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# Luxembourg Income Study Working Paper Series

Working Paper No. 130

Growth, Inequality and Social Institutions

Andrea Brandolini and Nicola Rossi

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**INCOME DISTRIBUTION AND SUSTAINABLE GROWTH  
IN INDUSTRIAL COUNTRIES\***

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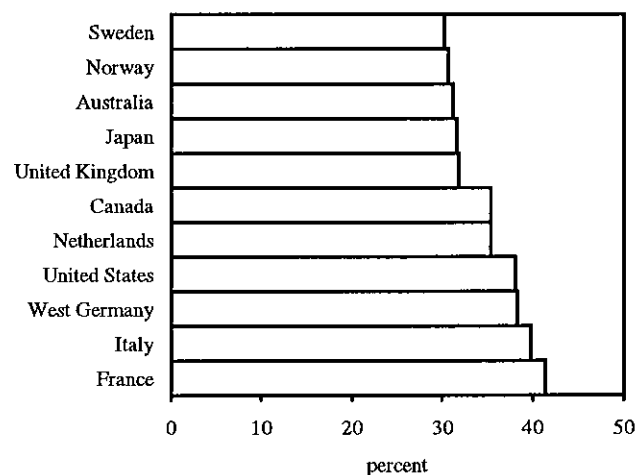
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*“Effective work [in the study of the economic growth of nations] calls for a shift from market economics to political and social economy”  
Kuznets (1955, p. 28)*

## 1. Introduction

In the early 1950s, taking the United States as the yardstick, the degree of concentration of before-tax incomes was lower in Denmark and the Netherlands and higher in Italy and Japan; it was about the same in Canada and Great Britain (Kravis, 1960). Two decades later, around 1970, the share of post-tax income appropriated by the bottom 20 percent of the population ranged between 4 percent in France to about 8 percent in Japan; the corresponding Gini coefficients fell from over 41 percent in France to about 30 percent in Norway and Sweden (Figure 1; Sawyer, 1976). Along with France, Italy, West Germany and the United States showed the highest inequality, whereas the United Kingdom, Australia and Japan shared with the Scandinavian countries the lowest. Scattered information confirm that economic inequality was far from constant in the post-war years. Significant reductions in the concentration of income were observed in Scandinavian countries, as well as in West Germany, Japan and the Netherlands, in conjunction with the extraordinary and prolonged acceleration of growth and near full employment experienced by industrialized countries since the early 1950s.

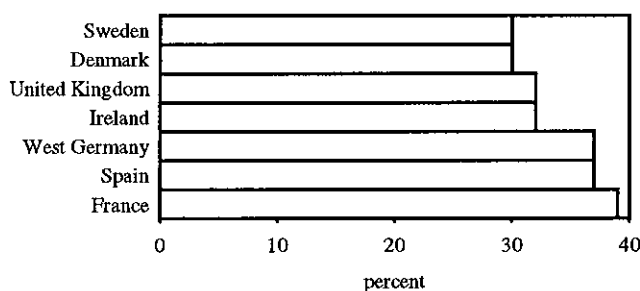
Figure 1: Gini coefficient in OECD countries around 1970



Source: Sawyer (1976), Table 6, p.17.

As for income distribution, growth too was far from uniform, even in those “golden years”. As Maddison (1991) noted, European countries and Japan were able to seize the post-war opportunities more than other countries. In the early 1950s, labor productivity in European countries was about a half of that observed in the United States while, a decade later, it was about six tenths. Interestingly, catching up did not prove to be stronger in poorer countries: among European countries, West Germany and Benelux were apparently better placed for it.

Figure 2: Gini coefficient in OECD countries around 1975



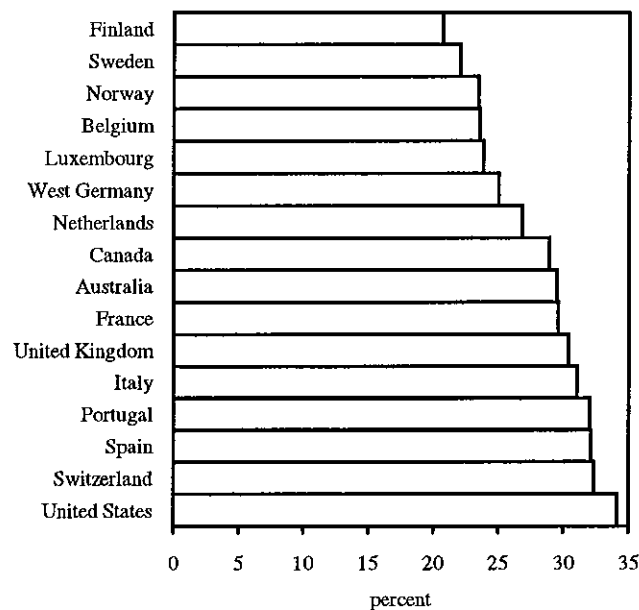
Source: Van Ginneken and Park (1984), Table 1, p.5.

By the early 1970, the “golden age” was coming to an end, to leave way to a rather sluggish performance of both output and employment. Production and productivity leveled off around the secular trend, with several countries experiencing negative growth rates in the 1970s, and again in the early 1980s and 1990s. Unemployment rates almost trebled in the 1980s relative to the 1960s. The ranking in terms of inequality of OECD countries that had not been much different yet in the second half of the 1970s (Figure 2; van Ginneken and Park, 1984), showed some marked difference by mid-1980s, with Anglo-Saxon countries (Australia, Canada, the United Kingdom and, most notably, the United States) moving towards the top of the scale, the Deutsche Mark area approaching the low-inequality Scandinavian countries, and Mediterranean countries (Italy, Spain, Portugal and, to a lesser extent, France) being somewhat in the middle (Figure 3; Atkinson, Rainwater and Smeeding, 1994).

The available evidence (e.g. Gottschalk, 1993; Fritzell, 1993) indicates that the various factors affecting income distribution combined differently across countries in determining the evolution of inequality in the last decade. As a matter of fact, most countries experienced a rise in inequality of *pre-tax and transfer income*, the largest increase in earnings dispersion being in countries with less centralized wage-setting institutions such as the United States. The increasing inequality of labor market outcomes was effectively, if partially, offset by active redistributive policies in countries such as Australia, Canada, France, West Germany and

Sweden. On the contrary, in the United States and the United Kingdom the redistributive impact of transfers and taxes worked in quite the opposite direction. For these two countries, there is evidence that the many changes to the welfare system implemented in the 1980s not only failed to mitigate the underlying market forces, but probably added to them in widening income distribution (e.g. Gramlich, Kasten and Sammartino, 1993; Johnson and Webb, 1993; Atkinson, 1994).

Figure 3: Gini coefficient in OECD countries around 1985



Source: Atkinson, Smeeding and Rainwater (1994).

Previous comparisons are subject to at least two important qualifications. First, the points in time of the figures just mentioned correspond to markedly different macroeconomic conditions. Economic growth and (un)employment levels may be expected to affect the level and trend in absolute and relative earnings as well as the pattern of property incomes, while inflation is quite likely to influence the real value of non indexed sources of income. Second, the statistical information referred to is drawn from heterogeneous sources whose degree of comparability is, if anything, highly questionable - with the partial exception of the data of Figure 3. Nonetheless, abstracting from such issues, the *prima facie* evidence suggests that a major re-ranking might have taken place, with countries of the continental Europe faring much better than the United Kingdom and the United States in terms of income inequality. Interestingly, a similar re-ranking apparently took place with regard to labor productivity, with the United Kingdom approaching the United States leader at a much slower pace than other European followers (notably, the countries of Scandinavia and of the Deutsche Mark area).

