ANALYSIS

Sustainable globalisation

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Abstract

The recent process of globalisation of international markets has managed to sustain the economic growth of the countries that have actively participated in this process. The available empirical evidence suggests, however, that it has been accompanied by a worldwide increase in environmental degradation and economic inequality. Therefore, there is growing concern that these features of the globalisation process may jeopardise its social and environmental sustainability. In order to clarify to what extent the recent process of globalisation may be considered as sustainable, this paper draws some hints from a critical assessment of the literature on the Kuznets curve and the environmental Kuznets curve. In particular it is argued that the optimistic implications of this literature on the sustainability of globalisation are ungranted and that the Kuznets approach is in principle unable to give reliable answers to the questions raised in this work. These curves, however, may be generalised as Kuznets relations whose analysis allows a clarification of a few basic conditions for sustainable globalisation. We conclude that these conditions can be met by implementing a systematic policy strategy aimed at shifting both Kuznets relations downwards.
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1. Introduction

World markets have become increasingly integrated in recent decades. This process, that started long time ago (at least since the early 9th century), has strongly accelerated in recent years by profiting from new Information and Communication Technology (ICT) infrastructure such as TV channels, communication satellites, Internet and so on. Empirical evidence, however, seems to suggest that the rapid growth of global markets has been accompanied by a world-wide increase in inequality and environmental degradation. This correlation raises the question as to whether the process of globalisation may jeopardise the social and environmental sustainability of development. As a matter of fact, these two dimensions of sustainability both played a crucial role in the definition of sustainable development as originally suggested by the Brundtland Commission (WCED, 1987): 'sustainable development is devel-

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opment that meets the needs of the present without compromising the ability of future generations to meet their own needs'. In this view the concept of sustainable development is based on an ethical principle of equity in the distribution of income, wealth and control of resources between generations that must logically be extended to the distribution within each generation. In the original definition of sustainable development, therefore, inequality and environmental deterioration are conceived as equally important and interdependent conditions of sustainability. In the ensuing debate on sustainable development, however, the focus concentrated on the environmental condition as if it were fully independent of the social condition of sustainability. In particular, although environmental sustainability has generally been analysed in terms of inter-generational distribution, its relationship with intra-generational distribution has been almost completely neglected.

In this paper we intend to develop the original, more comprehensive, approach to sustainable development by applying it to a special, though very broad, issue: the influence of the recent process of globalisation on inequality and environment deterioration. The effect of globalisation on social and environmental sustainability operates mainly through the enhanced growth in per capita income. Recent empirical evidence (e.g., Lindert and Williamson, 2001) shows, in fact, that open economies grow faster than closed ones and that per capita income growth tends to increase with the degree of openness. Per capita income, in turn, affects inequality and environmental degradation through several channels, as suggested by the literature on the Kuznets curve and the environmental Kuznets curve. For this reason, we investigate how the process of globalisation may affect the relationship between inequality and environmental degradation on one side and per capita income on the other side.

The structure of the paper is as follows. Section 2 aims at clarifying the rational foundations of the growing concern about inequality and environmental deterioration, pointing out that similar ethical and economic arguments underlie concerns about these two problems. We then analyse how globalisation may affect social and environmental

sustainability. In particular, we examine the impact of globalisation on inequality (Section 3) and on environmental degradation (Section 4) by devoting particular attention to the Kuznets curve and the environmental Kuznets curve, respectively. Section 5 goes on to investigate how globalisation may affect the two Kuznets relations that are here defined as more general specifications of the conventional Kuznets curves. In Section 6, some concluding remarks are tentatively drawn concerning some basic conditions for sustainable globalisation that emerge from the paper.

2. The ethical and economic foundations of sustainability

The recent growing concern about inequality and environmental degradation has sound ethical and economic foundations. From the ethical point of view, worries about inequality and environmental degradation have a common root to the extent that each violates the crucial ethical principle of equal initial opportunities for each citizen. Inequality in earnings is not necessarily a problem per se: in a meritocratic society it is in principle acceptable that more active and productive people have higher rewards. Rich people, however, often have more opportunities than poor people (easier access to higher education, for example), so that the difference in productivity (and earnings) is affected by the difference in initial opportunities.

