Vincenzo Lombardo

POVERTY, INEQUALITY AND GROWTH

Human capital inequality and social participation in dual societies

Books in Economic Development

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Vincenzo Lombardo
Università degli Studi di Napoli Parthenope
vincenzo.lombardo[at]uniparthenope.it

Indice

Introduction

Since the seventies a great bulk of literature has made great advances on the issues related to the identification of the poor and the aggregation of poverty and inequality measures in tractable and reasonable functional forms. These concepts have produced intense debates among advocates of an absolute view of poverty on a side and those of a relative position on the other one, strictly concerned with the suitability, goodness and validity of either one or other approach. We build upon this debate to analyze the extent to which the persistence of inequality may augment the persistence of poverty, even in growing economies.

The first chapter introduce the literature on dual economy models which adopts a more modern view of dualism integrating the basic features of those models with the advancements made by the new growth theories. By paying specific attention to the role of agents heterogeneity, market imperfections, non-convexities in preference and production structure, we show that the classical conclusions of the dual settings are enriched and often modified by adding more microeconomic structure to the supply and the demand side of the economy. We extends the research showing the sources of the usefulness of the dual economy models in answering questions related to the growth-inequality-poverty linkages and the long-run development of the societies. We show how dual economy environments are suitable to evaluate who benefits, and how much, from economic growth, or yet whether and the extent to which income distribution does matter for shaping the impact of economic growth on individual poverty and hence to proper analyze the theoretical channels driving pro-poor growth.

The second chapter proposes a theory according to which relative poverty may drive

the emergence of development traps, even in the absence of market imperfections. Poverty is defined as lack of or low social participation, which is source of direct benefits as well as indirect gains, whenever consumed over a threshold. We formalize poverty and behavior of poor and rich agents, considering that individuals have different characteristics and economic behavior determined by their specific socio-economic status, such that each of them behave and choose accordingly to their poverty status. We show that in economies starting largely poor inequality traps emerge, while in richer economies convergence towards a unique steady state is reached. The development traps are reinforced by the persistence of inequality as a large mass of people remains relatively disadvantaged and excluded from the benefits of societal participation.

The third chapter presents some pieces of evidence in favor of the positive role that education and income equality have on economic growth. The channels analyzed, however, are not the classical ones, presented in the economic growth literature. In particular, it is shown that, firstly, education and income inequality are striking determinants of social cohesion and, then, that social cohesion is a strongly positive covariate of economic growth. One importantly highlighted feature is the societal level of social cohesion; it is shown that, rather than the individual character also taken into account by the social capital literature, what does matter for economic growth is the broader approach, at societal level, to the interaction between individual features. Moreover, it is yet illustrated that education and income inequality strongly determine this latter; that is, the societal level of social cohesion.

Chapter 1

Poverty and inequality in dual economy models

1.1 Introduction

Dual economy models, or small general equilibrium models with a large agricultural sector, do deserve a powerful role in explaining the connections, if any, between growth, income or wealth distribution and the long-run development of an economy, as process of structural transformations, as well as in the analysis of the individual well-being.

Temple ([2005a](#)) maintains that *"...above all, small-scale general equilibrium models can be used...to shed new light on the origins of pro-poor growth and to explore the role of the informal sector"*. In this chapter, we take seriously up this claim by extending the Temple's research on the microeconomic ground and exploring the new channels offered by a recent literature that may explain how the benefits from growth processes are distributed across the population and the implication for the growth-poverty nexus. We show how the basic dual economy framework may produce new interesting insights on these issues, once integrated with the advances of the branch of the new growth theories, based on the role of non-convexities in production and preferences, and on market imperfections and agents heterogeneity. These models, in turn, may allow to question whether and under what conditions the process of structural transformation of a society is either more inclusive or more exclusive, supplying remarkable insights on the theoretical channels of pro-poor growth.

The traditional dual economy structure is due to the seminal Lewis's work ([1954](#)) which analyzes the long-run development of an economy with two specific sectors, a large agri-

cultural and an industrial or modern one, exploring the path through which a poor economy does convert itself into an industrial one. The agricultural sector is characterized for abundant endowments of labor and land. Given the unlimited labor supply at the subsistence wage, the marginal product of labor in this sector is very low (if not zero or negative), producing an horizontal curve of the marginal product at the level of subsistence wage for a considerable period. On the other side there exists an industrial sector, in which the exogenous wage is institutionally fixed at a level higher than the one in the rural sector; since at subsistence level there is a large excess supply, the "labor surplus", the capitalists in the industrial sector do not have to worry when deciding the amount of workers to employ. Further, it is assumed that only capitalists in the industrial sector do save, while agricultural and urban workers and agricultural landlords do not as they consume their entire budget. Dynamically, this model predicts that over time the marginal product of labor increases as the capital stock increases, while wages in the urban sector remain institutionally fixed until they are equalized to the agricultural ones. At this point - "the turning point" - the economy ceases to be a poor, underdeveloped, economy and looks very like an industrial one. This idea has undergone several critiques. One of the most important deals with the notion of institutional wage in the modern sector and of labor surplus at a subsistence level in the rural sector; this idea has been criticized from the neoclassical school, since this wage is not determined as equilibrium value of a general equilibrium model. Dual economists do maintains that in fact the dual economy assumption is that agricultural wage are related to, but not necessarily equal to, the average product of agricultural workers; this should imply that the supply curve is horizontal only over short periods of time, while being *gently* rising over time (Ranis, 2006).

Most of the attention of this survey is paid to a more recent view of dualism rather than to its traditional approach. Rather than assuming a wage exceeding the marginal product in the rural sector or independent of the labor demand in the modern one, the modern approach to dualism focuses on more commonly labor markets imperfections or on broadly market imperfections which carry over labor markets (for instance human capital market

4

imperfections due to financial markets imperfections which carry over labor markets).

On this ground, the framework of the dual economy models ceases to be consistent only with the characteristics of the developing economies, and it becomes suitable to properly analyze the structural transformation of the developed societies, in which there are large areas of marginalized poor (The Economist, 2007). The relevance of this framework for the interplay of growth and income distribution appears yet evident once considered that the persistence of economic dualism is an important explanatory factor of cross-country differences in inequality (Bourguignon and Morrisson, 1998; Temple, 2005a). Bourguignon and Morrisson (1998) show that even if the relative labor productivity between agricultural and the rest of the economy is not correlated with the rural-urban income gap, the observed effect of economic dualism on income inequality is still very strong. This is an important result since had income inequality been explained only by productivity gap between the sectors, there would have been little room to sustain that dual economies structure are source of income inequality; otherwise, the fact that the effect of economic dualism on income inequality is proved to be still huge when the relative productivity gap effect is isolated does confirm that dual economy models are actually very powerful tools in explaining structural transformation processes and their consequences on individual well-being. Another source of their relevance is that the features of the economic development of a society, which is mainly a transitional process, are better captured by unbalanced models (Baumol, 1967; Kongsamut et al., 2001) than by long-run steady state neoclassical ones, since "...*the stylized apparatus of balanced growth paths might have little to say about many events that are central to this transition*" (Temple, 2005a).

In the second section we review the basic set-up of the dual economy models as formalized by the classic and the neoclassic schools. In the third section we extend on a microeconomic ground these literatures, by reviewing the role of a) agents heterogeneity, b) informal sector, c) human capital and market imperfections, d) the demand side of the economy and the speed of urbanization. In the fourth section we show how this framework is yet useful in the analysis of the growth, inequality and poverty linkages

by reviewing a further theoretical methodology which reveals the usefulness of the dual economy framework to assess the implications of that interplay for the study of pro-poor growth. The last section concludes.

1.2 The basic model and the neoclassical reformulation

One of the most popular reformulation of the Lewis's ideas is due to Harris and Todaro (1970) who study, in a 2-sectors framework, the migration process from a rural to an urban center. In the economy there are L workers, of which L_R are employed in the rural sector and L_M in the urban one, with $L_R + L_M \leq L$ and $L_R, L_M \geq 0$. The urban wage is exogenously fixed at w, due to – for instance – institutional bargaining, while the rural wage, under the assumption of competitive labor market in the rural sector, equals the rural marginal product of labor and is given by w_R. Further, there exists a fixed number of jobs in the urban sector L_M, so that if there are more workers in the urban centers some of them must be unemployed, being trapped in an "unproductive informal sector"; the total labor force (employed plus unemployed) is hence given by $L - L_R$, with an $(L - L_R) - L_M$ unemployed. Let the rate of urban employed be $u = L_M / (L - L_R)$, Harris and Todaro assume that individuals base their migration decision on the expected income obtainable in the urban market, so that it is the rate of urban employment that does equalize the wages in the rural and urban centers

$$w \frac{L_M}{L - L_R} = w_R \tag{1}$$

When the left hand side in (1) is higher than the right hand side, individuals have incentive to migrate and the migration continues until condition in (1) is verified, when the migration equilibrium condition is reached. A famous caveat, the Todaro's paradox, arises from this equilibrium condition; let re-write (1) as

$$L_R = L - \frac{w}{w_R} L_M \tag{2}$$

It follows that

$$\frac{\partial L_R}{\partial L_M} = -\frac{w}{w_R} \qquad (3)$$

Raising the number of urban jobs induces an increment in the migration from the rural to the urban sector by the amount in (3), as the incentives of agricultural workers improve, so that increasing the number of urban jobs implies an increasing in the unemployment in the urban sector - the so-called Todaro's paradox. Ultimately, this result explains why rural-urban migration may persist in the presence of high urban unemployment, inducing either long delay or the impossibility to reach the "turning point" which Lewis did refer to in the development of a society which might be trapped in a dual system. Another important insight stemming from the assumed frictions on the labor market, which produce a fixed exogenously wage rate in the urban centers, is that all the unemployed in the urban sector is not voluntary, or else stated disguised unemployment.

Against this last view, Lucas (2004), based on neoclassical principles, develops a model of urban-rural migration, in which all individuals do perfectly foresee the consequence of their migration. This model describes three empirically recognized facts, namely: a) the process of migration from rural to urban sector continues until the rural one does not disappear, letting the agriculture sector in developed economies being completely integrated in that technological system; b) this process is not instantaneous but it does take long time; c) this process produces, finally, equalization of incomes of the individuals who migrate. The author shows under what conditions, in presence of perfectly competitive structure, those empirical facts may be observed. The economy is inhabited by identically individual families, infinitely living, normalized to one, and endowed with a fixed amount of time, which is divided between working at a wage, which depends on the current skill level, and accumulating human capital; each individual family has preference

$$\int_0^\infty e^{-\rho t} U\left(c\left(t\right)\right) dt \qquad (4)$$

with

$$U(c) = \frac{c^{1-\sigma}}{1-\sigma}$$

This structure is modeled upon a two-sector economy (rural and urban). In the rural sector, the production function is very simple, with human capital having no effect, namely

$$F(x(t)) = Ax(t)^\alpha \tag{5}$$

The farm production $F(x(t))$ is represented by a Cobb-Douglas, with the unique input being the farm employment, $x(t)$. In this economy the competitive equilibrium ensures that the wage equals the marginal product and all its whole value as well as land rents are consumed and not saved; $w = F'(1)$, $c = F(1)$, land rants are given by $F(1) - F'(1)$ and finally $r = \rho$. In the urban centers, production function depends on the accumulated skills as well, so that human capital accumulation is given by

$$\frac{\partial h(t)}{\partial t} = \delta h(t)[1 - u(t)] \tag{6}$$

where the skill level $h(t)$ is reached employing $1 - u(t)$ time to that activity, while $u(t)$ is the time devoted to the goods production. Each family will maximize over $u(t)$ and $h(t)$ such to optimize the stream of profits from its two main activities, production and human capital accumulation, so that the problem of the representative family is stated as

$$max \int_0^\infty \exp\left[-\int_0^t r(s)\,ds\right] h(t)u(t)\,dt \tag{7}$$

$$s.t.\ (6),\ \text{with}\ u(t) \in (0,1)$$

whose solution gives the optimal path for human capital and interest rate as

$$h(t) = \delta \int_t^\infty \exp\left[-\int_t^\tau r(s)\,ds\right] h(\tau)u(\tau)\,d\tau \tag{8}$$

8

$$r\left(t\right)=\delta \qquad\qquad (9)$$

Condition (8) reveals that each family will accumulate human capital up to the point where the benefits – the right hand side – equals the cost opportunity of devoting one unit of time to skill acquisition, instead of employing it in goods production. Solving a similar problem in order to maximize consumption, as given in (4), under a budget constraints, each family find out its optimal path of consumption $c\left(t\right)$. In equilibrium these two choices yield that

$$\frac{1}{c\left(t\right)}\frac{dc\left(t\right)}{dt}=\frac{1}{h\left(t\right)}\frac{dh\left(t\right)}{dt}=\delta\left[1-u\left(t\right)\right]=\frac{\delta-\rho}{\sigma} \qquad\qquad (10)$$

with a constant time employed to goods production given by

$$v=1-\frac{\delta-\rho}{\delta\sigma} \qquad\qquad (11)$$

The migrating decision is based upon the evaluation, over the entire life time, of the earnings accruing in the rural and in the modern sector; while in the rural sector family earnings are given by $F^{'}\left(x\left(t\right)\right)$, in the urban centers they are given in any earlier date τ by

$$h\left(\tau\right)u\left(\tau\right)=h_0\exp\left\{\delta\int_{t}^{\tau}\left[1-u\left(s\right)\right]ds\right\}u\left(\tau\right) \qquad\qquad (12)$$

where new migrants will gain h_0 times the time employed working, with h_0 being the initial conditions for human capital accumulation path. The migration process will stop when equality between the two earning streams is reached such that

$$\int_t^\infty \exp\left[-\delta\left(\tau - t\right)\right] F'\left(x\left(t\right)\right) d\tau =$$

$$h_0 \int_t^\infty \exp\left[-\delta\left(\tau - t\right) \exp\left\{\delta \int_t^\tau \left[1 - u\left(s\right)\right] ds\right\} u\left(\tau\right) d\tau\right] \quad (13)$$

which, given that the right hand side is equal to h_0/δ, can be re-written as

$$F'\left(x\left(t\right)\right) = h_0 \quad (14)$$

The result in (14) implies that in equilibrium the value of farm employment $x\left(t\right)$ is constant and, more importantly, the whole migration process takes place at time $t = 0$. Finally, under goods market clearing condition, a constant labor force employed in both sectors does imply that condition (10) is satisfied for $t \rightarrow \infty$.

In order to overcome the shortcoming, which implies a full migration process at time zero, the model is modified by assuming the presence of an externality in human capital accumulation, which extent depends on a parameter θ, such that its production becomes

$$\frac{\partial h\left(s, t\right)}{\partial t} = \delta \left[\frac{H\left(t\right)}{h\left(s, t\right)}\right]^\theta h\left(s, t\right) \left[1 - u\left(s, t\right)\right] \quad (15)$$

with $H\left(t\right)$ denoting the highest level of human capital that it has been reached in the economy, and $h\left(s, t\right)$ is the human capital level of a person who decides to migrate at time $s \leq t$. Now migration ceases to be instantaneous, while being increasingly attractive, as people who migrate earlier accumulate better and better skills. As in the above formalization, convergence toward the steady state given in (10) is reached along a balanced path. Several conclusions are offered by this specification. Firstly, larger is the externality (i.e. higher θ), faster is the process of migration. Secondly, the time path of this process entails that at time zero there is an initial migration to the city of $1 - x_0$ migrants, which are all immediately employed in the modern sector. These migrants start accumulating human

capital, and once this accumulation does reach a level at which external effects are strong enough to increase the incentives of rural workers to migrate toward city, other flows of migrants come to the city. This process follows until all the rural workers are exhausted in the agricultural sector. Finally, the strongest contribution of this model deals with the Todaro's paradox and the unemployment caused by the migration process. It is shown that higher is the externality, earlier does unemployment start rising, and higher the level it will reach in equilibrium; as people are perfectly aware of the consequences of their migration decision, the unemployment, which Todaro's model implies as a consequence of the increasing number of jobs in the urban sector, is completely voluntary.

1.3 Informal sector, human capital and social interactions

Based on the Harris and Todaro model, several extensions have been proposed in the literature. In this section, we will review them with particular attention at the role of the urban informal sector and at the implications of the insights furnished by the new growth theories literature on market imperfections and agents heterogeneity. Relevant consideration is attached to the role played by the human capital accumulation for the interplay between growth and inequality and for its effect on individual well-being. As pointed out by several authors (among others Rauch, 1993; Temple, 2005b) a distinguishing and surprising feature of the basic Harris and Todaro analysis is that no insights are offered with regard to the effect of dualism on inequality, even if the aim of that work is to investigate the structural process leading an underdeveloped economy toward a developed one; more specifically, the basic Harris and Todaro formalization appears to produce no inequality within the urban sector and between this and the rural one.

1.3.1 Agents heterogeneity and endogenous unemployment rate

One of the main questioned points of the original dual economy models is the hypothesis of downward rigidity of the urban wage, which does carry over the exogenously fixed un-

employment rate assumption. In order to overcome this weakness, Bencivenga and Smith (1997) offer a neoclassical growth model to study the migration process from a rural to a modern sector, with an informal sector and heterogeneous agents. They replace the frictions on labor markets with the hypothesis of agents heterogeneity. Instead of assuming downward wage rigidity in the urban labor market they assume that agent heterogeneity is the source of asymmetric information problems; agents differ for their skill levels and this, in turn, produces the information asymmetry, under the required assumption that the type of the agent is private information. Ultimately, it is this latter feature that allows them to endogenize the unemployment rate rather than assuming it exogenously. The model resembles the basic Harris and Todaro structure, with the unemployment rate in the formal sector being a positive function of the wage rate in that sector (i.e. the Todaro's paradox); yet seemingly, this unemployment rate balances the expected incomes that low skilled agents obtain in the urban and rural sectors. As both the wage rate and the unemployment rate in the urban sector are now endogenous, the model is evaluated also to assess whether it is dynamically consistent. It results that either one or two nontrivial steady-state equilibria may arise; in the case of unique steady state, this is also asymptotically stable, while in the case of two steady-states equilibria usual "trap" phenomena are manifest. In this latter case, an high capital stock asymptotically stable equilibrium is coupled with a low capital stock equilibrium, which may be asymptotically either stable or unstable, displaying, in the former case, strong fluctuations, which derive from the adjustment nature of the endogenous unemployment rate. Underemployment makes the rural-urban wage differential varies over time until equalization is reached through the presence of unemployed workers in the urban sector. While in the benchmark model *a là* Harris and Todaro this process toward wage equalization follows a monotonic path, in this endogenous framework it is well likely that intervals of high growth and intensive migration are followed by low ones with migration slowdown or yet back-migration toward rural sectors. This may happen since high capital/labor ratios in the urban formal sector imply high average income levels and, in turn, high levels of savings and future ag-

gregate capital stock; however, if the high average incomes in the city increase excessively the incentives of rural workers to migrate there, the capital/labor ratio may fall in successive periods, producing the non-monotonic path, which is ultimately the likely source of multiple equilibria.

1.3.2 The informal sector

In the original Lewis ideas as well as in its later formalizations, the urban informal sector is proposed as an unproductive one which would only serve as source of a seemingly "reserve army of labor" of Marxian memory. Further advances in theoretical and empirical literature highlight, instead, that a productive informal sector couples the formal one in urban centers. This issue is accurately analyzed in Rauch (1993), where the implications for inequality patterns of introducing an urban informal sector in the Harris and Todaro model are studied in a small open overlapping generation economy with three sectors; an urban formal, an urban informal and a rural sector. Correspondingly, three different and productive wage classes do emerge; the rural, the urban formal and the urban informal workers. Given the perfectly competitive structure of the capital markets, this formalization yields interesting results about permanent income inequality, which is evaluated as an intergenerational transmission process of current wage income inequality. More formally, let the two budget constraints for young and old people be

$$p_{at} c_{at}^y + c_{mt}^y + s_t = w_t \tag{16}$$

$$p_{at+1}^o c_{at+1}^o + c_{mt+1}^o = (1 + r_{t+1}) s_t \tag{17}$$

The wage w_t earned when young is shared between consumption of agricultural, c_{at}^y, and manufactured goods c_{mt}^y, with the latter being the numeraire, and savings s_t; when retired the old agent shares savings accumulated in the previous period between agricultural, c_{at+1}^o, and manufactured goods c_{mt+1}^o. Each risk-averse individual maximizes its

own lifetime utility under these two budget constraints, yielding an indirect utility function $v\left(w_t, r_{t+1}, p_{at}, p_{at+1}\right)$, on which also savings $s\left(w_t, r_{t+1}, p_{at}, p_{at+1}\right)$ depend. Production is assumed to be performed under constant return to scale conditions, so that

$$Q_{mt} = F_m\left(K_t, N_{mt}\right)$$

and

$$Q_{at} = F_a\left(L, N_{at}\right)$$

may be re-written in their intensive forms as

$$q_{mt} = \frac{Q_{mt}}{N_{mt}} = f_m\left(K_t/N_{mt}\right) \tag{18}$$

and

$$q_{at} = \frac{Q_{at}}{N_{at}} = f_a\left(L, N_{at}\right) \tag{19}$$

with the neoclassical properties satisfied. Production in the modern sector (Q_{mt}) employs both capital K and workers N_m, while in the rural sector only land L and workers N_a are employed in the production (Q_{at}).