Still leaving aside issues of data comparability and divergence in timing of national business cycles, the above long-run trends raise a number of rather important questions concerning the reshuffling of relative positions in income distribution and its link to the economic performance of different countries. Was this performance in any way linked to the state of income distribution prevailing in the aftermath of the Second World War? And was the subsequent evolution of income distribution in different countries a mere consequence of the growth acceleration and slow-down taking place since the 1950s? In other words, did the United Kingdom grow at a slower pace because of its initial rather fair distribution, or did rising inequality in the United Kingdom and the United States lead to lower sustainable growth paths? Did continental Europe rapidly catch-up because of its initial sizeable inequality, or were social policies in continental Europe capable to associate a fairer distribution of income with higher growth? In short, did continental Europe pay a price, in terms of economic growth, for a more egalitarian outcome? And if not, why? These questions have been recently taken up in a number of theoretical papers, questioning the perceived trade-off between equality and growth. The next section selectively (and briefly) reviews these developments to conclude that, although much progress has been achieved, the issue still escapes a general consensus, and it remains in many respects an empirical question. Section 3 submits that issues of conceptual and statistical comparability are essential to the understanding and measurement of the growth-equality relationship and their neglect actually undermines most of the available empirical evidence. Squarely facing the comparability issue, section 4 provides fresh evidence on the subject, drawing on relatively unexplored sources of information. Section 5 summarizes the main results and sketches some policy implications.

## **2. What Does Economic Theory Tell Us About the Growth-Inequality Relationship?<sup>1</sup>**

### *2.1. Setting the problem right*

Before discussing the new theories linking economic growth to income distribution, it is necessary to set the problem at hand in a somewhat more precise way. A useful abstraction, on a theoretical ground, is to distinguish between two key aspects: *i*) the economic mechanism underlying the production of goods (and services), and *ii*) the set of rules governing its distribution among people (Brandolini, 1992). Macroeconomists have been overwhelmingly, if not exclusively, concerned with constructing models describing the economic mechanism;

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<sup>1</sup> This section summarizes issues more rigorously discussed in Brandolini and Rossi (1995).

distributive issues have always been at the margin and, at most, some attention has been devoted to factor shares, which can however hardly be regarded as a proxy for the personal income distribution - as in contemporary industrialized economies the classical identification between income sources and social classes is, to say the least, somewhat blurred. The understanding of the division of the product among people demands to specify the “entitlement rules” which state who receives what and in which proportion. The notion of entitlements rules is broader than that of property rights: it extends to include all those social norms that govern the appropriation of resources without necessarily being set by law (e.g. when primogeniture is the *socially* prevailing way of transmitting wealth between generations in the absence of any specific legislation).

The recognition that the appropriation of the product is governed by rules established, to some extent, outside the purely economic sphere has far-reaching consequences. In the first place, aggregation matters. The inadequacy of the basic hypothesis of (modern) macro-economics, the “representative agent hypothesis”, becomes manifest. If people are different in the extent and manner they are entitled to enjoy the fruits of the economic system, there is much less space to model the aggregate behavior as that of the average agent. To put it differently, if individual saving decisions depend not only on standard economic variables such as income and wealth, but also on the individual’s relative position in the income scale (i.e. the *social status*; see Duesenberry, 1949, and Cole, Mailath and Postlewaite, 1992), the *aggregate* saving cannot be evidently modeled as that of the average individual. The departure from the representative agent hypothesis need not be so radical, however. Focusing on recent analytical contributions on the growth-inequality relationship, the economy’s capacity to save is influenced by the fraction of credit-constrained individuals in theories of capital market imperfections, or by the decision of the median agent (voter) in the new political economy - the minimal, if clever, departure from the average-representative agent hypothesis. In brief, setting the entitlement rules serves a twofold purpose: it determines the personal income distribution and allows its feedback into the economic mechanism.

In the second place, one is forced to think about the different institutional arrangements in a more careful way. A good case in point is provided by the institutional features of unemployment insurance schemes. As argued by Atkinson (1992), unemployment benefits are characterized not only by their amount, but also by “... the conditions under which benefits are paid, their link to labour market decisions, the contributory basis of unemployment insurance, and the limited duration of insurance benefit”; accounting for all these features, may well lead to conclusions about, say, the effect of the scheme on employment, rather different from those



obtained by simply assuming that the benefit is a constant fraction of the wage rate. Extending Atkinson's conclusion to our framework, it is fairly obvious that the definition of such institutional features influences the personal income distribution. This suggests that *i*) the role of the political and administrative forces shaping institutional arrangements as unemployment insurance should be made explicit, and *ii*) the results of models should be seen as conditional on the assumed institutional structure. The contributions of the new political economy to the topics at hand are an intriguing attempt to meet these conditions - with some reservation about the latter.

## 2.2. *Standard neoclassical growth models*

Probing more deeply into the nexus between inequality and growth, the obvious starting point is represented by the class of neoclassical growth models originated by the work of Solow (1956) and Swan (1956). In these models, income distribution has no role in determining aggregate savings, and aggregate savings, in turn, have no influence on the long-run growth of the economy, irrespective of the way the propensity to save is determined, whether exogenously, or as the result of an optimal decision (e.g. Bertola, 1994). As pointed out by Stiglitz (1969, p.384), the independence of aggregate capital accumulation from the distribution is an essential result of the linear relationship between savings and income (or wealth); also adopting Kaldor's (1955-56) hypothesis of a higher propensity to save out of profits than out of wages would not alter the result. In this framework, Stiglitz (1969) showed the existence of an intrinsic tendency of wealth to become more evenly distributed when the economy is on a balanced growth path.

By construction, in the steady-state of Stiglitz's model all per capita variables increase at the *exogenously* determined rate of technical progress, ruling out right at the beginning any influence of aggregate savings. A different perspective is offered by the recently developed theories of "endogenous growth", where accumulation is positively related to the aggregate (optimal) saving rate, paving the way for income distribution to play a role. Consider, for example, the "knowledge spillover" model, one of the simplest in this class: society is supposed to accumulate over time a stock of knowledge whose return cannot be privately appropriated, and spread out across all members of the community. The working hypothesis is that the amount of "received" knowledge is proportional to the stock of physical capital and unfolds by augmenting labor productivity. The production function then shows diminishing returns to labor and capital at the firm level, but it exhibits constant returns to capital in the aggregate.

Under this and other standard hypotheses on the utility function, the higher the economy propensity to save, the more intense is growth.

As the representative agent hypothesis has not been abandoned yet, the distribution of resources is unimportant. The dynamics of wealth inequality, on the other hand, implies that individual wealth paths will endlessly diverge. This, however, does not impede the movement towards an even distribution, whose speed is positively dependent on the propensity to save. In summary, the basic results obtained by Stiglitz (1969) extending Solow's growth model, carry over to the knowledge-spillover endogenous-growth model: in the absence of frictions, there is a tendency of the distribution of wealth (and income) to become more egalitarian; unless aggregate savings cease to be a linear function of income, wealth inequality has no effect on aggregate growth. The latter is the key point: when saving and investment decisions are one and the same - which is the case in the type of growth models we are studying - distribution matters to the extent that wealth is a determinant of people saving behavior. It is then to this last point that we turn our attention.

### *2.3. The political institutions approach*

Stiglitz's framework, whether growth is exogenous or endogenous, focuses on the economic mechanism with perfect markets and identical preferences. With endogenous growth, assuming different preferences is a simple way to make economic performance dependent on wealth distribution. In particular, if the propensity to save rises with wealth, a more unequal wealth distribution leads to higher aggregate investments. This type of class behavior is an easy, if unattractive, way to rationalize the popular idea that higher inequality fosters growth. It hints, however, that, while maintaining equal preferences, mechanisms generating social segmentation (e.g. credit market imperfections) may actually create a link between growth and distribution. Before dealing with this approach, we focus on a second way of departing from the baseline Stiglitz's case, one incorporating a political mechanism in an otherwise perfect market framework.

The endogenizing of political mechanisms with reference to the growth-inequality link is associated with the works by Alesina and Rodrik (1992, 1994), Alesina and Perotti (1993), Bertola (1993), Perotti (1992, 1993, 1994a, 1994b), Persson and Tabellini (1992, 1994), Saint-Paul and Verdier (1992, 1993) and reviewed by Alesina and Perotti (1994).

