + p(k) + [p'(k)/ p(k)] dk / db = 0$$

where the left hand side is positive when evaluated at b=0. Instilling productive values, while costly, directly increases utility, and, perhaps more importantly, increases human capital investment,

Summarizing,

Proposition 7. Instilling productive values through public intervention, by increasing investment in human capital and, hence, the likelihood of good outcomes, leads to welfare improvement.

This result is similar to that exhibited in a related context in Dixit, 2009, where collectively

instilled values cultivate pro-social attitudes. While this extension is not explicitly considered here, when the government has in its arsenal both tools, education subsidies and the opportunity to influence work ethics through public education, a further welfare improvement can be achieved.

6. Inequality and human capital investment

We next extend the basic model to study the effects of labor market inequalities. To this end, we assume that, in case of a bad outcome, the resulting labor income is y, $0<y<Y$, which can be viewed as a minimal guaranteed income. This implies – taking the welfare payment into account – that the consumption level under this contingency is

$$c_{L2} = y + (1- \alpha)T\,(HY + Ly)/L \qquad (3')$$

Proceeding as in Section 3, the benevolent government chooses a tax rate to maximize aggregate welfare; the tax rate is determined then from the following first order condition:

$$-\int p(k_i)di\,/(1-T) + \int[1 - p(k_i)]di\;\;[(1- \alpha)(HY + Ly)/L]\;/[y + (1- \alpha)T\,(HY + Ly)/L] = 0 \qquad (18)$$

And individual investments are determined from:

$$-1 + p'(k_i) \ln [(1-T)Y/ (y + (1- \alpha)T (HY + Ly)/L)] = 0 \quad (19)$$

implying that $k_i = k$, $H = p(k)$, $L = 1-p(k)$.

We can then re-write the equilibrium conditions as follows:

$$-p(k)/(1-T) + [1- p(k)] [(1- \alpha)(Hq + L)/L] /[1 + (1- \alpha)T (Hq + L)/L] = 0 \quad (20)$$

and

$$-1 + p'(k) \ln [(1-T)q/ (1 + (1- \alpha)T (Hq + L)/L)] = 0 \quad (21)$$

where the relative income, $q = Y/y$ is a measure of inequality.

Differentiating (20) and (21) we, in particular, obtain (see the Appendix for the proof):

Proposition 8. Human capital investment and the fraction of working adults increase in inequality.

This result is well consistent with available evidence, summarized in Heckman and Jacobs, 2010, that links earnings inequality and human capital investment; see, in particular, Figure 2 there which, in the context of OECD countries, exhibits a clear pattern of higher educational attainment being positively correlated with inequality; see also Frederiksson, 1997, where the

relationship between skill premium and demand for higher education is exhibited in the context of Sweden. Once L is interpreted as the unemployment rate, it is also consistent with another empirical regularity pointed out in Heckman and Jacobs, 2010 (see Section 2.3.3), that benefit entitlements reduce employment.

7. Conclusions

This paper's starting point is that extant social insurance arrangements are prone to lead to moral hazard, which reduces human capital investments. The government inability to effectively commit itself to a welfare policy causes underinvestment in education, as individuals anticipate to be bailed out if not working. In this context, education policies have the potential to at least partially alleviate these adverse consequences of moral hazard. Specifically, seemingly distortive policies in such second best environment are shown to enhance efficiency. Subsidization of private human capital investment; direct public human capital investment; or public education that promotes work norms – are all shown to improve the outcome relative to the laissez faire. Education subsidies are also shown to improve individually instilled work norms.

Public intervention in human capital accumulation, therefore, has the potential to partially alleviate the adverse incentive effects of the welfare state. This, in turn, implies that the picture of intertemporal dynamics of deteriorating work norms and welfare dependence as depicted in, for example, Lindbeck, 1995, and Lindbeck and Nyberg, 2006, and also suggested in Bisin and Verdier, 2004, may be somewhat nuanced, provided only that the

government actively pursues education policies. Such policies emerge as a rational response to moral hazard of social insurance in a second best environment and are consistent with observed correlations between welfare and public education spending. A fuller range of dynamic implications of these policies on privately instilled work norms will be developed in future research.

APPENDIX

A1. Direct government investment in human capital

We now generalize the labor market success function to allow for the possibility of a direct government investment affecting it. Such investment can be done via public schooling or job training programs, for example. Thus, suppose that the success probability now is

$$[p(k_i) + p(g)]/2$$

where g is the amount of government human capital investment, assumed to be financed by a lump sum tax on parental initial income, implying that the individual budget constraints are[10]

$$z = g + c_{i1} + k_i$$

The government undertakes investment first, followed by individual investments; then social insurance is implemented.