Two cases are distinguished depending on the relevance of the agricultural sector in the economy. When it is very large with respect to the urban one, a labor surplus makes the urban minimum wage to be binding at a level determined by the unique capital-labour ratio k, so that the urban minimum wage is given by

$$\overline{w}_m = f_m - \overline{k}f'_m \tag{20}$$

and the interest rate by

$$f'_m\left(\overline{k}\right) = \overline{r} \tag{21}$$

This situation is opposed to the one when the informal sector disappears because the economy has fully completed its development path, so that $N_{at} = 1 - N_{mt}$, and the wage

14

rate is determined by equality with respect to its marginal product. The informal sector is characterized for a capital intensity lower than in the formal sector; it is, further, assumed that the informal sector produces a manufactured good without employing capital, but only labor. Let $\underline{w}$ be the wage in the informal sector, so that $\underline{w} \leq \overline{w}_m$; in equilibrium given diminishing return to labor and given that the capital-labour ratio increases over time due to the migration process, it must be the case that $w_{at} \geq \underline{w}$, so that no limits are imposed to the individual possibility to reach the urban centers and installing an informal activity, which does require any capital investment. In order to avoid that at time zero no one would have incentive to migrate, it is assumed that when all the population is in the agricultural sector $w_a(1) \leq \underline{w}$. Similarly to the original Harris and Todaro, the exogenous probability of getting a job in the formal sector is given by $N_{mt} / (1 - N_{at})$ so that the probability to end up underemployed in the informal sector is given by

$$1 - \left[\frac{N_{mt}}{1 - N_{at}} \right] = \frac{(1 - N_{at} - N_{mt})}{1 - N_{at}} \tag{22}$$

The migration decision is based upon the evaluation of the relative benefits of migrating or not; in the initial phases of development, when the urban minimum wage is largely binding a young agent will face with

$$v(w_{at}, r_{t+1}) = \left[\frac{N_{mt}}{1 - N_{at}} \right] v(\overline{w}_m, r_{t+1}) + \left[\frac{1 - N_{at} - N_{mt}}{1 - N_{at}} \right] v(\underline{w}, r_{t+1}) \tag{23}$$

and since also the interest rate is fixed at $\overline{r}$ during this earlier stage, (23) yields

$$v_a = \left[\frac{N_m}{1 - N_a} \right] \overline{v} + \left[\frac{1 - N_a - N_m}{1 - N_a} \right] \underline{v} \tag{24}$$

with $v_a = v(w_a, \overline{r})$, $\overline{v} = (\overline{w}_m, \overline{r})$ and $\underline{v} = (\underline{w}, \overline{r})$. Otherwise, in mature stages, when the urban wage is no longer binding, $N_{at} + N_{mt} = 1$. On this structure, it is proved that a) the agricultural sector share of labor decreases monotonically along a growth path, b) the economy exhibits the Todaro's paradox only under some conditions, and in particular it

does not when the labor share in the urban formal sector is large enough. Yet under some specific conditions it is shown that the unemployment rate follow an inverted-U pattern as well as the log-variance of permanent income.

In order to deepen the intrinsic features of the informal sector, Banerjee and Newman (1998) study the implications of community effects for the pattern of migration and for the long-run relationship between development and income distribution. In a standard dual economy with two sectors, rural and modern, different degrees of information asymmetry are introduced such to discriminate between those sectors, depending on the degree of societal cooperation; the rural sector is distinguished by the urban one for its lower level of information asymmetry due to stronger community linkages. The higher quality of information of the rural sector, which implies a credit ration thresholds lower than the one attached to the urban sector, is shown to strikingly shape the migration pattern and the relationship between inequality and development. The other difference between the two sectors is the higher productivity of the urban sector with respect to the rural one. The economy is inhabited by a continuous of agents, the typical of them living for one period, and beginning his life endowed with an amount a of wealth and one unit of labor. This unit of labor is indivisibly used either in the rural or in the urban sector; given the productivity advantage of the latter, it results that an individual who earn w in the rural areas can earn λw in the urban centers, with $\lambda > 1$. At the beginning of his life, the agent makes a location choice between the two sectors, which does not involve any costs; labor as well as capital are freely mobile. Agents have to choose how much investing in human capital, which entails a cost m such that utility is given by

$$U = y + u \tag{25}$$

with

$$u = \begin{cases} s > 0, & \text{if } m > 0 \\ 0, & \text{otherwise} \end{cases}$$

16

In a first-best world, without any information asymmetry such that each individual might borrow and lend at market rate r, everyone would eventually migrate to the city earning an utility

$$U = \lambda w + s - (a - m) r \tag{26}$$

In presence of market imperfections of the type described above, instead, borrowers and lenders will face on with two incentive compatible constraints; one ex-ante and one ex-post the realization of the borrower income. More precisely, after obtaining a loan but before the income realization of that loan – i.e. before human capital investment reward is verified – the borrower may escape with a probability ρ, while, if caught, he is punished with his consumption reduced to zero. Since lenders know this probability, and moreover they know that an individual who tries to escape may obtain at maximum $\rho\lambda w$, while in case he decides to respect the contract he can obtain $w - (m - a) r$ (or in the city $\lambda w - (m - a) r$), the ex-ante incentive compatible constraint for not reneging is

$$\rho\lambda w = w - (m - a) r \text{ (or } \lambda w - (m - a) r)$$

which does establish the minimum wealth needed to be ex-ante eligible for a loan, depending on the location; the minimum amount of wealth required as collateral to an individual who is born in the rural sector and agrees to not escaping the contract by staying in the village is

$$a \geq a_A^V \equiv m - \frac{((1 - \rho\lambda) w)}{r} \tag{27}$$

while the same amount for an individual who is born in the village but has agreed to stay in the city is

$$a \geq a_A^C \equiv m - \frac{((1 - \rho) \lambda w)}{r} \tag{28}$$

Similarly, ex-post incentive compatible constraints arise after the realization of the in-

17

come borrower, when time of repaying the loans arrives; in this case there is a positive probability π that the borrower achieves in escaping the repayment, while otherwise the same punishment is applied. As lenders know also this probability, they require a collateral, which respects the possibility that the borrower will renege on loan repayment; hence, the minimum amount of wealth needed for the lenders to be insured is

$$a \geq a_P \equiv m - \frac{((1 - \pi)\, y)}{r} \tag{29}$$

The necessary amount of initial wealth required for qualifying for loans is $a \geq a_l = \max\left\{a_P, a_A^l\right\}$, with $l = V, C$; this wealth level is a positive function of the interest rate, of the probabilities of escaping and reneging on loan repayment, and a negative function of the income level. These two conditions show a first result; namely, the wealthiest, the most productive, and possibly the poorest and least productive are the individuals who have the highest incentive to migrate toward the urban centers. The rich migrate since they are not constrained, the most productive as they have much to gain, and the poorest and least productive, as they have nothing to lose[1]. As the rate of interest is associated to these wealth levels, an important caveat arises. Conditions (27) to (29) imply that the interest rate is higher in the rural sectors; even though it is apparently a strange result, since the capital markets works relatively well in the rural areas, due to the higher level of social capital, this result may be ascribed to self-selection dynamics active in the urban centers. Since who migrates to city is either the wealthiest or the poorest, lenders know that who asks for a loans must furnish the collateral, and since only the former can afford this collateral, because the poorer does not own that amount, so lenders know also the distribution of the risk which the lending activity entails and the distribution of these agents; given that only good borrowers will ask for a loan in the city, lenders are able to charge a lower interest rate there. This feature leads to an important second result; more people will move to the modern sector when the interest rate is either very low or very high. These results

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[1] See also Banerjee (2000) who analyzes poverty essentially in two distinct views; "poverty as desperation" and "poverty as vulnerability". Different implications of binding constraints apply, depending on which view of poverty we refer to.

stem from the assumed differences in "social capital" between the two sectors. In order to characterize them formally, it is assumed that for loans originating in the rural areas and directed to people born there and that decide to remain there even after the loans, the condition $\rho = \pi = 0$ applies; that is, it is very difficult both to escape and reneging on loans repayment in very cooperative habitats, where the social controls and punishments are very strong. In this case, the threshold level of wealth needed for obtaining a loan is given by

$$a = a_V \equiv m - \frac{w}{r} \tag{30}$$

Otherwise, in the urban centers the probability π of reneging on loans repayment is large enough that the condition $\lambda(1 - \pi) < 1$ holds; moreover, the ex-ante probability of escaping is either positive and equal to π or equal to zero, depending respectively on whether loans are originating in the urban or rural areas. The minimum wealth level for an individual who locates in the city at any time of his life is given by

$$a = a_C(w, r) = m - \frac{(1 - \pi)\lambda w}{r} \tag{31}$$

with $a_C > a_V$.

In equilibrium, three classes of people migrate from rural to urban sector; firstly, the richest, for whom

$$a \geq a_C(w, r) \tag{32}$$

These migrate as they increase their payoff; while in the rural areas they can gain $w - mr + ar$, they will earn $\lambda w - mr + ar$ in the urban centers, so that they surely migrate. Secondly, the poorest migrate because they have nothing to lose; and for them the following condition is verified

19

$$a < a_V(w, r) \tag{33}$$

Finally, individuals with wealth $a \in [a_V, a_C]$ will migrate if and only if for them $\lambda w - s + ar \geq w - mr + ar$, that is only if the interest rate is higher than a threshold level

$$r \geq \frac{s}{m} - \frac{(\lambda - 1)w}{m} \equiv \hat{r}(w) \tag{34}$$

As in Mude et al. (2007, see below) information asymmetry due to community effects lead to underinvestment in the rural sector, here information advantage of that areas may lead to inefficient undermigration and undermigration traps both in the static and in the dynamic equilibrium. In the static equilibrium, undermigration or inefficient migration is associated with the possibility that some agent is trapped in the rural sector. This case may arise whenever the equilibrium interest rate is not higher than $\hat{r}$; since the lowest level of the interest rate is 1, as its range is given by $r \in [1, s/m]$, the condition of inefficient migration derives from:

$$1 \leq \frac{s}{m} - \frac{(\lambda - 1)w}{m} \tag{35}$$

from which the condition for observing undermigration is given by

$$(s - m) \geq (\lambda - 1)w \tag{36}$$

Higher is the productivity gap between the two sectors, higher is the possibility that everyone chooses to migrate, because the chance to gain a lot is high enough to let people assume the risk of incurring the cost of not obtaining the loans in the city. This leads to the last result of the static equilibrium, following which that inefficiency is coupled with a global inefficiency; in equilibrium the social surplus is lower than the maximum attainable, had the entire resources of society been fully used. When capital markets are complete and perfectly working the interest rate attains its maximum level at $\bar{r} = s/m$, which implies

20

also that the surplus, defined as total output plus the net value of all youthful consumption, attains its maximum at

$$\overline{Y} = \lambda w + \left(\frac{s}{m} - 1\right)\overline{a} \tag{37}$$

where $\overline{a}$ is the aggregate supply of loans. If the equilibrium interest rate r^* is such that $r^* \equiv r^{h*} \geq \hat{r}$, everyone migrates to the modern sector so that national income is given by

$$Y^{h*} = \lambda w + \left(r^{h*} - 1\right)\overline{a} \tag{38}$$

which is high but less than $\overline{Y}$, since the interest rate is yet lower than s/m, that is $r^{h*} < \overline{r} = s/m$. If the equilibrium interest rate is lower than that threshold level, that is $r^* \equiv r^{l*} \leq \hat{r}$, not everyone migrates, but the migration decision will depend upon the initial wealth level; in particular, agents born in the traditional sector with initial wealth level between a_V and a_C, that is for $a \in [a_V, a_C]$, do not migrate. Let $R^C(a)$ and $R^V(a)$ be the distribution functions of the inherited wealth respectively in the urban and rural sector at the birth date of the generation; $R^C(a)$ and $R^V(a)$ represent the share of population born in the urban and rural sector with wealth $a_i < a$. For $r^* \equiv r^{l*} \leq \hat{r}$, national income is $Y^{l*} < Y^{h*}$ and given by

$$Y^{l*} = \left\{1 - p\left(r^{l*}\right)\right\}\lambda w + p\left(r^{h*}\right)w + \left(r^{l*} - 1\right)\overline{a} \tag{39}$$

where $p\left(r^{l*}\right) \equiv R^V\left(a_C\left(r^{l*}\right)\right) - R^V\left(a_V\left(r^{l*}\right)\right)$. From (32) to (34) it follows that the share of population born in the rural sector, who holds, at the interest rate r^{l*}, a wealth level higher than the required in the city for qualifying for a loan, $a_C\left(r^{l*}\right)$, and the share of that population who, otherwise, holds an initial wealth lower than $a_V\left(r^{l*}\right)$ will migrate to the city earning an income λw, while the rest will remain in the rural sector earning the income w. This is the dual character of this economy; in this last equilibrium those individuals who do not migrate are better off than they would have been in the urban sector, since they are

21

able to get loans which they would have not got in the city. However, the national income is lower, as had they been forcibly moved to the urban sector, the aggregate output would have been higher. Although membership in the rural sector helps those disadvantaged, it entails a cost for the society, in terms of lower aggregate output. In any case, even if the poor were forced to move to the city, a Pareto improvement would be not possible, since lenders would face on with a loss, necessary to compensate the increased benefits of the urban poor. This conclusion resembles the long-established one obtained by Stiglitz (1969) in a different theoretical environment; societies with a large share of very poor people would ultimately converge, if any, toward a low steady state equilibrium. Finally, it is worthwhile to notice that the degree of undermigration depends not only upon the first moment of the wealth distribution, but also on its higher moments; it is the whole wealth distributions within the two sectors that works as state variable and determines how many people migrate in equilibrium. On the former side, it may likely be an actual issue only if the rural economy has an aggregate wealth sufficiently high, such that a lot of poor individuals had something to lose in migrating. On the latter side, the degree of undermigration depends also on the variance and skewness of the wealth distribution; for instance, undermigration or "dual traps" are more likely to be observed if the distribution is quite unequal and the mean is reasonably high, so that $R^V\left(a_C\left(\hat{r}\right)\right)$ is likely to be large. Coupling this condition with the ones stated above, it is easily explainable why "dual traps" may be observed not only in developing countries, but also in developed ones, as, for instance, in the case of Italy or more generally in the case of middle-high income countries with strong degrees of inequality; these are situations in which poverty does persist over time because backward areas, due to a highly uneven distribution, may not be able to reach the famous Lewis "turning point". The equilibrium is analyzed also dynamically to assess whether the undermigration is an actual possibility also in the very long-run and to evaluate the implications of the interplay between growth and inequality on the development process. The dynamics are very complex. On a side the rate of growth depends on the extent to which people achieve to pass on into the urban sector and then on the institutional dif-

ferences between the sectors; conversely, in the long run, these institutional differences contribute to shape the economic growth pattern. Despite these difficulties, it is shown that, for instance, even if under some specific parameterizations of the model Kuznets patterns are possible, it may very likely be the case that U-shaped patterns are observed, with inequality rising during the development process.

1.3.3   Human capital

Large parts of the new growth theories literature have shown that heterogeneity in skill levels (Alesina and Rodrik, 1994; Benabou, 1996c; Glomm and Ravikumar, 1992), constraints on human capital accumulation (Galor and Moav, 2004, 2006; Galor and Tsiddon, 1997a) and capital markets imperfections (Galor and Zeira, 1993) are able to explain the sources of the growth-inequality correlation and are powerful predictors of adverse effects on individual poverty (Durlauf, 1996; Azariadis, 1996). Masson (2001) applies these issues in a dual economy model, where heterogeneous individuals internalize the cost of acquisition of the skills that are required and may be used in the formal urban sector. Individuals are distinct on the basis of differences in innate abilities and in initially inherited wealth, which is the only source for investing in human capital. Human capital acquisition is necessary for working in the formal urban sector at an institutionally fixed wage above the market clearing condition, while a large share of the population – the poor – may be blocked in passing into the formal urban sector due to capital market imperfections which are modeled assuming that people are not able to borrow any amount of wealth. Acquiring necessary skills to be employed at higher wage in the formal sector involves a cost, which take the form of an indivisible investment in human capital accumulation and of an opportunity cost for the family of children who would be, otherwise, employed in farm or informal income generating activities. Individuals take their migration decision depending on its implied benefits so that in equilibrium the rate of unemployment equalizes rural wage to urban expected income; the expected income streams of the urban sector take into account those costs such that the urban wage necessary for equilibrium must exceed the

rural one not only to reflect the probability of unemployment but also the costs of skill acquisition. People in the urban sector, were they migrants from rural sector or people born in the formal one, face on with the chance of back-migration to the agricultural region, which entails a cost as well. Under this formalization wealth distribution plays an important role in determining the sort of several dynasties; rural as well as urban poverty may arise as consequence of an initial wealth level low enough to impede poor people to acquire the necessary skills to enter the formal sector. Migration option is chosen only by the wealthier and the higher ability individuals, while the poorer and the lower skilled, who would require a larger investment in human capital, decide to remain in the rural regions. Several possible steady-states may arise, depending on whether the wealth level of urban unskilled individuals is higher or lower than the cost of accumulating human capital and depending on the extent of the back-migrating costs. The dynamics, as in Banerjee and Newman (1993), are very complex due to the connection between wealth distribution, aggregate unemployment and agricultural wage; as these two latter affect individual migration decision and yet wealth accumulation, the dynamical process is described by a non-stationary Markov process, which solution is left to different parameterizations.

The presence of an informal sector may affect educational attainments also through community or neighborhood effects, which may shed many lights on the intergenerational transmission of inequality (Benabou, 1996b; Durlauf, 2004). Mude et al. (2007) supply a dual economy model with an informal finance sector which, since the presence of imperfections on capital markets due to enforceability problems, must restore the financing gap between poor and rich, task which would be otherwise accomplished by perfectly competitive markets. Community or neighborhood effects may be essential for the chance to escape the poverty condition; however, social stratifications are the source of asymmetrical information problems which drive financial markets toward enforceability issues as well. In the literature it is quite well recognized a distinguishing feature of the traditional or rural sectors with respect to the more developed ones; the former are built on close associations of its members, such to create cooperative habitats, as it is the case of informal

provision of financial services; otherwise, in the urban centers deeply characterized by impersonal relationships among its members, such mutual aid element is ignored. Hence, while acquiring information on the goodness of the borrowers is relatively cheap in rural-traditional society, lenders face on with higher costs in the urban centers (see section 3.2 above); moreover, while in the former centers, escaping or reneging on contracts is more difficult, since the presence of social sanctions makes punishments to be more credible and enforceable, in urban centers the high probability that the borrowers might escape or reneging on the loan debt let the lenders to charge higher costs for lending. Under these conditions, migration options may influence educational attainments as well as be affected by spatial differences on educational returns; if educational attainments, which may depend on cooperation among community members, can influence migration decision, this latter is also affected by the former, because lenders in traditional sector will take into account the cost associated to the possibility that an individual, once financed, will migrate to the city, so to induce an increase in the costs to let the contract be strongly enforceable. In this latter case also informal financing market equilibria will depend on educational returns, and not only the reverse; so whether an increase in wage premia in the city is positively correlated to migration incentives in the rural sectors, these latter also amplify the problems of the financing sector, resulting in the likely underinvestment in rural education. Contrary to the Bencivenga and Smith (1997) results, now rural high-ability individuals may end up penalized for being born intelligent. On a side high innate abilities stimulate migration choices, but, on the other, this higher incentive is conflictingly evaluated from the lenders; more precisely, once lenders recognize that highly skilled individuals will migrate to the city in order to exploit the urban wage premia, the wealth constraints of the rural individual will be strongly tied, due to the higher probability of escaping or reneging on the debt, with a corresponding reduction on educational loans. As a result of the negative correlation between educational loans and innate skills, community-funded schemes ceases to be efficient and must be replaced with individual funding; highly skilled children will depend only or mainly on the initially wealth con-

ditions of their own families for investment in human capital, reproducing the familiar conclusions of the new growth theories. Rich households, independently on the degree of enforceability of the loan contracts and on the innate abilities of their children, will be able to afford their children required investment in human capital; otherwise, poor households will be hardly constrained in supplying the necessary investment in human capital to their children, even though these may own high innate abilities. In turn, this circumstance produces two apparently negative effects on the whole society. On a side, persistent inequality and poverty may be infinitely reproduced, because of the inherently asymmetry between family-funded and community-funded schemes; while families would prefer their children migrating to the city in order to escape poverty, but they are constrained, community-funded schemes predict, on the contrary, that those migration choices are limited, as consequence of the enforceability issues. A direct caveat of this circumstance is that inefficient allocation of educational funds may arise; under the hypothesis of no correlation of innate abilities and family wealth, it is well likely to be that some of the highly skilled children will not obtain their optimal educational level, because of their household low wealth, while, otherwise, some of the low skilled individuals may obtain their fully optimal level, due to the higher financial possibilities of their families. These asymmetries carry over aggregate inefficiencies as well, since poverty may persist over time also because of the adverse effects on the aggregate production of the society. This result couples the ones obtained in Benabou (1996b) and Durlauf (1996), where strong stratification of societies with respect to the productivity or to the income dimension may drive to severely negative consequence for inequality and poverty reduction.

1.3.4 Speed of urbanization and occupational choice

The dynamics and the speed of the urbanization process in dual economy settings have been analyzed by studying the implications of the occupational choice mechanisms (Banerjee and Newman, 1993; Rapaport, 2002; Mesnard, 2001) and by emphasizing the role of the demand side of the economy (Yuki, 2007). Economic growth affects both the extent of ur-

ban concentration and the speed at which this does occur; on the former side, the level of urban concentration is positively related to income's level, while on the latter the speed of urbanization follows an inverted-U pattern, initially increasing for low level of income and then decreasing after reaching its maximum when incomes are grown enough. The speed at which this process occurs does not only depend upon income growth, but also on the institutional structure of the society; the presence of an informal sector may imply that higher its extent, higher the chance that a large share of immigrants does not benefit from economic growth. Ravallion (2002) in a very simplified model identifies the conditions under which the poor urbanize faster than the non-poor, showing that the urban share of the poor is an increasing convex function of the urban share of the population. These issues are formally marked by Yuki (Yuki, 2007) in a dual economy model with a productive informal sector; each of the three sectors produces a different good. The goods differ each other for the degree of technological intensity incorporated in their production; the rural sector produces an agricultural tradable good with a diminishing return to scale technology, the urban informal sector produces a non-tradable good (i.e. services) with a constant return scale technology, while the urban formal sector, the more technologically advanced, produces a tradable good always under constant return to scale technology. The choices of a continuum of individuals are structured in a discrete overlapping generation model, in which individuals live for two periods; in the first, when young, they receive transfers in the form of bequests from their parents to be invested either in financial asset or in education which is necessary for acquiring the needed skills to work in the higher wage-urban formal sector. When adult, each agent makes his occupational choice, depending on this accumulated human capital. In the dynamic equilibrium, it is proved that two possible steady states may exist; an equal and unequal opportunity steady states – as the author refers to. In the former, which broadly characterizes a typical developed economy, many people are educated and skilled, much of them live in the urban centers, and inequality between urban and rural areas is small. In the other equilibrium, the unequal one, which otherwise characterizes a typical developing economy, many people live in the agricul-

tural sector, with a low level of education and skills even amongst the urban resident, with a substantial informal sector and high level of inequalities. The economy approaches one these two states in the long-run, the key determinant eventually being the initial share of the population who is wealthy enough to acquire education. An economy starting with a large fraction of poor will converge towards the unequal opportunity steady state, and during the balanced path it urbanizes without modernization but with the expansion of the informal sector, and increasing both urban and rural poverty and inequality. Conversely, economies starting relatively richer such to accumulate less financial assets and more human capital in the initial phases of the development will converge to the "higher" steady state, producing during the path a marked falling in inequality. Although this result resembles much of the conclusions obtained in the literature, it is worthwhile to spend some words on the channels through which it is obtained. The reason for why, in this model, the key determinant of the long-run outcome is the share of initial "poor", or better the share of people who can afford educational expenditures, and consequently the wealth distribution, is related to the role of the demand for informal goods. The way in which the economy may end up over the high path is by increasing the number of skilled workers in the formal sector; in turn this depends upon the possibility of the unskilled agents, who are endowed at time zero with low or zero amount of wealth, to accumulate enough wealth to be bequeathed for their children educational investment. This accumulation rate does rise when and whether this class of people achieves to migrate into the informal urban sector, where they can earn a higher wage, as they cannot aspire to the formal sector for lacking of the required educational skills. This migration, in turn, is possible if the price of the good they produce goes up in the formal urban sector, that is if the demand for that good increases. Since an initially greater number of skilled individuals may sustains this price both because higher is the demand and lower the supply, as skilled workers produces another class of goods, the conclusion is confirmed; the key variable for establishing the destiny of a society is the initial proportion of poor. If the economy starts relatively poor, since either wealth is strongly uneven distributed over few rich or the limited amount of

wealth is distributed over an high number of poor, skilled labor is insufficient to sustain a high enough price of the informal sector good such to allow unskilled people to migrate to the informal sector; their children will not be able to obtain education and the economy will develop on a path, with sustained inequality, persistent poverty and strong marginalization. Otherwise if the society starts relatively richer or starts with a more egalitarian wealth distribution.