Similarly, environmental degradation restricts the set of options at the disposal of future generations. Thus, for instance, pollution of environmental goods (e.g., fresh water) jeopardizes the viability of options relying on their quality (use of water for drinking or for irrigation purposes in our example). Sustainable development, therefore, should be interpreted in its broadest sense as development that gives 'equal opportunities' to all generations. This does not mean that we have to guarantee exactly the same level of income and wealth to every generation, but certainly we should try to guarantee the same set of initial options (Chichilnisky, 1997; Vercelli, 1998). Both inequality and environmental degradation, therefore, can be criticised from the ethical point of view, as they

violate the fundamental equity principle of giving every agent the same opportunities.

The increasing levels of inequality and environmental degradation, however, are a matter of concern for economic reasons as well, since they both have potential adverse consequences on the performance of an economy. There are compelling theoretical arguments that strongly support this assertion. In particular, the actual performance of a rational agent strictly depends on the extension of the agent's opportunity set. A wider opportunity set may include superior options that improve the utility as well as the performance of the decision-maker. Since inequality often restricts the opportunity set for people in the lower part of the distribution, it also reduces their potential contribution to social and economic efficiency and wealth. In addition, the condition of equal initial opportunities is a necessary condition for fair competition that implies greater efficiency and better performance for the economy as a whole. It is clear that a restricted opportunity set excludes people from market competition who may have superior specific skills whose exploitation would improve the performance of the market. Among poor people who could not afford a good education, there could be excellent scientists, technicians, managers, etc. Undoubtedly, the proper deployment of these underexploited resources would improve the efficiency and the performance of the economy. Apart from this general argument, there are further specific reasons why inequality and environmental deterioration may worsen the performance of a market economy.

As several works have pointed out (e.g., Alesina and Perotti, 1996; Benhabib and Rustichini, 1996), high levels of inequality may cause social and political tensions that often have negative effects on income growth[1]. Sociopolitical unrest, in fact, threatens property rights and, therefore, tends to discourage investment in the country. Anger about inequality, moreover, may lead to riots and strikes

that tend to reduce the average number of working hours and thus the total production of the economy. It is interesting to note that the above-mentioned social tensions are more likely to rise in a period of recession than of prosperity. When the economy grows, in fact, the poor may also be better off, but in a recession they are likely to suffer relatively more than the rich. The poor, in fact, generally lose less money than the rich, but they may lose their jobs. Hence, poverty may somehow enhance the negative effects of inequality on economic growth: the higher the number of the poor and the lower their living conditions, the greater their anger about inequality.

Similarly, environmental degradation might have adverse effects on production by increasing workers' health problems and thus reducing their productivity. In the long run, moreover, ecological degradation reduces land productivity. This may give rise to a 'poverty-environment trap' since the poor often rely on natural resources as their only source of income. Environmental degradation tends to worsen the conditions of the poor, which in turn leads them to exploit natural resources even more to secure their day-to-day survival.

Summing up, both ethical and economic reasons should induce public opinion and policy authorities to worry about social and environmental problems. But does current globalisation increase these problems, or does it potentially reduce them? To answer this question, the next two sections examine the impact of globalisation first on inequality, and then on the quality of the environment.

3. Globalisation and inequality

In recent decades, the world economy has become more integrated. As Lindert and Williamson (2001) point out, world market integration is not a new phenomenon, but it has steadily increased since the 1820s if we exclude the period between the two World Wars. After World War II and particularly in the last few years, globalisation has undergone an impressive acceleration that has nurtured a hot debate on its new features and implications.

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[1] Social and political instability is only one possible way in which inequality may affect economic growth. See Barro (1999) for a discussion of other theoretical effects of inequality on economic growth.

Empirical evidence suggests that in the last few decades, rapid market integration has been correlated with higher inequality in world income distribution. For example, combining inequality within and across countries, Bourguignon and Morrisson (2000) observed that the Theil coefficient of global inequality has risen since 1960. The results of econometric research on the trend of world income inequality are very sensitive to the measurement technique adopted to compare income in different countries. When countries are not weighted by population, most studies find that inequality has sharply increased in the past few decades. When countries are weighted by their population broadly similar results are obtained when incomes in different countries are compared by using actual exchange rates, while if they are compared in Purchasing Power Parity terms little change is found. However, in this case as well, recent studies based on a much more sophisticated database suggest that there was a marked increase in inequality during the period 1988–1993. Thus, for instance, Dikhanov and Ward (2001) found that the Gini coefficient for world income distribution increased by about 6% in that period. Similarly, Milanovic (2002) finds a marked polarisation between those at the top end of the world distribution (with more than $11,500 a year) and those at the bottom (less than $1,500 a year).

