FACOLTÀ DI ECONOMIA
UNIVERSITÀ DI BOLOGNA
SEDE DI FORLÌ

Corso di Laurea in Economia
delle Imprese Cooperative
e delle Organizzazioni Nonprofit

GLOBAL HEALTH

Simone Borghesi, Alessandro Vercelli

Working Paper n. 13
Maggio 2005

in collaborazione con

AICCON
CULTURA COOPERAZIONE | NONPROFIT

Simone Borghesi

Università di Pescara

Alessandro Vercelli

Università di Siena

1. Introduction[1]

The process of globalisation affects more and more the life quality of people around the world. In particular it impinges in different ways upon their health. In its turn the health of people affects the demographic and economic growth as well as their sustainability. However, notwithstanding the fundamental importance of this feed-back, the nexus between globalisation, sustainable development and health has been insufficiently analysed.

This paper aims to explore the main channels of influence through which the recent process of globalisation has affected the health of people, exerting an important influence on the sustainability of world development. To this end we try to identify the principal, direct and indirect, empirical correlations between the main features of globalisation and different indices of health; we proceed then to a preliminary discussion of their causal contents. The indirect correlations run in both directions. This feature turns out to be particularly important since the feed-back between the main intermediate variables (income growth, income inequality and environmental degradation) and different aspects of health plays a crucial role in determining the sustainability of world development.

The nexus between globalisation and health is blurred by a partly spurious correlation between the indices that measure them. While globalisation spread and intensified since the early 19th century (with the only exception of the period 1915-1945 encompassing the two world wars), in the meantime also the indices of health improved, mainly for the extraordinary continuous progress of theoretical and applied medicine. No doubt globalisation has given a contribution of its own to the strengthening of this positive correlation by spreading updated medical knowledge, know-how, medicines and therapeutic instruments around the world, and by promoting effective access to the most appropriate medical care. However, it is very difficult to disentangle the specific contribution to health of globalisation from that of scientific and technological progress, and of other economic, social, institutional factors that are in principle quite independent of, though correlated to, globalisation.

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[1] This paper extends two previous works of the authors (Borghesi and Vercelli, 2004; Borghesi, 2002).

In this essay we choose to concentrate the attention on a few specific psycho-physiological and socio-economic factors of health that explain possible deviations from the long-run positive correlation between economic development (measured by per capita income), globalisation and health observed in the last two centuries or so. The study of these specific factors is important for policy because the elimination, or at least the mitigation, of the negative influences of globalisation and the corroboration of its positive influences would improve the overall positive correlation between health and globalisation.

The structure of this paper is as follows. In section 2 we try to clarify which are the main indirect influence channels between globalisation and health and argue that income growth, income inequality and environmental degradation play a crucial role in explaining the health effects of post-war globalisation. The link between inequality and health is explored in greater detail in section 3 by taking into account also the underlying psychological and physiological mechanisms, whereas section 4 examines the health effects of environmental degradation by distinguishing between air, water and soil pollution. Health, however, can have feedback effects on each of the three variables mentioned above. Therefore, we then examine the inverse causality from health to income growth (section 5), inequality (section 6) and environmental degradation (section 7). Section 8 investigates a few direct effects that globalisation may have on health. Some policy implications of the preceding analysis are briefly discussed in section 9. A few concluding remarks follow.

2. Influence channels between globalisation, health and sustainable development

In this section we intend to suggest a fairly general map of the main channels of influence connecting globalisation, sustainable development and health. This map is summarised in a block-diagram where the arrows express the direction of the influence between the key variables examined (see fig.1 in appendix).

The process of globalisation affects the sustainability of development mainly through three channels: an economic, a social and an environmental channel (Borghesi and Vercelli, 2003). The economic channel is mainly represented by the effects of globalisation on per capita income growth, the social channel by its effects on income

inequality, while the environmental channel includes the consequences of globalisation on a variety of environmental degradation indices.[2]

Globalisation affects the income growth of countries according to their degree of involvement in the liberalisation of exchanges. Since the population level changes slowly in relation also to extra-economic factors, globalisation affects not only the dynamic behaviour of total income, but also that of per capita income. The rate of growth of per capita income influences, in its turn, both the environmental and social conditions of sustainability. In addition, the process of globalisation may have a direct effect on the environmental and social indices of sustainability.

This conceptual framework may help one to understand also the influence of globalisation on health. In fact, globalisation may affect the health of a population both directly and indirectly through the same channels mentioned above.

As to the economic channel, the average per capita income of a community (at a local, national or international level) is generally considered as a measure of its standard of living and thus also a major determinant of the average health status of the population that lives in that community. Globalisation tends to increase per capita income growth of the countries that participate actively in the process of globalisation (as shown, e.g., by Lindert and Williamson, 2003), which in turn may improve their health conditions (arrow 4 in figure 1). For instance, an increase in per capita income is generally accompanied by higher expenditures in health programs, better technologies that tend to improve the available therapeutic instruments and higher education levels that favour the diffusion of updated medical know-how both within and across countries.[3]

As for the social channel, it has been observed that the health of the poor has higher income elasticity than that of the rich. Cross-country evidence suggests that life expectancy increases with average per capita income in relatively poor countries, whereas this relationship tends to disappear for relatively rich countries (Preston, 1975). This can be clearly seen by looking at figure 2 (see appendix) that shows the

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[2] See arrows 1, 2 and 3 in fig. 1. The signs along the arrows in the block-diagram indicate the nature of the correlation between the variables examined.
[3] The recent phase of the globalisation process has also enhanced the spread of medical knowledge through the World Wide Web. Internet, in fact, allows on-line access to specialised journals and web sites that have updated information on the most recent developments in health research.

relationship between life expectancy and per capita Gross Domestic Product (GDP) in year 2000 based on World Bank data referring to 175 countries.[4]

Similar results emerge also in single-country studies. Using a survey on health and income in Britain, Wilkinson (1992) finds that several health indicators increase rapidly as income rises from the lowest to the middle classes of the income distribution, while no further health improvements occur at high income levels. Similarly, using data from the National Longitudinal Mortality Survey in the USA, Deaton (2001) observes that the male (age adjusted) probability of death decreases rapidly as income grows at low family income levels, while it flattens out at high family income levels. These results are relevant for policy as they suggest that redistributing income from the rich to the poor would reduce both income and health inequalities, improving the average health of the population since it benefits the health of the poor much more than it damages the health of the rich.

What we have reported so far is consistent with the traditional view that health is mainly affected by absolute income, while income inequality (both within and across countries) would have only an indirect effect on health: a reduction in income inequality would improve average health only because health indicators increase at a decreasing rate with income. In recent years, however, several studies have argued that socioeconomic inequality has also a direct impact on individuals' health (arrow 5 in figure 1), particularly in developed countries. A host of new evidence in different disciplinary fields clarified that, after a threshold of minimum income is reached, income inequality becomes a crucial determinant of health. Using data on nine OECD countries, Wilkinson (1992) finds evidence of a strong correlation between life expectancy and income distribution that is independent of absolute income since in this context per capita Gross National Product (GNP) has a statistically insignificant impact on life expectancy in the performed regressions.[5] As table 1 shows (see appendix), similar results emerge in several other studies that focused on different groups of countries and periods of time.

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[4] The regression line in the diagram describes how a logarithmic curve fits the data.

[5] Regressing life expectancy on per capita GNP and on the income share going to the least well off 70% of the population, Wilkinson (1992) finds that the former variable explains less than 10% of the variance of life expectancy, while the latter accounts for most of the variance. Moreover, the correlation coefficient between life expectancy and the income share to people below the 7th decile of the population is basically unchanged when controlling for per capita GNP, shifting from 0.86 to 0.90 with p-value below 0.001 in both cases.