1.4 Growth, inequality and poverty in dual settings

In this last section we review a methodology which makes more explicit the usefulness of the dual economy models in the analysis of the linkages between growth, income distribution and poverty and we will show how these theoretical tools may work in practice in the assessment of the pro-poor growth.

In a dual economy model Bourguignon (1990) introduces the use of the whole Lorenz curve to assess whether and under what conditions economic growth is either unambiguously or not conducive for an egalitarian distribution, and how these conditions matter for assessing the pro-poor character of the economic growth (see also chap. 15 in Bardhan and Udry, 1999; Temple, 2005b). The relevance of this approach stems from the fact that although two-sector models are theoretically able to represent the famous inverted-U pattern of development (Kuznets, 1955), they may experience two pitfalls, which derive from using parametric or standard measure of inequality and from assuming that internal terms of trade does not matter. On a former side, it is likely to be that even though a growing proportion of individuals become richer, due to the migration process from a rural to a modern sector, the Lorenz curve of the income distribution does not shift accordingly over its whole support. It may very likely be that despite the fact that the number of poor actually diminishes, the remaining poor becomes relatively poorer with respect to the mean income. In this case standard measures of inequality may represent conflicting views according to which inequality might be either increasing or decreasing, without any

certainty. On the other side, Bourguignon (1990) stresses that the basic two-sector models with exogenous prices do not take into account a fundamental feature of development, namely the change in the internal terms of trade; as also shown above in Yuki (2007), this variable may strikingly matter for the potential of the unskilled workers to enter the urban sector and hence an upward path of increasing income and decreasing poverty. These issues are analyzed in a dual economy model, in which a capitalist class is added in the urban sector to evaluate the patterns of inequality within the sectors as well as between them. A rural sector, whose population is employed only in their family farm production, is coupled with an urban one, composed by capitalists and employed workers. Workers are hired from the capitalists for the production undertaken in the urban centers and the former have a wage lower than the profits made by the latter but higher than their opportunity income in the farm production. Under this specification, necessary and sufficient conditions for the growth process to be unambiguously either unequal or egalitarian are found out; yet, necessary and sufficient conditions for growth to increase or decrease relative poverty are put forward. Notwithstanding the complexity of these conditions, it is worthwhile to stress here that they mainly depends on the relative extents of the price elasticities of the goods produced in the three sectors, and on the extents of the relative shares in GDP of the three sectors. For growth to be unambiguously egalitarian, or more specifically to observe a completely upward movement in the Lorenz curve, it is required that the share of the traditional sector in GDP does increase with growth; given that historically this pattern is not observed, it is difficult to sustain that growth may produce an unambiguous decrease in inequality. It is also stressed that this result is very sensitive to the assumption that the wage rate in the urban sector is only indexed on the price of the modern good; if, conversely, it is assumed that this wage may depend also on the price of basic agricultural goods, then a different conclusion applies. It is found that growth might be egalitarian, despite the fall in the GDP-share of the rural sector, whenever capital-labour is inelastic in the modern sector, since a fall in the profits rate is necessary in order to observe a drop in the income of the capitalist class, the richest one, with respect to the mean

income in the population, given that the GDP share of the modern sector rises over time. This drop may be observed only if the elasticity of substitution in the modern sector is less than unity, since the wage-price ratio is increasing in the modern sector. Seemingly, sufficient and necessary conditions for growth to be either unambiguously unequal, that is in order for the Lorenz curve to shift completely downward, or ambiguously unequal, that is when Lorenz curves between two successive periods intersect, are supplied. This approach is used, finally, for assessing the impacts of economic growth on relative poverty as well. Although this last model lacks the microeconomic foundations largely employed in the literature surveyed in this chapter, it is worthwhile to notice its precious insight; it has the merit to highlight the ways in which dual economy models may be used to evaluate the relative role of economic growth and income distribution on the individual well-being. Taking into account general equilibrium effects and integrating them with the advances of the new growth theories, it is likely to be that dual economy tools may still deserve a central place in the explanation of why and whether some countries, areas, or regions observe increasing or constant poverty rates, despite experiencing significant growth rates.

1.5   Conclusions

In this chapter we review a recent literature on dual economy models which adopts a modern approach integrating the basic features of those models with the advancements made by the new growth theories. Rather than assuming a wage exceeding the marginal product in the rural sector or independent of the labor demand in the modern one, this modern approach focuses on more commonly labor markets imperfections or on broadly market imperfections which carry over labor markets (for instance human capital market imperfections due to financial markets imperfections which carry over labor markets). We pay specific attention to the role of agents heterogeneity, market imperfections (financial, human capital and so forth), non-convexities in preference and production structure. We show that the classical conclusions of the dual settings are enriched and often modified

31

by adding more microeconomic structure to the supply and the demand side of the economy. Under this approach, dual economy models turn to be yet useful theoretical tools to explain how the growth-inequality-poverty linkages enter the long-run development of the societies and powerful predictors of income spatial difference. In particular they are suitable to proper evaluate the theoretical channels driving the analysis of pro-poor growth and hence to study questions like who benefits, and how much, from economic growth, or yet whether and the extent to which income distribution does matter for shaping the impact of economic growth on individual poverty. We claim that these theoretical environments may fit not only the characteristics of the developing economies, but also the structural transformation of the developed societies, in which there are large areas of marginalized poor.

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Chapter 2

Poor's behaviour and inequality traps: the role of human capital

"...any city, however small, is in fact divided into two, one the city of the poor, the other of the rich; these are at war with one another; and in either there are many smaller divisions, and you would be altogether beside the mark if you treated them all as a single State. But if you deal with them as many, and give the wealth or power or persons of the one to the others, you will always have a great many friends and not many enemies. And your State, while the wise order which has now been prescribed continues to prevail in her, will be the greatest of States, I do not mean to say in reputation or appearance, but in deed and truth, though she number not more than a thousand defenders."
[Plato, The Republic, Book IV, 422e-423a]

2.1   Introduction

The first sentence of the above Plato's quote often circulates in the development literature. In this sentence Socrates does emphasize two elements. High inequality and polarization does split most of the contemporary places, either cities or States, in essentially two or more ones and this division may not fuel the well-being of the whole society. While much of the economic literature is still debating on the validity of this claim, we would address the following part of the quote, where Socrates explicitly describes the two, or more, parts

of the society as inherently different. The poor have their own intrinsic characteristics and behavioral traits which differentiate them from the rich[1] such that the former behave and choose differently from the latter and both accordingly to their own status. In this chapter we take up this issue by considering the effects for positive economics of assuming that agents do behave accordingly to their specific income status and how this particular behaviour does influence the more general issue of the relation between economic growth and income distribution, and how this latter interplay may fuel poverty patterns. We carry out this task by formalizing on the microeconomic ground the diverse behaviour of the agents under different income condition and the consequences of this behaviour. At this regard, this chapter tries to connect two very wide literatures; the one focused on the elaboration of the ideas of poverty and inequality and the other focused on economic growth and development economics. On the former side – the conceptualization of poverty and inequality ideas – no large consensus has yet been reached on a large number of issues. Do we have to treat poverty as an absolute or relative concept? What do these two approaches imply and how they may be formalized? Is poverty different from inequality and if so, under which logic? On the other side, it does appear that the notion of poverty traps is not fully able to capture the relevant role of the relative position within a society and how this may influence and determine both individual and macroeconomic dynamics.

As Banerjee and Duflo (2007) have shown, even the extremely poor have a lot of real choices, but they not always choose to excersise those choices towards basic needs goods. In a work on the customs of the poor across 13 surveyed countries (Banerjee and Duflo, 2006, 2007), the authors report that the poor spend a large fraction of the total income in non-food goods (figure 1), as only in some countries the share of total income spent on food approaches the 70%. Most of the poor people spend much part of their income in participation goods, such as festivals; the percentage of households with any spending on festivals in South Africa is the 90.3%, in Udaipur (India) is the 99.4%, and its value is

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[1]This position is not recognized in the whole literature. There are authors who maintains, otherwise, that the poor have no intrinsic features and no particular behavioural trait, but they fail more often than the rich simply since they are more vulnerable as their budget constraints are much more and much more often stringent Bertrand et al. (2004).

relevant for most of the sample. A relevant share of their total income income is yet spent to organize or to take part at these festivals; for instance, in Udaipur (India) the 14.1% of the total income of the poor is spent in these activities. However, the very poor spend very little amount of money for the standard entertainment forms of the rich people.

Figure 1: Poor's expenditures
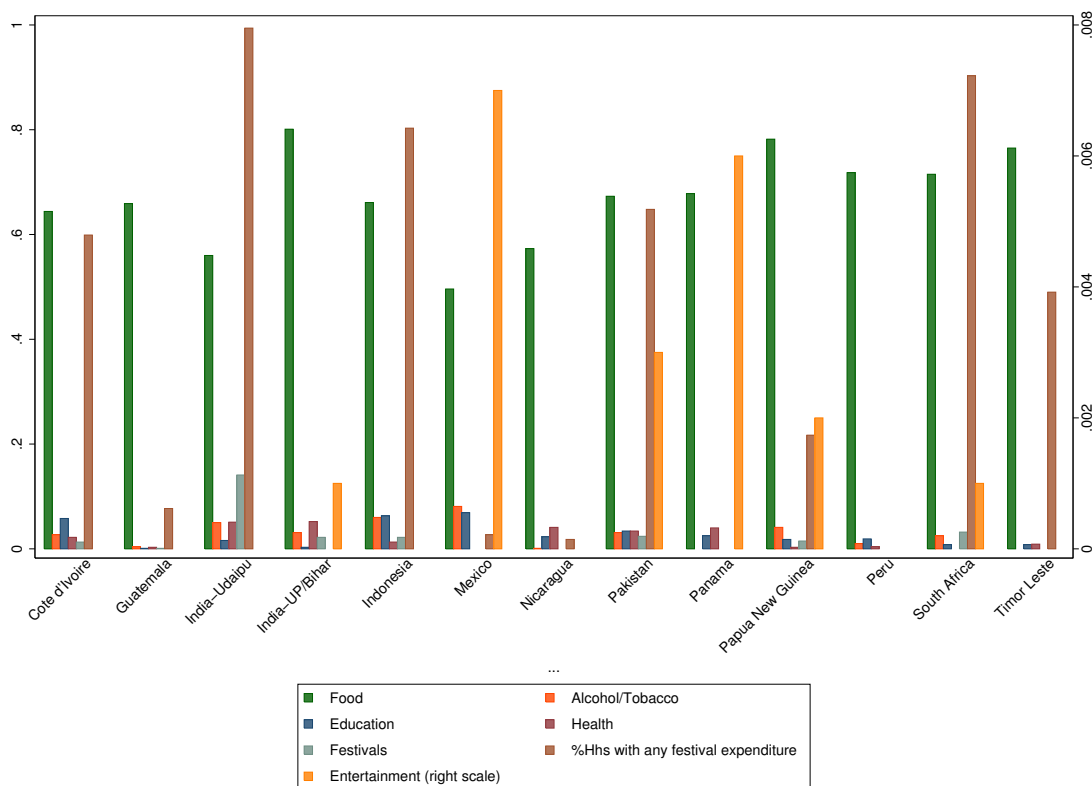
Note: All the variables but the percentage of households with any spending in festivals (black box) are expressed as share of total income spent on the good. The figure refers to the extreme poor, classified as people living on less than $1 a day in the rural areas.
Source: Banerjee and Duflo (2006), Table 3.

On the microeconomic ground, we employ two theoretical tools to introduce poverty ideas in a growth model. Firstly, being poor is discretely different from being non-poor; we embody this idea in discrete jumps in the behaviour and in the utility of the agents. Secondly, we introduce poverty ideas under the individual rational choice. Further, we use this microeconomic structure in an overlapping generation model *a là* Galor and Zeira

([1993](#)). Differently from the latter, we are able to couple and enrich their dynamics in an economic environment with perfect capital markets, without needing the assumption of market imperfections, by introducing a methodological novelty which connects the presence of the externality in the production function of the human capital of the children to the preference of the parents.

The chapter follows in the second section by introducing the literature related to these issues. In section 3 the basic structure of the model, with the definitions of the population structure, poverty, human capital accumulation and production is explored, so that in section 4 the statically individual equilibrium is computed. In section 5 the individual dynamics as well as the macroeconomic equilibrium are analysed in the light of the notion of inequality traps. The last section concludes.

2.2 Related Literature

2.2.1 Poverty and inequality: background ideas

Since the seventies a great bulk of literature (Atkinson, 1970; Foster, 1998; Sen, 1976, 1997) has made great advances on the issues related to the identification of the poor and the aggregation of poverty and inequality measures in tractable and reasonable functional forms[2]. These concepts have produced intense debates among advocates of an absolute view of poverty on a side and sustainers of a relative position on the other one, strictly concerned with the suitability, goodness and validity of either one or other approach. Already Adam Smith dealt with the choice of which approach might be the more appropriate, expressing a preference for a relative view of poverty, claiming that not only the physical goods, necessary for the support of the life, but also the commodities that become necessary due to the societal influence might be taken into account when fixing the reference standard. He maintains that a relative position within a society does matter as long as societal customs force agents in consuming goods otherwise not necessary for the basic

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[2]For a survey and more rigorous treatment of both definitional and measurement issues of poverty and inequality see Ch 3 and Ch 6 in Atkinson and Bourguignon (2000).

surviving. In his defense of the absolutist approach, Sen (1983; 1985) does maintain that the two positions may be conciliated, since a relative position is necessary to achieve an absolute benefit. The idea is that holding a relatively advantageous position is a source not only of a direct benefit, in that it allows consuming a specific bundle of goods, but also a source of a more important gain; namely, a relatively advantageous position in the society allows to have information that other individuals, the ones falling behind, do not have. He or she does not, or at least not exclusively, want to be relatively better than others per se. What he or she actually desires is to be absolutely well; a relative advantage is then functional to the achievement of this absolute gain. Townsend (1985) sustains that a relative view of poverty must be the main guide for the assessment of welfare judgments, especially in rich areas. This position tends to criticize the absolutist approach, viewing in this latter a constant inclination in confusing and associating relative poverty to inequality. Although poverty and inequality may be closely linked (Foster, 1998), especially when a relative approach is adopted, they still deserve different treatment for their own intrinsic features. "[T]he fact that some people have a lower standard of living than others is certainly proof of inequality, but by itself it cannot be a proof of poverty unless we know something more about the standard of living that these people do in fact enjoy" (Sen, 1983).

These extensive issues have been fitted in literatures which attempt to track the effects of poverty or unequal positions on positive economics, through microeconomic studies of the intrinsic characteristics of the poor. A large bulk of literature has included the ideas of minimum consumption requirements in growth models to assess the role of income distribution on economic growth and vice versa (Chatterjee, 1994; Chatterjee and Ravikumar, 1997). More recently, an effort is being accomplished in the microfoundation of poor's behaviour. Banerjee and Newman (1994) focus on the idea of "closeness to the lower bounds" to show how this affect behaviour, choices and incentives of the agents. Banerjee (2000) stresses the consequences for positive and normative economics of two notions of poverty: namely, poverty as "desperation" and poverty as "vulnerability"[3]. In the

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[3]On these issues see also Banerjee, Benabou and Mookherjee (2006) and Morduch (1994).

former case, the threat of punishment does not work, or at least it works less well, since the poor behaves as they had nothing to lose. On the other side, vulnerable agents are afraid of any losses since any potential failing causes them too much pain. This difference, it is shown, to decisively affect not only their own behaviour and choices, but also the aggregate dynamics. Banerjee and Mullainathan (2007) have presented new ideas to formalize, on a microeconomic ground, the behaviour of the poor. In an economy with "temptation goods", the authors supply a model in which the degree of temptedness is endogenous and may vary between rich and poor, showing the possibility of behavioral poverty traps, due to the higher impatience of the poor with respect to the rich; in turn, this impatience is both the result and the cause of their poverty.

We proceed on this branch of research by relating our work closely to the one by Lewis and Ulph (1988) who offer a microeconomic model of poverty, suggesting microeconomic principles for building utility functions, which can take into account the above discussion on the meaning of poverty as relative or absolute concepts. Feature of the poor is the lack of, or low, societal participation, which is source of two benefits. A direct benefit deriving from its consumption and, more importantly, an indirect advantage stemming from the fact that its consumption is source of relevant information acquisition as well. In order to buy this good a minimum level of income – the poverty line – is needed. This feature tends to capture a particular aspects of being poor; namely, "...being poor is discretely different from being non-poor, and that this is associated with discrete changes in consumer behaviour and, possibly, utility" (Lewis and Ulph, 1988). We capture this feature linking the discrete change in the income level with a discrete jump in the indirect utility function. The analysis on the extent of poverty is hence based upon the individual rational choice. If individuals are extremely poor as they are unable to consume some specific goods (i.e. the participation good), this aspect should not be exogenously described, but directly derived from the optimizing, rational behaviour of the agents. Was this good so important, why agents should rationally decide of not consuming it? Hence, the discrete jump in the indirect utility function is formalized by allowing the agents to make a choice between two

kind of goods. A divisible normal good whose consumption ensures only direct benefit and another kind of good – the participation good, which may be either divisible or not and whose consumption increases utility in two ways; directly, as its consumption yields immediate private benefits and indirectly as its consumption over a threshold (i.e. the poverty line) adds up an additional gain. Participating in social activities does, in fact, entail a cost; only who is able to afford this cost may exploit both the advantages this commodity furnishes. This participation has two effects on utility. A direct one, since everyone, to say, might be happier in going out with friends, and an indirect one, since this participation is source of another and greater benefit; namely, it is source of relevant information acquisition. Although a minimum amount of participation activities may entails low costs, the consumption of such a low level does not allow agents in exploiting the further more important benefit of information acquisition. Despite the fact that the feature of this kind of good may be quite common (i.e. club's membership, and so forth) – namely goods which may be consumed only over a minimum income level, the specific characteristic of this participation good is that its consumption over a threshold (the poverty line) entails an advantage so high that consumers are willing to sacrifice all the consumption of the discretionary good to enjoy the benefits of the former. As soon as income level reaches the threshold, agent is well willing to renounce to the discretionary good to exploit the benefits deriving from the consumption of the participation good. It is this characteristic that makes this participation good a "poverty good", in that not owning it makes agents so discontented that they never renounce to it, whenever they can.

2.2.2 Human Capital and "Inequality Traps"

Based upon this microeconomic framework we construct a dynamic model in the attempts to analyse whether and the extent to which the persistence of inequality may augment the persistence of poverty, even in growing economies. We build an overlapping generation model in which the dynamics of income distribution of the generations are mapped one-to-one to those of human capital accumulation, as the production function, on the

firm side, depends only on this last factor. Individuals are supposed initially heterogeneous in human capital. Given that there exists a one-to-one mapping from human capital to income dynamics, in each period this is equivalent to assume that individuals differs only for different income – or human capital – endowments[4]. In each period each parent has to choose how to split his budget into the consumption of the discretionary good, the participation good and investment for education of their children, which is supposed to occur in the standard form of "joy of giving". Each parent cares of the future well-being of the children, which depends on the amount of human capital these latter may accumulate in the future period. Human capital production of the children is function of parental expenditures in education and of parental human capital background. This latter depends in turn upon the amount of participation good consumed by the parents. When parents are able to afford to consume the participation good they will do as soon as they have not to renounce to the investment in educational expenditures, as physical investments in education and parental background are complementary in the production of children human capital, while they may decide to completely renounce in consuming the discretionary good. As result, human capital production presents a strong non-convex technology in that the consumption of the participation good, over the poverty line, does increase its final production, at an increasing rate. This setting does entail to assume that the poor enjoy relatively lower net marginal returns from education than the rich do. This assumption, while enough common in great part of the literature (Benabou, 1996; Durlauf, 1996; Galor and Tsiddon, 1997a; Galor and Zeira, 1993) is criticized as it is sustained that empirically it is less often observed this kind of non-convexities in the technology of the production of human capital (Ceroni, 2001). Nevertheless, some caveats are worthwhile to be explored. Human capital marginal returns are commonly assumed to be decreasing in educational investments, as by its nature human capital is embodied in human being, and its "physical" accumulation is obviously bounded. However, this observation cannot imply the renounce to the assumption of global increasing returns from human capital accu-

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[4]In the rest of the chapter, we will then use interchangeably the two words.

mulation, whenever this production increases, at increasing rates, due to a complementary factor, which in our case depends on initial income distribution of the parents. Summing up, human capital production function shows decreasing marginal returns when parents are not able to spread its production with the accumulation of the participation good – the case of the poor dynasties. It presents, otherwise, an increasing returns technology in the case of rich dynasties, which are able to speed up its production by allowing their children to better exploit the "physical" investment in education as a result of the higher information obtained from the consumption of the participation good. This jump in the curvature of the production function of human capital derives from the discrete jumps in the indirect utility function of the parents, and it introduces a methodological innovation which connects the externality in the human capital production function of the children with the preference of the parents. Given that also the relative position along the distribution does matter, the externality stems not only from the absolute economic possibilities of the agents, but also from the value they attach to this externality with respect to the other parts of the distribution.