Overall, we may conclude that the empirical correlation between globalisation and the increase in inequality is fairly supported by empirical evidence. However, as is well known, correlation does not imply causation. Therefore, we have to discuss whether it is possible to identify specific causal mechanisms that may allow us to assert that the above correlation is not spurious.

To examine how globalisation may affect inequality, we have to distinguish inequality within countries from inequality between countries. The two components of world inequality, in fact, may depend on different factors[2] and require, therefore, different policy responses. The recent rise observed in world inequality seems to depend mainly on the increasing income gap between countries rather than within them. This increase in inequality between countries is mainly due to lower economic growth and faster population growth in developing countries than in OECD countries (Wade, 2001). Income inequality, however, has also recently grown within many industrialised countries, such as the USA and Great Britain where it has reached its highest level in several decades.

In order to investigate the social impact of globalisation, it is useful to consider its indirect effects on inequality through income growth. Most economists agree that the progressive liberalisation of international trade and the consequent market globalisation tended to enhance income growth. Frankel and Romer (1999), for instance, estimate that the elasticity of per capita income with respect to the trade-GDP ratio ranges between 0.5 and 2%. Dollar and Kraay (2001) find that growth rates accelerated in developing countries that increased their trade-GDP ratio over the past 20 years, whereas growth rates fell on average in developing countries with a declining trade-GDP ratio. Lindert and Williamson (2001) show strong empirical evidence that open economies grow faster than closed ones and that growth rates increase with the degree of openness. Globalisation, therefore, seems to have contributed not only to fostering growth in countries that have actively participated in the process but also to increasing inequality between countries that liberalised their trade and those who followed autarkic policies.

Casual observation supports this conclusion: the Baltic countries, for instance, used to have similar income levels to Denmark before the implementation of an anti-trade policy by their governments after World War II. Lindert and Williamson (2001), however, claim that globalisation may also have reduced the gap between participating countries. This seems to be confirmed by the reduced income gap between OECD countries after World War II: post-war trade liberalisation was, in fact, mainly intra-OECD rather than between the OECD and the other countries. Participation in the market integration process also explains to some extent the polarisation in world income distribution observed today: countries isolated or excluded from globalisation re-

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[2] Exchange rates, for instance, are likely to affect inequality between countries more than inequality within them.

main behind, while those who participate in it join a sort of 'convergence club'[3].

A similar description seems to apply to the impact of globalisation on intra-national inequality. Lindert and Williamson (2001) argue that income distribution became more unequal after liberalisation in four large countries that account by themselves for much of the world population, namely China, India, Indonesia and Russia. Interestingly enough, inequality increased mainly in those regions that were cut off from the globalisation process, such as rural and hinterland China or rural India. In some cases access to trade reforms and benefits was limited to an extremely small minority, as in Russia where only a few oligarchs took part in the internationalisation process (Flemming and Micklewright, 2000). These arguments seem to suggest that the differential access to the process of globalisation contributed to increasing inequality both within and between countries.

Despite the rise of inequality in the four large economies mentioned above, the population-weighted index of intra-national inequality has increased only slightly since the 1960s (Bourguignon and Morrisson, 2000). In the postwar period, in fact, intra-national inequality has followed different and sometimes opposite patterns in different countries, which has partially counterbalanced the trend followed by these four economies. As Wood (1994) pointed out, the standard factor endowment trade theory may help to explain the existence of such different inequality trends within different economies. The Heckscher–Ohlin model, in fact, predicts that commodity market integration should increase income for the abundant factor and lower it for the scarce factor. Since unskilled labour is relatively more abundant in the South, freer trade should increase unskilled wages relatively to skilled wages and returns on property, thus lowering inequality in developing countries. The opposite applies in the North where skilled labour is relatively more abundant, so that globalisation is expected to increase wage dispersion.

