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Persistent Inequality: An Explanation Based on Limited Parental Altruism

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ABSTRACT

This paper provides an explanation for the observed persistence in income inequality across households in terms limited parental altruism. We postulate that the degree of parental altruism is 'limited' by the financial status of the parent. A poor parent not only has less ability, but also has less concern about children's welfare. This generates a non-linearity in the human capital formation for poor vis-à-vis rich households. With a constant returns to scale technology for human capital formation it implies that initial income differences may perpetuate over time. We also derive the conclusion that the initial distribution of income is important for long run growth – a conclusion that conforms to some of the recent works in this field, notably that of Galor and Zeira.

***Keywords*:** Income distribution, human capital, intergenerational mobility, growth

***JEL classification*:** O40, D31

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1. INTRODUCTION

In recent years the endogenous growth literature has shed new light on issues pertaining to income distribution, human capital formation, intergenerational mobility and growth. In two influential papers, Galor and Zeira (1993) and Banerjee and Newman (1993) have argued that inequality in income distribution might persist in the long run in the presence of credit market imperfection and some form of indivisibility in the human capital formation technology, and this would have a negative impact on the long run growth scenario. In an unequal society, credit market imperfection leads to unequal opportunities to invest in the short run – resulting in polarization, and the polarization is perpetuated in the long run due to the assumed indivisibility in the investment technology. A variety of models have subsequently been developed which essentially follow a similar line of argument, e.g., Freeman (1996), Aghion and Bolton (1997), Picketty (1997), Maoz and Moav (1999). A somewhat different explanation has been put forward by Benabou (1994) and Durlauf (1996), who stress the importance of location-specific factors (local human capital externalities, opportunities of local finance as well as other local economic and sociological effects).

The aim of this paper is to provide an alternative theory explaining the persistence of income inequality – an explanation based on human capital formation and parental preferences. We argue that in any family the human capital formation decisions affecting the next generation (e.g., how much to investment in children's schooling, health care etc.) are typically undertaken by the parents. Therefore the degree of parental altruism plays an important role in determining the future earning abilities of the children. The crucial assumption of our paper is that the degree of parental altruism is not exogenous; it depends on the earning ability (and the educational status) of the parent herself. A poor parent will feel less altruistic towards her children than her rich counterpart. As a result, not only does she have less ability to invest in children's human capital formation, but also has less *willingness* – a factor that contributes significantly to the perpetuation of lower earning abilities generation after generation.

The motivation for the paper comes from some recent studies about the low rates of health care utilization of the children among the poorer American households.[1] *It has been argued in this context that "the stress of poverty creates a heightened parental stress, straining or limiting the capacity of parents to provide warmth, understanding, and guidance for their children".*[2] *This would in general imply that a poor person would be less concerned about her children's overall welfare – including education and health. Our model attempts to capture this aspect of poverty and analyse its implication for intergenerational mobility across households and the long run pattern of development of an economy.*

The paper bestows "warm glow" kind of altruism on the parents where the parents derive direct utility by incurring expenditure on children's education and health (i.e., on human capital formation). However, parental altruism is 'limited' by the income status of the parent. The postulated positive relationship between the degree of parental altruism and parents' financial status has been captured by introducing a weight in the utility function on the expenditure on children's human capital formation. This weight is assumed to be an increasing function of the parent's own consumption. A somewhat similar route was followed by Cardak (1999), who introduced an "idiosyncratic weight" on education expenditure in the parents' utility function to represent heterogeneity in preferences. In our model however this weight is endogenously determined. In fact, in our model the individuals are homogeneous in terms of tastes and preferences – they have identical preference ordering. They only differ in terms of their earning abilities.

The production structure in our economy is very close to the Galor-Zeira set up and the basic conclusions of the model are also similar. However the sources of these results in the two models are very different. As we mentioned before, in Galor and Zeira the results are driven by capital market imperfection and indivisibility in investment. In contrast we do not posit any capital market imperfection giving rise to unequal opportunities; nor do we assume any form of indivisibility in the human capital investment. In our model inequality perpetuates in the long run due to the particular

[1] See Hisnanick and Coddington (2000). Also see Behrman, Hrubec, Taubman and Wales (1980), and Behrman, Pollak, and Taubman (1995).
[2] Hisnanick and Coddington, *ibid*. pp. 82.

assumption made about the parental preference function that relates the degree of altruism (and therefore investment in children's human capital formation) to the parental income level.