We are able to couple and enrich the dynamics a là Galor and Zeira (1993) in an economic environment characterised by perfect capital markets, instead of needing to assume market imperfections. In each period the individual income distributions are linked to the previous ones through the intergenerational transmission of both educational expenditures and participation commodities. Two cases can be distinguished. When poverty is strikingly high two equilibria do exist; one locally stable and the other unstable. Generations that start with an income below the poverty line are condemned in the low equilibrium, while those that start rich enough to afford both educational investment and participation good deserve a further analysis. Richer dynasties present, in fact, a dual dynamics. Who is sufficient rich to consume an enough high amount of both educational investments and participation goods will end up behind the locally unstable steady state on an explosive path, on which their wealth will grow unbounded. On the other side, middle income dynasties, which are closer to the poverty line, will not be able to grow along the explo-

sive path and will be condemned to end up in the lower steady state, even if they achieve in buying both the goods. In this case poverty reduction is positively correlated with reduction in inequality so that the persistence in inequality carries over the persistence in poverty as well, even in growing economies. In the other case, when poverty is quite low, there does exist no steady state as the whole population ends up on the explosive path, with unbounded growth rates, without any segmentation within the society. In the former case, the economy appears to be trapped in "inequality traps" (Bourguignon et al., 2007) rather than in poverty traps. We propose to integrate the notion of inequality traps in an economic growth and development model, which takes contemporaneously into account the group-specific behaviour, in order to start filling an apparent weakness of the literature on poverty traps. We refer to the idea of considering poor simply the ones who are below some equilibrium thresholds, without taking into account that the poor have their own particular behaviour as well as that the condition of being poor might derive and perpetuate from a condition of relatively disadvantage with respect to other parts of the distribution. What distinguishes the inequality traps from the more classic poverty traps is that the latter refer to poverty without looking at the other part of the distribution (i.e. top and middle income), but only looking at the poor, individually and without any reference to group dynamics. Further insights are hence derived looking at the intra-group dynamics through the restriction of the functional form of the initial distribution of human capital. If initial human capital is assumed to be lognormally distributed (Glomm and Ravikumar, 1992; Gradstein and Justman, 1997) it is possible to show that the mean income as well as the variance (i.e. inequality) of the richer dynasties grows faster than that of the poorer ones. These dynamics may furnish positive support to the current debate on the demise of the middle class and the constantly polarization of the societies. At aggregate level, finally, the inverse relationship between initial income distribution and aggregate economic growth is observed, as lower initial inequality fosters higher growth rates.

2.3 Model

2.3.1 Population

A continuum of individuals, indexed by i, is modelled in an overlapping generation economy, in which each of them lives for two periods, dying at the end of the second one. In each period t, each family is composed by a parent and a child and at the end of the second period each individual gives birth to another such that total population is constant over time. In each period the economy is then inhabited by heterogeneous families differentiated by the initial income of the parents, which are distributed according to an initial probability distribution $g_0()$. In the first period of their life, children obtain education, financed out by their parents. Parents have to choose how to split their budget among three goods. A discretionary good c, which gives only a direct private benefit, a participation good z, which furnishes a direct benefit by increasing utility of the parents as well as an indirect benefit, whenever consumed over a threshold $\underline{z} \geq 0$, by augmenting both the parental utility, linearly, and the human capital accumulation function of the children, exponentially, through a stock parameter θ, and finally educational expenditures e. In the second period of their life, depending on the amount of educational investment e and the amount of the participation good consumed by their parents, children accumulate human capital which is one-to-one mapped to income.

2.3.2 Preference

Individuals have identical preferences, which are defined by

$$U_t^i (c, z, e; \theta) = \alpha \log \left(\hat{c}_t^i \right) + (1 - \alpha) \log \left(z_t^i + \theta \left(z_t^i \right) \right) + \gamma \log \left(e_t^i \right) \tag{1}$$

with

$$
\theta\left(z_t^i\right) = \begin{cases} 0 & \text{if } z_t^i < \underline{z} \\ 1 & \text{if } z_t^i \geq \underline{z} \end{cases} \tag{2}
$$

$$
\hat{c}_t^i = \max\left[1, c_t^i\right] \tag{3}
$$

with $0 < \alpha < 1$ and $\gamma > 0$ is the degree of altruism of the parents. Condition (2) describes the feature of the participation good z; its consumption over the threshold implies an additional benefit which makes the utility non-homothetic. Condition (3) is a simplifying normalization, needed to make utility function defined when the parents find optimum to bring consumption of the discretionary good, c, at zero. In the utility in (1) it is explicit that the non-homotheticity of the function is not global but it appears only for a range of high incomes. Given that this non-homotheticity is due to the characteristics of the participation good, it is clearer the idea that closer the consumers are to the income poverty line, which will be determined as function of the threshold $\underline{z}$ of the participation good z, higher are their incentives in changing behaviour towards the purchase of that commodity.

The structure in (1) implies that $\forall c \geq 0, z \geq 0, e \geq 0$, $U\left(c, z, e; 0\right)$ and $U\left(c, z, e; \theta\right)$ are defined and twice continuously differentiable, strictly increasing and concave in c, z and e. Further, $\forall c \geq 0, z \geq 0, e \geq 0$, $U\left(c, z, e; 1\right) > U\left(c, z, e; 0\right)$ implies that participation is good. Finally, we make the following key assumption on the behaviour of the agents.

Assumption 1 *For each individual i and each period t,*

$$
U\left(0, \underline{z}, e^*; \theta\right) > U\left(c, z, e^*; 0\right) \tag{4}
$$

with

$$
e^* = \underset{c \geq 0, z \geq 0, e \geq 0}{\arg\max}\ \left\{U\left(c, z, e; \theta\right) = \alpha \log\left(\hat{c}\right) + \left(1 - \alpha\right) \log\left(z + \theta\right) + \gamma \log\left(e\right)\right\}
$$

subject to

48

$$c + z + e \leq y$$

$$\theta = 0 \Rightarrow z < \underline{z}$$

and y is the consumer disposable income, over the minimum amount needed for the basic needs. This is the main assumption needed for describing consumer behaviour and formalizing the definition of poverty we have sketched in the above sections, following which the gain from participation are so large that consumer is perfectly disposed to renounce to consume all the discretionary good c in order to purchase the threshold amount, $\underline{z}$, of the participation good z.

The role of the investments in education, e, must be clarified. In assumption 1 we assume that while for each agent it is perfectly rational to sacrifice the consumption of all the discretionary good, it is not rational and then she will not bring at zero educational investments neither she will decide to decrease its consumption at a level lower than the optimum amount chosen just before reaching the poverty line. This hypothesis on the behaviour of the agent is due to a couple of reasons. Firstly, had we assumed that rational agent might decide to reduce a bit the consumption in educational investment to be able to purchase the participation good, we would very likely lose the discrete jump, which characterizes our definition of poor. More precisely, the poor is different from the rich in that reaching the poverty line means that she becomes able in buying relevant goods *in excess* to the ones she was purchasing just before reaching that poverty line; in this sense, the jump tries to capture the figure by which the agent, once reached the poverty, becomes able to buy goods that before she cannot. The other rationale for this choice is that, as we will show soon, there does exist a complementarity between educational investments and societal participation in the human capital accumulation, such that it is neither worthwhile to bring educational expenditures at zero neither reduce them at a level lower that its optimal amount. If it would be the case that, when reached the poverty line, the agent find

optimum to reduce educational investments, this would imply that the choice made by the agent just before reaching that poverty line was not an optimum. This setting produces a discrete jump in the choice of the goods, expressed by a sharp discontinuity in the indirect utility function of the agents.

2.3.3 Human Capital Accumulation

Human capital, and hence income, of the children is accumulated in each period and for each family through the following technology

$$h_{t+1}^i = \left(e_t^i\right)^\beta \left(h_t^i\right)^{\theta\left(z_t^i\right)} \tag{5}$$

where $0 < \beta < 1$.

In each period, parents have a double role in the production of the human capital of their children; through a directly "physical" investment in education and by passing on to the children their human capital background. This latter is augmented, at an increasing rate, by the opportunity they have to participate in social activities at a level higher than the threshold, such to be able to exploit the additional benefit given by the parameter θ. So, while human capital accumulation shows decreasing marginal returns from "physical" education, it has globally increasing marginal returns for high income levels, due to the presence of the complementary factor, h^θ. This hypothesis means that, overall, the poor show lower net marginal returns from human capital accumulation than the rich, as they are "excluded" from that kind of social activities, which spread up that accumulation by furnishing relevant information. Hence, a poor family which is only able to afford educational expenditures, but not social activities above the threshold level, will have a decreasing returns to scale technology for production of human capital (i.e. $\theta = 0$), while richer families (i.e. $\theta = 1$) will have an increasing returns to scale technology.

2.3.4 Production

The aggregate production is very simple. The unique factor of production is human capital, so that

$$Y_t = H_t = \int_I h_t^i g_t \left(h_t^i \right) dh_t^i \tag{6}$$

where H_t is the aggregate stock of human capital at time t, expressed in efficiency units of labour, and $g_t \left(h_t^i \right)$ is the density function describing the distribution of the parent's human capital at time t, with $\int_I g_t \left(h_t^i \right) dh_t^i = 1$. In each period, parents supply inelastically their efficiency units of labour receiving a wage, such that their income is $y_t^i = h_t^i$.

2.4   Individual behaviour

In each period t, each agent i will face on with the following programme

$$\max U_t^i \left(c_t^i, z_t^i, e_t^i; \theta \right) = \alpha \log \left(\hat{c}_t^i \right) + (1 - \alpha) \log \left(z_t^i + \theta \left(z_t^i \right) \right) + \gamma \log \left(e_t^i \right) \tag{7}$$

subject to

$$c_t^i + z_t^i + e_t^i \leq y_t^i \tag{8}$$

$$\theta \left(z_t^i \right) = \begin{cases} 0 & \text{if} \quad z_t^i < \underline{z} \\ 1 & \text{if} \quad z_t^i \geq \underline{z} \end{cases} \tag{9}$$

$$\hat{c}_t^i = \max \left[1, c_t^i \right] \tag{10}$$

$$c_t^i \geq 0, z_t^i \geq 0, e_t^i \geq 0 \tag{11}$$

51

Parents care of their children in the form of "joy of giving". They do not internalize the overall welfare of their children (Becker, 1974, 1979), in which case they would have maximized over their whole future human capital, h_{t+1}. They, instead, choose how much of their budget in (8) to spend on investment for education of their children. We use this latter approach, since in the former one we would have implicitly assumed parents had a perfectly direct control also on the stock parameter θ, while they do not, as they can only control it indirectly through their disposable income.

2.4.1 Conditional indirect utility functions

In order to find the consumer optimal choices we need to determine the income threshold, the poverty line, at which the agent does consider rationally optimal to change behaviour, which means to purchase the threshold amount of good z by renouncing to the discretionary good c, while keeping on investing in education at the optimal level. At this end we proceed in two steps, by computing the indirect utility functions *conditioned* on the specific income status, evaluating the optimum for each of them, and finally the general optimal solution.

Poor dynasties Poor generations starting with a level of income y_t^i, which does not allow to buy the minimum level of the participation good (i.e. $\underline{z}$) to accede to the additional benefits, will choose c, z and e such to solve the following programme

$$\max U_t^i \left(c_t^i, z_t^i, e_t^i; \theta = 0 \right) = \alpha \log \left(\hat{c}_t^i \right) + (1 - \alpha) \log \left(z_t^i \right) + \gamma \log \left(e_t^i \right) \tag{12}$$

subject to

$$c_t^i + z_t^i + e_t^i \leq y_t^i \tag{13}$$

$$\hat{c}_t^i = \max \left[1, c_t^i \right] \tag{14}$$

$$c_t^i \geq 0, z_t^i \geq 0, e_t^i \geq 0 \tag{15}$$

The first order conditions (FOC) are

$$\left(c_t^i\right)^*_{NP} = \frac{\alpha}{1+\gamma}y_t^i, \quad \left(z_t^i\right)^*_{NP} = \frac{1-\alpha}{1+\gamma}y_t^i, \quad \left(e_t^i\right)^*_{NP} = \frac{\gamma}{1+\gamma}y_t^i \tag{16}$$

Consumers do split proportionally their budget across the three goods – i.e. the function is homothetic for this range of income. To this conditions is it associated the following indirect utility function for the poor, that do not participate ("NP"), $V^{NP}(y; \theta = 0)$

$$V^{NP}(y; \theta = 0) = \alpha \log\left(\frac{\alpha}{1+\gamma}y\right) + (1-\alpha)\left(\frac{1-\alpha}{1+\gamma}y\right) + \gamma \log\left(\frac{\gamma}{1+\gamma}y\right) \tag{17}$$

where "x_{NP}" are the optimum solutions in the poor regime, where the individuals are unable to fully participate in social activities and do not accede to the additional benefit θ. Marginal utility of each good is infinite at zero and increasing in income; it is further verified that $c'_{NP}(y) > 0, z'_{NP}(y) > 0, e'_{NP}(y) > 0$ and $c_{NP}(y=0) = 0, z_{NP}(y=0) = 0, e_{NP}(y=0) = 0$.

Rich Dynasties Correspondingly, rich dynasties will solve a programme similar to the one in (12)-(15), but being able to exploit the additional benefit from the participation good; namely,

$$\max U_t^i\left(c_t^i, z_t^i, e_t^i; \theta = 1\right) = \alpha \log\left(\hat{c}_t^i\right) + (1-\alpha)\log\left(z_t^i + 1\right) + \gamma \log\left(e_t^i\right) \tag{18}$$

subject to

$$c_t^i + z_t^i + e_t^i \leq y_t^i \tag{19}$$

$$\hat{c}_t^i = \max\left[1, c_t^i\right] \tag{20}$$

$$c_t^i \geq 0, z_t^i \geq 0, e_t^i \geq 0 \qquad (21)$$

where in this case income y is high enough to let the consumer buying each of the three good over the consumption of the amount $\underline{z}$.

The FOC are

$$\left(c_t^i\right)_P^* = \frac{\alpha}{1+\gamma} y_t^i + \frac{\alpha}{1+\gamma}, \quad \left(z_t^i\right)_P^* = \frac{1-\alpha}{1+\gamma} y_t^i - \frac{\alpha+\gamma}{1+\gamma}, \quad \left(e_t^i\right)_P^* = \frac{\gamma}{1+\gamma} y_t^i + \frac{\gamma}{1+\gamma} \qquad (22)$$

The corner solution implied for the good z in (22) does not mean that its actual consumption is at zero; as these solutions correspond to very rich agents which are consuming over the threshold amount $\underline{z}$, the corner solution suggests a consumption level at the threshold $\underline{z}$. The optimal choices are increasing in income and to them is it associated a correspondingly indirect utility functions for the rich, who are able to fully participate in social activities and then can exploit the additional benefit θ, $V^P(y; \theta = 1)$.

Static equilibrium Looking at the marginal consumer, we derive the conditions under which a threshold amount of the good z does exist and hence the poverty line - the threshold level of income needed to buy the threshold amount of the participation good - and we prove that assumption 1 actually characterizes the behaviour of the agents.

Proposition 1 (Existence and level of the threshold) *Whenever either the degree of altruism* (γ) *is not extremely low or the consumption share on the good z is not extremely low or both, a threshold amount of the participation good $z \equiv \underline{z} \in [z^\circ, z^{\circ\circ}]$ such that assumption 1 holds and actually describes the behaviour of the agents does exist and it is bounded in the interval $[z^\circ, z^{\circ\circ}]$, with $z^{\circ\circ} > z^\circ$.*

Proof. See appendix.

Proposition 1 not only does ensure that a threshold which shapes the behaviour of the

agents such as initially described in assumption 1 does in fact exist, but it also binds the *level* of the threshold in a closed interval such that $\underline{z} \in [z^{\circ}, z^{\circ\circ}]$. The width of this interval depends in turn on the degree of altruism of the parents (γ) and on the consumption shares on the goods z $(1 - \alpha)$ and c (α); indeed, such a threshold does exist whenever either the degree of altruism (γ) is not extremely low or the consumption share on the good z $(1 - \alpha)$ $(c$ $(\alpha))$ is not extremely low (high) or both. In the appendix (Figure A.2) we provide simulations from which it results that for a wide and very reasonable range of the parameters γ and α proposition 1 results verified. As discussed in the introduction, Banerjee and Duflo (2007) report that unexpectedly the poor do not spend their whole income in food, while a large share of it is indeed spent on non-food consumption. They document that participation goods expenditures are incurred by a large percentage of the extremely poor households; in most of the surveyed countries the percentages of households with any spendings on festivals - for instance - are very large, in many cases ranging between the 40% and the 99%. Contrary to the conventional wisdom which claims that the poor do not have choices as they are forced to spend all their income in basic goods, Banerjee and Duflo (2007) show that even the extremely poor have a lot of choices which they decide to exercise not in the direction of more basic goods. This conclusion fits perfectly our theoretical strategy of analysing poverty under the individual rational choice of the agents, allowing these to rationally choose whether and how much of the discretionary good either to consume or to renounce. Coupling the individual rationality with the fact that the linkage between the parents utility and the children accumulation of human capital is driven also by the initially relative position of the household along the distribution of income we can explain why both the *existence* and the *level* of the threshold are endogenously determined. A threshold amount of the poverty good (i.e. the participation good z) does indeed not always exist; its existence will depend on the particular relation between the degree of altruism of the parents and the shares of income which they decide to spend on the discretionary and the participation goods; once a threshold exists, its level will be hence bounded in a closed interval since a considerably low threshold would not

relevantly influence agents behaviour, while a considerably high threshold would reveal that agents do not forsee the possibility of reaching that threshold and hence they do not take actually into account the existence of such a threshold. Higher the degree of altruism and lower (higher) the share of income spent on the discretionary good (the participation good), larger the likelihood that a threshold does actually exist. We can explain this correlation by considering that lower is the share of income spent on the discretionary good, more difficult it results for the agents to renounce to such a good, whereas when higher is the degree of altruism, more important it is for the parents the accumulation of the children human capital.

Proposition 2 (Poverty line and optimal choices) $\forall z \equiv \underline{z} \in [z^\circ, z^{\circ\circ}]$, *the threshold level of income – the poverty line in terms of the amount $\underline{z}$ of the good z, at which she find rationally optimum to sacrifice all the consumption of the discretionary good c to buy the minimum amount of good z, $\underline{z}$, while keeping on investing in education at its optimal level e^*_{NP}, is $y_t \equiv \underline{y} = \underline{z}(1+\gamma)$. For level of income lower than $\underline{y}$ the optimal decision is given by (16), while for level of income equal to or higher than $\underline{y}$ the optimal choice is given by (22).*

Proof. See appendix.

What characterizes the poor is the discrete jump they do at the poverty line. The general optimal solution to the problem (7)-(11) can be formally expressed, for each individuals i and period t, from the triple

$$
(c^*, z^*, e^*) = \begin{cases} (c^*_{NP}, z^*_{NP}, e^*_{NP}) & \text{if } y < \underline{y} \\ (c^*_P, z^*_P, e^*_P) & \text{if } y \geq \underline{y} \end{cases} \tag{23}
$$

where $\underline{y} \equiv \underline{z}(1+\gamma)$.

The condition $y \geq \underline{y}$ might imply that for values of y close to the poverty line, $\underline{y}$, the consumer would restrict the consumption of z at $\underline{z}$. However, even this possibility is excluded when noticing that:

Lemma 1 $\forall y \geq \underline{y}$, c_P and e_P are strictly increasing and z_P non-decreasing in y. Moreover for values of $z_P > z$, z_P is strictly increasing in y as well.

2.5 Dynamics and "Inequality Traps"

In each period the links within generations are described by the evolution of the human capital accumulation and hence income distribution dynamics through the intergenerational transmission of educational expenditures and parental human capital background. At any point in time, the current distribution of income (i.e. human capital) shapes the distribution tomorrow. We explore how the presence of "inequality traps" carries over the persistence of poverty by firstly evaluating the dynamics governing individual accumulation of human capital and hence personal income, then analysing their evolution within groups, by restricting the functional form of the income distribution and finally by commenting on the macroeconomic equilibrium. Two main cases will be throughout distinguished, depending on whether the initial level of poverty is high or low.

2.5.1 Individual Dynamics

From the static equilibrium above, we know that in each period t parents pass on their children the following optimal educational investments

$$
\left(e_t^i\right)^* \equiv \begin{cases} \left(e_t^i\right)^*_{NP} = \dfrac{\gamma}{1+\gamma} h_t^i & \text{if} \quad h_t^i < \underline{h} \\[3mm] \\[3mm] \left(e_t^i\right)^*_{P} = \dfrac{\gamma}{1+\gamma} h_t^i + \dfrac{\gamma}{1+\gamma} & \text{if} \quad h_t^i \geq \underline{h} \end{cases}
\tag{24}
$$

with $\underline{h} \equiv \underline{y} = \underline{z}(1+\gamma)$ the poverty line expressed in terms of the good z.

The transition equation of the personal human capital accumulation of their children is determined by (5) as

$$
h^i_{t+1} = \phi\left(h^i_t\right) \equiv
\begin{cases}
\phi_{NP}\left(h^i_t\right) = \left(\dfrac{\gamma}{1+\gamma}\right)^{\beta}\left(h^i_t\right)^{\beta} & \text{if } h^i_t < \underline{h} \\[4mm]
\phi_P\left(h^i_t\right) = \left(\dfrac{\gamma}{1+\gamma}\right)^{\beta}\left(h^i_t+1\right)^{\beta} h^i_t & \text{if } h^i_t \geq \underline{h}
\end{cases}
\tag{25}
$$

The transition equation presents a jump in its curvature corresponding to the discrete jump in the indirect utility function of the individuals we took as our definition of poverty. In particular, while in the first part of its support it shows decreasing returns to scale (i.e. concave), in the range of higher incomes it is convex with increasing returns to human capital accumulation. This feature captures the idea that rich families are in better position – have better opportunities – to better exploit the gains from education as they are able to have additional benefits in terms of relevant information acquisition which in turn do speed up the overall human capital accumulation.