The same relationship, moreover, may also apply at the local level. For example, comparing the 50 states of the U.S.A. it was found a very weak relationship between their average income and mortality rates, whereas on the contrary a close relationship emerged between inequality and mortality rates (Kaplan et al., 1996).[6] Analogously, among the 282 metropolitan areas of the USA the ones with the most unequal income distribution have the highest mortality rates (Lynch et al, 1998). Although the regressions do not control for some potential explanatory variables and there is not yet unanimous consensus in the literature on the available evidence,[7] these results suggest that relative income, independently of absolute income, may have a crucial influence on health in these countries. More generally, the relative deprivation suffered by people in the lowest deciles of the income distribution may determine their exclusion from the social activities that promote or preserve health. Moreover, as several empirical papers have pointed out (see section 3), relative deprivation may be a source of psychosocial stress, loss of self-esteem and depression that tends to damage the individuals' health. People tend to compare themselves with reference groups around them (neighbours, co-workers, friends, relatives, TV stars etc…) and may suffer chronic psychological stress from comparison with these benchmarks.[8] These psychological mechanisms can adversely affect people's health as much as the material deprivation suffered by the poor (see, e.g., Sapolsky, 1998; Brunner and Marmot, 1999; Wilkinson, 2002). To the extent that these results are robust, since increasing inequality damages the average health of a population, it can be said that globalisation has indirectly contributed to deteriorate health in several countries. Empirical evidence suggests, in fact, that the process of globalisation has determined a progressive increase in income inequality between countries and within countries (see Vercelli, 2003 and the literature there cited). In particular, the evidence suggests

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[6] Kaplan et al. (1996) found that the correlation coefficient between the age-adjusted mortality rates and the income proportion that goes to the least well off 50% of the population is high and basically unchanged when median income is also taken into account among the explanatory variables, shifting from 0.62 to 0.59 with $p<0.001$ in both cases. On the contrary, the correlation coefficient between total mortality and median income is much lower and falls drastically from 0.28 ($p<0.05$) to 0.06 ($p>0.05$) when adjusted for income inequality.

[7] Lynch et al. (2000), for instance, have observed that higher inequality has been related to lower mortality rates in Britain during the period 1962-1990.

[8] Deaton (2001) argues that this psychological mechanism plays a crucial role in causing stress to the agents and sets up a model assuming that each individual's stress is proportional to the total amount of income that goes to richer people in the community.

that in the last twenty years there was a marked increase of inequality in many OECD countries including the USA and the UK (see in particular Brandolini, 2002).

The third main channel of influence of globalisation on health is the influence of globalisation on the environment. The world-wide integration process of the markets has globalised also the environmental problems and these have huge effects on health (the thinning of the ozone layer, pollution, the exhaustion of vital resources such as drinkable water, etc). However, the influence of globalisation on environmental degradation is quite complex and ambiguous. Thus, for instance, by increasing the economic growth of the participating countries, the globalisation process may contribute to raise the scale of the production and consumption activities that damage the environment. At the same time, however, the higher economic growth that generally characterises the globalisation process may promote technological progress and thus reduce the intensity of environmental degradation. The health effect of globalisation through the environmental channel thus depends on which of these two opposite forces will tend to prevail. The increasing levels of air, water and soil pollution that have characterised most of the countries in the last decades seem to suggest that the former effect has tended to prevail so far. As in the case of inequality, therefore, globalisation may have unintentionally contributed to deteriorate health through environmental degradation. To get a deeper understanding of the complex link between globalisation and health, in what follows we will then take a closer look to the way inequality and environmental degradation may affect health.

3. The influence of inequality on health

Before discussing the economic mechanisms that affect health through inequality, we have to understand the psycho-physiological foundations of this influence. Though the relevance of psychosocial factors on health has been occasionally recognised since long,[9] until very recently only few observers realised that they are an important cause of global health.[10]

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[9] For example, the great French sociologist Durkheim documented more than one century ago in his classical work on suicide the crucial importance of the sudden change in social status on the health of individuals (Durkheim, 1952).

[10] Wilkinson (2002) claims that the psychological and social factors are "the most important etiological factors" of health.

A reserve of (relatively liquid) financial capital is crucial to absorb economic shocks, and a reserve of natural capital to absorb environmental shocks. Analogously, it has been argued that a crucial role may be played by the intensity and quality of social relations, i.e. what is often called "social capital", in order to withstand psycho-physiological shocks. In particular, the lack of social trust was shown to be positively and significantly correlated with mortality in the USA (Kawachi et al., 1997), with a correlation coefficient that ranges between 0.71 and 0.79 depending on the kind of social trust indicators used for the analysis (see table 2 in appendix).[11] Analogously hostility was found positively correlated with mortality. For example, Williams et al. (1995) estimated that mean hostility scores of ten cities in the USA were strongly and significantly correlated with their mortality rates after adjusting for race, age, gender, income and education level of the individuals (see table 2). On the other hand, trust and hostility appear to be strictly correlated to inequality. Table 3 reports the Pearson correlation coefficients between various social capital and income inequality indicators in selected studies, with p-values in parentheses. As the table shows, two commonly used indicators of social capital (civic engagement as measured by membership in groups and associations, and social trust) were significantly related to inequality in the USA (Kawachi et al., 1997). Similar results were obtained by Uslaner (2001), who found a high correlation coefficient (r = -0.684) between inequality and trust in a cross-country analysis. As the author showed, this connection between the two variables holds true also in multivariate tests that take into account economic, cultural and religious aspects that might affect the observed levels of trust and inequality in the selected countries. In particular, estimating a simultaneous equation model to test the direction of causality between trust and inequality, Uslaner (2001) found that trust has no effect on economic inequality, whereas the latter turns out to be the strongest determinant of trust among the explanatory variables (see table 3 in appendix). Analogously, many studies (see table 3 and the survey by Hsieh and Pugh, 1993) have confirmed the existence of a close relationship between income inequality and both homicides and violent crime that can be interpreted as indirect

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[11] Kawachi et al. (1997) take also poverty into account since the latter variable can be a potential disturbance in the relationship between social capital and mortality, being related to both these variables. All the coefficients presented in this study, however, were basically unchanged when adjusted for poverty.

measures of hostility and social capital.[12] Summing up, the empirical evidence suggests that inequality acts as a wedge between people that engenders mistrust and hostility with negative effects on people's health, the more so the more upper incomes are considered non-proportional to individual effort and merit.

This may explain why the most egalitarian developed countries, not the richest, tend to have the highest life expectancy.[13] A similarly close relationship between income inequality and mortality rates has been found also in time series analyses on single countries including Russia, United Kingdom and Taiwan.[14]

Income inequality may be interpreted as a measure of the intensity of relative deprivation and gap of status affecting individuals in a society. It was found that in human and non-human primates (such as baboons and macaques) the experience of a low status severely damages health producing "obesity, glucose intolerance, increased atherosclerosis, raised basal cortisol levels and attenuated cortisol responses to experimental stressors" (Wilkinson, 2002, p.15 and literature there cited). The physiological mechanism is based "on the effects of sustained activation of the hypothalamus-pituitary-adrenal axis and the sympathetic nervous system. The stress response activates a cascade of stress hormones that affect the cardiovascular and immune systems" (ibidem, pp.15-16).

4. The influence of environmental degradation on health

In recent years numerous scientific studies have analysed the effects that individual forms of environmental degradation can have on a person's health. Some of these analyses, such as the United Nations study on the so-called "Asian cloud" (UNEP and C^4, 2002), have recently received increasing attention in the mass media and on the part of public opinion for their interesting results. The World Health Organisation

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[12] As Deaton (2001) points out, however, the link between inequality and crime is an object of debate. In principle, high inequality may coexist with little crime since very rich individuals may afford defensive expenditures to protect themselves against potential crimes (Wittenberg, 2000). However, these sorts of repressive measures are rarely sufficient to thwart the crime arising from social tension while often they foment it further.

[13] For example, Wilkinson (2002, p.14) remarks that "the United States, although it is richer and spends more on medical care than any other country, has poorer health than almost all western European countries and comes 22nd in the international league tables of life expectancy. On the other hand, countries such as Greece, despite having just under half the level of income per head, have substantially higher life expectancy than the United States. More egalitarian countries such as Japan, Norway and Sweden have among the best health in the developed world".