Consider, for instance, a simple endogenous growth model with overlapping generations, modified to embody redistributive taxation and a political mechanism along the lines suggested by Persson and Tabellini (1992, 1994). Typically, in such models people work

when young and accumulate capital to sustain their consumption when old. Let the tax-benefit structure comprise a direct tax levied on wealth held by the old generation and a uniform benefit paid to the same generation. This system is purely redistributive in the sense that it takes away from those investing more than the average to give to those investing less.

As the tax rate rises, the adverse incentive to accumulation is less and less mitigated from the higher benefit which higher taxes allow to pay. Consequently, the higher the tax rate, the lower the rate of growth of the economy. In the extreme, when the tax rate is unity, all returns from investment are entirely paid as taxes, the incentive to wealth accumulation vanishes - at least to the extent that individuals do not take into account the effect of their behavior on the aggregate stock of capital - and current income is wholly consumed. As no accumulation takes place, the original distribution of wealth persists forever.

It is then clear that individuals have well-defined preferences over the tax-benefit schedule. Understandably, those richer than the average would not levy any tax on wealth, thus maximizing the rate of growth of the economy. On the other hand, a proportion of people with wealth below the average would balance the gain from a wider redistribution with the loss due to the slower growth, choosing a tax rate between zero and unity. Redistribution becomes more and more attractive as individual wealth falls: below a certain threshold (determined by preferences and technology), people are so poor to choose a tax rate equal to unity at the cost of hindering any growth; as a by-product, they would make income distribution among the old perfectly even.

Suppose now that the tax-benefit structure is chosen by a democratic voting process. Since preferences, as just seen, are well-defined and single-peaked, the median voter theorem can be applied. Therefore, the tax rate will be set at the level preferred by the median voter. In the empirically relevant case, wealth (and income) distribution is skewed right and the median is less than the mean. It follows that the closer is median wealth to mean wealth, the lower the tax rate and the higher the rate of growth of the economy. To the extent that the distance between the mean and the median is a good measure of inequality - which is strictly speaking not the case, as shown, for instance, by Wolfson (1994) - Persson and Tabellini can conclude that inequality is harmful for growth.

Persson and Tabellini's conclusion is subject to a series of qualifications. First, it is possible to show that the evolution of the model over time is rank-preserving, implying that the median voter always belongs to the same dynasty. This has the important implication that a tax rate between zero and one eventually chosen by the median voter at time 0 cannot be sustained in the long run (except for a case with probability zero). If the wealth of the median voter

dynasty grows more quickly than the average, the tax rate gradually approaches zero: economic growth tends to a maximum and inequality to a minimum. In the opposite case where the median voter dynasty fails to keep the pace of the average, the economy converges to the no-accumulation and maximum-inequality long-run equilibrium. At the end of the day, what matters is the inequality of the *original* distribution of wealth, its role being limited to select the long-run equilibrium.

Second, the impact of inequality on growth requires a democratic one-person-one-vote system: if political rights are restricted so that the median voter is in the upper half of the population, the link disappears. At the other extreme, it may well happen that the distribution is so skewed to imply a tax rate on wealth above unity, i.e. expropriation of capital. In this case the political mechanism would fail to provide an institutional way out to the distributional conflict, paving the way to changes of governments, changes of regimes and, more generally, political instability, as suggested by Alesina and Perotti (1993) and Perotti (1994a, b).

Third, Persson and Tabellini's result crucially depends on the policy mix as well as on the stage of development of the economy (Perotti, 1992). The result that inequality is bad for growth is also obtained by Alesina and Rodrik (1992, 1994) in a model where capital-income taxation finances the provision of productive ("law and order") public services, but the opposite result is found by Saint-Paul and Verdier (1992, 1993) in a model where public education is funded with non-distortionary taxes. Likewise, Bertola (1993) shows that the rate of growth preferred by capital-poor (with respect to the average) median voters is lower than the social optimum when capital-income subsidies are financed by labor-income taxes, but may well be larger when investment subsidies are financed by indirect consumption taxes (Bertola uses "capital" and "labor" as shorthands for "reproducible" and "non-reproducible" factors, respectively). Perotti (1993), on the other hand, suggests that income distribution affects growth differently in rich and poor economies: in a model combining a political mechanism with imperfect capital markets, preconditions for higher growth are a more even distribution in high-income countries, but concentration of resources in the upper class in low-income countries.

#### *2.4. The social institutions approach*

The starting point of the political institutions approach is that some relevant economic variables are set through a political procedure, which conveys outcomes different from those achieved, for instance, by a social planner. No market failure or coordination problem is

supposed to impair the economic system, and the inequality-growth link stems entirely from the specification of entitlement rules in the form of political rights.

Conversely, the assumption of some kind of market imperfection is at the origin of an alternative approach to the growth-distribution nexus. An extensively studied example (e.g. Galor and Zeira, 1993) is that of an economy where education holds the key to better paid jobs but is costly: if capital market imperfections prevent the worse off from attaining a sufficiently high level of education, preferred skilled jobs could actually be beyond their reach.

More specifically, suppose that people are given the choice between either working as unskilled, or studying to increase their work ability, by paying a positive fee, and then earn the skilled wage rate. Production occurs in two sectors differing for technology, one using capital and skilled labor, the other relying on unskilled labor only. Both sectors are assumed to benefit from the accumulation of knowledge, and in both labor productivity is proportional to the stock of physical capital. Moreover, the education fee is indexed to the skilled wage rate.

In order to have people investing in education, its opportunity cost must be smaller than the wage differential between skilled and unskilled jobs. When such condition is met and all people can borrow any amount at the current interest rate, everybody chooses to study and the model collapses to the simple endogenous growth models discussed in 2. However, in the absence of credit markets, only people with initial wealth higher than the education fee have access to education; the others are forced to work in the unskilled sector. The level of the education fee splits the population into two classes which differ not only in their job status and income, but also in their ability to accumulate physical capital. Such class behavior affects the aggregate wealth dynamics: the higher the employment share of the skilled sector, the stronger the pace of accumulation. Wealth distribution, on the other hand, determines the sectoral composition of the labor force, since skilled workers are all people having at time 0 wealth higher than the education fee. In the long run only the *level* of per capita wealth will differ across people, whereas the *rates of growth* will converge to a common value.

The society turns out to be divided into two broad classes: the “poor”, i.e. people with initial wealth too small to allow them to accumulate human capital, will eventually settle on the lower steady-state; the “rich”, on the other hand, are born with an endowment sufficient to incur the cost of education and their wealth will converge to the upper steady-state. As a result, inequality tends asymptotically to a positive value, the sign of the long-run tendency being dependent on the initial degree of concentration. Two different phenomena are at work: *within-group inequality* is unequivocally diminishing as all the poor, on one side, and all the rich, on the other, are each converging to their respective level of per capita wealth; *between-*

*group inequality*, on the contrary, is bound to persist and, in the end, it will explain all the long-run inequality.

This simple story captures several aspects of the growth-inequality relationship. First, it highlights how the existence of capital market imperfections leads naturally to establish an influence of the distribution of resources on accumulation. In the story, wealth distribution would be irrelevant for the aggregate behavior of the economy was the credit market perfect; in the absence of such market, the distribution matters in that the exclusion of some people from education because of their insufficient initial endowment, lowers the steady state growth rate. The result survives by allowing for some less drastic imperfection. Galor and Zeira (1993) and Torvik (1993) model the imperfection of the credit market as a wedge between the interest rates paid by borrowers and received by lenders, arising from the cost that the latter must incur to avoid defaulting by the former. In Aghion and Bolton (1992, 1993) the imperfection stems from the “debt-overhang problem”, whereby the poor need to borrow more funds than the rich to be able to invest; the higher the repayment they owe to lenders, the less effort they supply to increase the probability of success of their project. Below a certain wealth level, incentives are so distorted that lending is unprofitable, even if these very poor individuals are not necessarily credit constrained as might themselves prefer being lenders rather than borrowers. In Ferreira (1995) loan arrangements require a collateral, which indirectly sets a credit ceiling proportional to borrowers’ wealth. In general, the possibility of borrowing gives rise to a “middle class” made of people whose inheritances are large enough to make education worthwhile, but at the cost of becoming borrowers. However, in the models by Galor and Zeira (1993) and Torvik (1993) the middle class is bound to disappear, as in the long run the offspring of some of its members will succeed and join the rich, while the others will experience a decline in wealth from generation to generation until they join the poor; the relative size of the two groups will eventually depend on the initial wealth distribution. Differently, in the models by Aghion and Bolton (1992, 1993) and Ferreira (1995), under certain conditions, the economy converges to a unique invariant income distribution independent of the initial conditions.