In order to analyse these dynamics let's notice that for each individual i, the followings are verified

Lemma 2 $h_{t+1} = \phi_{NP}\left(h_t\right) = \left(\frac{\gamma}{1+\gamma}\right)^{\beta}\left(h_t\right)^{\beta}$ *is defined only for $h_t \in [0, \underline{h})$. Over this support it is strictly increasing and strictly concave; moreover, $\phi_{NP}\left(0\right) = 0$ and $\lim\limits_{h_t \to 0}\phi'_{NP}\left(h_t\right) = \infty$ imply that that whenever it intersects the 45-degree line it will do it from above. This implies that whenever a steady state does exists it is locally stable, since $\phi'_{NP}\left(h^*_L\right) < 1$, where this low-steady state h^*_L is defined as $h^*_L = \left(\frac{\gamma}{1+\gamma}\right)^{(\beta/1-\beta)}$.*

Lemma 3 $h_{t+1} = \phi_P\left(h_t\right) = \left(\frac{\gamma}{1+\gamma}\right)^{\beta}\left(h_t+1\right)^{\beta} h_t$ *is defined over the support for $h_t \in [\underline{h}, \infty)$ and is strictly increasing and strictly convex. The high steady state, whenever it exists, is then locally unstable, since $\phi'_P\left(h^*_H\right) > 1$, with h^*_H defined by $h^*_H = \frac{1}{\gamma}$.*

These two lemma allow to completely define the individual dynamics, distinguishing two key cases, depending on whether the initial level of poverty is either low (poverty regime) or high (rich regime).

Proposition 3 (Poverty Regime) *If $\underline{h} > h_L^*$, that is if the level of poverty is initially high, two equilibria exist; a low locally stable (h_L^*) and an upper locally unstable (h_H^*). Poor and middle-income dynasties are condemned to end up in the lower stable equilibrium – h_L^*, while the richer ones, with initial income equal to or above h_H^*, will enter an explosive path, with unbounded income growth.*

Proof. If $\underline{h} > h_L^*$, the transition equation $\phi_{NP}(h_t)$ intersects the 45-degree line at h_L^* from above, implying stability of equilibrium. Correspondingly the transition equation $\phi_P(h_t)$ it will strictly increase starting from $\underline{z}$, intersecting the 45-degree line from below at h_H^*, implying both unstable equilibrium – h_H^* – and explosive path above this equilibrium.∎

Proposition 4 (Rich Regime) *If $\underline{h} < h_L^*$ that is if the level of poverty is initially low, no equilibria exist. The whole population will enter the explosive path, with unbounded growth.*

In this case, indeed, even the poorer part of the distribution is able to buy the minimum amount of the participation good such that their children may accumulate human capital following $h_{t+1} = \phi_P(h_t)$ in (25) (figure 1).

If the level of societal poverty is quite high, $\underline{h} \equiv \underline{h}^1 > h_L^*$, two classes of equilibrium are possible. Dynasties starting with an income h lower than the low-equilibrium converge to it as well as middle-income dynasties that start with a level of income h higher than h_L^* but not high enough to sustain a positive consumption of both the educational investments and participation goods. Indeed, while very rich families, with income $h > h_H^*$, will grow unboundedly over an explosive path, middle-income or vulnerable dynasties, $h \in \left(\underline{h}^1, h_H^*\right)$, that are above the poverty line, but very close to it, are condemned to end up on the lower steady state. On the other side, in an economy starting very rich, $\underline{h} \equiv \underline{h}^2 < h_L^*$, dynasties evolve along the explosive path, with "globally" unbounded growth rates.

These results belong to the tradition of the Stiglitz's (1969) ones, following which economies starting very poor are characterised by multiple equilibria, with the lower part of the distribution showing a continuous worsening with respect to the upper part of the distribution.

Figure 2: Individual dynamics. Poor versus rich regime
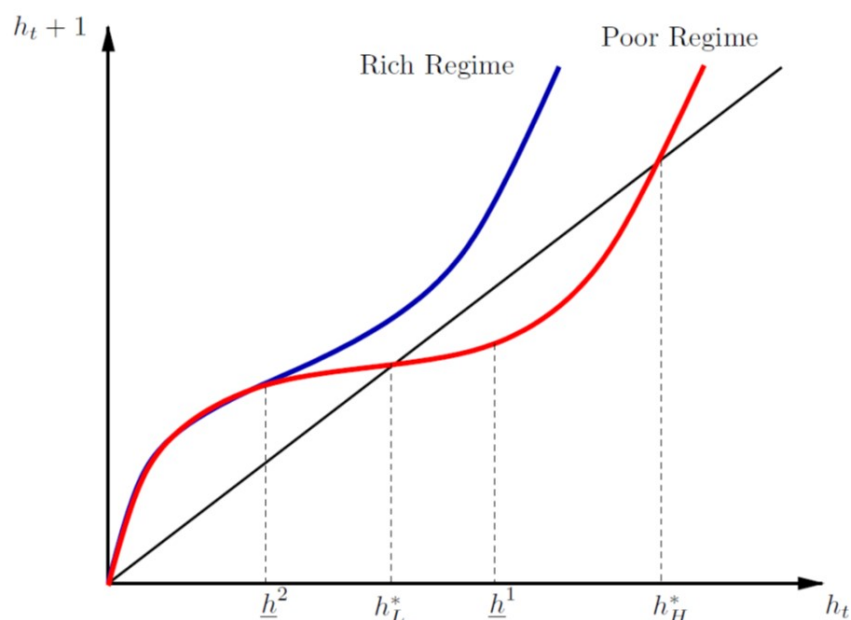
This consideration brings about another direct one. It is often assumed that reduction in inequality may be a powerful tool for reducing poverty especially in low poverty environments. Otherwise, we have shown that it is not the case, as the higher the initial level of poverty the higher the power of egalitarian policies in reducing poverty, improving aggregate economic efficiency and hence increasing aggregate output. In turn these results do appear to confirm the claim and the needs of a recent part of the literature focusing on pro-poor growth policies.

2.5.2 Inequality Traps and Intra-group dynamics

The low-equilibrium arising in the poor regime is closer to the notion of "inequality traps" than to the more classic poverty traps. With the term inequality trap we would point out the relevance of looking at the whole distribution rather than only at specific individuals – poor versus rich. A specific characteristic of the inequality traps is the permanent non-convergence in the opportunities opened to some social groups; the feature that would differentiate it from the poverty traps is that "there must be persistence in relative posi-

tions in a distribution across time periods, and that this be (partly) a product of features of the overall distribution – or of relations between groups" (Bourguignon et al., 2007). A consequence is that this persistence often does lead to efficiency losses, "resulting in an economic equilibrium that is inferior to some feasible alternatives" (Bourguignon et al., 2007), as it does happen in our case, where the poor regime is inferior to the other equilibrium – the rich regime, which would be feasible by reducing inequality and allowing the poorer part of the distribution in participating in social activities in the relevant range.

In order to preliminarily catch this point, let's consider what would happen by increasing the level of income of the poor and middle classes or, equivalently, by reducing the poverty line, which would correspond to reduce the price at which the participation good might be bought. The economy might enter the rich regime, under which every individual enter the explosive path with unbounded growth rates. Graphically (figure 1), let's suppose that at time $t = 0$ the economy is trapped in a poor regime, with a level of poverty determined by the poverty line $\underline{h}^1 \equiv \underline{z}(1 + \gamma)$. Either redistributing income from the upper classes to lower and middle ones, which would imply increasing the individual level of income of the latter classes and then a shifting up of the lower equilibrium, h_L^*, or by reducing the price, $\underline{z}$, at which it is possible to buy the societal participation or both, the economy would end up in the rich regime, with no poverty and higher aggregate output.

In a poor and polarized society, redistribution of income from the upper to the lower-middle classes as well as making the access to the societal participation less stringent would allow the entire economy to both grow richer and to substantially reduce individual poverty. That is, we would have got another feasible equilibrium which is superior to the former one. At this regard and as shown below at aggregate level, the efficiency losses in the poor regime stem from the fact that: 1) the aggregate output is lower under poor regime than under the rich one; 2) this is in turn due to the fact that in the poor regime not only the poor class is unable to accumulate the same amount of human capital accumulated by the richer families, but also the middle-income it is not, even though it has the same access to the participation good. Indeed, the vulnerable class ends up in the lower

equilibrium even if it is able to spend how the richer class for educational investments. At aggregate level, this wastage of economic resources produces the above economic inefficiency. Reducing inequality, in this case, would generate both the reduction of poverty and the macroeconomic efficiency.

In order to deepen the analysis of the group-specific income dynamics, we proceed by restricting the functional form of the initial density function to be lognormal (Glomm and Ravikumar, 1992; Gradstein and Justman, 1997). We can show the following

Proposition 5 (Intra-group dynamics) *If the initial distribution of human capital (i.e. income) is lognormally distributed, the mean and the variance of the richer part of the distribution are always higher than that of the poorer one. While inequality of the poor group is strictly decreasing over time, tending to zero in the very long-run (i.e. infinity), it is strictly increasing over time, at a rate greater than 1, among the richer part of distribution.*

Proof.

Let's suppose that at time $t = 0$, human capital (i.e. income) is lognormally distributed with mean μ_0 and variance σ_0^2. Namely, $h_0^i \sim LN\left(\mu_0, \sigma_0^2\right)$ which also implies that the logarithm of the human capital is normally distributed with same mean and same variance, $\log\left(h_0^i\right) \sim N\left(\mu_0, \sigma_0^2\right)$. It is hence possible to compute the dynamics of the mean and the variance *within* the groups, i.e. poor and rich. From (25) let's loglinearize the transition equations for the two groups, as follow

$$\log\left(h_{NP,t+1}^i\right) = \beta \log\left(\frac{\gamma}{1+\gamma}\right) + \beta \log\left(h_{NP,t}^i\right) \tag{26}$$

and

$$\log\left(h_{P,t+1}^i\right) = \beta \log\left(\frac{\gamma}{1+\gamma}\right) + \beta \log\left(h_{P,t}^i + 1\right) + \log\left(h_{P,t}^i\right) \tag{27}$$

In this latter case (27) it would be not possible to compute mean and variance of $\log\left(h_{P,t+1}^i\right)$ due to the presence of the term $\log\left(h_{P,t}^i + 1\right)$, since the expected value of this

latter does not coincide with the expected value of $\log\left(h^i_{P,t}\right)$, and we would be neither sure that there is a specific distribution describing it. Nonetheless, we can approximate, by first-order Taylor expansion, the term to get a tractable functional form. In particular, approximating (see appendix)

$$\log\left(h^i_{P,t}+1\right) \approx \log\left(h^i_{P,t}\right)$$

we can rewrite (27) as follow

$$\log\left(h^i_{P,t+1}\right) = \beta\log\left(\frac{\gamma}{1+\gamma}\right) + (1+\beta)\log\left(h^i_{P,t}\right) \tag{28}$$

Hence, mean and variance of the $\log\left(h^i_{X,t+1}\right)$, with $X = (NP, P)$, are given for the poor by

$$\mu^{NP}_{t+1} = E\left(\log\left(h^i_{NP,t+1}\right)\right) = \beta\log\left(\frac{\gamma}{1+\gamma}\right) + \beta\mu^{NP}_t \tag{29}$$

$$\sigma^2_{NP,t+1} = Var\left(\log\left(h^i_{NP,t+1}\right)\right) = \beta^2\sigma^2_{NP,t} \tag{30}$$

and for the rich by

$$\mu^P_{t+1} = E\left(\log\left(h^i_{P,t+1}\right)\right) = \beta\log\left(\frac{\gamma}{1+\gamma}\right) + (1+\beta)\,\mu^P_t \tag{31}$$

$$\sigma^2_{P,t+1} = Var\left(\log\left(h^i_{P,t+1}\right)\right) = (1+\beta)^2\,\sigma^2_{P,t} \tag{32}$$

∎

Mean and variance for the variable h would be easily computed from (29)-(32), without changing the qualitative analysis (see appendix). Mean income as well as inequality of the poor group evolves being always lower than those of the richer part of the distribution. Moreover, while *within* the former group inequality is decreasing over time tending at zero

in the very long-run, *within* the richer part of the distribution inequality is strictly increasing over time, at a rate $(1 + \beta)^2$ greater than 1. These results couple the ones obtained in the more general setting above, showing a channel through which polarization and marginalization are actually possibilities in very poor societies. This effect might in turn explain both the continuous marginalization observed in less developed as well as in developed countries and the demise of the middle class observed especially in the latter case. This is mainly due to the fact that polarization and marginalization do fuel the inequality traps, excluding a part of the population from fully exploiting the available opportunities.

2.5.3 Macroeconomic equilibrium and aggregate economic inefficiencies

At aggregate level we can see that the above results are consistent with the macroeconomic equilibrium, which is characterised on a side by the negative correlation between inequality and economic growth and on the other by aggregate economic inefficiency, in the poor regime, due to the wastage of economic resources. This latter economic inefficiency might be removed by reducing inequality, which would produce both the poverty reduction and the increase in the overall output. In each period, indeed, the current income distribution, today, is determined by the previous one, yesterday.

In the case of an initially poor economy, $\underline{h} \equiv \underline{h}^1 > h_L^*$, aggregate educational investments and incomes are given by

$$E_t^{poor} = \frac{\gamma}{1 + \gamma} \int\limits_0^\infty h_t^i g\left(h_t^i\right) dh_t^i + \frac{\gamma}{1 + \gamma} \left[1 - G_t\left(\underline{h}^1\right)\right] \tag{33}$$

where $G_t\left(\underline{h}^1\right) = \int_0^{\underline{h}} g_t\left(h_t^i\right) dh_t^i$ is the cumulative distribution function at $\underline{z}$, and by

$$Y_t^{poor} = \left(\frac{\gamma}{1+\gamma}\right)^\beta \int\limits_0^{h_H^*} \left(h_{t-1}^i\right)^\beta g_{t-1}\left(h_{t-1}^i\right) dh_{t-1}^i +$$

$$+ \left(\frac{\gamma}{1+\gamma}\right)^\beta \int\limits_{h_H^*}^\infty \left(h_{t-1}^i + 1\right)^\beta \left(h_{t-1}^i\right) g_{t-1}\left(h_{t-1}^i\right) dh_{t-1}^i \quad (34)$$

Firstly, the negative relation between inequality and economic growth stems from considering that in (34) the final aggregate output would be higher by allowing more people to reach the level of steady state h_H^*. Starting from this point, indeed, the economy grows at a higher rate than below it.

In order to evaluate more rigorously the loss in economic efficiency due to the inequality traps, let's consider what follows:

1. Poor class: the proportion of people owning an income $h_t \in \left[0, \underline{h}^1\right]$ makes educational investments following $e_{NP}(.)$ in (24) and ends up in the low equilibrium in h_L^*, defined from $\phi_{NP}(.)$ in (25);

2. Middle-"Vulnerable" class: the proportion of people owning initially an income $h_t \in \left[\underline{h}^1, h_H^*\right]$ can spend and indeed they spend in educational investments the higher amount $e_P(.)$, but they are still condemned in the low-equilibrium h_L^*;

3. Rich class: the proportion of people owning, finally, an initially income $h_t \in [h_H^*, \infty)$ even spending for educational investment in the same proportion as the middle class, end up on the explosive path, growing without bounds.

The wastage of economic resources for the economy as a whole is quantifiable from (33) and (34) in the amount

$$\frac{\gamma}{1+\gamma} G_t^M\left(h_t^M\right)$$

with $G_t^M\left(h_t^M\right) = \int_{\underline{h}^1}^{h_H^*} g_t\left(h_t^i\right) dh_t^i$.

This wastage, due to the inequality traps, is persistent over time and is the source of the economic inefficiency, which might be removed by reducing initial inequality. A reduction in inequality would, indeed, allow an higher proportion of the population to be able not only to spend an higher amount for educational expenditure, but also to access the societal participation at the relevant level, such to produce contemporaneously a reduction of poverty and an increase in the aggregate output.

2.6 Conclusion

In this chapter we evaluate how the persistence of inequality and the presence of inequality traps carry over the persistence of poverty and possible aggregate economic inefficiencies. We propose a microeconomic formalization of one possible definition of poverty and of the behaviour of poor and rich agents. Poverty, net of minimum basic needs, is defined as lack of or low societal participation, which is source of both a direct private benefit which augments the utility of the parents linearly and an indirect gain, taking the form of a factor increasing the human capital accumulation of the children, exponentially. This additional benefit is so large that agents are well willing in renouncing to the consumption of a discretionary good in order to purchase the participation good. In order to achieve this additional gain, a specific minimum amount of the participation good must be purchased. We hence introduce poverty ideas in the individual rationality of the agents, defining the entry and exit from poverty status as a discrete jump in the indirect utility function to which corresponds a jump in the curvature of the human capital production function. This is crucial not only for the endogeneization of the threshold amount of the participation good needed to join an additional indirect benefit as well as the threshold level of income - the poverty line - needed to buy that amount, but also for the endogeneization of the conditions which guarantee their *existence* and which fix their *level*. We assemble an overlapping generation structure, in which in each period parent choose among three goods; a discretionary one, the participation good, and educational expenditures of their children. Human capital is

the only factor of production which is then mapped one-to-one to individual income. We are able to couple and enrich the dynamics *a là* Galor and Zeira (1993) in an economic environment with perfect capital markets, without needing the assumption of market imperfections, by introducing a methodological novelty which connects the presence of the externality in the production function of the human capital of the children to the preference of the parents.

We show that two regimes may be distinguished; a poor and a rich regime. In economies starting largely poor, the poor regime, two equilibria exists; one low locally stable equilibrium and one upper locally unstable. Individuals whose income is under the poverty line converge to the low equilibrium as well as the vulnerable individuals of the middle class, defined by the proportion of individuals owning an income higher than the poverty line, but lower than the upper unstable equilibrium. Richer individuals, whose initial income is equal to or higher than the upper equilibrium end up on an explosive path, with unbounded growth rates of personal income. In the rich regime, instead, no steady state equilibrium does exist, as the whole population enter the explosive path, with unbounded growth rates. We further evaluate the intra-group dynamics, by restricting the functional form of the initial income distribution to be lognormal. It is shown that the mean income and the variance (i.e. inequality) of the richer part of the distribution are always higher than the ones of the lower part; moreover, while inequality in the poor class tend to zero in the very long-run (i.e. infinity), in the richer class of income inequality is increasing at an increasing rate. These dynamics do appear to firstly suggest a positive support for the current debate on the demise of the middle class and the continuous polarization of the modern society. Further, the low equilibrium of the poor regime is closer to the notion of inequality traps rather than poverty traps, in that the persistence of poverty is caused by the continuously relative disadvantageous positions of the lower classes of income in exploiting the benefits of societal participation. We find theoretical support for sustaining that policies aimed in reducing inequality are more powerful tools for poverty reduction when initially economies are very poor, contrary to an established claim, following which

67

reduction in inequality induce higher decreasing in poverty in initially richer economies. On this ground, this chapter tries to start the microeconomic and macroeconomic formalization of the so called pro-poor growth theory, firstly developed in policy institutes. At macroeconomic level, two conclusions may be furnished. Firstly, a negative relation between initial inequality and economic growth is observed, since by reducing inequality in poor regime economies, the whole population, or higher proportions of it, is able to enter the explosive path, producing a greater aggregate output as well. Finally, the inequality traps which cause the poor regime to emerge are also sources of aggregate economic inefficiencies, which can be eliminated by reducing income disparities accordingly. Indeed, economies trapped in the poor regime show that: 1) poor families, unable to purchase the minimum amount of participation good, end up in the low equilibrium; 2) middle-income families converge to the same equilibrium, even though they are able to purchase that good, but they have not enough initial income to reach the upper equilibrium; 3) richer families, able to purchase the "right" amount of all the bundle of goods grow richer. At aggregate level, this implies that there is a wastage of economic resources, as although the middle income class spends for accumulating human capital quite a lot, the final aggregate output does not increase accordingly, as people in this class are still marginalised with respect to an upper elite.

Appendix

Proof of Proposition 1 and Proposition 2

The proofs proceed in three steps and they apply for each individuals i and each period t.

Step 1

Let's consider the marginal consumer which owns the exact amount of income, in terms of the amount $\underline{z}$ of good z, needed to buy both $\underline{z}$ and e^*_{NP}. The indirect utility function V^P is defined only when the minimum level $\underline{z}$ of good z is purchased; namely, $\forall z \geq \underline{z}$. Given that $e^*_{NP} = \frac{\gamma}{1+\gamma}y$, this level y^1 is $y \equiv y^1 = \underline{z} + \frac{\gamma}{1+\gamma}y \Rightarrow y^1 = \underline{z}(1+\gamma)$. In order to be optimum for her to buy this bundle of goods instead of splitting the same amount of income over the three goods, it must be verified that

$$V^P\left(y^1;\theta \mid \theta = 1\right) > V^{NP}\left(y^1;\theta \mid \theta = 0\right) \tag{A.1}$$

That is, it must be verified that for the same level of income y^1 the indirect utility, V^P, obtained by consuming the minimum amount to accede to the extra-benefit from participation $\underline{z}$ must be greater than the one, V^{NP}, obtained by splitting it across the three goods, not purchasing that threshold amount and then not obtaining those extra-benefits. That is

$$V^P\left(y^1;1\right) \equiv (1-\alpha)\log\left(\underline{z}+1\right) + \gamma\log\left(\frac{\gamma}{1+\gamma}y^1\right) > \alpha\log\left(\frac{\alpha}{1+\gamma}y^1\right) +$$
$$+ (1-\alpha)\log\left(\frac{1-\alpha}{1+\gamma}y^1\right) + \gamma\log\left(\frac{\gamma}{1+\gamma}y^1\right) \equiv V^{NP}\left(y^1;0\right) \tag{A.2}$$

Hence,

$$(1-\alpha)\log\left(\underline{z}+1\right) > \alpha\log\left(\alpha\underline{z}\right) + (1-\alpha)\log\left((1-\alpha)\underline{z}\right) \Rightarrow$$

by simplifying and taking the inverse function (i.e. exponential)

$$\Rightarrow \underline{z}+1 > (\alpha\underline{z})^{(\alpha/1-\alpha)} (1-\alpha)\underline{z} \Rightarrow \underline{z}+1 > B\underline{z}^{(\alpha/1-\alpha)}\underline{z}$$

with $B \equiv \alpha^{(\alpha/1-\alpha)} (1-\alpha) = \left[\alpha^\alpha (1-\alpha)^{(1-\alpha)}\right]^{1/1-\alpha}$; and $0 < B < 1$.

$$\Rightarrow \underline{z}+1 > B\underline{z}^{(1/1-\alpha)} \tag{A.3}$$

Step 2

It must be proved furthermore that for levels of income lower than y^1 that allow to buy the threshold amount $\underline{z}$ of good z, the consumer does not find optimum purchasing that minimum amount by not only sacrificing the entire consumption of the discretionary good c, but also by reducing the consumption of educational expenditures, e.