(WHO) has estimated that bad environmental conditions are directly responsible for about 25% of all cases of preventable illness all over the world (WHO, 1997). In order to demonstrate the direct causal links between environment and health (summarised by arrow 6 in fig. 1), it may be useful to classify the health impacts of environmental degradation by distinguishing between atmospheric pollution, water pollution, and soil pollution. These three forms of pollution are not the only ways in which environmental degradation influences a population's health status. Consider, for example, noise pollution which affects many big cities even during the night, making it increasingly difficult for people to sleep and thus reducing, by day, workers' concentration and productivity. Here we will consider three forms of pollution – those regarding air, water and food i.e. the channels through which human health is most directly exposed to environmental risks.

Effects of atmospheric pollution

Atmospheric pollution is considered the main cause of the large increase in cases of respiratory diseases observed in recent years. Some particularly volatile pollutants such as fine dust (PM10), nitric oxide (NO_x) and sulphur dioxide (SO_2) - discharged by cars for example – can penetrate as far as the bronchioles, provoking asthma, bronchitis and emphysema (Worldwatch Institute, 1990).[15] In Italy, it has been calculated (Galassi, 2002) that the number of patients with smog-related chronic coughs has doubled in the last ten years and about 20% of otherwise healthy, non-smoking Italians suffer from this complaint. This is all the more worrying because it affects, in particular, individuals in the younger age groups adversely affecting the average health conditions of future generations. Children living in Italian cities, for example, have a 20% higher likelihood of suffering from asthma than those living in rural or mountain areas where there is less traffic on the roads and fewer associated polluting emissions.[16] The data relating to the developing countries are even more alarming. A recent study of some Latin American capital cities reported by *The*

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[14] Much of the relevant research has been collected in one volume (Kawachi et al., 1999).

[15] WHO (1997) estimates that atmospheric pollution is also directly responsible for 2% of cases of cancer and that the highest number of deaths by tumour involve the respiratory tract (trachea, bronchi, and lungs).

[16] Atmospheric pollution also tends to increase the incidence of acute respiratory infections such as pneumonia which is today the main cause of infant death worldwide (WHO, 1997).

Economist (2002a), estimates that a 10% reduction in ozone and particulate emissions by 2020 could avoid 37 thousand premature deaths among the inhabitants of Mexico City and 13 thousand in San Paolo. Another study carried out in Bangladesh by the World Bank (World Bank, 2000, p.3) estimates that the high level of atmospheric pollution in this country's towns is responsible annually for 15 thousand premature deaths and a million cases of disease, with an estimated overall cost between 200 and 800 million dollars a year. Bangladesh is one of the countries worst hit by the effects of the so-called "Asian brown cloud", a thick cloud formed by carbon particles and carbon monoxide, sulphur and nitrogen gases, that stretches for about 16 million square kilometres over a large part of Asia. The cloud – caused by the continuous burning of forest areas, the activities of electrical power stations, emissions from road traffic and dust from desertified land – constitutes a new global emergency that has recently come to the fore because of the serious respiratory problems it is causing in these countries and because it could easily spread to other continents, carried by the wind.

Some authors think that the impact of atmospheric pollution on an individual's health status may be even greater than that estimated in the above-mentioned studies which restrict their attention to the increase in respiratory disease among the populations under consideration. Besides respiratory conditions, atmospheric pollutants are often responsible for cardiovascular disease since, once inhaled, pollutants are carried round the body in the blood. It was observed (WHO, 1997) that high concentrations of carbon monoxide in the air reduce the blood's capacity to absorb oxygen and that an increase of PM10 levels in the blood of 10 grams per square metre raises the incidence of death by cardiovascular disease by about 1%.

Greenhouse gases also have other negative effects on health. As is well known, the depletion of the atmosphere's ozone layer as a result of greenhouse gases increases the population's exposure to ultraviolet rays which may account for the greater numbers of cases of skin cancer and damage to the eyes. Lastly, atmospheric pollutants can also damage health because they are deposited on water and on the soil, thus adding to the contamination of the water we drink and the food we eat. We will now deal specifically with the effects on health of water and soil pollution.

Effects of water pollution

One of the measures of water pollution often found in the literature is the concentration of faecal coliform bacteria in the water where there is no treatment system in place. These bacteria, which are found in human and animal faeces, give a good approximation of the quantity of pathogenic agents responsible for diarrhoea, cholera, hepatitis, typhoid and other illnesses of the digestive system. Recent studies (WHO, 1997) have estimated that these illnesses can be ascribed in 90% of cases precisely to the lack of clean water and to inadequate sanitation. Those worst affected are children in the developing countries (where 95% of water is untreated), thus creating a serious obstacle to the future growth of these countries and to the reduction of the gap that exists today between rich and poor countries. It has been estimated (WHO, 1997) that 88% of deaths due to intestinal illnesses involve children under 15 years of age, a much higher incidence than the average number of deaths under 15 years of age due to other diseases (30%).

Another factor of water pollution that has serious consequences for human health is the presence of heavy metals in the water (such as lead, cadmium, mercury, arsenic and nickel) and polluting chemical products (such as PCB, DDT and dioxins). People ingest these elements with their drinking water since they are difficult to remove under normal treatment processes, or when they eat fish where metals can accumulate. As has been demonstrated in various studies (e.g. Conservation Foundation, 1992), some heavy metals, such as nickel, cause serious damage to the nervous system, others, such as lead, mercury and arsenic, harm the liver and the kidneys. All heavy metals and many chemical pollutants are also thought to be responsible for tumour formation. In this respect, a study on Lake Michigan (Glenn et al., 1989) found that a high level of consumption of fish from this lake, polluted with high concentrations of PCB, DDT and other toxic chemical substances, increased the risk of a tumour by about 1%.

A recent example of water pollution caused by heavy metals that is causing great concern is to be found in Bangladesh and the Indian region of Bengal. In well waters in these areas, used for drinking by the local population since the 1980s, the quantity of arsenic found was fifty times greater than the permitted safety level (*The Economist*, 2001). A WHO study (Smith et al., 2000) estimated that the contaminated population could number between 35 and 77 million people, underlining the fact that prolonged exposure to arsenic causes skin disease (already evident in the populations

of the villages concerned) and the appearance of tumours of the lung, bladder, liver and kidneys.

Furthermore, water pollution in combination with atmospheric pollution can modify the habitat of some ecosystems (temperature, humidity, vegetation density, etc.). This can encourage the survival and spreading of insects that are particularly harmful because of the diseases they carry. This is the case of the mosquito which is a vector for various diseases including malaria which is thought to be responsible for a million deaths among children aged under five years and which is becoming an increasingly serious problem, especially in sub-Saharan Africa where 90% of the world's malaria cases are concentrated (WHO, 1977).

Effects of soil pollution

Many chemical, biological and radioactive pollutants tend to settle on the soil, contaminating both the crops planted there and the resultant agricultural products. This can cause serious harm to the population which can then be passed on to the next generation and last for many decades. One example is the pollution of food in Vietnam following American use, during the war, of a herbicide called "Agent Orange" which later proved to be carcinogenic. Thirty years on from the conflict, a recent study carried out in the Bien Hoa area found that 95% of the resident population has extremely high levels of dioxin (sometimes as much as 200 times more than normal values) which causes damage to the liver, birth defects and the appearance of tumours (*The Economist*, 2002b).

In addition, soil pollution damages the health not only of the farmers who work the land and of any children playing there, but also of the surrounding population since dust from the polluted area can be carried by the wind. Direct contact with contaminated soil and with the numerous microbes and parasites contained in it is particularly harmful for children who are obviously more vulnerable.[17]

Not only pollution but also overworking the soil can damage the health of the population. This is particularly true for rural families in poor countries who are dependent on the food they themselves produce. The attempt to achieve a minimum level of subsistence sometimes drives rural people to over-exploit the land thus

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[17] This may contribute to explain, for example, the high incidence of neonatal tetanus in the poorest areas of the developing countries.

reducing its productivity. Lower productivity in turn reduces calorie and protein intake on the part of the farmers, thus reducing their own productivity and making them more vulnerable to disease. The loss of income resulting from illness and lower land and labour productivity therefore increases the indigence of the farmers thus generating a kind of vicious circle between poverty, environmental degradation and the health of the population.