Second, the emphasis on education provides a clear example of how the link between growth and inequality might change with different institutional arrangements. Studies by Glomm and Ravikumar (1992), Bénabou (1992) and Garcia-Peñalosa (1995) examine the issue of private versus public schooling, finding that the latter can yield higher per capita incomes or growth rates when the initial income inequality is sufficiently high. On the other hand, Bénabou (1992) and Fernandez and Rogerson (1994) show that moving from local to national funding of education raises average income. The large international differences in the organization of

educational systems suggest that the impact of inequality on economic performance might greatly vary across countries.

Third, market imperfections need not be limited to capital markets. For instance, Agell and Lommerud (1993) consider a model with imperfect labor mobility across sectors. Because of their locational preferences, workers do not move towards the areas where the modern high productivity firms are based. In the absence of active public policies, competitive wage premia arise and growth is dampened; on the contrary, social institutions taking the form of central bargaining may implement egalitarian wage policies, which compress wage differentials and stimulate labor reallocation from low- to high-productivity sectors. This has the twofold effect of speeding up growth, on one side, and establishing a more even distribution of wages and income, on the other. Acemoglu (1995) analyses a model where matching in the labor market is costly and mobility costs are high. In this framework, more human-capital heterogeneity increases the level of social mismatch and lowers output: as heterogeneity depends on the distribution of income, inequality is harmful for growth. In related work, Bénabou (1994a, b) shows how a high degree of stratification may be brought about by small differences in wealth, even in the absence of capital market imperfections; in turn, local segregation makes income inequality more persistent and slows down growth.

To sum up, market imperfections re-design entitlement rules by restricting differently agents' opportunity sets. From a positive point of view, this means that the development of social institutions aimed at removing market imperfections may simultaneously reduce inequality and raise productivity. From a normative point of view, it paves the way for a positive role of public policies aiming at equalizing opportunities "by letting all agents have access to profitable activities on similar terms" (Aghion and Bolton, 1993, p. 34). At the end of the day, both the "political institutions approach" and the "social institutions approach" regard the relationship between inequality and growth as being negative, but, according to the former, increased inequality translates into a pressure for more redistribution which hurts people's incentives to invest, whereas for the latter it implies that fewer people have access to all investment opportunities. As pointed out by Bénabou (1995), a rather different view of government lays behind the two approaches: public policies are distortionary in the political institutions approach, but lead to positive efficiency gains in the social institutions approach.

### 3. Unequal Inequalities

As the preceding section witnesses, the theoretical debate is hardly over and, as pointed out by Lindert and Williamson (1985, p. 342) is quite likely to persist for at least two reasons: “First, highly politicized debates tend to have long lives. Government policies which involve a possible redistribution of income create opposing self-interests, and each side can be counted on to promote its cause by economic arguments that are hard to falsify. Second, the issue is exceedingly difficult to resolve with evidence. Certainly, the trade-off cannot be assessed by simple correlations between growth and inequality”.

Notwithstanding Lindert and Williamson’s warning, inferences based on simple (cross-country partial) correlations still are the keystone of most empirical studies dealing with the subject and, to some extent, the present paper will not be an exception<sup>2</sup>. Their drawbacks have been outlined elsewhere (Levine and Renelt, 1992) and need not be recalled here except to note that they might be exacerbated in the case at hand. To clarify the issue, it may be worth considering the standard layout of recent empirical studies, whose main ingredient is a Cobb-Douglas production function, augmented to embody human capital  $H_{jt}$  :

$$Q_{jt} = K_{jt}^{\alpha} H_{jt}^{\kappa} (A_{jt} L_{jt})^{1-\alpha-\kappa} \quad (1)$$

where  $Q_{jt}$ ,  $K_{jt}$ ,  $L_{jt}$  and  $A_{jt}$  are the output, the capital stock, the labor input and the efficiency factor, respectively, and  $j$  and  $t$  refers to country and time. If  $k_{jt}$  and  $h_{jt}$  indicate the fraction of output devoted to the accumulation of physical and human capital, respectively, and  $\delta$  the constant (across countries and capital goods, and over time) depreciation rate, in the neighborhood of the steady state path, labor productivity evolves according to the following equation (Mankiw, Romer and Weil, 1992):

$$\ln q_{jt+1} - \ln q_{jt} = \gamma + \left[ 1 - \exp(-\lambda_{jt}) \right] \left[ \ln A_{j0} + \gamma + \frac{\alpha}{1-\alpha-\kappa} \ln k_{jt} + \frac{\kappa}{1-\alpha-\kappa} \ln h_{jt} + \frac{\alpha+\kappa}{1-\alpha-\kappa} \ln(n_{jt} + \gamma + \delta) - \ln q_{jt} \right] \quad (2)$$

where  $\lambda_{jt} = (n_{jt} + \gamma + \delta)(1-\alpha-\kappa)$  and the “time length” between observations has been normalized to unity. In equation (2), the difference (in brackets) between steady state labor

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<sup>2</sup> Barro (1991) and Barro and Lee (1994) are probably among the best examples in the field at large. Cross-country evidence on the growth-equality trade-off based on reduced-form regressions is provided by Alesina and Perotti (1993), Alesina and Rodrik (1992, 1994), Clarke (1992), Perotti (1992, 1994a, 1994b) and Persson and Tabellini (1992, 1994).



productivity and its current value affects the future labor productivity growth rate and induces “conditional convergence” toward the stochastic (across countries and over time) steady state equilibrium path, given by a linear function of the population growth rate, the time trend and suitable proxies for the investment rates in physical and human capital. Augmented versions of equation (2) allow for an efficiency variable  $A_{j0}$ , depending (directly or indirectly) not only on exogenous technological progress, but also on additional variables such as measures of the role of the public sector in the economy, the degree of openness of the domestic economy to foreign trade, political instability, or, finally, economic inequality.

Equation (2) does not imply a specific time unit. As pointed out by Cellini (1994), neoclassical growth models embody, in the econometric terminology, an “error correction mechanism”, whereby convergence toward the steady state occurs if  $-1 < -[1 - \exp(-\lambda_{jt})] < 0$ ; this mechanism is operative whatever the time unit<sup>3</sup>. In particular, nothing prevents us from abandoning the usual practice of looking at long-term averages and exploiting, if the relevant information is available, the wealth of information embodied in higher frequency data<sup>4</sup>.

The important point to notice is that the constant term of the linear functions defining steady state labor productivity allows for country-specific effects as well as for time-specific effects. The latter may be accounted for, in principle, by the term  $\gamma t$ , while the former are embodied in the term  $\ln A_{j0}$ , which approximates the initial state of the technology and all the unobserved elements determining the efficiency of production. In this setting, country-specific effects (including the structure of taxation, the regulation of international trade, the provision of public services) may well be correlated with the other explanatory variables considered in the model<sup>5</sup>.

When confined to cross-sectional data, the above setup is bound to ignore country-specific effects, while time-specific effects become irrelevant and the story told by equation (2) boils down, in the simplest case, to a simple regression of average (per capita or per worker) productivity growth rates against average population growth rates, initial physical and human capital proxies and initial productivity levels.