In some countries, empirical evidence seems consistent with these theoretical predictions. Thus, for instance, several studies (e.g., Freeman and Oostendorp, 2000) have observed a sharp rise in wage inequality in Britain and the US. Similarly, three East Asian countries (Korea, Singapore and Taiwan) showed a decline in wage inequality in the 1960s and 1970s after liberalisation. Empirical evidence for other countries, however, is at odds with what the theory would lead us to expect. Wage gaps, in fact, increased in several Latin American countries during the 1980s following their liberalisation process. As Wood (1997) argued, the different timing and historical context in which liberalisation occurred may explain the different effect of free trade on inequality in Latin America compared with East Asia. The Mexican liberalisation, for instance, took place at the same time as the entry into the world market of China and other Asian countries with a relatively more abundant pool of unskilled workers than Mexico. The rise of inequality in Mexico in that period, therefore, could also be explained with the simple Heckscher–Ohlin model.

As O'Rourke (2001) points out, however, income distribution is affected by many other factors beyond those underlined by the standard trade theory. Thus, for example, the increasing wage dispersion in Latin American countries might depend on the evolution of education in those countries, on political events reducing the power of the unions or on the introduction of new technologies that disfavoured unskilled workers.

Many empirical studies have tried to estimate the impact of trade liberalisation and of these additional factors on intra-national inequality. While many studies arrive at conflicting results as regards the sign of the trade coefficient, most of them find that openness has a limited direct impact

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[3] The idea that inequality falls between countries that participate to the globalisation process relies on the traditional opinion that relatively poorer countries gain most of the benefits from trade liberalisation. Trade liberalisation, in fact, 'should have a bigger effect on the terms of trade of the country joining the larger integrated world economy than on countries already integrated' (Lindert and Williamson, 2001). See Lindert and Williamson (2001) for a more thorough discussion of who gains from trade liberalisation.

on inequality[4]. By increasing per capita income, however, trade liberalisation may also have an indirect effect on inequality through income growth. In order to analyse this indirect effect it is useful, therefore, to briefly recall the literature on the so-called Kuznets curve. As is well known, Kuznets (1955) observed that inequality tends to increase during the early stages of growth to decrease later on, describing an inverted-U shaped relationship between per capita income (on the horizontal axis) and income inequality (on the vertical axis). This relationship, called Kuznets curve (henceforth KC) after the name of the author, was very popular during the 1970s when it was taken as an empirical regularity of the economy (Ahluwalia, 1976; Robinson, 1976). Later contributions, however, started to question the evidence in support of this curve. Some authors (Anand and Kanbur, 1993) found that different inequality indices may give different results, while others (Papanek and Kyn, 1986; Fishlow, 1995) argued that income explains only a small part of the variance of inequality across countries. Several works (Clarke, 1992; Li et al., 1998), moreover, claimed that the KC applies well to cross-country studies, but not to time-series analysis, therefore, it does not necessarily describe the evolution of single countries over time. These results lead us to believe that the quadratic relationship between inequality and per capita income suggested by Kuznets is not generally sound. In our opinion, therefore, the general relationship between these two variables—from now on Kuznets relation (KR)—should be further explored relaxing the constraints on its specification. In Section 5 we will examine how globalisation may influence the KR in order to clarify to what extent globalisation may be considered sustainable.

4. Globalisation and environmental degradation

A long-term correlation between the recent process of globalisation of international markets and environmental degradation is quite evident. The globalisation of markets also brought about the globalisation of environmental problems. Global warming, thinning of the ozone layer, loss of biodiversity, depletion of natural resources, widespread deforestation and desertification are examples of global environmental deterioration that emerged and worsened while the process of globalisation accelerated after the World War II. We believe that the existence of a general correlation of this kind is so uncontroversial that, for the sake of brevity, we do not need to document it here. However, since correlation does not imply causation, we have to discuss to what extent it is possible to identify specific causal mechanisms that connect the process of globalisation to that of global environmental deterioration. In this section we intend to make a preliminary tentative exploration of this causal analysis in order to clarify a few basic conditions for environmental sustainability.