In the context of human capital formation, growth and distribution, the education system plays an important role. This issue was first addressed by Glomm and Ravikumar (1992) who had analyzed the relative merits and demerits of the public education system in a standard overlapping generations model with human capital formation. This issue assumes special significance in the context of our model: given that poor parent are less concerned about their children's welfare, and therefore at the margin are less willing to incur expenditure on children's education, in a poor economy characterized by high inequality in skill and income distribution, would public education system perform better than private education system in terms of growth? Secondly, would such a public education policy be necessarily welfare improving for the majority of the population? In order to address these issues, we consider an alternative structure incorporating a public education system which is financed by a uniform proportional income tax. As in Glomm and Ravikumar, we assume that the tax rate is decided by majority voting. We derive the condition under which the public education system performs better than the private education system in terms of long run growth. The performance of the public education system is positively related to the degree of inequality in the economy. In an economy characterized by extreme inequality, not only will the public education system perform better than the private education regime in terms of growth, but it will also be the preferred educational system, chosen by the majority.

The paper is organized as follows. We lay out the basic structure of the economy in Section 2. Section 3 discusses the intergenerational mobility across households. Questions pertaining to initial distribution of income and growth has been analysed in Section 4. In Section 5 we compare the relative merits an demerits of the public education system vis-à-vis the private education system in this context. Section 6 offers the final comments and conclusion.

2. THE MODEL

We consider a small open economy producing a single commodity that can be used either as consumption good or as investment good.

2.1 PRODUCTION

2.1.1. Technology

There are two technologies that can be used to produce the final good – a modern technology that requires capital and skilled labour as inputs, and a traditional technology that requires unskilled labour alone. The production technology in the modern sector is represented by a continuous, concave, and CRS technology of the following kind:

$$Y_t^A = F(K_t, H_t) \tag{1}$$

where Y^A is the output produced in the modern sector and K and H are the amount of capital and skilled labour used in the modern sector respectively.

The production technology in the traditional sector is given by:

$$Y_t^B = \overline{w} L_t \tag{2}$$

where Y^B is the output produced in the traditional sector; L is the amount of unskilled labour used in the traditional sector, and $\overline{w}$ is the fixed marginal product of labour in the traditional sector.

2.1.2. Factor Prices

The small open economy assumption implies that the domestic rate of return on capital is equal to the given foreign rate of interest r^*. This fixes the capital-skilled labour ratio in the modern sector, which in turn fixes wage rate of the skilled labour, say at w^*. The return to labour in the traditional sector is given by the constant marginal product of labour in this sector, namely $\overline{w}$, which is strictly less than w^*.

The goods market and the labour markets are perfectly competitive and there is full employment of all factors of production.

2.2 HOUSEHOLDS

We consider an overlapping generations structure. At any point of time, there are N families in the economy, each consisting of one young member, one old member and one child. Each individual is born with an endowment of one unit unskilled labour and lives for three periods.

In the first period as a child she consumes a fixed amount (out of her parent's income) and acquires some skill, the skill level being a function of the amount of investment made by her parent on her education (or human capital formation). In the second period of her life she chooses to work either in the modern sector or in the traditional sector depending on her skill level; and takes decisions about consumption, savings and investment in children's education on the basis of an optimisation exercise. In the third period she is retired and lives of the returns from savings made in the previous period. She dies at the end of this period.
Generation t denotes the set of young people at period t.

For simplicity, we assume that people consume nothing as child and when young; they consume only at the old age. Thus out of their income when young, they invest a part in children's human capital formation; the rest they invest in the capital market earning an interest income r^* in the next period (when old). This they consume entirely in the next period along with the principal.