Consider now augmenting the above simplified set-up with measures of income distribution. First, different theoretical views of the growth-inequality relationship imply

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<sup>3</sup> The logical time unit of models such as Persson and Tabellini's (1994) is usually taken to be a generation. However, when dealing with aggregate data, time lags may lose their original meaning and the growth-inequality relationship may show up also over relatively shorter periods of time. In such a case, taking long-run averages may be a very inappropriate way of filtering short-run dynamics.

<sup>4</sup> Actually, long-term averages are quite likely to imply time-aggregation biases.

<sup>5</sup> Cellini (1994) and Knight, Loayza and Villanueva (1993) explicitly account for country specific effects in testing the neoclassical theory of economic growth. They do not deal, though, with the growth-inequality issue.

different concepts of the distribution of economic resources (e.g. wealth vs. income, inequality vs. polarization). Second, measures of the distribution of economic resources within a given population may widely differ as to: *i*) the definition of economic resource, *ii*) the unit of analysis, *iii*) the degree of comparability across basic units, and *iv*) the implied attitude towards inequality. Consequently, cross-sectional analyses are quite likely to mix up measures of inequality whose degree of (logical and statistical) comparability is, if anything, highly questionable. As a result, the cross-country variability of inequality measures may simply account for country-specific effects ruled out by assumption in the cross-sectional context<sup>6</sup>.

In short, the (conceptual and statistical) heterogeneity of inequality measures should be taken seriously and full comparability insured whenever possible. This rather difficult task has been recently made possible by the important work undertaken since the early 1980s at the “Luxembourg Income Study” (LIS). The LIS group has assembled and, as much as possible, homogenized national micro-datasets to create a unified database for household incomes<sup>7</sup>. Using the LIS database, possibly in conjunction with country studies, Gottschalk (1993), Atkinson, Rainwater and Smeeding (1994), Fritzell (1993), and Gottschalk and Smeeding (1995), among others, have recently provided insightful analyses of distributional changes in a number of OECD countries, attempting also to trace the causes of such changes. In the following sections we will hopefully shed further light on the growth-inequality debate by applying, first, the standard cross-sectional time-averaged methodology to the LIS database, and exploiting subsequently the panel information coming from national sources. It is worth underlying that for the reasons explained above, we regard the first research strategy as hardly informative and report the relevant results mostly for comparative purposes.

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<sup>6</sup> For instance, the “political institutions approach” actually refers to *polarization* (see Wolfson, 1994) rather than truly *inequality* measures of the distribution of *wealth* among individuals. In testing that approach, though, the literature thoughtlessly uses *polarization* and *concentration* measures of (personal or family) *income* before tax. Moreover, it is sometimes recognized that income units and income concepts may vary across countries. No wonder, then, if adding continental dummies to cross-country regression washes out the effect of income distribution. The comparability issue is explicitly recognized by Perotti (1994b), who attempts to adjust inequality figures to ensure partial comparability, at least as far as the definition of recipient unit and the coverage of the underlying survey are concerned. The supposedly higher degree of comparability apparently allows him to pinpoint more precisely the impact of income distribution on growth.

<sup>7</sup> The LIS project began in 1983 under the joint sponsorship of the government of Luxembourg and the Center for Population, Poverty and Policy Studies (CEPS). It is now funded on a continuing basis by CEPS/INSTEAD and by annual contributions of its member countries. Membership includes countries in Europe, North America, Asia and Oceania. The database contains information for over 25 countries for one or more years, ranging from 1960 to 1993.

## 4. Empirical Evidence

### 4.1. The LIS database

Standardized income inequality measures are provided in Atkinson, Rainwater and Smeeding (1994) for 17 OECD countries (sometimes for more than one year) and lend themselves naturally to analyses of the kind attempted by Alesina and Rodrik (1992, 1994), Persson and Tabellini (1992, 1994) and Perotti (1994a, b) estimating a reduced form relationship between some inequality measure at some point in time and the subsequent average growth rate of GDP per capita.

As all countries in the sample are, undoubtedly, democracies, the LIS database provides an ideal environment to test the political institutions channel, which should entail a negative relationship between (initial) inequality and (subsequent) growth. At the same time, all countries in the sample possess sufficiently developed capital markets, which makes it unlikely that a correlation between equality and growth comes from this channel. As the countries in the sample have rather different institutional structures as well as standard of social policy, the social institutions approach should emerge only with selected sections of the sample.

In the following regressions, based on an augmented linear unrestricted version of (2),

$$\begin{aligned} \ln(q_{jt}/q_{jt-5}) = & \pi_0 + \pi_1 t + \pi_2 \ln k_{jt-5} + \pi_3 \ln h_{jt-5} \\ & + \pi_4 \ln(n_{jt-5} + 0.05) + \pi_5 G_{jt-5} + \pi_6 \ln q_{jt-5} \end{aligned} \quad (3)$$

two alternative measures of income inequality ( $G_{jt-5}$ ) have been considered: *i*) a summary measure of inequality (namely, the Gini coefficient, Table 1), and *ii*) the income share of the third quintile of the distribution (Table 2). Their sampling date (reported in the Appendix) varies by country and, sometimes, more than a sampling date is available for a few countries. In general, information can be grouped around 1979 and 1984, that are right at the start of the five-year periods over which the dependent variable, the growth rate of GDP per worker, was computed. In addition to a time dummy ( $t$ ) and a constant term, the regression included (in logarithm) the level of GDP per worker ( $q_{jt-5}$ ), the share of fixed investment over GDP ( $k_{jt-5}$ ), the share of the relevant age group attending secondary school in the same years ( $h_{jt-5}$ ), the sum of the rate of growth of population ( $n_{jt-5}$ ), of the rate of technological progress and of the rate of depreciation (guess-estimated at 0.05).

Table 1: Estimates of equation (3). Income distribution variable: Gini coefficient. LIS database.

	Heteroskedasticity adj.	Error in variables	Robust regression
constant ( $\hat{\pi}_0$ )	0.2040 (0.1057)	0.2008 (0.1894)	0.4977 (0.0827)
time dummy ( $\hat{\pi}_1$ )	0.0035 (0.0008)	0.0035 (0.0008)	0.0023 (0.0007)
Gini coefficient ( $\hat{\pi}_2$ )	0.0016 (0.0611)	0.0063 (0.2400)	0.0508 (0.0478)
initial labor productivity ( $\hat{\pi}_3$ )	-0.0299 (0.0097)	-0.0297 (0.0133)	-0.0562 (0.0076)
R-squared	0.5312	0.5312	-
Root Mean Squared Error	0.0128	0.0128	-
No. of observations	27	27	27

Out of the several variables included, only the initial level of GDP per worker, the time dummy (catching time-specific effects) and the constant survived the initial specification search. Tables 1 and 2 therefore report the restricted estimates allowing for White's (1980) heteroskedasticity consistent standard errors in the first column, Greene's (1993) error-in-variables adjustment in the second column, and a treatment of outliers as suggested by Li (1985) in the third column.

Table 2: Estimates of equation (3). Income distribution variable: income share of 3rd quintile. LIS database.

	Heteroskedasticity adj.	Error in variables	Robust regression
constant ( $\hat{\pi}_0$ )	0.2296 (0.1025)	0.3094 (0.1719)	0.4781 (0.0870)
time dummy ( $\hat{\pi}_1$ )	0.0035 (0.0008)	0.0034 (0.0008)	0.0027 (0.0007)
income share 3rd quintile ( $\hat{\pi}_2$ )	-0.2388 (0.3431)	-1.0154 (1.4080)	-0.1263 (0.2922)
initial labor productivity ( $\hat{\pi}_3$ )	-0.0280 (0.0097)	-0.0217 (0.0146)	-0.0519 (0.0083)
R-squared	0.5408	0.5723	-
Root Mean Squared Error	0.0126	0.0122	-
No. of observations	27	27	27

As Tables 1 and 2 show, the coefficients of the basic variables (that is the time trend and the catch-up variable) have the expected sign, are reasonably significant and explain a large fraction of the variance in growth. However, contrary to recent literature, neither the Gini coefficient, nor the income share of the third quintile play a significant role in the regressions; if anything, both income distribution variables seem apparently to revive the time honored growth-equality trade off. As the second and third columns of Tables 1 and 2 indicate, the disappointing result cannot be imputed to measurement errors in the inequality indicators, nor to few outlying observations, while reverse causation is clearly ruled out by the timing of the

variables involved. In addition, it is worth noting that the zero impact of income inequality on growth is not a consequence of investment playing a major role in the regression - which would be the case if inequality affected growth through accumulation - as the share of fixed investment never survived the specification search.