Generally speaking, four basic categories of causal mechanisms can be identified: (1) technological, (2) economic, (3) demographic and (4) cultural. (1) The diffusion of mechanisation during the industrial revolution increased the exploitation of natural resources used as inputs in industrial production, as well as the deterioration of their quality as a consequence of pollution. Since then, successive waves of technological innovation have raised new environmental problems along with new opportunities for solving them[5]. (2) The ensuing acceleration of economic growth progressively increased the size of industrial activity that determined a progressive environmental deterioration but also, in many cases, a progressive increase in per capita income. (3) This also led to a steady increase in world population that proved to be a crucial factor of environmental deterioration. Finally, (4) the new cultural values introduced by the industrial revolution and progressively spread all over the world by free markets considered nature as a mere means for satisfying human needs

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[4] See O'Rourke (2001) for a survey of recent studies on the link between openness and intra-national inequality.

[5] For the last wave under the heading of New Economy see Vercelli (2001).

rather than a value in itself as in many pre-industrial cultures.

An empirical analysis of the impact of these four causal factors requires extensive evidence in order to assess to what extent they may be interpreted in genuine causal terms. This empirical background analysis is almost completely absent in the literature. Some hints, however, may be found in the recent debate on the Environmental Kuznets Curve (from now on EKC) which studies the empirical relationship between per capita income y, generally interpreted as a proxy of the stage of development, measured on the horizontal axis, and environmental deterioration, measured on the vertical axis by different indexes: total environmental deterioration D, or more often its per capita value d_p or its value per unit of income d_y. So far, the debate has concentrated mainly on whether the available evidence corroborates the existence of an inverted-U curve (called EKC by analogy with the KC discussed in the preceding section) or whether a different pattern emerges from the available data. Most empirical contributions on the EKC are cross-country studies that consider various indicators of environmental degradation[6]. In the case of air-quality indicators the existence of an EKC found good support for local air-pollutants (e.g., Grossman, 1995; Shafik, 1994) but not for global pollutants (such as CO_2) which have a limited direct impact on population (Cole et al., 1997). For water quality the evidence is more mixed, with studies giving conflicting results on the shape, position and peak of the curve according to the different indicators used. As for the other indicators of environmental degradation, the EKC hypothesis receives very little corroboration. Environmental problems that have a direct and strong impact on the population (such as access to urban sanitation and clean water) tend to improve steadily with the process of development, while environmental problems that can be transferred elsewhere (such as municipal solid wastes) do not exhibit any clear tendency to diminish with development. Whatever the degree of corrobora-

tion it seems reasonable to attribute to the EKC hypothesis on the basis of cross-country studies, single country studies reach very questionable results even in the case best supported by cross-country studies (see, for instance, Vincent, 1997).

From this short survey of the available evidence we may draw the conclusion that it gives only limited support to the EKC. Even when the empirical evidence is consistent with the EKC hypothesis for a category of variables (in terms of D, d_y, d_p), this does not imply that it is also consistent with it for another category of variables. In particular, if the EKC fits well the relationship between d_p and y, this will imply a linear downward sloping relationship between d_y and y[7].

In order to use the EKC for constructive purposes we, therefore, have to relax the specification constraints and reformulate it as the environmental Kuznets relation (EKR), i.e., a more general relationship that takes the most convenient dependent variable and clarifies the logical link between the three dependent variables appearing in the Kuznets literature (d_y, d_p and D).

As to the choice of the dependent variable, in our opinion total environmental degradation is the most convenient one since long-term global sustainability strictly depends on it[8]. As D increases, at least some of the components of the index are bound to violate the conditions of environmental sustainability sooner or later, either because it will exceed the specific assimilative capacity of the environment or because the exploitation of a certain renewable resource exceeds its natural growth.

Let us now clarify the logical nexus between the independent variable y and the three dependent variables that appear in the EKC literature (d_y, d_p and D). To this end we define the following identity:

$$D = Pyd_y \qquad (1)$$

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[6] See Borghesi (2001) for an extensive critical survey on the EKC literature.

[7] This point, surprisingly overlooked in the literature so far, can easily be verified by assuming an EKC in d_p (i.e. $d_p = ay + by^2$ where $a > 0$, $b < 0$) and multiplying both sides of the relationship by $1/y$, which yields: $d_y = a + by$.