Let's suppose to assign to the consumer a level of income y^2 lower than y^1.

Given that $\gamma > 0$ only, let's define this level of income $y^2 = \underline{z}$. It must be the case that

$$V^P \left(y^2;\theta \mid \theta = 1\right) < V^{NP} \left(y^2;\theta \mid \theta = 0\right) \tag{A.4}$$

This would prove that the indirect utility obtained by buying only the amount $\underline{z}$ of good z and obtaining the additional benefit is lower than the indirect utility obtained by spending the same budget over the three goods and not achieving the benefits from participation.

$$V^P \left(y^2;\theta \mid \theta = 1\right) \equiv (1-\alpha) \log\left(\underline{z}+1\right) < \alpha \log\left(\frac{\alpha}{1+\gamma}y^2\right) +$$
$$+ (1-\alpha) \log\left(\frac{1-\alpha}{1+\gamma}y^2\right) + \gamma \log\left(\frac{\gamma}{1+\gamma}y^2\right) \equiv V^{NP} \left(y^2;\theta \mid \theta = 0\right) \tag{A.5}$$

Hence,

70

$$\log\left(\underline{z}+1\right) < \frac{\alpha}{1-\alpha}\log\left(\frac{\alpha}{1+\gamma}\underline{z}\right) + \log\left(\frac{1-\alpha}{1+\gamma}\underline{z}\right) + \frac{\gamma}{1-\alpha}\log\left(\frac{\gamma}{1+\gamma}\underline{z}\right) \Rightarrow$$

$$\Rightarrow \underline{z}+1 < \left(\frac{\alpha}{1+\gamma}\underline{z}\right)^{(\alpha/1-\alpha)}\left(\frac{1-\alpha}{1+\gamma}\underline{z}\right)\left(\frac{\gamma}{1+\gamma}\underline{z}\right)^{(\gamma/1-\alpha)} \Rightarrow$$

$$\Rightarrow \underline{z}+1 < \left(\frac{\alpha}{1+\gamma}\right)^{(\alpha/1-\alpha)}\left(\frac{1-\alpha}{1+\gamma}\right)\left(\frac{\gamma}{1+\gamma}\right)^{(\gamma/1-\alpha)} \cdot \underline{z}^{(\alpha/1-\alpha)} \cdot \underline{z} \cdot \underline{z}^{(\gamma/1-\alpha)} \Rightarrow$$

$$\underline{z}+1 < C \cdot \underline{z}^{((1+\gamma)/(1-\alpha))} \tag{A.6}$$

with $C \equiv \dfrac{\alpha^{(\alpha/1-\alpha)} \cdot (1-\alpha) \cdot \gamma^{(\gamma/1-\alpha)}}{(1+\gamma)^{((1+\gamma)/(1-\alpha))}} = \left[\dfrac{\alpha^{\alpha}\,(1-\alpha)^{(1-\alpha)}\,\gamma^{\gamma}}{(1+\gamma)^{1+\gamma}}\right]^{1/1-\alpha} > 0$ and $C < B$.

Step 3. Existence and level of the threshold

In order to completely prove the proposition 1, it must showed that there exists a value $\underline{z}$ such that (A.1) and (A.4) are *contemporaneously* verified. This amounts to prove that inequalities in (A.3) and in (A.6) are *contemporaneously* verified as well. Let's define three functions as:

$$f_1\left(\underline{z}\right) = \underline{z}+1$$

$$f_2\left(\underline{z}\right) = B\underline{z}^{(1/1-\alpha)}$$

$$f_3\left(\underline{z}\right) = C \cdot \underline{z}^{((1+\gamma)/(1-\alpha))}$$

It must be the case that

$$f_2\left(\underline{z}\right) < f_1\left(\underline{z}\right) < f_3\left(\underline{z}\right) \tag{A.7}$$

Let's consider the following properties of the functions $f_2(.)$ and $f_3(.)$:

- $f_2\left(0\right) = f_3\left(0\right) = 0$;

- The two functions are strictly increasing in z and strictly convex, namely: $\forall z > 0, f_2'\left(.\right) > 0, f_2''\left(.\right) > 0, f_3'\left(.\right) > 0, f_3''\left(.\right) > 0$;

- The slope of the function $f_2\left(.\right)$ is greater than the slope of the function $f_3\left(.\right)$, namely: $B > C$;

- The curvature of the function $f_3\left(.\right)$ is greater than the curvature of the function $f_2\left(.\right)$, namely: $\dfrac{1+\gamma}{1-\alpha} > \dfrac{1}{1-\alpha}$.

From these properties it results that $\exists z \equiv z^\dagger : f_2\left(z^\dagger\right) = f_3\left(z^\dagger\right)$; moreover $\forall z < z^\dagger, f_2\left(z\right) > f_3\left(z\right)$ and $\forall z > z^\dagger, f_2\left(z\right) < f_3\left(z\right)$.

In particular, whenever either the degree of altruism (γ) is not extremely low or the consumption share on the good z is not extremely low or both, the point $z \equiv z^\dagger$ is such that $f_2\left(z^\dagger\right) = f_3\left(z^\dagger\right) < f_1\left(z^\dagger\right)$. It follows that a threshold $z \equiv \underline{z} \in [z^\circ, z^{\circ\circ}]$ does exist, where z° is such that $f_3\left(z^\circ\right) = f_1\left(z^\circ\right)$ and $z^{\circ\circ} > z^\circ$ is such that $f_2\left(z^{\circ\circ}\right) = f_1\left(z^{\circ\circ}\right)$.

Let's consider the point $z \equiv z^\dagger$ at which the functions $f_2\left(.\right)$ and $f_3\left(.\right)$ equal each other, namely:

$$f_2\left(z^\dagger\right) \equiv Bz^{\dagger^{(1/1-\alpha)}} = Cz^{\dagger^{(1+\gamma/1-\alpha)}} \equiv f_3\left(z^\dagger\right)$$

after simple arithmetics such a point is defined as

$$z^\dagger = \frac{\left(1+\gamma\right)^{(1+\gamma/\gamma)}}{\gamma}$$

The existence of the threshold is guaranteed whenever the value of the functions $f_2\left(z^\dagger\right)$ and $f_3\left(z^\dagger\right)$ is lower than the value of the function $f_1\left(z^\dagger\right)$ at the point $z^\dagger$ where the functions

$f_2\left(z^\dagger\right)$ and $f_3\left(z^\dagger\right)$ do intersect each other - i.e. at the point where the functions $f_2\left(z^\dagger\right)$ and $f_3\left(z^\dagger\right)$ are equal. For this condition to be verified, it must hence be the case that

$$f_2\left(z^\dagger\right) = f_3\left(z^\dagger\right) < f_1\left(z^\dagger\right) \tag{A.8}$$

By substituting back the value of the point $z^\dagger$ in either $f_2\left(z\right)$ or $f_3\left(z\right)$ and in $f_1\left(z\right)$, it follows that inequality in (A.8) is verified whenever

$$B\left[\frac{(1+\gamma)^{(1+\gamma/\gamma)}}{\gamma}\right]^{1/1-\alpha} < \frac{(1+\gamma)^{(1+\gamma/\gamma)}}{\gamma} + 1 \tag{A.9}$$

which is verified whenever either the degree of altruism (γ) is not extremely low or the consumption share on the good z is not extremely low or both. Whenever condition (A.9) is verified, it does exist a value $z \equiv \underline{z} \in [z^\circ, z^{\circ\circ}]$ such that inequality (A.7) and hence proposition 1 are both verified. This can be shown graphically as follow

Figure A.1: Existence and level of the threshold
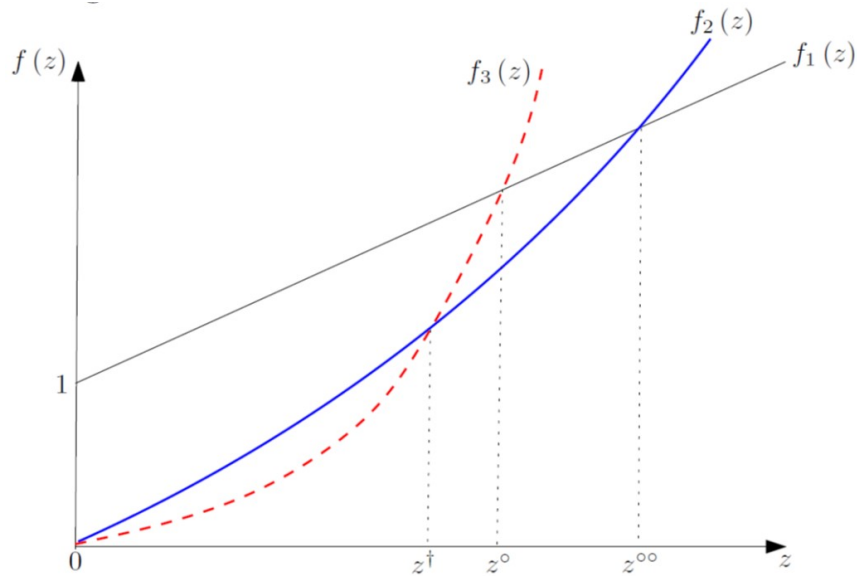
Finally, it suffices to note that from the properties of these indirect utility functions (see also the text):

Given that for $y \geq \underline{y}$ $V^P\left(y;1\right) > V^{NP}\left(y;0\right)$ it implies that for all levels of income $y' > y$

it will be also the case that $V^P\left(y';1\right) > V^{NP}\left(y';0\right)$. This property implies that whenever she can she always decide to buy the participation good. ∎

Proofs for Lemma 2

The properties of the function $h_{t+1} = \phi_{NP}\left(h_t\right) = \left(\frac{\gamma}{1+\gamma}\right)^\beta h_t^\beta$ are easily derived from its first and second derivates.

$$\phi'_{NP}\left(h_t\right) = \beta\left(\frac{\gamma}{1+\gamma}\right)^\beta h_{t-1}^\beta > 0$$

$$\phi''_{NP}\left(h_t\right) = \beta\left(\beta-1\right)\left(\frac{\gamma}{1+\gamma}\right)^\beta h_t^{\beta-2} < 0$$

The steady state h_L^* is derived from

$$h_L^* = \phi_{NP}\left(h_L^*\right) = \left(\frac{\gamma}{1+\gamma}\right)^\beta \left(h_L^*\right)^\beta \Rightarrow$$

$$h_L^* = \left(\frac{\gamma}{1+\gamma}\right)^{\beta/1-\beta}$$

and the stability conditions from

$$\phi'_{NP}\left(h_L^*\right) = \beta\left(\frac{\gamma}{1+\gamma}\right)^\beta \left(h_L^*\right)^{\beta-1} =$$

$$= \beta\left(\frac{\gamma}{1+\gamma}\right)^\beta \left[\left(\frac{\gamma}{1+\gamma}\right)^{\beta/1-\beta}\right]^{\beta-1} =$$

$$= \beta\left(\frac{\gamma}{1+\gamma}\right)^\beta \left(\frac{\gamma}{1+\gamma}\right)^{(\beta(\beta-1)/1-\beta)} = \beta < 1$$

74

Proofs for Lemma 3

The properties of the transition function $h_{t+1} = \phi_P(h_t) = \left(\frac{\gamma}{1+\gamma}\right)^{\beta} (h_t + 1)^{\beta} h_t$ are derived from its first and second derivatives.

$$\phi_P'(h_t) = \left(\frac{\gamma}{1+\gamma}\right) \left[(h_t + 1)^{\beta} + \beta h_t (h_t + 1)^{\beta - 1}\right] > 0$$

$$\phi_P''(h_t) = \left(\frac{\gamma}{1+\gamma}\right) \left[\beta (h_t + 1)^{\beta - 1} + \beta (h_t + 1)^{\beta - 1} + \beta h_t (\beta - 1)(h_t + 1)^{\beta - 2}\right] =$$

$$= \left(\frac{\gamma}{1+\gamma}\right)^{\beta} \beta \left[2(h_t + 1)^{\beta - 1} - (1 - \beta) h_t (h_t + 1)^{\beta - 2}\right] > 0$$

since $2(h_t + 1)^{\beta - 1} > (1 - \beta) h_t (h_t + 1)^{\beta - 2} \Rightarrow 2(h_t + 1) > (1 - \beta) h_t \Rightarrow h_t (1 + \beta) + 2 > 0$, which is always verified.

The steady state h_H^* is derived from

$$h_H^* = \phi_P(h_H^*) = \left(\frac{\gamma}{1+\gamma}\right)^{\beta} (h_H^* + 1)^{\beta} h_H^* \Rightarrow$$

$$\Rightarrow 1 = \left(\frac{\gamma}{1+\gamma}\right)^{\beta} (h_H^* + 1)^{\beta} \Rightarrow h_H^* + 1 = \left(\frac{1+\gamma}{\gamma}\right) \Rightarrow$$

$$\Rightarrow h_H^* = \frac{1}{\gamma}$$

and the stability condition from

$$\phi'_P(h^*_H) = \left(\frac{\gamma}{1+\gamma}\right)^\beta \times$$

$$\times \left[\left(\frac{1+\gamma}{\gamma}\right)^\beta + \beta\left(\frac{1+\gamma}{\gamma}\right)^{\beta-1} \cdot \left(\frac{1+\gamma}{\gamma} - 1\right)\right] =$$

$$= \left(\frac{\gamma}{1+\gamma}\right)^\beta \left[\left(\frac{1+\gamma}{\gamma}\right)^\beta + \beta\left(\frac{1+\gamma}{\gamma}\right)^\beta - \beta\left(\frac{1+\gamma}{\gamma}\right)^{\beta-1}\right] =$$

$$= 1 + \beta - \beta\left(\frac{1+\gamma}{\gamma}\right)^{-1} \Rightarrow$$

$$\Rightarrow \phi'_P(h^*_H) = 1 + \beta\left[1 - \left(\frac{1+\gamma}{\gamma}\right)^{-1}\right] > 1$$

Lognormal distribution properties

It is shown (Aitchison and Brown, 1957; De La Croix and Michel, 2002; Glomm and Ravikumar, 1992; Gradstein and Justman, 1997) that if a variable h is lognormally distributed with mean μ_0 and variance σ_0^2, namely if

$$h^i \sim LN\left(\mu, \sigma^2\right)$$

which also implies that

$$\log\left(h^i\right) \sim N\left(\mu, \sigma^2\right)$$

then, the mean and the variance of the variable h are given by

$$E\left(h^i\right) = \exp\left(\mu + \frac{\sigma^2}{2}\right)$$

$$Var\left(h^i\right) = \left[\exp\left(\sigma^2\right) - 1\right]\exp\left(2\mu + \sigma^2\right)$$

Lognormal approximation

$$\log\left(h^i_{P,t+1}\right) \approx \log\left(h^i_{P,t}\right) \tag{A.10}$$

Taking the first-order Taylor approximation, it results that

$$\log\left(h^i_{P,t+1}\right) = \log\left(h^i_{P,t}\right) + \frac{1}{h^i_{P,t}} \tag{A.11}$$

For very large values of $h^i_{P,t}$ the approximation (A.10) is consistent when considering for instance that $\lim\limits_{h\to\infty} \log\left(h^i_{P,t}\right) + \frac{1}{h^i_{P,t}} = \log\left(h^i_{P,t}\right)$

Simulations

Figure A.2: Simulation of condition in (A.9)

(a) $\alpha = 0.1$ (b) $\alpha = 0.2$ (c) $\alpha = 0.3$

(d) $\alpha = 0.4$ (e) $\alpha = 0.5$ (f) $\alpha = 0.6$

(g) $\alpha = 0.7$ (h) $\alpha = 0.8$ (i) $\alpha = 0.9$
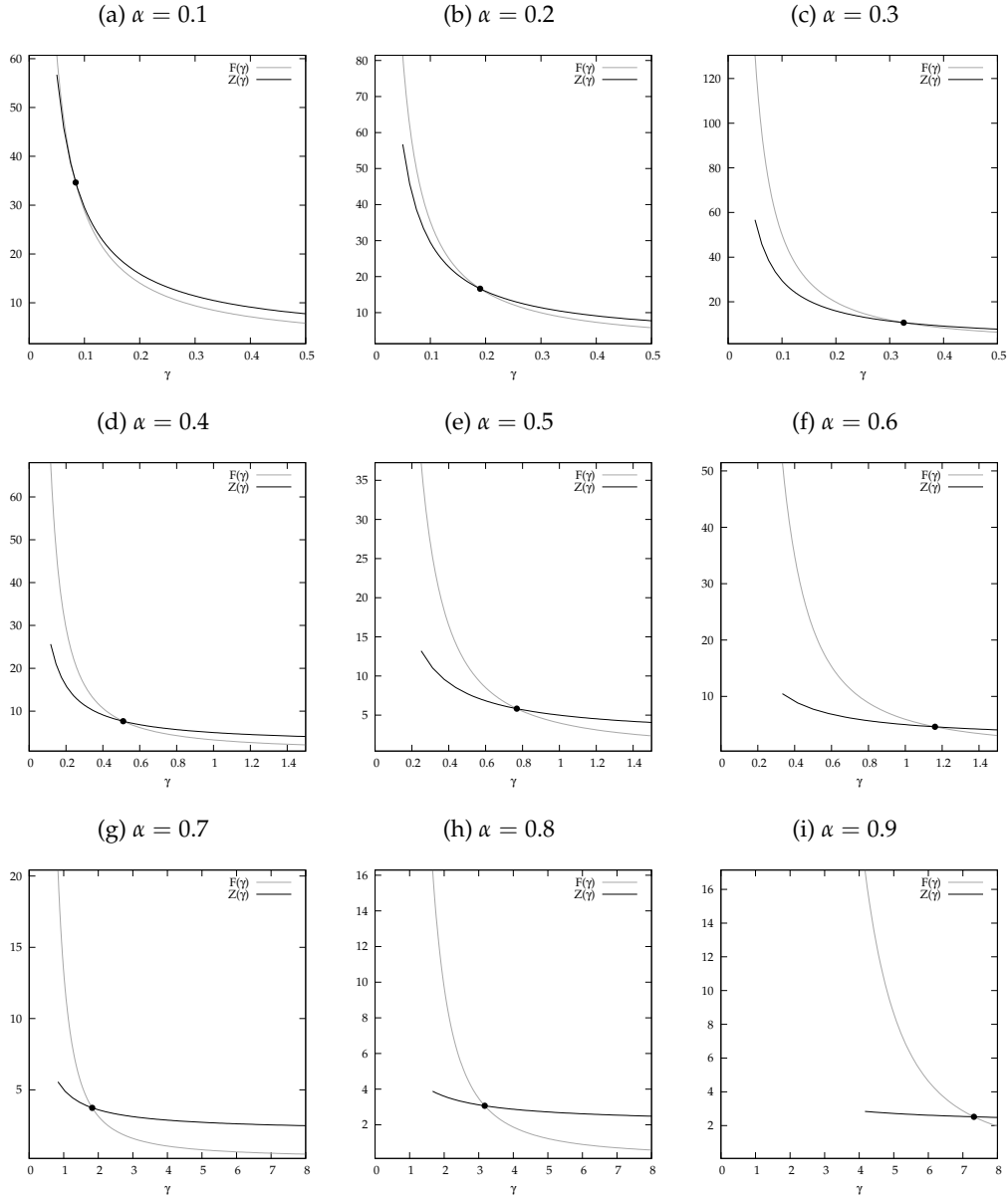
Note: Simulations of condition in (A.9) with γ on the x-axis and the functions of γ for each given level of α on the y-axis. The two functions represent respectively the right hand side and the left hand side of the condition in equation (A.9); namely, $F(\gamma) = \left[\alpha^{\alpha} (1-\alpha)^{(1-\alpha)} \right]^{1/1-\alpha} \left[\frac{(1+\gamma)^{(1+\gamma/\gamma)}}{\gamma} \right]^{1/1-\alpha}$ and $Z(\gamma) = \frac{(1+\gamma)^{(1+\gamma/\gamma)}}{\gamma} + 1.$

78

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Chapter 3

Human capital inequality, social cohesion and economic growth

3.1 Introduction

Social cohesion is a concept with a long and complex history.

So as in the history, attention to social cohesion has been placed by philosophers, sociologists and economists because they were aware that they lived in an era of rapid transition when traditional bonds and ties were being rapidly eroded and where the centrifugal forces of industrialisation and democracy could rip apart all previous social connections, so, nowadays, social cohesion is reviewing an increasingly prominent concern in most of our countries.

This is, in part, due to the social and ethnic diversity strongly arising everywhere, and to the social and economic inequalities increasing in many countries, especially in the OECD countries.

Moreover, recent advances in the sociological and economical sciences, highlighting how economic performances and social outcomes strikingly depend on the environment

upon which the same are achieved, impose a reflection on the role of the cooperative and inclusive forces behind the social cohesion process and on its deep determinants.

In particular, several pieces of research point out how economic growth is remarkably affected, amongst others, by the extent to which people acts in a society, aimed by shared objectives and cooperatively at societal level, and how the educational factor is a strong predictor of high growth levels, both because its impact on the productivity and its effect as socializing force.

At the same time, however, social cohesion appears to be strongly determined by the extent of inequality, especially income inequality. In this framework, the role of education, in fostering social cohesion, does not refer only to build cooperative environments, but also to reduce such inequalities, especially because, the modern skill-dependent production processes could indirectly produce several biases in both the distribution of access to education (i.e. years of schooling) and to achievements from the educational process.

After sketching the theoretical background in Section 1, the paper furnishes empirical evidence in Section 2; the final Section concludes.

3.2 Theoretical background

Despite the huge interest and effort of the research on social cohesion, some confusion is yet present about its definition; most of the research undertaken, incorrectly, seems directly relating the concept of social cohesion to the notion of social capital.

In particular, one of the most diffused view of social capital, as "…[referring] to features of social organisation, such as trust, norms, and networks, that can improve the efficiency of society by facilitating co-ordinated actions" (Putnam, 1993), appears mostly as a necessary but not sufficient condition for generating social cohesion at societal level.

Indeed, it has been pointed out that "social capital is a narrower, more tightly defined concept that calls attention to one crucial ingredient in social cohesion, in the sense of a just, equitable, tolerant, and well-integrated society" (Putnam, 2004).

Indeed, as it has been shown in the literature (Knack and Keefer, 1997), several determinants of social capital are not correlated with appropriate measures of social cohesion.

This is the case, for instance, of associational activities, in the form of community-based or individual-grouping activities; these, indeed, may either promote or detract from societal cohesion depending on whether the associations in question are narrow and relatively self-interested, or more encompassing and universalistic in their objectives.