The first order condition for the tax rate is now modified thus:

$$-[\int p(k_i)di + p(g)]/2(1-T) + \{\int\{1-[p(k_i) + p(g)]/2\}di\ /T = 0 \qquad \text{(A1)}$$

and the first order conditions for individual investments remain unchanged relative to the

[10] Tax collection costs to finance public education spending are ignored for simplicity, as they bear no consequences for the qualitative results.

main analysis, so that $p'(k) = 1/\ln [1/(1-\alpha)]$; further,

$$H = [p(k) + p(g)]/2 \text{ and } L = 1 - [p(k) + p(g)]/2$$

It then follows that $T = 1 - [p(k) + p(g)]/2$, where k is given by (9).

The government chooses g so as to maximize the aggregate of individual utilities, while anticipating future responses; employing the envelope theorem, the first order condition is

$$-1 + (1/H)dH/dg - (1/L)(dL/dg) = -1 + (1/H)[p'(g)/2 + (1/L)p'(g)/2 = 0 \qquad \text{(A2)}$$

and our assumptions guarantee that the left hand side in (A1) is positive when evaluated at g=0. This then leads to

Proposition A1. Public investment in human capital, by inducing a higher likelihood of future labor market success, reduces welfare dependence and enhances aggregate welfare.

As in the main analysis, this variant can be extended to consider different weights placed on the ex post rich and poor adults, to show that the larger the relative weight of the poor the larger is the implied public investment in human capital.

A2. Proof of Proposition 8

Equations (20) and (21) have the following form, respectively:

$$F(T, k, q) = 0 \tag{A3}$$

$$G(T, k, q) = 0 \tag{A4}$$

Comparative statics with respect to q yields:

$$dk / dq = [F_T G_q + F_q G_T] / \text{S.O.C} \tag{A5}$$

Now, $F_T < 0$, $F_q > 0$, as is seen by differentiation (20) (the former is just the second order condition that defines the equilibrium tax rate); and $G_q > 0$, $G_T < 0$, as is evident from differentiating (21). It then follows that $dk / dq < 0$, which also implies, in turn, that $dp(k) / dq < 0$.

References

Alesina, A. Glaeser, E. and B. Sacerdote, 2005, "Work and leisure in the US and Europe: Why so different?" *NBER Macroeconomics Annual*, 1-64.

Anderberg, D. and Balestrino, A., 2003, "Self-enforcing intergenerational transfers and the provision of education," *Economica*, 70, 55-71.

Anderberg, D. and Andersson, F., 2003, "Investments in human capital, wage uncertainty, and tax policy," *Journal of Public Economics*, 87, 1521-1537.

Andersson, F. and K.A. Konrad, 2003, "Human capital investment and globalization in extortionary states," *Journal of Public Economics*, 1539-1555.

Barr, N., 2004, *Economics of the Welfare State*, New York: Oxford University Press.

Bisin, A. and T. Verdier, 2004, "Work ethic and redistribution: A cultural transmission model of the welfare state," mimeo.

Bohacek, R and M. Kapicka, 2008, "Optimal human capital policies," *Journal of Monetary Economics*, 55, 1-16.

Bovenberg, L. and B. Jacobs, 2005, "Redistribution and education subsidies are Siamese twins," *Journal of Public Economics*, 89, 2005-2035.

Dixit, A., 2009, "Socializing education and pro-social preferences," mimeo.

Frederiksson, P., 1997, "Economic incentives and the demand for higher education," *Scandinavian Journal of Economics*, 99, 129-142.

Gradstein, M., 2000, "An economic rationale for public education: The value of commitment," *Journal of Monetary Economics*, 45, 463-474.

Gradstein, M. and M. Kaganovich, 2004, "Aging population and education finance,"

Journal of Public Economics, 88, 2469-2485.

Haupt, A. and E. Janeba, 2009, "Education, redistribution and the threat of brain drain," *International Tax and Public Finance*, 16.

Heckman, J. J., and B. Jacobs, 2010, "Policies to create and destroy human capital in Europe," forthcoming in: E. Phelps and H.-W. Sinn, eds. *Perspectives on the Performance on the Continent's Economies*, Cambridge, MA, MIT Press.

Krueger, A. B., and M. Lindahl, 2002, "Education and growth: Why and for whom", *Journal of Economic Litera*ture, 39, (4), 1101-1136.

Kydland, F., and E.C. Prescott, 1977, "Rules rather than discretion: The inconsistency of optimal plans," *Journal of Political Economy*, 85, 473–91.

Lindbeck A., 1995, "Hazardous welfare state dynamics," *American Economic Review*, *Papers and Proceedings*, 9-15.