[8] Total environmental degradation is what actually matters when we look at the carrying capacity of the whole planet.

where D measures global environmental degradation[9], P measures world population, $y = Y/P$ measures per capita income, and $d_y = D/Y$ measures the intensity of environmental degradation. As Daily and Ehrlich (1992) have pointed out, it may be difficult to estimate the environmental impact of the last two factors separately. It is sometimes useful, therefore, to summarise them by a fourth factor through the following identity:

$$d_p = yd_y \qquad (2)$$

where d_p measures per capita environmental deterioration. These two identities clarify the logical nexus between the independent and the dependent variables that appear in the EKC literature. In addition, they connect with the IPAT model originally proposed by Holdren and Ehrlich (1974). The IPAT model tried to identify the environmental impact (I) of a population as the product of three factors: population size (P), its affluence (A) measured in terms of per capita consumption, and the damage per unit of consumption determined by the technology used (T). Differently from that model, here we consider income rather than consumption per person as a measure of a population's affluence. This allows us to derive a general relationship between environmental degradation and per capita income encompassing the different functional forms examined in the empirical literature.

Finally these two identities may help us to understand the nexus between the four causal mechanisms mentioned above: P represents the demographic factor, y (given P) the economic factor, d_y the technological factor, and d_p the nexus between the economic and the technological factor. The cultural factor mentioned above is implicit in these indexes and may be made explicit only through a structural analysis that goes beyond the scope of the present paper.

It should be stressed, however, that these two identities are, by definition, unfit for a causal analysis but fix important constraints that any causal analysis has to comply with. A proper causal analysis could start from an equation of the following kind:

$$D = aP + by + cd_y + fz \qquad (3)$$

where the variables are measured in their logarithms, z represents a vector of relevant exogenous variables, while a, b, c, and f are empirical coefficients[10].

We define Eq. (3) as the EKR and use it in constructive terms to clarify the conditions of environmental sustainability. Eq. (3) may be estimated to evaluate how total environmental degradation reacts to changes in the single explanatory variables and thus how it changes over time.

In order to achieve a sound process of sustainable globalisation, total environmental degradation D should not increase over time. To this end we may derive from Eq. (1) the following identity:

$$\dot{D} = \dot{y} + \dot{d}_y + \dot{P} \qquad (4)$$

where the dot above each variable indicates the logarithmic derivative (i.e., the rate of growth) of the variable. It is clear from this identity that global environmental deterioration tends to increase ceteris paribus with per capita income unless the sum of demographic growth and degradation intensity is negative. Therefore, we may set the following condition of long-term global sustainability:

$$\dot{y} \le -(\dot{d}_y + \dot{P}) \qquad (5)$$

In other words, global environmental deterioration does not increase if and only if degradation intensity and/or demographic growth are sufficiently negative to offset the (ceteris paribus) negative effect of per capita income growth. Since we know that both world aggregate per capita income and world population tend to increase

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[9] We define D as an index that aggregates the environmental conditions of sustainability that jointly assure that pollution should not exceed the assimilative capacity of the environment and the exploitation of renewable resources should not exceed its natural growth (Atkinson et al., 1999).

[10] Notwithstanding the fact that Eq. (3) is derived from Eq. (1) the coefficients a, b, c may have a value different from one because of the introduction of exogenous factors.

within the post-war process of globalisation, the only way to achieve a process of sustainable globalisation relies on a reduction of deterioration intensity sufficient to offset the negative implications of demographic growth and of rising per capita income. This is what is already happening in many countries and economic sectors as a consequence of technological change and cultural evolution that are reshaping the structure of economic activity in a direction more consistent with economic sustainability. However, the velocity of reduction of degradation intensity is, generally speaking, clearly insufficient to stabilise environmental degradation and must be accelerated through specific policies. These policies should be directed to shift downwards, i.e., in a more favourable direction, the relationship between D and y. This may be clarified through Eq. (3) where D depends on y and:

$$aP + cd_y + fz$$

are shift factors. A reduction of demographic pressure and/or of degradation intensity would shift the relationship between D and y downwards[11].

The relationships examined above may also shed some light on the conditions of sustainable globalisation in a more disaggregated approach. In particular, we may better understand why industrialised countries rather than developing countries seem to follow an EKC. In the industrialised countries demographic growth is around zero, and the technological and cultural mechanisms that tend to reduce degradation intensity may be sufficient, for certain indexes, to reduce aggregate degradation. In the developing countries, on the contrary, demographic growth is typically quite strong while the reduction of environmental degradation is rather slow for technological and cultural reasons, and this may help to explain why the empirical evidence is unable to find in

these countries the negative correlation between per capita income and environmental deterioration necessary to assure sustainability.