Yet, whereas some of the most diffused measures of social cohesion at societal level, such as trust in others and institutions, civic cooperation and violent crime, do tend to go together at the country level, the wider range of social capital variables, including association and tolerance, do not co-vary cross-nationally as national aggregates (Green and Preston, 2005; Knack and Keefer, 1997). Countries with typically high level of social and institutional trust, and with low violent crime rates (such as some Nordic countries) often have only moderate levels of association. On the other hand, countries with high

levels of association (such as the USA and the UK) often have lower (and declining) levels of trust, as well higher rates of crime.

Thus, the first striking issue in the analysis is that **social capital does not necessarily transfer up from the community to the societal level.**

This is, in part, because the cooperation and solidarity invoked most commonly to resolve collective action problems at the level of smaller groups does not translate directly at societal level; for instance, if the economic goals of a group conflict with those of other groups or of unorganized interests, the overall effect of group memberships and activities on economic performance could be negative. As Adam Smith noted, when "people of the same trade" meet "even for merriment and diversion" the result is often "a conspiracy against the public" or "some contrivance to raise prices."

A more appropriate approach, inspired by Judith Maxwell, defines social cohesion as the process of:

"…building shared values and communities of interpretation, reducing disparities in wealth and income, and generally enabling people to have a sense that they are engaged in a common enterprise, facing shared challenges, and that they are members of the same community".(Maxwell 1996, as reported in Easterly et al. 2005)

This definition highlights two aspects of social cohesion as condition, in a static framework, and as process, in a more dynamic approach; that is, social cohesion is both a condition dependent on the degree of inequality, in income and educational achievements and accesses, and a process of instilling in individuals the sense of

belonging to the same community and the feeling that they are recognised as members of that community.

In a more schematic way, social cohesion can be defined and analysed (Jenson, 1998), following five main dimensions (Figure 1).

Figure 1 - Dimension of Social Cohesion

<u>**Dimension of Social Cohesion**</u>

Belonging…………Isolation
Inclusion…………..Exclusion
Participation………Non-Involment
Recognition……….Rejection
Legitimacy………...Illegitimacy

Source: Jenson, 1998

The first dimension is widely shared. Social cohesion in terms of values and collective identities.

A cohesive society is one in which citizens "share values." A sense of identity allows them to feel "committed" and "part of the same community". The feeling of **belonging** is clearly a dimension of social cohesion. A threat to social cohesion is associated with feelings of isolation from the community.

A second shared element is that social cohesion is related to economic institutions and especially one central institution of modern societies, that is, markets.

This feature includes, then, equality of opportunity in a market society as a constitutive element of its definition. This is the dimension of **inclusion**. A threat to social cohesion is then associated with practices that result in exclusion.

Social cohesion requires **involvement**: governance practices, such as partnerships and to increasing responsibility of the "third sector" for promoting cohesion. Cohesion problems may be signalled by political backlashes, provoked by "political disenchantment." The emergence of a third dimension, that of **participation** and that social cohesion may be the threatened by non-involvement.

The necessary mediation of differences over power, resources and values is, according to this perspective, assured by institutions, whether formal or informal, public or private.

The essential task for maintaining social cohesion is nurturing those institutions which contribute to, rather than undermine, practices of **recognition** of difference.

The final dimension relates to the crucial role of mediation. The intermediation necessary for living with the value conflicts of a plural society does not happen at the level of individuals; it is the product of institutions. Therefore, social cohesion depends at least in part on maintaining the **legitimacy** of those public and private institutions that act as mediators and maintain the spaces within which mediation can occur.

Economic and social inequalities appears to be striking candidates of the degree of cohesion in a society. Even though some degree of inequality could be sustained at social and economic levels, excessive inequality may be socially divisive and hence inefficient: it may motivate the poor to engage in illegal activities and riots, or at least to divert resources from productive uses, both the resources of the poor and those of the state. Social conflict over the distribution of income, land or other assets can take place through labour unrest, for instance, or rent seeking which can hinder investment and growth.

Moreover, social polarization is a likely determinant of measures of social cohesion, such as trust and civic cooperation. In polarized societies, individuals are less likely to share common backgrounds and mutual expectations about behaviour, so it is more difficult to make self-enforcing agreements. Yet, polarization can increase rent-seeking activities whether legal, through the political system, or illegal, through theft-that undermine trust. Through any of these various channels, polarization can erode trust and weaken cooperative norms.

In this framework, education is a significant factor that can affect social cohesion directly and indirectly through income dynamics; in both the cases, education systems are powerful predictors of social and economical outcomes, in terms of both social cohesion and economic performance.

Countries with education systems producing more equal outcomes in terms of skills and qualifications are likely to have more equal distribution of income and this in turn promotes social cohesion.

From a social perspective, Colenso (2005) highlights several channels through which education can affect social cohesion.

Firstly, education affects social cohesion through transparency and participation in education policy formulation, planning and management.

Secondly, education can foster equity and equality of opportunities; education, indeed, affects social cohesion through the distribution of education resources, opportunities and outcomes.

In this case, it is remarkable the distance between the social capital and social cohesion approaches. The former looks at the quantity of education alone (i.e. aggregate years of schooling), predicting strongly association with social cohesion; in contrast, Green & Preston (2005) claim that there appears to be no significant correlation at national level between aggregate levels of education and social cohesion. They assess, instead, that inequality of educational outcomes is closely connected to income inequality, which is closely connected to many of the measures of social cohesion.

That is, it is not the total amount of education that appears significant, but the distribution of education outcomes.

This dichotomy reflects the basic difference between the individual approach of social capital, that analyses social cohesion as an aggregation of individual-level characteristics, and the broader social cohesion theory, that uses a 'societal approach to social cohesion', identifying a set of variables that form a combined indicator of national level social cohesion.

While there is strong evidence that education does affect individual attitudes and behaviours in ways which may be considered crucial to the formation of social capital at the community level, on the other hand, there is little clear evidence of how this translates upwards and therefore of the relationship between education and cohesion at the societal level.

Using national aggregate measures, no significant correlations can be found between average levels of skills and social cohesion outcomes for a range of advanced states.

However, degrees of inequality in the distribution of skills appear to be powerfully negatively correlated with a number of social cohesion outcomes.

Yet, from a societal perspectives, people are more likely to adhere to social contracts under certain conditions. They are more likely to adhere to contracts when they do not consider each other as cultural 'strangers'; that is, when they have more understanding of each other as people, as citizens of the same country or as citizens of a 'similar' country where it is believed that the same norms and expectations govern social contracts. People are more likely to adhere to social contracts when they have a greater understanding of the reasons for those contracts, and are more knowledgeable about the sanctions which may be expected in the event of non-compliance.

As Heyneman (1999) assesses, education contributes to this goal in three ways.

First, it helps provide public knowledge about social contracts themselves, what they mean, and why they are important, etc.

Second, education helps provide the behaviour expected under social contracts, in part through the socially heterogeneous experiences students have in the schools themselves, and finally helps provide an understanding of the expected consequences for breaking social contracts.

At this regard, another strand of literature (Easterly et al. 2005) commonly refers to the effect of social cohesion on institutions quality and on the consequences this latter have, in turn, on the economic performance.

The idea that human capital accumulation fosters economic growth not only directly, as established by the new growth theory (Lucas, 1988), but also through its mediated or

indirect effect on the institutional improvement has been recently sustained to assess the benefits of education and income equality on economic growth, through their impact on social cohesion.

Educated people are more likely to resolve their differences through negotiation and voting than through violent disputes. Yet, education is needed for courts to operate and to empower citizens to engage with government institutions, or, moreover, literacy encourages the spread of knowledge about the government's malfeasance.

In particular, even good politicians in countries all over the world often enact bad policies because they experience significant social constraints on their efforts to bring about reform. These constraints are shaped by the degree of 'social cohesion' within their country. Social cohesion, shaping the quality of institutions, has important impacts on whether and how pro-growth policies are devised and implemented. A country's social cohesion is essential for generating the confidence and patience needed to implement reforms: citizens have to trust the government that the short-term losses inevitably arising from reform will be more than offset by long-term gains.

Finally, the importance of social cohesion in performing social contracts has been recognized from authors (Gradstein/Justman, 2002) that analyse the direct economic benefits of education as a socializing force, in heterogeneous environment.

From an economic point of view, games theory predicts that cooperative actions lead to higher outcomes than individual decisions.

In this framework, instilling civic virtues from an early age, through education, can reduce the cost of enforcing desirable social norms. Particularly, when society is divided

along ethnic or religious lines, uniform schooling in a common culture can lessen the potential for distributional conflict among distinct social groups.

Indeed, when people has to take decision on a choice, higher is the degree of cooperation between them, higher is the final outcome; the absence of a common culture inhibits the ability of economic agents to interact with each other and undermines the efficiency of production and exchange.

Then, benefits of common socialization call for the role of state schooling in reducing transaction costs by shrinking the "social distance" between individuals in the economy.

Social cohesion is viewed, here, as the nature and extent of social and economic divisions within society.

As such, socially cohesive societies are not necessarily demographically homogenous, but rather ones that "have fewer potential and/or actual leverage points for individuals, groups, or events to expose and exacerbate social fault lines, and ones that find ways to harness the potential residing in their societal diversity (in terms of diversity of ideas, opinions, skills, etc)" (Easterly et. al., 2005).

Here, we are most surely not arguing that social cohesion equals cultural homogeneity or intolerance of diversity; rather, the concept of social cohesion is used, here, to make the general point that the extent to which people work together when crisis strikes or opportunity knocks is a key factor shaping economic performance[1].

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[1] An example is furnished from the South Corean crisis: "Graphic scenes on CNN during the 1997 financial crisis in South Korea neatly illustrates social cohesion in action: everyday citizens were shown tearfully selling their modest family treasures in the belief that their humble contribution was somehow making a difference to the financial health of their country" (Easterly et. al. 2005).

93

3.3 Empirical evidence

Before showing the main results drawn by the literature, some caveats is needed.

The problems of defining social cohesion transfer directly in issues relating its measurement. Mostly, evaluation of societal effects on social cohesion cannot simply be deduced from individual level associations. This is the mostly striking drawback of estimations of social cohesion, based upon characteristics of social capital. At this regard, Hall (1999) provides a clear illustration of this confusion; despite the level of association activities, in United Kingdom, shows an increasing trend over the period 1959-1990, levels of social trust, one of the mostly diffused measure of social capital and social cohesion, seem to have declined in the same period (Table 1).

Table 1 – Social trust and associations

a) Trends in Associational Membership

	1959	1973	1981	1990
All people	0.73	1.15	0.87	1.12
Gender				
Men	1.05	1.46	0.93	1.13
Women	0.43	0.90	0.81	1.11
Education				
Primary	0.60	0.97	0.64	0.67
Secondary	0.88	1.48	0.76	1.04
Post-secondary	1.58	2.05	1.74	2.18
Social class				
Upper-middle	1.13	2.24	1.57	2.15
Non-manual/clerical	0.82	1.36	0.89	1.34
Skilled manual	0.70	1.02	0.63	0.79
Low skilled manual	0.53	1.02	0.57	0.65
Age				
30 or under	0.63	1.14	0.71	0.90
Over 30	0.75	1.16	0.98	1.19

Note: The cells indicate the average number of associational memberships reported by each group.
Sources: 1959: *Civic Culture* survey; 1973: *Political Action* survey; 1981 and 1990: *World Values Survey*.

b) Trends in Social Trust

	Percentage who display social trust		
	1959	1981	1990
All people	56	43	44
Gender			
Men	56	45	46
Women	56	42	42
Education			
Primary	50	37	42
Secondary	64	42	41
Post-secondary	79	60	62
Social class			
Upper-middle	71	58	57
Non-manual/clerical	54	48	45
Skilled manual	55	40	39
Low skilled manual	51	33	38
Age			
30 or under	56	41	37
Over 30	56	45	46

Note: The cells report the percentage among each group responding that 'in general, you can trust other people' rather than 'you can never be too careful', excluding responses of 'don't know', 'it depends' and 'other'.
Sources: 1959: *Civic Culture* survey; 1981 and 1990: *World Values Survey*.

Source: Hall (1999)

The same author points out that "it may be that the character of associational life has changed in such a way that membership in secondary associations is no longer as conducive to trusting relations as it once was…[because] associations dedicated to advancing some common or public interest may have diminished in size, while

94

associations dedicated primarily to the private needs of their members could have grown" (Hall, 1999).

Then, measurements and empirical evaluation of the determinants and effects of social cohesion require the use of specific variables, not necessarily correlated with the social capital theory.

3.3.1 Determinants of social cohesion: education and income inequalities

The above considerations stimulate the use of more specific variables that can better represent the societal level of cohesion; indeed, individual characteristics, as shown above, do not automatically imply correlation at societal level.

Income inequality and educational differentials (see section 1) appear to be strong predictors of the degree of social cohesion; education, in particular, affects social cohesion directly, but also indirectly through its impact on income inequality.

Social cohesion can be measured mainly in two ways; on a side, several indicators are used to infer the degree of socialisation and cooperation, at societal level (Green and Prescott 2005, Knack and Keefer 1997), and, subsequently, aggregate indexes of social cohesion have been created from the same indicators (Green, Prescott and Sabates 2003).

Social trust[2] is generally considered an important property for social cohesion. Consequently it has been measured over a number of years and across many countries.

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[2] Generally, the question used, in the World Value Survey (WVS), to assess the level of trust in a society is: "generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?".
This question has been criticised for its likely bias; indeed, the question does not allow to specify whether the respondent strictly refers to general trust or to trust in acquaintances. Nevertheless, the data obtained from these surveys have been proved reliable in several studies, included the ones presented in his work.

Negative relationship has been found between educational inequality[3] and this measure of social trust (Figure 2), over the period 1980-1990 for the 27 countries, included in the dataset (Green, Prescott 2005).

Figure 2 - Educational inequality and social trust
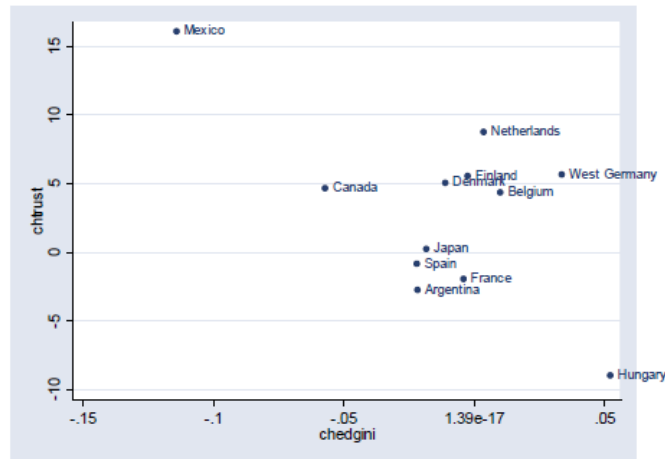
Source: Green, Prescott 2005

The negative correlation between the change in EdGini and the change in trust is of – 0.61, while the regression indicates a strong and negative relationship (coefficient= -92.767) between the two variables (t=2.49).

Even though the presence of some outliers could weaken the power of this result, other analysis confirm the strong and negative relationship between the two variables.

For instance, Knack and Keefer, using the same dataset from the WVS over the period 1980-1991 for 29 market economies, report strong correlation (r = 0.83) between TRUST

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[3] Educational inequality is measured, using, as proxy, either attainments (Green, Prescott, 2005) or enrolment rates (Knack, Keefer, 1997). Attainments are measured by the education Gini, "EdGini", based upon the proportions of the population achieving at seven levels of education (partial-primary, complete primary, partial secondary, complete secondary, partial tertiary, complete tertiary), and is analogous to the conventional measure of income inequality, the Gini coefficient. Enrolments are usually measured from the proportion of people attending the primary and secondary level of education.

and an estimate of average years of schooling for 1980, and note that "education may strengthen trust and civic norms, for example, if ignorance breeds distrust, or if learning reduces uncertainty about the behaviour of others, or if students are taught to behave co-operatively" (Knack, Keefer 1997, p. 1270).

The same study, in order to take into account the broad notion of social cohesion, employs another indicator (CIVIC), standing for the strength of norms of civic cooperation[4], to assess the effect of education and income inequality (Table 2).

Table 2 - Determinant of Trust and Civic Norms

DETERMINANTS OF TRUST AND CIVIC COOPERATION: POLARIZATION

Equation	1	2	3	4
Dependent variable	TRUST	CIVIC	TRUST	CIVIC
Constant	57.938	47.704	25.717	39.883
	(12.108)	(2.112)	(4.645)	(1.710)
GDP80	1.341	0.054	1.776	0.224
	(0.516)	(0.143)	(0.473)	(0.150)
PRIM60	−24.228	−5.509	−25.660	−8.305
	(7.137)	(1.511)	(8.219)	(1.766)
SEC60	17.425	0.906	5.968	1.313
	(9.566)	(2.667)	(9.350)	(2.413)
Gini (income)	−0.453	−0.099		
	(0.173)	(0.027)		
Ethnic			0.349	0.064
homogeneity			(0.107)	(0.023)
Lawyers (1963)			−1.254	0.012
			(0.194)	(0.068)
Adj. R^2	.55	.31	.73	.30
SEE	9.53	1.68	7.32	1.68
Mean, D.V.	35.6	39.4	35.8	39.4
N	28	28	29	29

White-corrected standard errors are shown in parentheses.

Source: Knack, Keefer, 1997

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[4] CIVIC is defined by attitudes toward cooperating with anonymous others in prisoner's dilemma settings; that is, civic norms are defined as those that resolve prisoner's dilemmas without imposing substantial external costs on other parties (unlike cartel arrangements, for example), and are used to proxy the total benefits to society from attaining cooperative outcomes, from a societal standpoint.

Trust and civic norms appears to be stronger in nations with higher and more equal incomes and with better-educated and ethnically homogeneous populations. The effect of income, indeed, is always positive and significant; the effect of secondary education is uniformly positive and always significant, while coefficients for primary education are always negative, but only sometimes significant. The effect of polarization is given by the Gini coefficient for income inequality that is strongly associated with lower trust and civic cooperation (equations 1 and 2).

Despite the above results, civic cooperation is likely to be biased, because of the strength of some groups or associations. In this case, the limits of this variable to directly assess the effect of inequality on social cohesion require further analysis of the likely linkages, at societal level, between education and social cohesion.

At this regard, other indicators have been employed to take into account, for instance, how inequality could decrease political and civil liberties and increase civil unrests.

Green and Prescott (2005) research illustrates, indeed, that the negative relationship between educational inequality and social cohesion can be alleged from the negative correlation between educational inequality and civil liberties (-0.31) and the positive relationship between EdGini and unrests (0.19); surprisingly, in their study, income inequality (Gini) appears to be positively correlated with political liberty (0.31).

In particular, as shown in Figure 3, there is generally a negative relationship between educational inequality and civil liberties, but after an initial decline as educational inequality rises from zero the relationship stabilises and then it drops quickly. There is,

additionally, an income inequality impact on civil liberties with all income inequality terms significantly impacting on this variable (see Appendix, Chart 1).

Figure 3 - Educational Inequality and Political Outcomes

a) Civil Liberties   **b) Unrests**
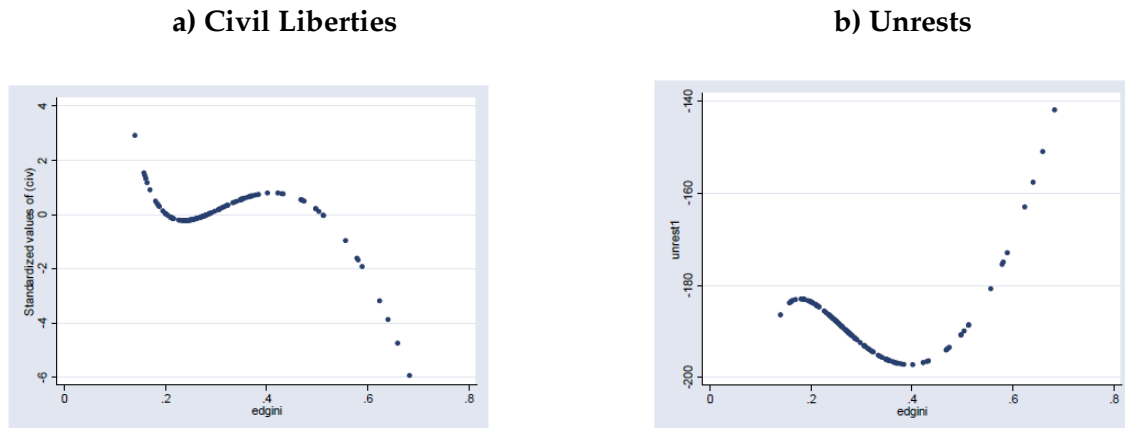
Source: Green, Prescott, 2005

Moreover, educational inequality appears the most significant variable in explaining unrest[5]. Again, there is a non-linear relationship between educational inequality and unrest (Chart 2, Appendix).

Despite the huge pieces of evidence running from inequality to indicators of social cohesion, that relationship could and should be assessed with respect to a more general index, to better take into account the fact that social cohesion must be viewed as a societal phenomenon rather than an outcome of aggregation of individual behaviours.

At this regard, Green, Prescott and Sabates (2003) assemble an aggregate index of social cohesion, from individual indicators. In particular, their aggregate measure of social cohesion includes individual measures for general trust and trust in democracy, for civic

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[5] Unrest is an aggregate variable indicating riots, strikes and demonstrations.

99

co-operation in terms of attitudes to cheating on taxes and public transport, and a measure of violent crime.
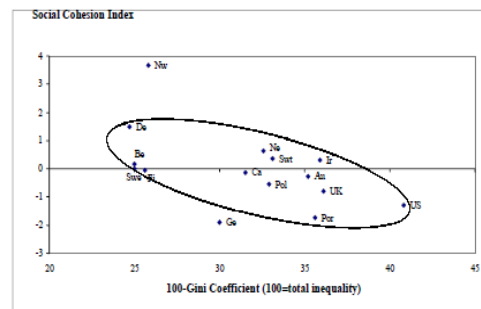
The conclusions of their cross-country analysis seems to confirm the above evidence; that is, educational inequality has a negative effect on social cohesion, both directly and indirectly through its impact on income dynamics (Figure 4).