2.2.1. Preferences

Individuals derive utility from own old-age consumption as well as from the investment made in children's' education. That expenditure incurred on children's education gives them utility implies the presence of 'warm glow' kind of altruism. However we assume that the *degree* of altruism is positively related to their income level. This fact is captured by attaching a weight δ to the utility derived from children's education expenditure, the weight being positively related to the own (old-age) consumption of an individual. Thus the utility function of the representative agent of the t-th generation is given by:

$$W(c_t, b_t) = u(c_t) + \delta(c_t)u(b_t) \qquad (3)$$

where c_t denotes her old-age consumption and b_t denotes the amount invested in children's education.[3]

The following assumptions characterizes the u and δ functions:

Assumption 1. *The function* $u(.)$ *is a real valued, twice continuously differentiable, homogeneous function defined on* $(0,\infty)$ *such that*

for all $c, b \geq 0,\ u(0) \geq 0;\ u'(.) > 0;\ u''(.) < 0$.

Assumption 2. *The function* $\delta(c)$ *is a real valued, twice continuously differentiable function defined on* $(0,\infty)$ *such that*

for all $c \geq 0,\ \delta(0) = 0;\ \delta'(c) > 0;\ \delta''(c) < 0$.

The above assumptions ensure that the preference function $W(c,b)$ is monotonic and quasi-concave.

2.2.2 Income

The representative individual, when young, earns a wage income y_t. Out of this income she spends b_t amount in children's education, and save and invest the other part, s_t, in the capital market. In the next period she earns an income $(1+r^*)s_t$, which she consumes entirely. Thus her budget constraint is given by

[3] Since people consume only once – in the last period of their life, we can denote the old-age consumption simply by c_t, without specifying any additional subscript or superscript.

$$b_t + \frac{c_t}{(1+r^*)} = y_t \qquad (4)$$

The households maximizes (3) subject to the budget constraint given in (4).

The income of the representative agent of generation t depends on whether she works in the traditional sector or the modern sector. If she works in the traditional sector she earns a fixed wage income $\overline{w}$. If she works in the moderns sector she earns a wage income $w^* h^i$, where h^i denotes the skill level of individual *i*. The individual chooses to work in the traditional sector if $w^* h^i < \overline{w}$. Thus

$$\left.\begin{aligned} y_t^i &= \overline{w} \text{ if } h^i < \frac{\overline{w}}{w^*} = \underline{h} \\ &= w^* h^i \text{ if } h^i \geq \frac{\overline{w}}{w^*} \end{aligned}\right\} \qquad (5)$$

HUMAN CAPITAL FORMATION

Skill or human capital formation is assumed to follow a simple linear technology where the skill level of an individual of generation $t+1$ is a function of the investment expenditure on her education incurred by her parent in the previous period:

$$h_{t+1} = \gamma\, b_t;\ \gamma > 0. \qquad (6)$$

However, there is a finite upper bound $\overline{h}$ to the skill level that can be acquired through investment in education, such that

$$\left.\begin{aligned} h_{t+1} &= \gamma\, b_t \text{ for } b_t \leq \frac{\overline{h}}{\gamma} \\ &= \overline{h} \text{ otherwise.} \end{aligned}\right\} \qquad (7)$$

The skill level of an individual fully determines her income and therefore her decisions as to how much to consume and how much to invest in her children's education. The skill level in turn is a function of the investment made by her parent on her education.

Note that according to our specification, children's human capital formation does not depend directly on the parent's skill level. This is a simplification. The purpose here is to capture the non-linearity in human capital formation of poor vis-à-vis rich households that arises out of parental investment decisions. Incorporating parental skill level in the human capital formation technology directly would only accentuate any such non-linearity.

DISTRIBUTION

Let $f_t(h_t)$ be the distribution of human capital (skill) across agents belonging to generation t. Then

$$\int_0^{\bar{h}} df_t(h_t) = N . \tag{8}$$

The amount of skilled labour employed in any period is given by

$$H_t = \int_{\underline{h}}^{\bar{h}} h_t df_t(h_t) . \tag{9}$$

On the other hand the number of people working in the traditional sector is given by

$$L_t = \int_0^{\underline{h}} df_t(h_t) . \tag{10}$$

3. INTERGENERATIONAL MOBILITY

The intergenerational mobility of the representative household is determined by the human capital formation technology given in (7). Note that the investment in *education* b_t *can be obtained by solving the optimisation problem of the households. From the first order conditions:*

$$\frac{u'(c)+u(b).\delta'(c)}{\delta(c).u'(b)}=\frac{1}{(1+r^*)} \tag{11}$$

$$b+\frac{c}{1+r^*}=y \tag{12}$$

From (11) and (12), the expenditure on children's education can be expressed as a function of the income level y. By implicit function theorem it can be shown that $0<\frac{db}{dy}<1$.