5. The impact of health on economic growth

Recent empirical studies have shown that a country's economic growth is closely correlated to the average health conditions of its inhabitants. For a given starting income level, countries with low infant mortality rates (assumed as a proxy for a country's health conditions), grew more rapidly between 1964-95 than those with higher mortality rates (WHO, 2001). Various empirical "cross-country" analyses (Barro e Sala-i-Martin 1995, Bloom e Sachs 1998, Bhargava et al. 2001) seem to confirm that good health conditions can contribute to explain economic growth (as suggested by the positive sign on arrow 7 in figure 1). By introducing, besides health, some traditional explanatory variables of economic growth into the econometric model (starting income level, economic policies, and the structural characteristics of the countries), these studies found that the coefficient of the health variable is statistically significant and that a 10% increase in life expectancy at birth gives a 0.3-0.4% increase in a country's annual economic growth.[18]

It is possible to identify three main channels through which the health conditions prevailing in one country can influence its economic growth: through investment in the country; through the average educational level of individuals; and through individuals' productivity. In the first place, a worsening of average health conditions discourages investment in the country. High incidence of a disease like malaria, for example, increases absenteeism and turnover in the labour market, thus increasing staff training costs for companies. This makes companies less likely to invest in the

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[18] It should be noted that life expectancy in the rich countries is today around 77 years as against 49 years in the poor countries. This difference can therefore help to explain the large and expanding gap that we find today between the economies of the North and South of the world.

country which therefore has lower growth capacity. This is what recently happened in South Africa where the incidence of AIDS among workers has convinced many companies to cut their investment programmes (WHO, 2001). An epidemic or a general worsening of average health conditions can further reduce the rate of capital accumulation in a country in that it reduces the household savings rate. This can happen either because disease obliges families to face higher medical expenses, or because it reduces life expectancy and so also reduces the incentive to save for future consumption. Lastly, the accumulation of capital in a country hit by an epidemic falls, partly because the risk of contracting the disease discourages tourism in the area and related investments.

Secondly, as emphasised by the WHO report (WHO,2001), the prevalence of bad health conditions in the population adversely affects not only investments in physical capital but also those in human capital. When an adult member of a family is ill, for example, this reduces the sum of money that can be spent on the children's education both because the household spends more in order to treat the illness and because disposable income is reduced. Since the incidence of disease is higher among poor families where there are already tight cash constraints, the children may be obliged to leave school early to help support their family. The low level of investment in human capital seen in countries with poor average health conditions is also the result of low life expectancy which, by reducing the temporal horizon available to an individual, makes the initial investment in education less profitable.

Furthermore, high infant mortality rates drive poor families to have many children. This reduces the amount that the family can spend on each child, leading therefore – for a given level of disposable income – to investing less on the education of each one. If the children receive less education they may repeat the same behaviour over time passing it on to successive generations. As argued by WHO (2001), the less education received by girls, the lower their future earnings will be and therefore the lower the opportunity cost of staying at home to raise their children once they reach adulthood, which means they will also have many children. What is more, the high birth rates generated by this behaviour tend to reduce the proportion of the population of working age which various studies (cf. Bloom et al., 2001) find to be directly proportional to per capita income.

Lastly, the early death due to disease of many adults prevents the passing on of precious knowledge to the next generation, which also lowers the level of human

capital. This aspect is particularly important in African countries hit by the spread of AIDS, where the ways of working the land are mostly passed on from father to son (WHO, 2001).

A third way in which the health status of a population influences economic growth is through individual productivity.[19] A poor state of health increases the number of sick days taken by workers and reduces both their physical and mental productivity. In addition, it reduces children's ability to learn, thus adversely affecting their future educational achievement. In this regard, many studies (see, for example, Pollitt, 2001) have found strong links between a lack of iron and vitamin A in the organism and reduced cognitive skills.

An individual's poor state of health can also have a negative spillover effect on the productivity of other family members or of people close to them. If an individual is ill, for example, other family members may have to give assistance, reducing the number of hours these carers can dedicate to their own work and often also reducing their productivity when they are at work. This productivity loss may be the result of the poor concentration and stress caused by worrying and giving assistance to their relative.

Besides the three channels described above (investment in physical capital, investment in human capital, and individual productivity), it is also possible to hypothesise other ways in which the health of a population may influence economic growth. A worsening of average health conditions leads to an increase in government spending on health. This can generate high public deficits and an increase in public debt which cause instability harmful to economic growth in the country.

In conclusion, it can be said that the health of a population influences also the "health" of its economy. If a population is in good health this will generally encourage economic growth in a country, especially in poor countries where the spread of diseases prevents the economy taking off, whereas the opposite occurs if the population is in bad health. In this light, health policies can promote economic growth, while the latter tends to improve health. The existence of circular

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[19] As argued by Fogel (1977), the improvement of medical techniques and the increase in the number of calories available to workers have played an important role in supporting growth in Europe in the last two centuries.

relationships between health and economic growth can therefore give rise to vicious or virtuous circles according to the policies employed.

Finally, through its influence on economic growth, health can affect also inequality and environmental degradation. As argued by the vast literature on the Kuznets curve (indicated with KC in figure 1) and the environmental Kuznets curve (EKC), inequality and environmental degradation (measured on the vertical axis) first rise and then decrease as per capita income grows. For those cases in which the Kuznets curves are empirically robust,[20] therefore, promoting health policies may help increase a country's per capita income (moving along the horizontal axis) and eventually reach the downward side of the two curves where inequality and environmental degradation tend to decrease.

Health, however, can also have other feedback effects on inequality and ecological degradation that are independent of income growth. We now turn to the analysis of these additional effects.

6. Feedback effects of health on inequality

There is a growing debate in the literature about the possible explanations underlying the observed correlation between health and inequality. In section 3 we have discussed how inequality can affect health, but it seems reasonable to argue that there exists a bidirectional link between these two variables. The health status of the poor is generally worse than that of the rich since the rich enjoy higher living standards and higher access to the health care system than the poor. This fact tends to widen the gap in terms of present income and future income capacity, thus increasing the level of inequality in the country (Gwatkin, 2000). The children of poor families, in fact, generally have worse health conditions than the children of rich families, and this adversely affects their future earning possibilities as adults. It has been observed, in fact, that even when the children of poor and rich families receive the same level of education, the former may suffer inferior cognitive capacities because of the lower health conditions in which they live. For instance, several studies find a strong

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[20] Several recent contributions in the literature have cast doubts on the validity of the two relationships. See, among the others, Li et al. (1998) on the Kuznets curve and Borghesi (2001) on the environmental Kuznets curve.

correlation between reduced cognitive capacity and low nutritional status, e.g. lack of iron and vitamin A in the organism (Bhargava and Yu, 1997; Pollitt, 2001). Health, therefore, as many other traits (e.g. wealth, race), may explain much of the intergenerational transmission of economic status (Bowles and Gintis, 2001).

Moreover, low health conditions can increase inequality not only within countries, but also across them (WHO, 2001). Developing countries, in fact, often have poor average health conditions that hinder their ability to grow and converge towards the developed economies. Countries with high rates of infant mortality have grown more slowly during the period 1964-1995 than countries with low levels of the same variable (WHO, 2001). Thus, inequality jeopardises health and health in its turn strongly affects the earning capacity of individuals (arrow 8 in figure 1). This feedback may trigger a vicious circle between bad health and inequality that risks to reinforce progressively both of them.