We may conclude that the causal relationship between globalisation and global environmental degradation is quite complex and ambiguous. While so far there has been a clear prevalence of negative causal effects for most indexes of environmental degradation, especially in developing countries, it is possible to reinforce the positive effects and at the same time reduce the negative effects of globalisation on the environment through appropriate policies to implement a viable process of sustainable globalisation.

5. Globalisation and the Kuznets relations

As pointed out in the previous paragraph, environmentally sustainable globalisation requires a policy strategy directed to shift the relationship between D and y downwards. Let us now examine how the current phase of globalisation may contribute to shift both KRs. For this purpose, we focus on one particular explanation of both the original KC and its environmental counterpart. Both curves have often been explained, in fact, in terms of public opinion pressure for intervention (Borghesi, 2000). At low-income levels environmental degradation and inequality tend to rise since people are willing to accept increasing environmental degradation and inequality in exchange for higher consumption. However, as individuals achieve higher living standards, they care increasingly about the quality of the environment and the level of inequality of the societies in which they live. Therefore, at sufficiently high income levels, the government is induced to introduce egalitarian and environmental policies under the pressure of public opinion (channelled for example through egalitarian movements like the trade unions or ecological movements such as green parties). This intervention tends to reduce inequality and pollution in the country, thus pushing the economy along the decreasing portion of the KC and the EKC. If this argument is correct, democracy is a crucial requirement to address inequality and ecological problems. A

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[11] This general argument also applies when the relationship is a quadratic (EKC) one. As Tisdell (2001) has pointed out, globalisation may shift the EKC downwards by increasing competition and thus reducing pollution emissions per unit of output.

democratic system, in fact, gives agents a chance to express their preferences affecting government decisions on inequality and pollution by voting.

Globalisation may affect this mechanism and thus also the shape and position of the two curves. The increasing mobility of information that characterises the current phase of globalisation rapidly disseminates images of social injustice, poverty and environmental disasters that may occur even in distant countries. This is likely to make people more aware of social and ecological problems world-wide than in the past and tends to create 'global' public opinion pressure for intervention. It has been noted, in fact, that while most of the people concerned with these issues come from industrialised countries, they express concern for inequality, poverty and environmental problems occurring both in the North and the South of the world.

Globalisation, therefore, may create a pressure for egalitarian and ecological policies even in countries where lack of democracy hinders the ability of people to express their preferences on such issues. This 'global' pressure, therefore, takes place even when a country is still relatively poor and might lead to intervention on inequality and environmental degradation at an earlier stage of growth than predicted by the two curves. If so, their turning points may occur at a much lower income level than was the case for industrialised countries in the past. The turning points, moreover, might also be lower since earlier intervention may prevent inequality and environmental degradation from growing as much as in the past. This argument, however, applies to any relationship between per capita income and environmental degradation (or inequality) and not only to the particular specification of the KC or the EKC. Thus, for instance, if environmental degradation always increases with per capita income (as in the case of carbon dioxide emissions), 'global' pressure may contribute to inverting the existing trend and generate a downward turn of the curve by pushing governments to implement an international environmental agreement. Within the process of globalisation it is, therefore, possible to modify the shape and position of the KR and the EKR, thus improving social and ecological conditions.

In the case of the environment, moreover, public opinion can influence environmental quality not only through the voting system, but also through the market: 'greener' consumer demand contributes to a shift in production and technologies towards less polluting activities. Globalisation may increase competition and thus strengthen public opinion pressure for environmental quality. In a more competitive market consumers are likely to have more alternatives to polluting products and thus more chances to express their environmental demand. This positive impact of globalisation on the environment, however, crucially depends on the actual capacity of globalisation to increase competition. If greater market concentration comes together with globalisation (as occurs in some sectors), then the opposite might be true and environmental-friendly consumers might end up with fewer opportunities to express their preferences. We may conclude, therefore, that globalisation might contribute to a more sustainable development by enhancing the impact of public opinion pressure on government and market decisions and thus shifting the KRs downwards. Market integration alone, however, may not be sufficient to make public opinion pressure more effective in practice, unless genuine democracy and effective market competition are globalised along with trade.