Thus

$$\left.\begin{aligned} b_t &= b(\overline{w}) \text{ if } h_t < \underline{h} \\ &= b(w^* h_t) \text{ if } h_t \geq \underline{h} \end{aligned}\right\} \tag{13}$$

Thus intergenerational mobility is determined by the following dynamic equation:

$$\left.\begin{aligned} h_{t+1} &= \gamma.b(\overline{w}) \text{ if } h_t < \underline{h} \\ &= \gamma.b(w^* h_t) \text{ if } \underline{h} \leq h_t \leq \frac{b^{-1}\left(\frac{\overline{h}}{\gamma}\right)}{w^*} \\ &= \overline{h} \text{ if } b(w^* h_t) > \frac{\overline{h}}{\gamma} \end{aligned}\right\} \tag{14}$$

Lemma 1. *If* $\lim_{h \to 0} \frac{db(w^* h_t)}{dh_t}=0$ *and* $\gamma.b(w^* h_t) > h_t$ *for some* $h_t \in (\underline{h}, \overline{h})$, *then the difference equation* $h_{t+1}=\gamma.b(w^* h_t)$ *will have at least one non-trivial steady state lying* *between* $\underline{h}$ *and* $\overline{h}$ *, which is unstable. This steady state will be unique if* $\frac{db(w^* h_t)}{dh_t}$ *is a monotonic function of* h_t *.*

Proof. Since $b(w^* h_t)$ is continuous in h_t, this can be easily proved from the intermediate value theorem.

Lemma 1 provides a set of sufficient conditions for the existence of multiple equilibria for the complete dynamic system (9) that characterizes the intergenerational mobility of a particular household. Figure 1 below depicts such a scenario.

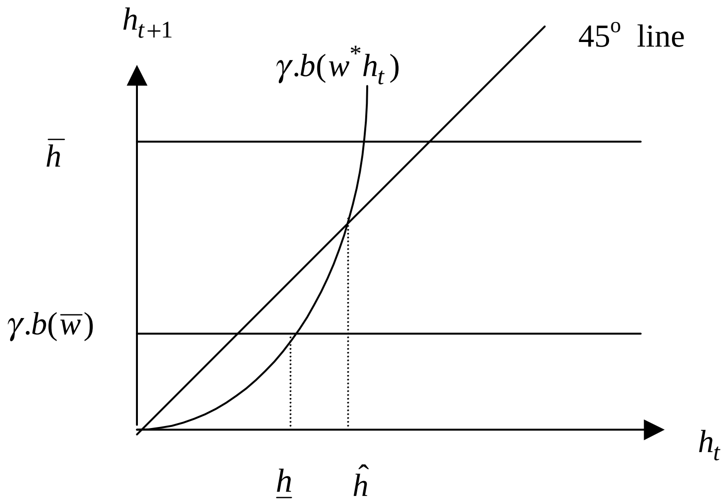

Figure 1

Proposition 1. *If* $\lim_{h \to 0} \frac{db(w^* h_t)}{dh_t} = 0$, $\gamma.b(w^* h_t) > h_t$ *for some* $h_t \in (\underline{h}, \overline{h})$, *and* $\frac{db(w^* h_t)}{dh_t}$ *is a monotonic function of* h_t*, then the dynamic system given in* (14) *is characterized by three non-trivial equilibrium points* $\gamma.b(\overline{w})$, $\hat{h}$, *and* $\overline{h}$ *respectively such that the first and the third one are stable and the middle one is unstable. Thus the dynamic evolution of a household will be governed by either of the following condition:*

$$\lim_{t \to \infty} h_t^i = \gamma.b(\overline{w}) \text{ if } h_0^i \in (0, \hat{h})$$
$$= \overline{h} \text{ if } h_0^i \in (\hat{h}, \overline{h}]$$

Proof. Follows from Figure 1.