In short, when inequality measures are selected so as to ensure a reasonable degree of comparability (and rule out spurious country-specific effects), the following points are worth noting: *i*) simple (cross-section partial) correlations do not support the idea that growth should be inversely related to inequality, *ii*) if anything, income inequality at the start of the period has a positive effect on subsequent growth. In the light of previous remarks on the informational content of the LIS database, these results appear as particularly damaging for the “political institutions approach” which would have implied a significantly negative impact of initial inequality on growth.

#### 4.2. National sources

A viable alternative to the standardized LIS database is given by national sources providing inequality measures possibly heterogeneous across countries, but homogeneous over time in a given country. As Table A.1 suggests, the statistical information available to us translates into an unbalanced panel extending over 9 developed countries (Australia, Canada, Finland, West Germany, Italy, Norway, Sweden, the United Kingdom and the United States) and, on average, over a 23-year period, from the late 1960s to the early 1990s.

The results of estimating equation (2) on the whole sample by OLS, allowing for fixed effects, are reported in Table 3, column (i)-(iii)<sup>8</sup>. It should be noticed that the (linear unrestricted) estimated version of equation (2) adds to the basic specification the inequality measure (as given by the Gini coefficient) and the (logarithm of the) share of government consumption over GDP ( $g_{jt}$ )<sup>9</sup>, and it allows for a number of differenced regressors designed to “filter” the short-run movements of labor productivity:

$$\ln(q_{jt}/q_{jt-1}) = \pi_0 + \pi_1 t + \pi_2 \ln k_{jt-1} + \pi_3 \ln h_{jt-1} + \pi_4 \ln(n_{jt-1} + 0.05) + \pi_5 G_{jt-1} + \pi_6 \ln q_{jt-1} + \pi_7 \ln g_{jt-1} + \pi_8 \Delta \ln k_{jt} + \pi_9 \Delta \ln h_{jt} + \pi_{10} \Delta \ln(n_{jt} + 0.05) + \pi_{11} \Delta G_{jt} + \pi_{12} \Delta \ln g_{jt} \quad (4)$$

<sup>8</sup> Allowing for fixed effects as in Table 3 may result in inconsistent estimators because of the presence of a lagged dependent variable in the right-hand side of the regression equation. The asymptotic bias of the fixed effects estimator neatly shows up in the typical situation in which a panel involves a large number of individuals (or, for that matter countries), but over only a short period of time. This is not the present case, though, and the bias might well be ignored.

<sup>9</sup> The degree of openness of the economy failed as an additional regressors, while lack of data prevented the use of political instability indicators.

where all other variables are defined as before. In Table 3, column (i) reports on the estimation of equation (4) in its basic version; column (ii) presents its augmented version; and, finally, column (iii) constraints to zero a few badly determined coefficients. As before, White's (1980) corrected standard errors take care of heteroskedasticity.

Table 3: Estimates of equation (4). Whole national sample. Heteroskedasticity corrected standard errors. Fixed effects.

	Specification (i)	Specification (ii)	Specification (iii)
- constant ( $\hat{\pi}_0$ )	0.7289 (0.2153)	0.4278 (0.1943)	0.3708 (0.1792)
<i>Long-run effects:</i>			
- time trend ( $\hat{\pi}_1$ )	0.0012 (0.0005)	0.0007 (0.0004)	0.0004 (0.0004)
- physical capital ( $\hat{\pi}_2$ )	0.0067 (0.0151)	0.0186 (0.0135)	0.0217 (0.0132)
- human capital ( $\hat{\pi}_3$ )	-0.0172 (0.0132)	-0.0153 (0.0105)	
- population growth ( $\hat{\pi}_4$ )	-0.0392 (0.0157)	-0.0480 (0.0106)	-0.0529 (0.0108)
- income distribution ( $\hat{\pi}_5$ )	-	-0.0136 (0.0575)	0.0054 (0.0522)
- initial labor productivity ( $\hat{\pi}_6$ )	-0.0821 (0.0206)	-0.0584 (0.0180)	-0.0527 (0.0165)
- government consumption ( $\hat{\pi}_7$ )	-	-0.0335 (0.0184)	-0.0288 (0.0171)
<i>Short-run effects:</i>			
- physical capital ( $\hat{\pi}_8$ )	0.2251 (0.0238)	0.0922 (0.0186)	0.0939 (0.0185)
- human capital ( $\hat{\pi}_9$ )	-0.0048 (0.0236)	0.01178 (0.0190)	-
- population growth ( $\hat{\pi}_{10}$ )	-0.0443 (0.0112)	-0.0580 (0.0124)	-0.0603 (0.0123)
- income distribution ( $\hat{\pi}_{11}$ )	-	0.0438 (0.0689)	-
- government consumption ( $\hat{\pi}_{12}$ )	-	-0.5733 (0.0472)	-0.5030 (0.0522)
R-squared	0.6072	0.8158	0.8132
Root Mean Squared Error	0.0171	0.0118	0.0118
No. of observations	201	201	201

With the exception of the human capital proxy, equation (2) seems to track reasonably well the movements of labor productivity. Abstracting from short-run effects, as in other recent works on the subject, a conditional convergence effect (as given by  $\hat{\pi}_6$ ) shows up quite strongly, together with a positive effect on growth of a high ratio of investment to GDP ( $\hat{\pi}_2$ ), a negative effect of population growth ( $\hat{\pi}_4$ ) and a negative effect from overly large government ( $\hat{\pi}_7$ ). However, income distribution (as measured by the Gini coefficient) always makes a very poor showing, strongly suggesting that, *prima facie*, the steady state equilibrium path of labor productivity does not depend on income inequality and, if it does, it does as 19th century economists used to think: the coefficient  $\hat{\pi}_5$  is never significant and takes positive as well as negative values.

Table 4: Estimates of equation (4). Sensitivity analysis. Whole sample. Fixed effects.

	Error in variables	Robust regression	Weighted regression
- constant ( $\hat{\pi}_0$ )	0.3265 (0.5436)	0.3702 (0.1809)	-
<i>Long-run effects:</i>			
- time trend ( $\hat{\pi}_1$ )	0.0004 (0.0009)	0.0004 (0.0004)	0.0011 (0.0004)
- physical capital ( $\hat{\pi}_2$ )	0.0200 (0.0240)	0.0228 (0.0143)	0.0760 (0.0198)
- human capital ( $\hat{\pi}_3$ )	-	-	-
- population growth ( $\hat{\pi}_4$ )	-0.0520 (0.0148)	-0.0439 (0.0101)	-0.0529 (0.0122)
- income distribution ( $\hat{\pi}_5$ )	0.0355 (0.3533)	0.0138 (0.0541)	0.0228 (0.0608)
- initial labor productivity ( $\hat{\pi}_6$ )	-0.0487 (0.0491)	-0.0479 (0.0162)	-0.0573 (0.0161)
- government consumption ( $\hat{\pi}_7$ )	-0.0249 (0.0483)	-0.0157 (0.0199)	-0.0270 (0.0272)
<i>Short-run effects:</i>			
- physical capital ( $\hat{\pi}_8$ )	0.0943 (0.0168)	0.0965 (0.0165)	0.2020 (0.0233)
- human capital ( $\hat{\pi}_9$ )	-	-	-
- population growth ( $\hat{\pi}_{10}$ )	-0.0599 (0.0103)	-0.0461 (0.0094)	-0.0609 (0.0132)
- income distribution ( $\hat{\pi}_{11}$ )	-	-	-
- government consumption ( $\hat{\pi}_{12}$ )	-0.0566 (0.0636)	-0.5938 (0.0417)	-0.3678 (0.0560)
R-squared	0.8132	-	0.8521
Root Mean Squared Error	0.0118	0.0118	0.0104
No. of observations	201	201	201

This result is not driven by measurement errors in the inequality indicator, nor by one or two outliers. Table 4, column (i), allows for mis-measurement in the Gini coefficient: the implied downward bias in the estimate of the coefficient of the inequality indicator does not appreciably change the results. Accounting for a few outliers, as in column (ii), casts doubts on the role of government consumption but yields estimates otherwise quite close to the OLS ones. Finally, column (iii) applies weighted-least-squares (with weights inversely proportional to population) to further investigate the issue of heteroskedasticity, again without changing the substance of the results. In all cases,  $\hat{\pi}_5$  would entail a growth-equality trade-off, but it is never significantly different from 0.