Figure 4 - Inequality and Social Cohesion Index
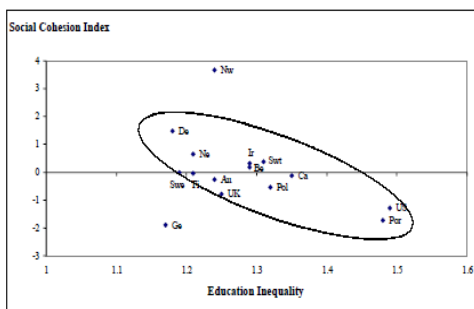
a) Educational Inequality   **b) Income Inequality**

Source: Green, Prescott and Sabates, 2003

Excluding Norway and Germany, a negative and significant correlation of -0.765 has been found between social cohesion and education inequality[6]. Moreover, there appears to be a negative relationship between income inequality and social cohesion; once again, excluding Norway and Germany, a negative and significant correlation of -0.616 exists between these two variables.

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[6] Education inequality, here, is measured as test score ratio; this is the ratio of the mean scores in prose literacy of those who have completed tertiary education to the mean for those with only the basic level of secondary education.

These findings are strictly consistent even to multivariate analysis (see Chart 3, Appendix). Education inequality results as strong predictor of social cohesion (OLScoefficient = -5.34; RR(Robust)coefficient = -5.83).

Moreover, education shows not only a direct impact on social cohesion, but also an indirect effect via income dynamics[7], once income inequality is taken into account.

As a final way to understand the links between education and social cohesion, from a societal point of view, the role of educational outcomes is analysed in terms of quality of institutions and public sentiment towards them.

It is confirmed that education is a strong covariate of the quality of institutions (Glaeser et al. 2004), and has also an indirect effect, through increasing general and interpersonal trust, on the public sentiment towards them (Brehm/Rahn, 1997).

Using several measures of institutions quality and effectiveness and efficiency of government[8], lagged values of education predict improvement in institutional outcomes (Glaeser et. al., 2004).

In particular, nearly all highly educated countries are stable democracies (score= 10), and nearly all stable democracies are highly educated, while nearly all dictatorships are poorly educated (Table 3). Put differently, the lowest education countries are never stable democracies; the highest education countries are generally stable, even though sometimes imperfect, democracies.

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[7] The relationship between educational outcomes and earnings inequality has been long analysed. General results shows a positive effect of education differentials on income inequality; for instance Aghion et al. (1999) give evidence for UK and US that, over the period 1960-1990, wage gaps can be explained in terms of educational and occupational differentials (see Chart 4, Appendix).

[8] The variables used as proxy of quality, efficiency and effectiveness of institutions are: executive constraints, democracy and two measures of autocracy (Autocracy-Polity IV and Autocracy-Alvarez), derived from previous research. Description of these variables is given in the Appendix.

Table 3 - Education and Democracy

Years of schooling (1960)	Democracy = 10	10 > Democracy > 7	7 ≥ Democracy > 2	Democracy ≤ 2	All countries
Low (yrs. schooling < 2.6785)	0	6	8	28	42
Intermediate (2.6785 ≤ yrs. schooling ≤ 5.0115)	2	5	14	3	24
High (yrs. schooling > 5.0115)	17	3	3	0	23
Total	19	14	25	31	89

Source: Glaeser et al., 2004

In more details, initial levels of schooling appears to be strong predictor of improving institutional outcomes over the next five years; moreover, given the weakly predictive power of initial per capita income, these results seem to imply a direct effect of education on institutions (Chart 5, Appendix), not mediated by other variables, such as income, and are strikingly consistent with the Lipset view that high human capital leads to institutional improvement. Indeed, educational levels (i.e. years of schooling) strongly predict improvements in democracy, constraints on the power of small groups and ("executive on constraint"), and limitations in forming autocracies (i.e. autocracy proxies). Some caveats are needed on these measures; in particular "executive on constraints" measure is used to proxy "institutional constraints on the decision making powers of chief executive" (Glaeser et al, 2004). If the theory (see Section 1) views social cohesion, among others, as ability of society to support even bad policies, if temporary, in the spirit of the aggregate benefits, the last measure could appear not actually related to this notion of social cohesion; however, this proxy is devoted to capture the extent by which less concentration of power in the governmental institutions and more control on the actions of the executive make possible the societal cooperation in the public activities, such to determine the public sentiment toward the "common goals".

Finally, education appears to strongly affect sentiments toward public institutions even indirectly, through increasing general and interpersonal trust. Brahm and Rehn (1997) report that education and real income family are strong predictors of their variable "Confidence in Government"; in particular, they find that who trust others have greater confidence in political institutions, and education and income are reliable covariates of trust and confidence in government, indirectly. Further evidence, at this regard, is furnished by Knack and Keefer (1997); in their analysis, trust and education jointly determine the quality of institutions, increasing the bureaucratic efficiency and the confidence in the government, improving the system of property rights and facilitating the enforceability of the contracts (Chart 6, Appendix).

3.3.2 From Social Cohesion to Economic Growth

As illustrated in the section above, several links run from equality, in terms of educational attainments and levels, to social cohesion, defined by both individual and aggregate indexes.

The next step is to assess the impact on economic performance of social cohesion, as measured by ad hoc indexes and proxied by educational and income inequality.

The general result from the literature is that social cohesion and its deep determinants appear to have strikingly positive effects on economic growth. At aggregate level, income and education inequality, as proxy for social and economic division, are negative covariates of economic growth; moreover, this overall picture is consistent with the evidence that more and better education appears to encourage economic growth directly

as well as indirectly through increased social equality and cohesion (see Gylfason and Zoega 2003 for a review of the relationship between education, income and growth).

Using "middle class consensus", as proxy for income inequality, Easterly at al. (2005) define a set of the most and least "cohesive countries", finding that more cohesive societies always grow faster than the less cohesive[9].

Figure 5 - Social Cohesion and Economic Growth
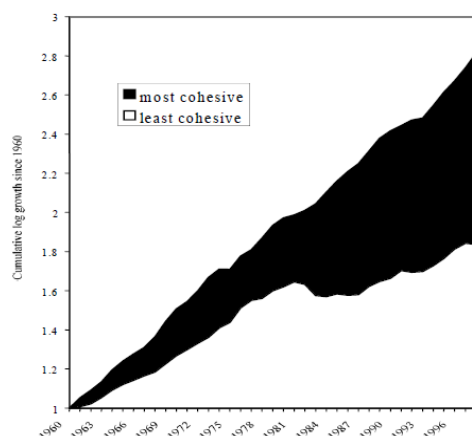
Source: Easterly et al., 2005; Note: Index of per capita income in least cohesive and most cohesive societies (1960=1)

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[9] The "middle class consensus" is a social inequality index that includes the share of income going to the middle 60% of the population; then, the most cohesive are defined those societies in the lower half of ethno-linguistic fractionalization and in the upper half of share of the middle class, and as least cohesive the reverse. The least cohesive countries are: Algeria, Benin, Bolivia, Botswana, Cote d'Ivoire, Ecuador, Gabon, Guatemala, Guyana, Kenya, Malaysia, Morocco, Myanmar, Nepal, Nigeria, Peru, Philippines, Senegal, Sierra Leone, South Africa, Sri Lanka, Sudan, Tanzania, Thailand, Uganda, Zambia, Zimbabwe.
The most cohesive are: Australia, Austria, Denmark, Egypt, Arab Rep., Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Republic of Korea, Luxembourg, Mauritania, Netherlands, New Zealand, Norway, Portugal, Rwanda, Sweden, United Kingdom.
However, while the simple correlation between the Gini coefficient and the "middle class consensus" is high (0.88), there are nonetheless important exceptions. Some countries (e.g. U.S.) have a large middle class but (for rich countries) a high level of inequality; others have low inequality and a small middle class (e.g. Hungary), while still others have a large middle class and low inequality (also for rich countries) (e.g. the Netherlands); nevertheless, the presence of these outliers do not seem affect the overall result of the analysis.

In deeper details, social cohesion have been proved positively related to economic growth, also when its main determinants are considered.

Trust, civic norms and cooperation appear highly positive related to long-run economic growth as well as to long-run Investment/Gdp ratio (Knack and Keefer, 1997); the coefficients of both the variables (i.e. TRUST and CIVIC) are strongly significant and positive, with an effect ranging from 10 to 20% (see Figure 6, Chart 7 in Appendix).

Figure 6 - Trust and Economic Performance
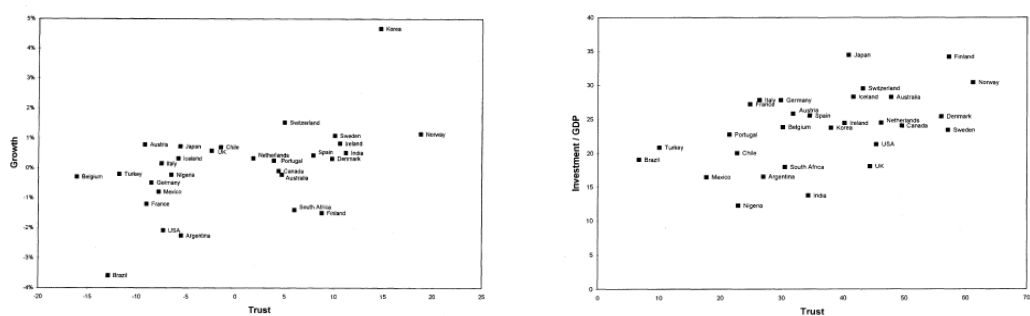
Source: Knack and Keefer, 1997

Considering, then, the role of institutions, it is confirmed (Easterly et al. 2005, Glaeser et al. 2004) the positive impact that equality has on economic growth, through the channel running from social cohesion to higher quality of institutions.

Figure 7 shows that higher quality institutions, measured by the "Rule of Law" proxy, are positively associated with higher average growth rates (Easterly et al., 2005). In particular, better institutions are the outcome of more equal societies, and, in turn, this implies higher growth rates; indeed, higher the level of middle class consensus, higher the quality of institutions (i.e. rule of law), and, in turn, higher the average rate of growth of the GDP.

Figure 7- Equality, Institutions and Growth
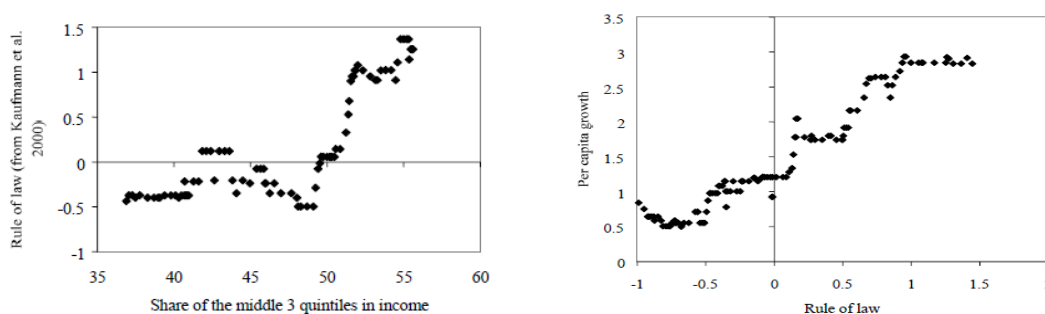
Source: Easterly et al., 2005

The role of human capital accumulation as socio-political rather than only technological determinant of economic growth is, finally, confirmed looking at its impact on the formation of institutions. Stronger "executive on constraints", constraints on decision making powers of chief executives, as well as less autocratic regimes imply higher long-run (1960-2000) growth rates (Glaeser et al., 2004).

In addition, during 1960-2000, better educated countries grown 2 times faster, on average, than low human capital ones, due to the their higher degree of democracy (Table 4); stable democracies, indeed, have grown slightly faster than imperfect democracies, and much faster than dictatorships, on average (Glaeser et al., 2004); moreover democracies present lower dispersion of growth rates than autocracies.

Table 4 - Growth and Political Regimes

Years of schooling (1960)	Democracy = 10	10 > Democracy > 7	7 ≥ Democracy > 2	Democracy ≤ 2	All countries
	Panel A: Number of observations				
Low (yrs. schooling < 2.6785)	6	17	22	87	132
Intermediate (2.6785 ≤ yrs. schooling ≤ 5.0115)	9	21	26	35	91
High (yrs. schooling > 5.0115)	67	10	3	7	87
Total	82	48	51	129	310
	Panel B: Average within-country 10-year growth rate				
Low (yrs. schooling < 2.6785)	0.0036	0.0292	0.0185	0.0076	0.0120
Intermediate (2.6785 ≤ yrs. schooling ≤ 5.0115)	0.0225	0.0224	0.0271	0.0273	0.0256
High (yrs. schooling > 5.0115)	0.0257	0.0212	0.0235	0.0204	0.0247
Total	0.0238	0.0246	0.0232	0.0136	0.0196
	Panel C: Mean standard deviation of the 10-year growth rates across countries				
Low (yrs. schooling < 2.6785)	0.0168	0.0298	0.0224	0.0303	0.0294
Intermediate (2.6785 ≤ yrs. schooling ≤ 5.0115)	0.0161	0.0197	0.0206	0.0317	0.0247
High (yrs. schooling > 5.0115)	0.0137	0.0122	0.0078	0.0250	0.0144
Total	0.0151	0.0225	0.0210	0.0315	0.0254

Source: Glaeser et al., 2004

This picture, joint to the results of the section above, appears to confirm the power of education in fostering economic growth, through improvements in the quality of institutions, used, here, as one of the proxies for social cohesion.

3.4 Conclusion

There are, over time and across countries, relationships between educational and income inequality and social cohesion; likewise, relationships do exist between social cohesion and economic performance.

Despite the complexity of properly narrowing the notion of social cohesion, the literature have significantly advanced in finding suitable definitions, especially in distinguishing enough carefully the idea of social cohesion from the one of social capital. This has implications for the measurement and estimation of social cohesion indexes, their deep determinants, and their effect on the economic and social environment; in particular, using individual indicators to assess the societal level of the social cohesion has been proved problematic. Nevertheless, some of these appear reliable to isolate

some features of social cohesion, and are useful instruments in assembling aggregate index of social cohesion; this is the case of measures such as trust, civic norms and cooperation, institutional quality, and political outcomes. In all these cases, it has been shown that equality, in terms of both educational attainments and participations and income, is a strong predictor of social cohesion. Education equality, especially, fosters social cohesion directly as well as indirectly, through reducing income inequality; education inequality has been shown, indeed, negative correlated to both individual indicators and aggregate index of social cohesion.

Finally, these relationship have been transferred in the analysis of the effect of social cohesion on economic performance. The result is that education fosters economic growth not only from the technological point of view, as predicted by the new growth theories looking at the power of the accumulation of human capital, but also from the social side; education, indeed, reducing income inequality, improving the quality of institutions, increasing general and interpersonal trust, have a strikingly positive effect on economic growth. At this regard, education acts as powerful predictor of economic growth both directly than indirectly, as stated above.

APPENDIX

Chart 1 – Civil Liberties: regression results

	Civlib
Edgini	109.596
	(2.34)*
edgini2	-109.885
	(2.29)*
edginiinv	3.230
	(2.86)**
Gini	-5.422
	(2.81)**
gini2	0.057
	(3.00)**
Giniinv	-1,617.433
	(2.33)*
Gdp	0.001
	(1.16)
gdp2	-0.000
	(1.61)
Gdpinv	3,273.571
	(0.07)
Constant	131.796
	(2.19)*
Observations	56
Number of id	18
R-squared	0.45
Absolute value of t statistics in parentheses	
* significant at 5%; ** significant at 1%	

Source: Green, Prescott 2005; regression analysis referred to Figure 3.

Note: Income Inequality is measured by the Gini index, "gini2" stands for the squared Gini, used to capture likely non-linearities in the relationship, "Giniinv" is the inverse of the Gini index.

Chart 2 – Unrest: regression result

	Unrest
Edgini	-726.344
	(3.58)**
edgini2	802.474
	(3.69)**
edginiinv	-14.170
	(2.85)**
Gini	-2.199
	(0.32)
gini2	0.001
	(0.02)
Giniinv	-2,550.165
	(0.93)
Gdp	-0.002
	(1.49)
gdp2	0.000
	(1.33)
Gdpinv	-115,243.833
	(1.69)
Constant	368.652
	(1.63)
Observations	73
Number of id	18
R-squared	0.38
Absolute value of t statistics in parentheses	
* significant at 5%; ** significant at 1%	

Source: Green, Prescott 2005; regression analysis referred to Figure 3.

Chart 3 - Social Cohesion Index: Regression Analysis

Variable	Model 1 Method OLS[i]	Model 2 Method RR[ii]	Model 3 Method OLS	Model 4 Method OLS
Constant	6.84 (3.91)	7.36 (2.60)*	7.68 (2.07)*	5.59 (2.10)*
Education Inequality	-5.34 (2.85)**	-5.83 (2.02)*	-5.26 (1.96)*	-5.53 (1.93)*
Income Inequality			-0.032 (0.041)	-0.042 (0.047)
Log GNP				0.82 (0.26)*
Education Level				-1.91 (1.08)
No. Observations[iii]	15	15	13	13

Note: Corrected Standard Errors in Parenthesis. (*) means significant at 5% level and (**) means significant at 10 % level. (i) Ordinary Least Squares estimation performed with White corrected standard errors; (ii) Robust Regression estimation using iteratively re-weighted least squares; (iii) For restricted sample, 13 observations, Norway and Germany were excluded.

Source: Green, Prescott, Sabates, 2003

Chart 4 - Education and Income Inequality

BETWEEN-GROUP CHANGES IN WAGES IN THE UK AND THE US

Differential		Late 1960s–Early 1970s		Late 1970s–Early 1980s		Late 1980s–Early 1990s	
		Year	Ratio	Year	Ratio	Year	Ratio
Educational Differentials (males)							
UK	University/no-qualification	1974	1.64	1980	1.53	1988	1.65
US	College/High school	1969	1.49	1979	1.37	1987	1.51
Occupational Differentials (manufact.)							
UK	Non-manual/manual	1970	1.35	1980	1.31	1990	1.49
US	Non-production/production	1970	1.56	1980	1.53	1990	1.64
Age Differentials							
UK	40–49/21–24	1974	1.27	1980	1.29	1990	1.36
US	45–49/20–24	1970	1.76	1980	1.88	1990	2.14

Source: Aghion et. al., 1999

Chart 5 – Education and Quality of Institutions

	Dependent Variables are the five-year changes in political institutions (t+5,t)			

	Change executive constraints	Change autocracy -- Polity IV	Change autocracy -- Alvarez	Change democracy
Years of schooling (t)	0.4975[a]	-0.9092[a]	-0.0958	0.7004[a]
	(0.1191)	(0.1790)	(0.0707)	(0.1804)
Log GDP per capita (t)	0.0382	0.5075	-0.2675	0.2918
	(0.4035)	(0.6295)	(0.2022)	(0.6055)
Executive constraints (t)	-0.5724[a]			
	(0.0716)			
Autocracy -- Polity IV (t)		-0.5471[a]		
		(0.0680)		
Autocracy -- Alvarez (t)			-0.8642[a]	
			(0.1032)	
Democracy (t)				-0.5145[a]
				(0.0650)
Observations	499	499	349	499
R^2	0.33	0.32	0.47	0.30

a=significant at 1 percent; b=significant at 5 percent; c=significant at 10 percent.

Chart 6 - Trust, Education and Quality of Institutions

Equation	1	2	3	4	5	6	7
Dependent variable	Confidence in government (WVS)	Bureaucratic efficiency		Property rights (ICRG)		Contract enforceability (BERI)	
		ICRG	BERI				
Constant	0.626	2.662	2.065	4.812	2.647	1.395	1.266
	(0.074)	(1.244)	(0.755)	(1.102)	(1.100)	(0.281)	(0.318)
GDP80	.0085	0.235	0.134	0.293	0.170	0.065	0.057
	(.0091)	(0.102)	(0.056)	(0.149)	(0.104)	(0.029)	(0.031)
PRIM60	−0.162	2.195	0.750	5.765	6.483	0.054	0.101
	(0.093)	(1.263)	(0.578)	(1.468)	(0.954)	(0.333)	(0.360)
SEC60	−0.215	2.220	0.675	1.938	1.586	0.485	0.465
	(0.145)	(1.412)	(0.964)	(1.847)	(1.507)	(0.426)	(0.421)
TRUST	.0045	0.050	0.018	0.065	0.037	0.015	0.014
	(.0013)	(0.025)	(0.010)	(0.020)	(0.029)	(0.005)	(0.005)
Executive constraint					0.616		0.037
					(0.260)		(0.039)
Adj. R^2	.20	.73	.69	.74	.82	.73	.73
SEE	.096	1.33	.645	1.81	1.51	.324	.324
Mean, D.V.	.605	9.66	4.91	16.3	16.3	2.75	2.75
N	28	29	28	29	29	28	28

Source:Knack and Keefer, 1997

Chart 7: Trust, Civic Cooperation and Economic Performance

Equation	1	2	3	4	5	6	7
Method	OLS	OLS	OLS	OLS	2SLS	OLS	OLS
Dependent variable	Growth 1980–1992					Investment/GDP 1980–1992	
Constant	−0.935	−10.476	−9.593	−2.829	−1.037	9.617	−23.893
	(1.280)	(4.730)	(4.520)	(1.895)	(1.898)	(3.820)	(11.998)
GDP80	−0.361	−0.273	−0.375	0.152	−0.366	0.162	0.273
	(0.131)	(0.126)	(0.127)	(0.274)	(0.127)	(0.403)	(0.364)
PRIM60	6.192	5.930	7.061	4.818	6.270	11.655	13.030
	(1.051)	(1.164)	(1.224)	(1.709)	(1.759)	(3.558)	(3.274)
SEC60	2.194	3.457	1.648	1.256	2.085	−0.431	0.495
	(1.632)	(1.543)	(1.485)	(1.930)	(2.133)	(8.286)	(7.067)
PI80	−3.693	−3.117	−3.535	−3.930	−3.713	−4.435	−3.170
	(0.867)	(1.100)	(0.935)	(0.755)	(0.809)	(1.993)	(2.154)
TRUST	0.082		0.076	0.192	0.086	0.146	
	(0.030)		(0.030)	(0.060)	(0.039)	(0.078)	
CIVIC		0.272	0.207				0.872
		(0.098)	(0.092)				(0.301)
TRUST*GDP80				−0.013			
				(0.006)			
Adj. R^2	.55	.44	.56	.60	.52	.37	.38
SEE	1.37	1.52	1.35	1.29	1.37	4.43	4.38
Mean, D.V.	1.45	1.45	1.45	1.45	1.45	22.4	22.4

Source: Knack and Keefer, 1997

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