7. Feedback effects of health on the environment

The health status of a population can indirectly influence the quality of the environment as a result of two factors which have an impact on environmental degradation: economic growth and population dynamics. We have already discussed how health can affect economic growth. As to the population dynamics, population growth is influenced by the average health conditions of the population that strongly affect the birth rate. In this respect, it has been observed that the countries with the highest fertility rates are those that also have the highest infant mortality rates. A strong correlation between these two rates emerged, for example, from the analysis of 148 countries in 1995 carried out by WHO's Commission on Macroeconomics and Health (WHO, 2001, p.36, Fig. 3). In general, this study found that the average number of children increased from 2 to 6 as the child survival rate fell from 95% to 75%. This is because in countries with a high number of deaths in the first years of life, parents tend to have more children to ensure that at least some of them survive into adulthood. This trend is further reinforced by the fact that in many developing countries, having children is the only way parents can provide for their old age. The result is that the populations with the highest infant mortality rates are also those that grow most quickly, as shown in the WHO report (2001, p.37, Fig. 4), because the

high rates of infant mortality are more than compensated by the high birth rates.[21] Reducing infant mortality in these countries would therefore tend to reduce population growth.

A lower population growth would have in turn a positive effect on the quality of the environment. Environmental degradation is so strongly influenced by the size of the resident population that the demographic issue holds centre stage in the sustainable development debate, right from the first contributions to be found in the literature (cf Holdren and Ehrlich, 1974). The size of the population does, in fact, determine the amount of natural resources used to satisfy a population's consumption needs and thus also the carrying capacity of an ecosystem. Population growth can damage the environment since it is accompanied by both an increase in the demand for environmental goods and an increase in the waste coming from the production and consumption of a more numerous population.

Therefore, the causal link we have just described starts with health, moves on to population dynamics and ends with the environment, as described by arrows 9 and 10 in figure 1.

Alongside this link, we can nevertheless identify another one moving in the opposite direction, starting with environmental degradation and leading to average health conditions (indicated by arrows 11 and 12 in the block diagram), making the relationship between health and environment bi-directional, mediated by variations in the population. The high level of environmental degradation in some areas of the world has, in recent years, led to increasing migratory flows of "environmental refugees" (El-Hinnawi, 1985) who move on to escape from the pollution of their traditional habitat. There are so many cases of migration caused by environmental degradation that some authors (cf.. Bates, 2002) have attempted to classify some typologies of environmental refugees to provide a theoretical framework to the fast-growing literature on this subject. Amongst the examples given is the migration of 7 million Vietnamese rural people to the cities during the war with the United States because of the destruction of the forests and harvests following the use of the previously mentioned herbicide "Agent Orange" (Glassman, 1992). Another example

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[21] The aforementioned study by WHO (2001) found that the infant mortality rate accounts for 85% of the variation in the population growth rate of a country.

is that of the 15 million people who may well be forced to leave Bangladesh by 2050 as a result of a rise in sea level (Myers, 1993).

Migration caused by environmental degradation tends to change the population's distribution over the territory which can in turn affect the health status of the population. An increase in population density in the cities, for example, can facilitate the transmission of diseases such as tuberculosis, meningitis, poliomyelitis, and measles which spread rapidly, above all in the overcrowded hinterlands of large urban centres which also suffer from poor sanitation.

8. The direct influence of globalisation on health

After examining the indirect effects of globalisation on health through economic growth, inequality and environmental degradation, and the bidirectional nature of these links, let us now move to the analysis of the direct health effects of the worldwide economic integration (arrow 13 in figure 1).

Globalisation may increase the cross-border transmission of infectious diseases by augmenting the movements of people and the consequent risk of contagion. People move from the North to the South and vice versa mainly for tourism and labour, although other causes can also contribute to this sort of decisions.[22] Thus, for instance, Northern people may go on holiday to the South to enjoy unpolluted natural resources that have been depleted in their own countries by the industrialisation process. At the same time, Southern people may go to the North to find a job and enjoy higher living standards.[23]

These large multi-directional movements of people that characterise the globalisation process can spread, therefore, transmissible diseases across countries, which raises the health interdependence between developed and developing countries.

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[22] Part of the literature (e.g. Hugo, 1996; Bates, 2002) has emphasized the role of environmental degradation as a possible reason to migrate. The rise in the sea level that follows from global warming, for instance, might pose serious hazards on the future possibility to live in several islands and low lands, which induces people to migrate. Some authors (Myers, 1997) argue that these "environmental refugees" might become the largest group of involuntary migrants in the near future.

[23] The current level of labour mobility, however, is the object of debate. While immigration has increased in some industrialised countries such as in the European Union area, some authors (e.g. Sandmo, 2002; Woodward et al., 2001) argue that labour migration is lower in the present phase of globalisation than in the previous one (1870-1914), also because developed countries have partly closed their borders to unskilled workers.

Thus, for instance, large migrations from the South to the North may increase human settlements in poor areas without adequate sanitation and access to safe water (e.g. suburban areas in large Northern towns), augmenting the consequent risks of contagion throughout the Northern population. The worldwide diffusion of AIDS (apparently originated in Western Africa in the 1930s) and the transmission of multidrug resistant tuberculosis from poor to rich countries provide other important examples of how low health conditions of the poor can have negative spill-over effects on the health status of the rich. The outbreak of SARS is another recent example.

As these examples show, inequality tends to strengthen the health interdependence between developed and developing countries. In a globalised world, in fact, the health of a country depends on infectious diseases that are breed by poverty in some far-distant country (Sandler and Arce, 2002).[24]

Globalisation has also a direct health effect through the consequences that international agreements can have on the health of the populations involved (Woodward et al., 2001). The international agreements on food security standards and on the use of Genetically Modified Organisms (GMO), for instance, can have large positive as well as negative impacts on public health. These agreements pose important trade-offs between conflicting interests. The food security standards imposed by some developed countries, in fact, can protect the health of their inhabitants. However, this may come at the cost of a reduction in the exports of developing countries. If so, low-income countries might become even poorer, with a consequent negative impact on their average health status and on inequality between countries. Similarly, the adoption of GMO poses a delicate trade-off between the need to feed an ever-increasing population in the developing countries (that have the highest rates of demographic growth) and the unknown consequences that GMO might cause to their population in terms of health risks and variability of the agricultural production.

The recent TRIPS agreements on the intellectual property rights provide another example of how the governance of globalisation can directly affect public health. Even in this case, a trade-off arises between the need to promote research in health

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[24] It is estimated that most of the infectious disease epidemics are of special relevance to Sub-Saharan Africa and Asia that account for the poorest 20% of the world's population (Beaglehole and McMichael, 1999).

technologies (that generally takes place in developed countries) and the need to protect public health in developing countries that cannot afford high-costs medicaments. The "Declaration on the TRIPS agreements and public health" promulgated at the WTO meeting in Doha in November 2001 tried to find a compromise solution between the opposite interests of developed and developing countries in this field. While reaffirming the commitment of the WTO members to the TRIPS agreement, the Declaration recognised that each member has the right to grant compulsory pharmaceutical licences in case of national public health crises, especially those resulting from HIV/AIDS, tuberculosis, malaria and other epidemics that afflict many developing countries. However, most of these countries are unable to make effective use of this right since they had no manufacturing capacities in the pharmaceutical sector and wanted therefore to be allowed to import the necessary pharmaceutical medicaments from countries that can sell them at low costs. This request caused a lively debate between developed and developing countries that have reached an agreement on this issue only after several months in Geneva (August 2003). During this long bargaining process, Brazil has asked for WHO to be involved in the negotiations to safeguard its own interests, which further confirms that global governance and public health are strictly intertwined.

The international agreements on labour standards represent another important case of global governance that can affect public health, particularly in the developing countries. The possible existence of "sweatshop" labour conditions in some multinationals that produce in developing countries and the use of children in their production process have recently attracted much attention in the public opinion. The actual extension of this phenomenon is still the object of debate.[25] However, some legitimate concerns exist on the potential impact that these labour conditions might have on the health of the population in developing countries. The exploitation of adults and children in unhealthy labour conditions could provoke diseases among the poor in the developing countries and thus reduce also the average health in these countries. If so, this would tend to raise inequality both within developing countries and across countries. On the other hand, one must be aware that imposing in the South the same labour standards of the North might increase labour costs in developing

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[25] Lindert and Williamson (2003), for instance, argue that there is no positive correlation between globalisation and the use of child labour and that during the last globalisation phase (since 1950) the

countries and reduce the incentive of Northern enterprises to invest in these countries. As the other international agreements mentioned above, therefore, also those on labour standards might generate a trade-off in developing countries between better health from higher labour standards and lower income (thus possibly lower health) from a reduction in investments.