6. Concluding remarks on a few basic conditions for sustainable globalisation

In this paper we have considered the impact of the recent process of globalisation on the sustainability of world development in the light of the literature on the KC and the EKC. These two curves taken together seem to suggest that the process of globalisation may render world development more sustainable simply by pushing the world economy towards the decreasing part of the bell-shaped curves. Globalisation, in fact, increases per capita income of the countries that actively participate in this process and spreads the technological knowledge of the most advanced economies, which contributes to reducing environmental degradation intensity. The interpretation

of the empirical evidence briefly surveyed in this paper, however, seems on the whole to be inconsistent with these optimistic conclusions. In particular, the process of globalisation pushes developing countries upwards along the rising part of an hypothetical KC and EKC, i.e., in the direction of diminishing sustainability, while there is often no clear-cut evidence that it is possible to rely on a peak beyond which a healthy descent may start. Moreover, even when the empirical evidence supports the existence of a peak, this may be reached if and only if average income growth is higher than average population growth for a sufficiently long time. Since average income growth is relatively low in most countries, this implies that their demographic growth should be kept under strict control. Finally, recent changes in the institutional regulation of the globalisation process have not helped to corroborate its sustainability. The indiscriminate deregulation of world trade is progressively sweeping away many of the environmental and social constraints introduced by international institutions, countries and multilateral agreements (Wallach and Sforza, 1999; Esty, 2001; Tisdell, 2001). This sort of deregulation has contributed to accelerating the rate of growth of the participant countries but has undermined its sustainability.

Summing up, the available empirical evidence suggests that the current process of globalisation is unsustainable in the long run unless we introduce new institutions and policies able to govern it. For this purpose, it is necessary to encourage participation in the process of market integration on the part of those countries and regions that have been excluded from the globalisation process to date. This may be achieved by lowering or removing the trade barriers of developed countries to increase imports from developing countries. While some developing world regions (e.g., Eastern Asia, Eastern Europe and Mexico) have increased their market share in the industrialised countries, this share was halved between the 1980s and 1990s for the world's 48 least developed countries (mainly African and Southern Asiatic countries). The reduction of Northern trade barriers is particularly important in two specific sectors, agriculture and the textile industry, that account, respectively, for

about 15 and 20% of exports from developing countries. These sectors are important sources of economic growth for developing countries that still lack sufficient capital and technology to shift their production towards high-technology products.

A more generalised and consistent deregulation of world trade, however, is not enough to ensure the sustainability of world development. The rules of international markets should be radically reformed by establishing a minimal but efficient active regulation of these markets (Vercelli, 2001). Such regulation of international markets should be managed in a non-bureaucratic and accountable way and should ensure the active and democratic participation of all countries in the decision-making process and its application. In any case, the process of deregulation should comply with the environmental and social constraints that buttress the sustainability of world development.

The regulation process mentioned above should include among its crucial targets that of coordinating and promoting active policies to strengthen the sustainability of development. Among these policies we may recall here those that promote higher education levels. These policies are extremely important in reducing inequality, particularly in the recent phase of globalisation characterised by the increasing mobility of information and the unparalleled speed of its world-wide diffusion. Inadequate education (e.g., lack of computer literacy) may prevent access to such information and thus also to the opportunities that it creates[12].

The policy measures briefly mentioned above are just tentative examples of interventions that may help in implementing the conditions of sustainability that we have tried to clarify in this paper. It is our hope that a further clarification of the conditions of sustainable globalisation may help policy-makers to reform the process of globalisation in the direction of its long-term sustainability. To this end, the approach we have

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[12] Thus, for instance, people who are not able to use computers or have no access to the world-wide web are excluded from the opportunities that Internet creates. Inequalities in education thus generate unequal access to these new opportunities.

tentatively sketched here must be developed in many directions. First of all, the conditions of sustainable globalisation should integrate in a more satisfactory way the conditions of environmental sustainability with those of social sustainability. Secondly, the conditions of sustainability must be disaggregated from the sectoral and spatial viewpoints in order to separate and better understand the impact of technological and cultural changes. Finally, extensive empirical work is needed to identify the relevant causal mechanisms underlying the influence of globalisation on sustainable world development.

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