From the above proposition it is evident that intergenerational mobility depends crucially on the initial skill level of the young member of the households. All those households which start with an initial skill level lying below the critical value $\hat{h}$ will in the long run end up in the traditional sector earning a lower income than those households which start with a skill level above the critical value and thus ending up in the modern sector in the long run. Interestingly, even if a family works in the modern sector to begin with, it may eventually move to the traditional sector if its initial skill level is not high enough.

In order to convince the reader that the dynamics described in Proposition 1 is indeed a possibility under reasonable assumptions about the utility function, an example might be appropriate here.

Example: Let the utility function of the representative member of generation *t* be

$$W(c,b) = \sqrt{c}\left(1+\sqrt{b}\right) \tag{15}$$

In terms of the general utility function defined in (3), this implies $u(c) = \delta(c) = \sqrt{c}$ and $u(b) = \sqrt{b}$. Obviously these specific forms of the $u(c)$ and the $\delta(c)$ functions satisfy Assumption 1 and Assumption 2 respectively. Maximising (15) subject to the budget constraint of the household given in (4), we get the following set of first order conditions:

$$\sqrt{b}\left(1+\sqrt{b}\right) = \frac{c}{1+r^*} \tag{16}$$

$$b + \frac{c}{(1+r^*)} = y \tag{17}$$

Simplifying, we get a quadratic equation of the form:

$$2\left(\sqrt{b}\right)^2 + \sqrt{b} - y = 0. \tag{18}$$

Ruling out the negative solution for $\sqrt{b}$, we get the optimal expenditure on children's education as:

$$b = \left(\frac{-1 + \sqrt{1+8y}}{4} \right)^2 \tag{19}$$

It is easy to see that $\frac{db}{dy} = \left(1 - \frac{1}{\sqrt{1+8y}} \right) > 0$, with the limiting values given by $\lim_{y \to 0} \frac{db}{dy} = 0$ and $\lim_{y \to \infty} \frac{db}{dy} = 1$. Also $\frac{db^2}{dy^2} > 0$, i.e., $\frac{db}{dy}$ is monotonically increasing in *y*. Thus for a wide range of parameter values the conditions specified in Lemma 1 will be satisfied. From the differential equation $h_{t+1} = \gamma\, b(w^* h_t)$, one can in fact compute the equilibrium skill level as $\hat{h} = \frac{16\gamma}{(4w^*\gamma - 8)^2}$. Thus for parameter values such that $\frac{\overline{w}}{w^*} < \frac{16\gamma}{(4w^*\gamma - 8)^2} < \overline{h}$, the dynamic system will be characterized by three equilibrium points $\gamma.b(\overline{w})$, $\hat{h}$ and $\overline{h}$ such that the first and the last one are stable and the middle one is unstable. Hence the skill level of the agents will converge to either $\gamma.b(\overline{w})$ or $\overline{h}$ in the long run.

4. INCOME DISTRIBUTION AND GROWTH

In the above section we have seen that the long run income level of a household depends crucially on the initial skill level of the young member, which in turn depends on the past investment made by her parent on her education. The income level of the young member on a household converges either to $\overline{w}$ or to $w^*\overline{h}$ depending on whether her ancestors started with an initial skill level lying below or above $\hat{h}$. Therefore, as in Galor and Zeira, in the long run there will be complete polarization of the households with the number of people employed in the traditional sector given by

$$L_\infty = \int_0^{\hat{h}} df_0(h_0^i) \tag{20}$$

It can be easily shown that the average income of the working population in the long run will depend on the initial distribution of skills and therefore on the initial distribution of income. The higher is the proportion of people who have skill level below $\hat{h}$ *to begin with (and therefore have initial income below* $w^{*}\hat{h}$*), the lower is the long run average income. Hence the Galor and Zeira conclusion that distribution and growth are positively correlated is reinstated here – though the dynamics works through a different channel.*

Note that the Galor and Zeira result is replicated here essentially because in both the cases there is complete polarization of income in the long run depending on whether the initial skill level (or as in the Galor-Zeira case, the initial wealth level) lies above or below a critical minimum value. However, in our case this critical value $\hat{h}$ is endogenously determined, whereas in Galor-Zeira it is exogenous – arising due to the assumed indivisibility in human capital investment. Also unlike Galor and Zeira, capital market imperfection plays no role in our model. Poor households can borrow from the market at the same interest rate as the rich households; so it is not a higher cost of borrowing that restricts the investment in human capital formation by the poor households. The poor households simply *choose* to invest less in children's human capital formation because they are more concerned about their own consumption. Educating children is a luxury that the households can ill-afford when poor.