Another channel through which global governance can directly affect public health is given by the international environmental agreements. The reduction in CO_2 emissions proposed by the Kyoto agreements, for instance, would largely benefit the health status of the world population, regardless of where this reduction occurs (mainly in developed countries). However, if the environmental policies required by the Kyoto Protocol had recessive effects, cutting CO_2 emissions might come at the cost of a reduction in per capita income and thus also of the average health conditions. Moreover, if the implementation of the Kyoto Protocol increases the costs of production of the firms that operate in the developed countries, these might shift their polluting activities from the North to the South with potential negative effects on the health conditions of the population living in developing countries. If so, like in the cases examined above, the adoption of the international environmental agreements in the North might generate a trade-off in the South between better health (from lower CO_2 emissions at the world level) and lower health (from higher concentration of polluting activities in developing countries). Although the "pollution haven hypothesis" has found little empirical support in the past, one cannot deny that such a displacement of polluting activities might occur in the future if the environmental costs of production were to increase substantially. And this might actually occur if the countries had to respect the commitments taken in Kyoto in terms of lower CO_2 emissions, since the environmental regulations should be much stricter (and the implementation costs much higher) than the one adopted by single countries in the past.

A deeper analysis of the economic and social implications of these international agreements goes beyond the scope of the present work.[26] These few examples, however, although largely incomplete, can help to clarify the strict linkage between globalisation, health and inequality across countries. In all these examples, in fact, the

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rates of work by children under 15 have been reducing in all member countries of the International Labour Organization.

[26] See Wallach and Sforza (2000) for a thorough discussion of these potential implications.

governance of globalisation and its direct impact on public health raises potential trade-offs and conflicts of interests between the North and the South that are likely to increase, the higher is the level of inequality across countries.

9. Policy implications

As we have seen, crucial socio-economic determinants of health are poverty, inequality, social and environmental capital. Therefore, in principle, any policy that reduces the poverty and the inequality of a population and invests in its social and environmental capital also improves its health and the life quality of its members contributing to the sustainability of its economic development. We are here specifically interested in the socio-economic policies that may offset the negative implications of globalisation on health and exploit its potentialities.

As we have argued elsewhere (Vercelli, 2003a and 2003b), according to many reserachers inequality has increased in several countries in the last two decades or so, basically because in this period redistributive policies proved unable to offset these tendencies and reduce inequality. As a matter of fact, the welfarist policies pursued in the 1950s and 1960s succeeded to some extent in this task in many countries. In principle, globalisation is fully consistent with these policies, but it raises specific obstacles to their implementation. Since the welfarist policies may increase the cost of labour, investment and production may shift to the countries where the cost of labour is the lowest, thus triggering a sort of race to the bottom in the labour markets not sheltered by the use of superior technology. Globalisation, therefore, can make welfare state policies more difficult. The higher factor mobility that characterises globalisation imposes constraints on the instruments that countries may use for redistribution, such as progressive taxation and health security systems. In a globalised world progressive taxation on capital and labour income is more likely to cause an outflow of capital and the emigration of high-income earners (Sandmo, 2002). The same applies, in our opinion, in the case of health policies that aim to promote equality in the access to health services. Globalisation, therefore, may prevent governments from reducing income and health inequalities. Given the bi-directional link between inequality and health discussed above, this might be a serious problem for those developed countries where income inequality tends to increase with

globalisation. Following the Heckscher-Ohlin theory, in fact, international market integration should lead rich countries to produce and export commodities that are skilled labour intensive. This tends to increase the wage differential between skilled and unskilled workers in the developed countries that, in the absence of redistributive policies, may widen also the health differential between these two categories.

The higher factor mobility that distinguishes the globalisation process may also hinder other government interventions that promote health like, for instance, the environmental policies. The "displacement hypothesis" discussed above can prevent governments from implementing ecological policies that might lead some firms to move abroad to avoid the consequent reduction in the national production and employment levels. Similarly, in a globalised world, single governments have no incentive to introduce unilaterally an environmental policy that increases the cost of energy (like a carbon-energy tax), since this may induce firms to import energy from other countries where these costs are lower because of lower environmental regulations.

International financial integration provides another reason, beyond factor mobility, why globalisation can make welfarist policies in general, and health policies in particular, less viable. Financial integration, in fact, tends to raise the pressure on single countries to reduce their budget deficit, making governments increasingly unable to cope with the expensive health care programs for the poorest. In the USA, for instance, this program - named Medicaid - represents the second biggest state expenditure after education spending, corresponding to about 15% of the overall USA spending (The Economist, 2003). In recent years, moreover, the costs of Medicaid have grown faster than any other health program, also because the number of poor people that are eligible for the program has increased over time. To cope with the stricter budget constraints imposed by financial integration, many USA states are currently cutting or planning to cut the health program for the poor (by lowering reimbursement rates to doctor that treat Medicaid patients, reducing the services covered by the program and narrowing eligibility). The same might happen in the future in the EMU countries that are currently the target of large immigration flows of poor people from the South of the world and, at the same time, must respect the Stability Pact that induce them to cut expenditures.

While factor mobility and financial integration tend to reduce the state interventions that promote health, other aspects of globalisation make such

interventions more strictly needed. Thus, the existence of global environmental problems should induce developed countries to support the introduction of environmental policies and less polluting technologies also in developing countries. If not, the rising pollution intensity of the South might compromise the environmental efforts of the North and damage the health status of the Northern inhabitants. Similarly, the increasing health interdependence across countries increases the need for Northern interventions with health policies in the South of the world to avoid the potential negative feedback effects on the North of a Southern disease that spreads all over the world. This risk is currently provoking a debate on how to eradicate the risk of global diseases. Some authors (WHO, 2001) argue that the North should partially finance the health policies of the South as an investment to reduce the health risks posed by possible infectious diseases. Thus, for instance, the eradication of smallpox in 1977 was made possible in the past by large investments mainly financed by rich countries for the mass immunisation in poor countries.[27] Moreover, the existing differences in health between countries call for the transmission of new health care technologies from the North to the South of the world that can contribute to reduce both health and income inequality across countries (Sachs, 2001). In the short run, however, the introduction of best-practice health care technologies may have ambiguous effects on the health and income distribution within the receiving country, depending on how the disease is distributed between rich and poor people in that country (Deaton, 2001).[28] The transmission of health care technologies to the South, therefore, should come along with redistribution policies that guarantee equal access to such technologies for people that equally need them, independently of their income level.[29]

10. Concluding remarks

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[27] Using a game theoretical model, Barrett (2003) has recently shown that global eradication of a disease, i.e. its complete elimination in every country, requires international cooperation and strong international institutions.

[28] Some authors (e.g. Preston and Haines, 1991) report that in some cases the transmission of health care technologies has initially widened the health and income gaps within the receiving country.

[29] See van Doorslaer et al. (2000) for a discussion of how health care systems should be financed to ensure an equitable allocation of resources.

In this paper we have discussed how the process of globalisation may affect in different ways the health of people living in different areas of the globe, taking account of their economic and social status. We have seen in particular that poverty, inequality, as well as social and environmental capital, play a detectable role in affecting the health of specific individuals or groups of individuals. The health of individuals is not uniformly proportional to their per capita income but rather to poverty and to the inequality of income distribution. Poverty acts through material deprivation and inequality through relative deprivation. We have analysed in particular the impact of relative deprivation on the health of individuals independently of poverty and per capita income. Since globalisation in the last twenty years was found to be correlated with increasing inequality both between countries and within many of them, this may have induced stress and poor health in people hit by a sense of relative deprivation.