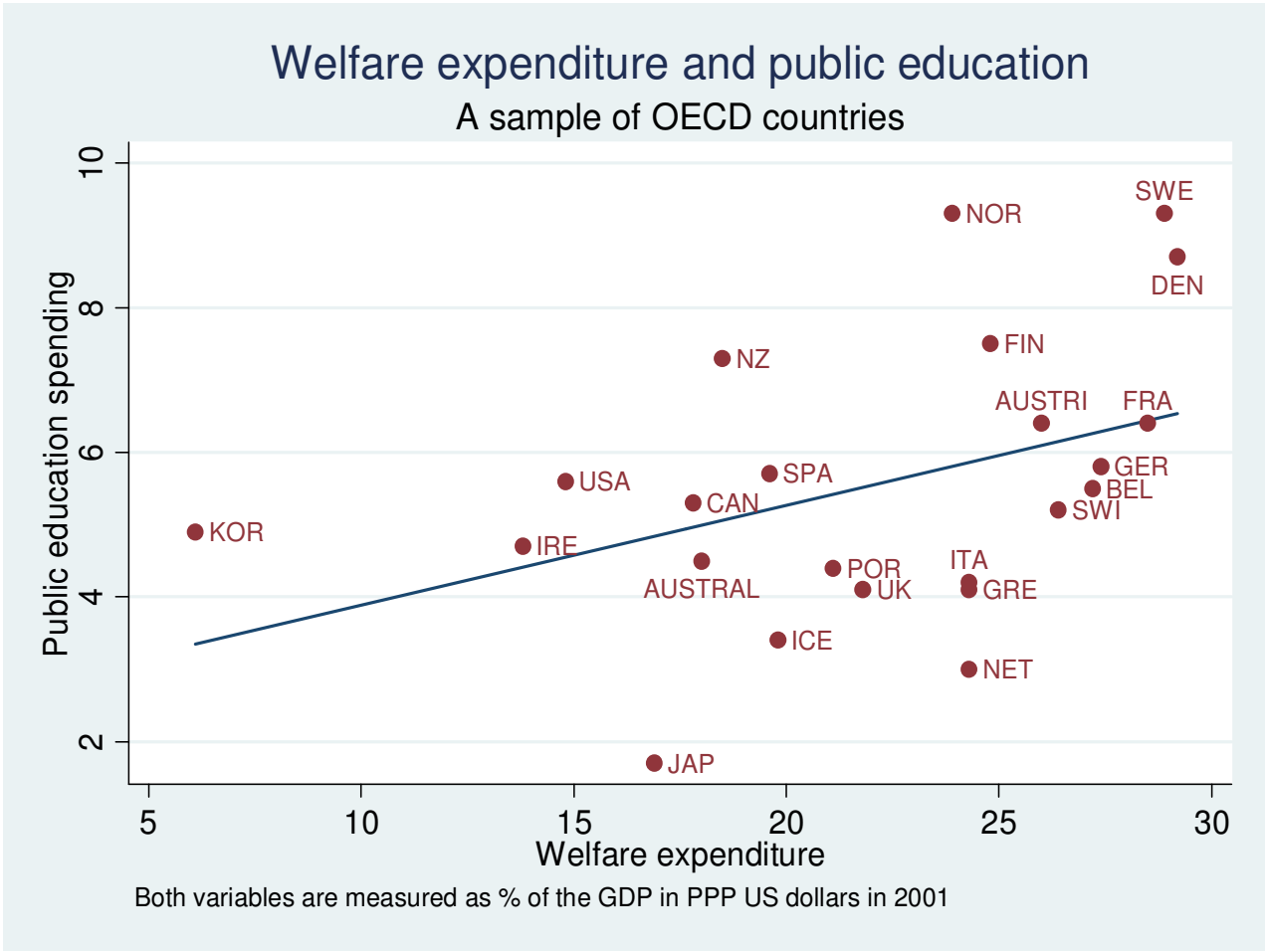
Lindbeck, A. and S. Nyberg, 2006, "Raising children to work hard: Altruism, work norms and social insurance," *Quarterly Journal of Economics*, 121, 1473-1503.

OECD (2006a), *OECD Labor Force Statistics Database*, Paris: OECD.

OECD (2006b), *OECD Social Indicators,* Paris: OECD.

OECD (2006c), *OECD Education Database*, Paris: OECD.

Prescott, E.C., 2004, "Why do Americans work so much more than Europeans?" *Federal Reserve Bank of Minneapolis Quarterly Review*, 28, 2-13.


Welfare expenditure and public education
A sample of OECD countries
Public education spending
Welfare expenditure
2
4
6
8
10
5
10
15
20
25
30
SWE
NOR
DEN
FIN
NZ
AUSTRI
FRA
GER
BEL
SWI
USA
SPA
CAN
KOR
IRE
AUSTRAL
POR
UK
ITA
GRE
ICE
NET
JAP
Both variables are measured as % of the GDP in PPP US dollars in 2001