In brief, when inequality measures are observed over time so as to allow country dummies to capture differences in sources, definitions and measurement, we confirm all the relevant results found using the LIS database, namely that there is no evidence of a negative effect of inequality on growth - which is, if anything, positive - and that there is little support for the political institutions approach, although it should be recognized here that in Table 4 the impact of income inequality might well be captured by the role of investment in physical capital.

Should this evidence be taken as conclusive? Notwithstanding Tables 1 to 4, the answer is negative. In particular, the empirical evidence discussed above, while raising doubts on the political institutions approach, does not do justice to the social institutions approach, which, as noted, may be expected to have results depending on the institutional context. This, as a matter of fact, is the message of Table 5, where the estimates of equation (4) for different subsamples are reported.

Table 5: Estimates of equation (4). National subsamples. Heteroskedasticity corrected standard errors. Fixed effects.

	Europe	North America and Oceania	Continental Europe	North America UK and Oceania	Scandinavia
- constant ( $\hat{\pi}_0$ )	0.440 (0.217)	1.102 (0.424)	0.433 (0.241)	0.969 (0.310)	0.797 (0.168)
<i>Long-run effects:</i>					
- time trend ( $\hat{\pi}_1$ )	0.001 (0.001)	-0.002 (0.001)	0.000 (0.001)	0.001 (0.001)	-
- physical capital ( $\hat{\pi}_2$ )	0.028 (0.013)	-	0.033 (0.015)	0.052 (0.021)	0.041 (0.014)
- human capital ( $\hat{\pi}_3$ )	-	0.090 (0.037)	-	-	0.124 (0.040)
- populat. growth ( $\hat{\pi}_4$ )	-0.067 (0.015)	-0.099 (0.019)	-0.071 (0.015)	-	-
- income distrib. ( $\hat{\pi}_5$ )	-0.105 (0.066)	1.154 (0.174)	-0.186 (0.070)	0.167 (0.081)	-0.099 (0.068)
- initial lab.prod. ( $\hat{\pi}_6$ )	-0.067 (0.023)	-0.185 (0.046)	-0.063 (0.026)	-0.095 (0.029)	-0.067 (0.015)
- govt.consumpt. ( $\hat{\pi}_7$ )	-0.063 (0.024)	-0.078 (0.023)	-0.061 (0.027)	-	-
<i>Short-run effects:</i>					
- physical capital ( $\hat{\pi}_8$ )	0.069 (0.020)	0.173 (0.018)	0.057 (0.020)	0.172 (0.023)	0.035 (0.016)
- human capital ( $\hat{\pi}_9$ )	-	-0.133 (0.067)	-	-	-
- populat.growth ( $\hat{\pi}_{10}$ )	-0.067 (0.014)	-0.094 (0.024)	-0.069 (0.014)	-0.041 (0.022)	-0.052 (0.021)
- income distrib. ( $\hat{\pi}_{11}$ )	-	-	-	-	-
- govt.consumpt. ( $\hat{\pi}_{12}$ )	-0.643 (0.061)	-0.334 (0.055)	-0.703 (0.063)	-0.398 (0.058)	-0.771 (0.048)
R-squared	0.8187	0.8896	0.8443	0.8285	0.8802
Root Mean Squared E.	0.0115	0.0096	0.0111	0.0112	0.0096
No. of observations	141	60	112	89	59

In particular, columns (i) and (ii) in Table 5 split the sample between European and non-European countries and show that equation (4) provides a reasonable description of the evolution of labor productivity in both subsamples. Conditional convergence is apparently slower in Europe, where the economy moves half-way to the steady state in about 7 years as opposed to less than 3 years in the case of North America and Oceania (given the formula for  $\lambda$ , these estimates look rather sensible). Moreover, the impact of basic determinants of the steady state growth path is largely comparable among the two areas, with one single (and striking) exception: income distribution. In fact, Gini coefficients apparently play opposite roles: higher inequality leads to lesser growth in Europe, and to higher growth in North



America and Oceania. Notice also that income distribution affects productivity growth in both areas notwithstanding the significant contribution of the share of fixed investment in all regressions. However, as columns (iii) and (iv) of Table 5 suggest, geography might not be the root of the problem, the watershed being not the Atlantic Ocean, but possibly the social institutions and norms prevailing in continental Europe as opposed to Anglo-Saxon countries.

In short, different subsamples tell largely different and conflicting stories, which offset each other in the whole sample. The equality-growth trade off seems to be alive and well in English-speaking countries (especially, in the United States) while equality seems to be conducive to growth in Europe, most notably in continental Europe. Interestingly, as column (v) of Table 5 shows, the latter finding does not depend on the performance of the Scandinavian countries. Our estimates suggest that a 5 to 10 percentage point decrease in the Gini coefficient might well lead to a percentage point increase in steady state labor productivity in the nations of continental Europe. The opposite result would prevail in the Anglo-Saxon countries, with a 5 percentage point increase in the concentration index stimulating growth by one percentage point.

Coefficient estimates also hints that the way income equalization is arrived at may be crucial, since in continental Europe the positive impact of equality on growth is partially offset by the negative effect of government consumption. In other words, while suggesting that social institutions increasing the size of government may imply lower growth rates, the above evidence clearly indicates that public spending (possibly on social transfers) may actually be growth-enhancing. In this respect, however, we fully endorse Atkinson's (1995) view: what matters most is the fine institutional structure which, eventually, sets the balance between distributional outcomes and public finance implications.

## **5. Concluding Comments**

Empirical work on the growth-inequality relationship is, admittedly, difficult. The typical problems arising from the limited amount of information available on long-term growth compound with a host of statistical and methodological issues plaguing the measurement of inequality. We explicitly tackled these difficulties by adopting two strategies, the first favoring a high degree of comparability across countries, the second exploiting the gains from using inequality measures homogeneous over time at the country level. In this respect, our approach is likely to improve over the existing empirical literature, but we hardly need to stress that our

results, as suggestive as it might be, are far from conclusive. More important, the information content of reduced-form regressions is very limited, calling for further research of a more structural nature. In particular, highly-stylized analyses as the one performed here have to be integrated and substantiated with the wealth of information, now available for many countries, produced by researchers investigating the many aspects of the evolution of income distribution over time.

Nevertheless, some concluding, if speculative, comments are in order. In the face of the relatively homogeneous nature of the political institutions and the similar placing in the international per capita income scale of the countries in our sample, the evidence presented in the previous sections does not lend much support to the political economy explanation of the growth-inequality link and suggests that the emphasis recently placed on political institutions might be partly misplaced. The markedly different response of economic performance to changes in the distribution of income across countries calls for a broader view: the observed wide differences in social institutions characterizing different countries might be a useful starting point.