The mechanism through which chronic stress jeopardises the health of individuals is very similar to economic "short-termism". Energies are mobilised to obtain a desired short-term goal even at the cost of jeopardising the sustainability of the good performance in the longer term. In fact, whenever a human being has to face an emergency, the body mobilises all the resources that may be useful to face the exceptional threat preparing muscular activity for fight or flight and\or alerting the nervous system for devising a quick solution to the problems. However, the energy mobilised to face the immediate task is subtracted from the resources available for routine functions such as tissue maintenance and repair, growth, digestion and depuration of liquids and food through liver and kidneys, reproductive and immunity functions. This mechanism may be very efficient when the emergencies are brief and rare because in this case the suspension of routine functions does not produce serious damages. However, it is bound to affect health in an irreversible way when the shocks are frequent or permanent, like in the case of a worsening social status or relative deprivation. An increase in income inequality, as that induced by globalisation in the last twenty years, produced for many people exactly a reduction in social status and an increasing feeling of relative deprivation.

We have to stress the link between the physiological mechanism that explains how inequality deteriorates health and the economic mechanism that explains how certain aspects of globalisation may deteriorate the economic "health", i.e. the stability and sustainability, of the economic performance. In both cases, the pathology originates

from short-termism, i.e. the myopic emphasis on short-term objectives to the cost of jeopardising the achievement of longer-run objectives.

In the last two decades the globalisation process, driven by the principles of privatisation and deregulation, progressively shortened the time horizon within which decision-makers optimise their strategies. This mechanism can be seen in some more detail by focussing on three of its salient features.

The first one is the growing importance of the financial side in the balance sheets of corporations and households. Financial decisions are liable to big, often unexpected, gains and losses and must be revised almost continuously in the light of the latest available information, thus greatly contributing to the shortening of the time horizon of economic decisions. Globalisation accelerated this trend by unifying financial markets and increasing the size and velocity of "hot money" transferred at very short notice from one sector or country to the other for speculative purposes. This greatly increased the instability of financial markets and the size of potential losses and gains of financial decisions, focusing the attention of operators on the speculative factors rather than on the long-run trends of economic fundamentals.

A second important aspect of short-termism is the growing flexibility of labour markets and industrial relations. Workers are compelled to shorten the time horizon of their decisions while the employers have the opportunity of revising their choices concerning the size and use of the labour force almost continuously on the basis of mainly speculative considerations.

The third example may be found in the field of corporate governance. Managers are evaluated and rewarded according to indices of performance calculated over increasingly short time horizon. This trend has negative implications on the sustainability of the economic performance of the firms and on its compliance with the tenets of business ethics and is a source of greater stress for the top managers and all the people affected by their decisions.

The recent phase of globalisation has greatly reinforced the three trends here briefly recalled. The increasing importance of financial capital was promoted by the radical liberalisation of the capital movements across countries. The growing flexibility of labour markets and industrial relations was enhanced by the increasing international competition based on the opportunity of shifting capital in the countries and sectors where the flexibility of labour is higher. In addition, the growing

international mobility of capital and skilled labour encouraged the adoption of short-termist capital governance and reward systems.

Summing up, the growing short-termism induced by globalisation progressively increased the stress of workers, entrepreneurs, shareholders and households and this nurtured an analogously "short-termist" physiological and psychological response that undermined their health. Of course, this effect is particularly visible and sizeable in individuals affected by absolute and relative deprivation and weakly protected by a social security network and accessible social capital. Policies that reduce poverty and inequality and invest in social capital may counteract these negative effects on health. More generally, any measure capable to curb short-termism in favour of the consolidation and diffusion of a longer-term horizon would improve global health and the sustainability of the process of globalisation.

Health policies of this kind can be interpreted as an investment that can contribute to reduce other expenditures in the longer run (e.g. by reducing poverty and thus also future health expenditures for the poor). As any other form of investment, however, health policies take time to produce their returns. Therefore, while the prevailing short-termism pushes in the direction of a further cut in health expenditures, a less myopic perspective would encourage the opposite path. In this perspective it would be particularly advisable to pursue internationally coordinated policies that exploit the potentialities of globalisation (e.g. diffusion of knowledge and human capital) to fight its negative effects (e.g. diffusion of global diseases). This consideration applies not only to health policies strictly speaking, but also to any policy that can promote or preserve good health conditions, like the environmental policies. These policies, in fact, often generate high costs in the present, but produce considerable benefits in the longer run, sometimes even well beyond the life horizon of the generation who bears the costs. The prevalence of short-termism hinders, therefore, the adoption of environmental friendly measures and calls for internationally coordinated policies to solve the current global environmental issues.

In conclusion, the deep link between psycho-physiological and economic short-termism stressed above suggests a further strategy of investment in health that is generally neglected in the literature. Whatever intervention may react to the growing short-termism, accelerated by the recent process of globalisation, will reduce stress, improve health, and corroborate the sustainability of development. Here we limit ourselves to a few hints related to the three examples mentioned before. Some control

of the speculative flows of capital, for example through a Tobin tax, would give a contribution in the right direction. Analogously, stopping –and possibly reversing– the process of increasing precariousness in labour relations would go in the right direction. Finally, the adoption of more rigorous and far-sighted rules of corporate governance capable to lengthen the time-horizon of managers and shareholders would provide a very important contribution to curbing short-termism. This may be obtained by adopting criteria of evaluation of managers' performance based on longer-period indicators and by strengthening the role of stakeholders in the definition and control of corporate strategies.

Appendix

Table 1: Correlation between income inequality and health indicators in selected studies

Health indicator	Inequality indicator	Correlation coefficient	Period	Countries	Study
Life expectancy (years at birth)	Income share to 7th decile[30]	0.86 (p<0.001)[31]	1979-1983 (single years)	9 OECD countries	Wilkinson (1992)
Life expectancy (annual rate of change)	Relative poverty[32] (annual rate of change)	-0.73 (p<0.01)	1975-1985	12 European Union countries	Wilkinson (1992)
Life expectancy (annual rate of change)	Income share to 6th decile (annual rate of change)	0.80 (p<0.05)	Different periods (mainly in the '70s)	7 OECD countries	Wilkinson (1992)
Life expectancy (annual rate of change)	Income share to 6th decile (annual rate of change)	0.47 (p<0.05)	1979-90	15 OECD countries	Wilkinson (1992)
Age-adjusted total mortality	Income share to 5th decile	-0.45 (p<0.001)	1980	50 US states	Kaplan et al. (1996)
Age-adjusted total mortality	Income share to 5th decile	-0.62 (p<0.001)[33]	1990	50 US states	Kaplan et al. (1996)
Age-adjusted total mortality (% change 1980-1990)	Income share to 5th decile in 1980	-0.62 (p<0.0001)[34]	1980-1990	50 US states	Kaplan et al. (1996)
Age-adjusted total mortality (% change 1980-1990)	Income share to 1st decile (% change 1980-1990)	-0.53 (p<0.001)	1980-1990	50 US states	Kaplan et al. (1996)
All-cause mortality	Robin Hood Index[35]	0.54 (p<0.0001)	1990	50 US states	Kennedy et al. (1996)
Age-adjusted total mortality	Gini coefficient	0.25 (p<0.001)	1990	282 US metropolitan areas	Lynch et al. (1998)
Age-adjusted total mortality	Theil Entropy coefficient	0.21 (p<0.001)	1990	282 US metropolitan areas	Lynch et al. (1998)
Age-adjusted total mortality	90th:10th percentile income share ratio	0.52 (p<0.001)	1990	282 US metropolitan areas	Lynch et al. (1998)

[30] By this we mean the proportion of income going to the least well off 70% of the population. A similar interpretation applies to the other deciles in these tables.

[31] The correlation coefficient is 0.90 (p<0.001) when controlling for Gross National Product per head.

[32] Relative poverty is defined as the proportion of the population living on less than 50% of the national average disposable income.

[33] The correlation coefficient is basically unchanged (r=-0.59 with p<0.001) when median income is also taken into account among the explanatory variables.

[34] The correlation coefficient is r=-0.51 (p<0.002) when adjusted for changes in median income for each state.

[35] The Robin Hood Index is defined as the proportion of aggregate income that must be redistributed from households above the mean to those below it to achieve a perfectly equal distribution. Obviously, the higher the Index, the more unequal the distribution.