5. PUBLIC EDUCATION SYSTEM

In our analysis so far we have assumed that each parent finances education of her children privately. In this section we discuss the consequence of introducing a public education system which is financed by a proportional income tax.

Suppose the government imposes a proportional income tax at the rate τ on the young members of the households and invests the entire taxed amount on a public education programme. The individual households do not have the option of pursuing an independent private education program.

In every period the young generation of that period vote to decide the tax rate and the tax rate chosen by the majority is accepted by the government. In this case the households' decision-making is a two-step procedure. The young generation first choose the level of consumption that maximises their utility for a given post tax income, treating the expenditure on children's education as given. Since marginal utility from consumption is positive, this would imply that they would save their entire post tax income so as to consume the entire savings with interest in the next period. Thus we can derive the indirect utility function of the households as a function of the tax rate. In the next step they choose the tax rate τ *so as to maximise the indirect utility.*

It follows trivially that when the initial distribution of skill is uniform across the households such that everybody has identical skill level and identical income (which is also the average income of the economy), the tax rate chosen under majority voting will coincide with the proportion of income spent on children's education under the private education regime. Hence the investment in human capital formation per child will be exactly the same under the private and the public education system, and the long run growth path will also be identical. The public education system will generate a different growth path for the economy than the private education system if and only if the initial distribution is not uniform.

If the public education system is introduced at time 0, then the initial expenditure on education is given by

$$E_0 = \tau\left[w^* \int_{\underline{h}}^{\overline{h}} h_0^i df_0(h^i) + \overline{w} \int_0^{\underline{h}} df_0(h^i) \right]. \tag{21}$$

Hence e ducation expenditure per child under public education system is,

$$e_0 = \frac{\tau\left[w^* \int_{\underline{h}}^{\overline{h}} h_0^i df_0(h^i) + \overline{w} \int_0^{\underline{h}} df_0(h^i) \right]}{\int_0^{\overline{h}} df_0(h^i)} = \tau \frac{Y_0}{N}, \tag{22}$$

where $\frac{Y_0}{N}$ is the average income at time 0. Let $\tilde{h}$ denote the human capital formation under the public investment regime. Then,

$$\tilde{h}_1 = \gamma e_0 \tag{23}$$

Thus the income of each household in the next period will be $\tilde{y}_1 = \text{Max}.[w^* \tilde{h}_1, \overline{w}]$, depending on whether $\tilde{h}_1 > \underline{h}$.

One important implication of the public education system is that it removes the difference in the skill level across households from the next period onwards. Thus the first round impact of the public education system would determine the subsequent pattern of development for the entire economy.

It is easy to see that if $\tilde{h}_1 < \hat{h}$, then the economy would not be better off in the long run under public education system. This is so because in the next period all the households will earn an income $\tilde{y}_1 < w^* \hat{h}$ and choose a tax rate such that $e_1 = b(\tilde{y}_1) < b(w^* \hat{h})$. From our analysis in section 3 we know that $\hat{h}$ is an unstable equilibrium. Thus in every subsequent period the skill level, and therefore the income level, of the households will fall until it reaches $\overline{w}$.

The public education system will unambiguously improve the position of the economy in the long run if $\tau > \frac{\hat{h}}{\gamma \frac{Y_0}{N}}$. If the chosen tax rate satisfies this condition then under public education system every household of the economy in the long run will reach the highest possible income level $w^* \overline{h}$. Under private education system on the *other hand only those households with initial skill level above $\hat{h}$ will attain the maximum possible income level. Thus for any initial distribution of skill such that there is at least one household with initial skill level below $\hat{h}$, an economy will attain a higher average income under public education system than under private education system, provided the chosen tax rate is greater than $\frac{\hat{h}}{\gamma \frac{Y_0}{N}}$. The following proposition summarises this result.*

Proposition 2. An economy will be better off in the long run under public education system in the sense that it will attain a higher level of per capita income compared to its initial position if the chosen tax rate is such that $\tau > \frac{\hat{h}}{\gamma \frac{Y_0}{N}}$.
Moreover, under this condition the public education system will perform better than the private education system in terms of long run growth provided there is at least one household in the economy with initial skill level below $\hat{h}$.