In reviewing the European performance after World War II, Eichengreen (forthcoming) remarks that European "... post-World War II growth benefited from the presence of institutions singularly well suited to reconstruction and growth. Those institutions solved commitment and coordination problems in whose presence neither wage moderation nor the expansion of international trade could have taken place". He adds that institutions were not equally apt to the needs of growth in all European countries and "these different institutional responses go a fair way toward accounting for variations across countries and over time in European growth performance". Eichengreen's idea that institutions are a device to create credible commitments points to the role of long-term contracts, social pacts between labor, management and government, statutory wages and price controls, centralization of sectoral wage negotiations as "mechanisms used to precommit unions to wage moderation and to thereby induce management to invest". The paramount importance of social institutions permeates also Crafts and Toniolo's (1995) view of the European post-war economic performance. As they put it, "in order to take full advantage of the adaptation of American technologies to European conditions, business and trade union practices had to be adjusted accordingly". Cooperative labor relations and a commitment to welfare-state provisions were instrumental in moderating wage demands, thereby creating the preconditions for a macroeconomic equilibrium in which an increasingly fairer income distribution ended up being associated with high rates of growth in output and productivity.

When, around 1970, it became less and less feasible to sustain the distributive environment that had made possible high investment rates and high productivity growth, the post-war social pact began to crumble in a number of European countries (notably, France and Italy) and the institutions developed to solve the post-war commitment and coordination problems only went half-way to meet the new circumstances, showing a lack of flexibility which possibly contributed to the dramatic rise of unemployment and the decline of labor-force participation rates. Nevertheless, as Freeman (1994) forcefully argues, in the 1970s and 1980s European labor institutions and social protection schemes were apparently still better suited than North American ones for improving productivity. In particular, Germany (and Japan) outperformed the United States, still preserving a significant institutional presence in market adjustment. Institutions preventing excessive market failures, mandating cooperative attitudes, insuring people against extreme fluctuations fostered growth and did not reduce it.

Drawing policy lessons from this brief comparative discussion of the equality-growth relationship is, to say the least, hazardous. Even taking seriously measurement issues and using great care in interpreting the results from reduced-form regressions, moving from allegation to evidence would require: *i*) a complete sample of long-term national experiences, *ii*) further structural investigation of the channels linking (directly or indirectly, spuriously or effectively) inequality and growth, and *iii*) additional theoretical analysis to explicit the role of social institutions into growth models.

Nonetheless, to the extent that the interpretation given in this paper of the growth-equality relationship in industrial countries can be regarded as a viable working hypothesis, we are inclined to conclude that productivity growth, far from being reduced, might be stimulated by the presence of equality-enhancing institutions. Social institutions - from those framing labor market relations to those removing obstacles to the efficient accumulation of human and physical capital, to social protection schemes - do not necessarily prevent markets from satisfactorily functioning and may actually solve commitment and coordination failures reasonably well. On the contrary, generic social spending cuts may be costly and ineffective, leading to slower growth and undesirable social outcomes, when implemented failing to realize their impact on the net of social bounds originated by the interaction of agents, markets and social institutions. Their disruptive effect can only be exacerbated when they are carried out in a piecemeal fashion. Some more and less recent European experiences lend some support to these statements.

At the same time, social institutions are neither a-historical, nor uniquely-defined entities - a point neatly made by Esping-Andersen (1990) with regard to the welfare state. The

highly differentiated performance of social institutions across time and space asks for a reconsideration of social policy and suggests the need to re-design substantially the network of social institutions so as to meet the requirements of the incoming century. In this specific respect, far from making welfare state redundant, the globalization of the world economy, the nature and the diffusion of technology will create a new and even deeper need for social justice and social security - an issue which is vividly present in Stiglitz (1995) as well as in the recent effort of the Commission on Social Justice (1994). Post-war industrial societies felt a responsibility for providing social insurance against the sudden loss of earning power. Future industrial societies will have to concentrate instead on the provision of resources and opportunities to help people to cope with more frequent changes in work and/or residence; the focus will be on quality services as training, childcare, and elder-care rather than cash-benefits, on poverty prevention through education rather than poverty relief. More generally, in a society where distributive conflicts are bound to worsen, what will be needed most is the ability to induce cooperative solutions to simultaneously achieve equity objectives and long-run economic targets.

## Appendix

### A.1. Inequality measures: the LIS database

The main objective of the Luxembourg Income Study is to create a database containing social and economic data collected in household surveys from different countries. Moreover, LIS reorganizes original national micro-datasets in order to increase the degree of cross-national comparability. The LIS database we have used draws on the work by Atkinson, Rainwater and Smeeding (1994). In this paper a number of inequality measures (distribution by percentile as well as summary measures) are provided for the distributions of total family incomes (i.e., after tax and cash transfers) in the mid to late 1980s in 18 OECD countries. In order to compare households of different sizes and compositions, all income figures are adjusted by an equivalence scale. Details on the LIS database, on the quality and consistency of the LIS datasets, and on its major limitations are also outlined in the paper. Table A1 lists the OECD countries for which comparable inequality measures are available in the LIS database, indicates the nature (and years) of the underlying surveys and the agencies responsible for them. It also reports the “quality level” of each LIS country dataset. Quality level 5 indicates that the basic information consists in the “amount of income actually reported by the population”. Quality level 4 refers to “edited” income data whereby all item non-response is corrected. Quality level 3 refers to the amount of income recorded in information taken from tax records. Income data at quality level 2 are grossed up to the total amount recorded by some administrative government agencies. Finally, information at quality level 1 include the “underground” economy.

Table A1: The LIS database on the distribution of household equivalent incomes.

Country	Type of survey	Data quality	Years	Main Source
Australia	Income survey	4	1981/82, 1985/86	Australian Bureau Statistics
Austria	Labor force survey		1987	Austrian Microcensus
Belgium	Panel study	4	1985, 1988	CSP
Canada	Income survey	4	1981, 1987	Statistics Canada
Finland	Survey and Adm. records	2	1987, 1990	
France	Income tax records	3	1979, 1984	INSEE
Fed.Rep.Germany	Panel study	4	1984	DIW
Ireland	Income survey	4	1987	ESRI
Italy	Income survey	4	1986	Bank of Italy
Luxembourg	Panel study	4	1985	CEPS
Netherlands	Income survey	5	1983, 1987	Central Bureau of Statistics
New Zealand			1983/84, 1987/88	
Norway	Income tax records	3	1979, 1986	
Spain			1980/81, 1989/90	
Sweden	Survey and Adm. records	2	1981, 1987	Statistiska Centralbyran
Switzerland	Income survey	5	1982	Universitat Bern
United Kingdom	Expenditure survey	4	1979, 1986	Central Statistical Office
United States	Labor force survey	4	1979, 1986	Bureau of the Census

Source: Atkinson, Rainwater and Smeeding (1994).

### A.2. Inequality measures: national sources

Along with comparable cross-country information on income distribution, Atkinson, Rainwater and Smeeding (1994) extensively review the available evidence contained in national studies of income inequality; further information is provided by Atkinson (1994). National studies are based on different definitions, sources and timing and are much less comparable

across countries. For 9 countries, it proved possible to construct, on the basis of the available information, consistent yearly time series spanning over the periods listed in Table A2. Whenever needed, missing figures were replaced by estimates based on other distributional indicators or, in some cases, a linear time trend.

Table A2: National sources.

Country	Income definition	Income unit	Period	Main source
Australia	Households	Households	1969-1990	Saunders (1992)
Canada	Households	Households	1971-1983	Wolfson (1986)
Finland	Equivalent	Persons	1966-1990	Uusitalo (1989)
Fed.Rep.Germany	Household	Household	1960-1990	Guger (1989)
Italy	Family	Family	1967-1993	Brandolini and Sestito (1994)
Norway	Equivalent	Persons	1970-1990	Ringen (1991)
Sweden	Equivalent	Persons	1975-1991	Gustafsson and Palmer (1993)
United Kingdom	Family	Family	1961-1991	Goodman and Webb (1994)
United States	Households	Households	1967-1992	Department of Commerce (1993)

*Note:* in some cases data were derived by Atkinson (1994) and Atkinson, Rainwater and Smeeding (1994) and not by the original sources.

### A.3. Other variables

Variables other than the above inequality measures have been drawn from Penn World Table, version 5.5.

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