Table 2: correlation between health and social indicators in selected studies

Health indicator	Social indicator	Correlation coefficient	Period	Countries	Study
Age-adjusted rates of total mortality	Lack of social trust (perceived unfairness)[36]	0.77 (p<0.0001)	1990	39 US states	Kawachi et al. (1997)
Age-adjusted rates of total mortality	Lack of social trust (perceived mistrust)[37]	0.79 (p<0.0001)	1990	39 US states	Kawachi et al. (1997)
Age-adjusted rates of total mortality	Lack of social trust (perceived lack of helpfulness)[38]	0.71 (p<0.0001)	1990	39 US states	Kawachi et al. (1997)
Age-adjusted rates of total mortality	Per capita group membership in voluntary groups	-0.49 (p<0.0001)	1990	39 US states	Kawachi et al. (1997)
Mortality rates	Hostility rates[39]	0.9 (p<0.0001)	1994	10 US cities	Williams et al. (1995)

Table 3: correlation between income inequality and social indicators in selected studies

Social indicator	Inequality indicator	Correlation coefficient	Period	Countries	Study
Homicides/100000	Income share to 5th decile	-0.74 (p<0.0001)	1989-91	50 US states	Kaplan et al. (1996)
Violent crimes/100000	Income share to 5th decile	-0.70 (p<0.0001)	1989-91	50 US states	Kaplan et al. (1996)
Per capita group membership in voluntary groups	Robin Hood Index	-0.46 (p<0.01)	1990	39 US states	Kawachi et al. (1997)
Lack of social trust (perceived unfairness)	Robin Hood Index	0.73 (p<0.0001)	1990	39 US states	Kawachi et al. (1997)
Social trust[40]	Gini index	-0.908 (p<0.0001)	1990-93 and 1995-96	33 countries	Uslaner[41] (2001)

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[36] Perceived unfairness was measured by the percentage of respondents who agreed with the first part of the following question: "Do you think most people would try to take advantage of you if they got a chance or would they try to be fair?"

[37] Perceived mistrust was measured by the percentage of people that agreed with the second part of the following question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?".

[38] Perceived lack of helpfulness was measured by the percentage of respondents that agreed with the second part of the following question: "Would you say that most of the time people try to be helpful, or are they mostly looking out for themselves?".

[39] Hostility rates were based on the scores obtained through a telephone poll conducted on about 200 persons residing in each of the ten US cities taken into account.

[40] See Uslaner (2002, p.29, footnote 22) for a description of how this variable is constructed from the data set of the World Values Study.

[41] The value reported in the third column for this study is the two-stage least square estimator of a multivariate regression, therefore it provides information on the partial correlation between social trust and the Gini index.
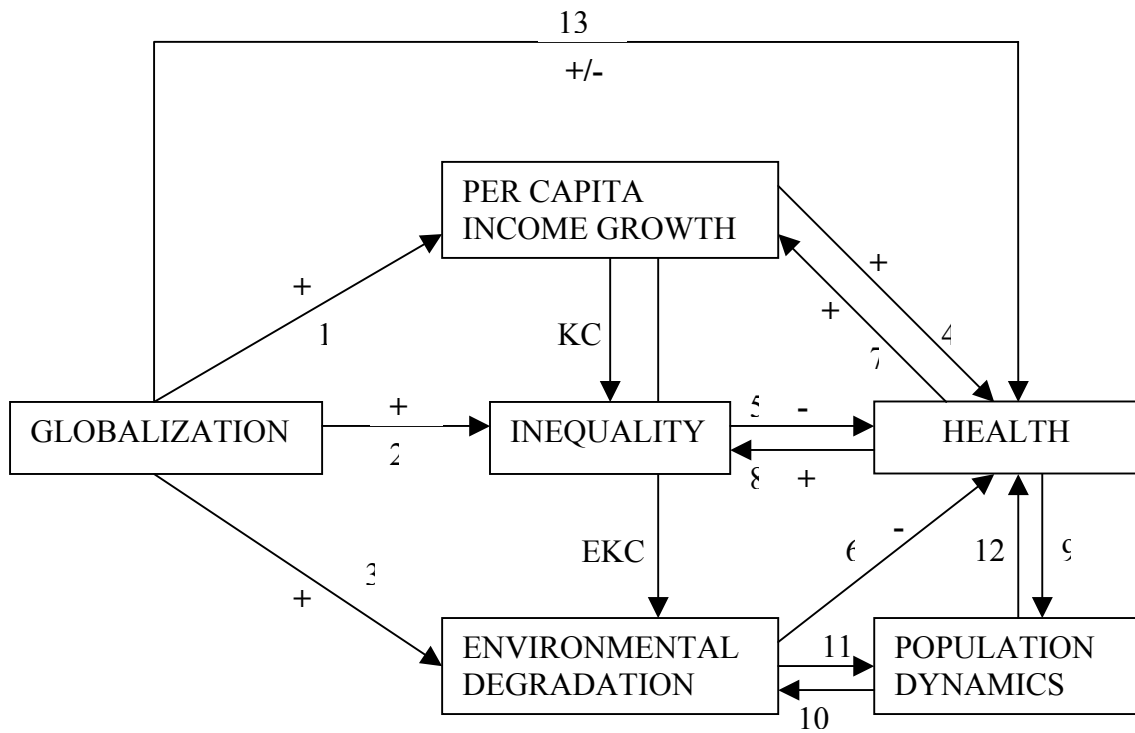
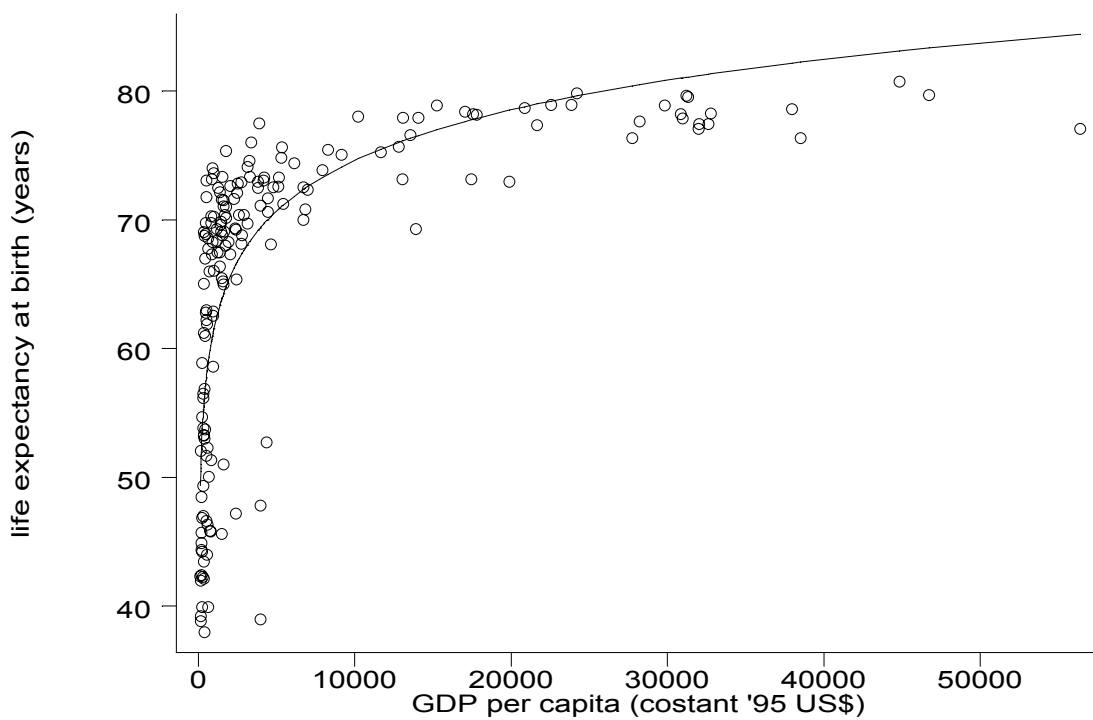Figure 1: block diagram of main causal relationships

Figure 2: life expectancy and per capita GDP in 175 countries in 2000.

Source: authors' elaboration on World Bank data (World Bank, 2002)

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