Note that the chosen tax rate itself will in general be a function of the initial average income. Thus Proposition 2 in effect imposes a condition on the initial average income and thus on the initial distribution. To see this more clearly, let us consider an example. Let the utility function of the households be given by (15), which is the specific example that we had considered earlier in Section 3. It can be easily shown that in this case the indirect utility function of the household with initial income y_0 is given by

$$\hat{W} = \left[\sqrt{(1+r^*)\,((1-\tau)y_0}\ \right]\left(1+\sqrt{\tau \frac{Y_0}{N}}\right) \tag{24}$$

Maximizing $\hat{W}$ with respect to τ we can derive the optimal tax rate for the household as,

$$\tau = \left\{ \frac{-1+\sqrt{1+8\frac{Y_0}{N}}}{4\sqrt{\frac{Y_0}{N}}} \right\}^2 . \tag{25}$$

The optimal tax rate here is independent of the household's own initial income and will therefore be identical for all households.[4] *Thus from Proposition 2, the economy will be better off in the long run under the public education system if the initial distribution is such that the average income satisfies the following condition:*

$$\left\{ \frac{-1+\sqrt{1+8\frac{Y_0}{N}}}{4\sqrt{\frac{Y_0}{N}}} \right\}^2 > \frac{\hat{h}}{\gamma \frac{Y_0}{N}} . \tag{26}$$

Finally, suppose that the choice of the education system is also endogenous and is determined by majority voting. Even if the public education system performs better than the private education system in terms of long run growth, it will not be the preferred education system if it reduces the welfare of the majority of the population belonging to the young generation. To see under what circumstances the majority will prefer the public education system, let us have a closer look at the utility maximization exercise of a household with initial income y_0. *Under the private education system, the household's utility maximisation problem is given by*

$$\text{Max.}W(c_0, b_0) = u(c_0) + \delta(c_0)u(b_0) \quad \textit{subject to } b_0 + \frac{c_0}{1+r^*} = y_0 . \tag{27}$$

On the other hand, noting that $\tau = \frac{e_0}{Y_0 / N}$, *under the public education system the maximisation exercise of the household can be written as,*

[4] This result is due to the specific form of the utility function assumed here. In general the optimal tax rate for a household will depend on its own income level as well.

$$\text{Max.}\hat{W}(c,e) = u(c_0) + \delta(c_0)u(e_0) \quad \textit{subject to } e_0 \frac{y_0}{Y_0 / N} + \frac{c_0}{1+r^*} = y_0 . \quad (28)$$

The only difference (28) and (29) is in the budget equation. While under private education the price associated with the expenditure on children's education is unity, under the public education system, the price is given by $\frac{y_0}{Y_0 / N}$. *Thus for households with income level below the mean income, the cost of educating children under the public education regime would be lower. Since the utility function is strictly quasi-concave such that the indifference curves are convex, for households with income level below the mean income,* $\hat{W} > W$ *and therefore the public education system will be necessarily welfare improving. Moreover, if initial the distribution of income is positively skewed such the median<mean, public education will be welfare-improving for the majority of the voting population.*

6. CONCLUSION

In this paper we have explained the persistence of income inequality in terms of a model based on limited parental altruism. We have shown that intergenerational mobility of labour across households depends on the initial distribution of income generating abilities, which in turn determines the parent's ability as well as willingness to invest in children's human capital. This gives rise to a non-linearity in the investment expenditure on human capital formation, and in with a constant returns to scale technology in human capital formation, initial low earning ability of the parent may translate into a low earning ability of the subsequent generations as well. A direct consequence of this is a long run polarization of skill levels and income levels. Initial distribution therefore becomes an important determinant of the long run development pattern. Hence a one shot re-distributive policy of the government that aims at reducing inequality by shifting people from the two tail ends towards the middle may enhance the growth performance of an economy.

Given the fact that poor households are less willing to invest in children's education, a public education system that reduces the cost of education for the poor *households at the expense of the richer households may improve the long run growth prospect of the economy. Moreover, if the economy is characterized by extreme inequality, such an education system will be the preferred one, chosen by the majority.*

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