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by

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1. Introduction, background and purpose of analysis

The last quarter century – the years of the current globalisation - enjoyed a ‘peace dividend’ produced by the end of the Cold War, a ‘democratic dividend’ due to the collapse of communism and spread of democratic institutions, a ‘market dividend’ generated by the introduction of market reforms in dirigiste economies, a ‘demographic dividend’ due to a sharp deceleration in birth rates and a parallel growth of the labour force and, finally, a ‘technological dividend’ due to the ITC and bio-medical revolution.

The last quarter century has simultaneously witnessed the spread of an economic paradigm that emphasizes macroeconomic stability, domestic liberalization, privatization of state-owned enterprises and public utilities, the removal of barriers to international trade and finance, and the search for market-based solutions in the production of public goods. Its proponents claim that these measures reduce rent-seeking, increase competition, improve export opportunities, and promote the convergence of the income per capita of poor countries towards that of the advanced ones. However, such claims have seldom been validated, and economic and health performance was disappointing in several countries that followed such policies. In this regard, the debate on the pace of improvement in health status and reduction in health differentials acquires considerable relevance. Though health status can be – and indeed has been - affected by non-policy factors, such as HIV-AIDS, unsatisfactory health trends could be seen as a negative side-effect of globalisation policies. In contrast, sustained health gains could be interpreted as a sign of their success (Dollar 2001).

This paper tries to shed some light on the relation between globalisation policies² and health. It first discusses changes in health status and in its social determinants over the last quarter century and then analyzes the relation between globalisation policies and the social determinants of health. This task faces huge methodological and data problems, and the establishment of a causal nexus between globalisation policies and health cannot be but tentative. Be as it may, the literature reviewed and econometric analyses presented in this

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² This paper focuses on ‘economic globalisation’ i.e. a process of gradual integration of countries and people into the world economy through the liberalisation of the markets for goods, services, investments, finance, technology, information, and workers. The paper separates, somewhat arbitrarily, the drivers of globalisation in ‘exogenous’ (i.e. dependent, if in part, on the decisions of policy makers), ‘endogenous’ (i.e. resulting from the choices of agents in the field of consumption, health innovation, migration and so on) and ‘shocks’ (such wars).

paper suggest that – in spite of the five dividends mentioned above - during the last quarter century most social determinants of health improved at a slower pace than during the prior two decades. The blame for this slowdown should not be necessarily placed on globalisation policies, as such slowdown might have been caused by random shocks and endogenous changes in the field of technology and demography. Indeed, it might be argued that where domestic and global markets are complete, competitive and non-exclusionary, regulatory institutions strong, asset concentration moderate, access to health services universal and social safety nets in place, globalisation policies may be desirable from an efficiency, equity and health perspective. However, in most cases, such conditions are not verified, and the growth, inequality and health impact of a liberalisation and globalisation that ignore real-life structural rigidities, incomplete markets and institutions, persistent protectionism, and the high cost of technology transfer have been negative in many cases.

2. Mortality trends during the recent globalisation

2.1. A slow down in the pace of improvement in health status

Until recently, it has been commonly believed that the positive health trend recorded during the 1960s and 1970s continued during the 1980s and 1990s (Fox 1998). However, the most recent literature points to a slowdown in the rate of improvement of the main health indicators (Wagstaff and Cleason 2004, Deaton 2004, Deaton and Drèze 2002). A comprehensive evaluation by Cornia and Menchini (2006) confirms that during the 1980s and 1990s there was a statistically significant slowdown in the global rate of improvement of (100-LEB)³ (Table 1). Such global slowdown is robust to the removal of HIV-affected Sub-Saharan Africa and hard-hit transitional economies of Eastern Europe from the group of countries analyzed. Such slowdown was most pronounced and widespread in the 1990s, suggesting the presence of systemic problems possibly related to the policies adopted on a massive scale during that decade, or to the influence of other factors (Table 1). The slowdown of the 1980s and 1990s can be juxtaposed to the rapid health gains recorded in the developed and developing countries over the 1960s, 1970s and in some cases 1980s following the gradual development of national health systems and transfer to poor countries of modern health technologies. Finally, the last five years point to a trend reversal as there was a slight but generally significant improvement in health indicators.

The IMR trends are not too different, except that in East Asia, Eastern Europe, Latin America, India and MENA the fastest decline was recorded in the 1980s rather than in the 1970s. In the ‘rest of South Asia’ the largest health improvement was observed in the 1990s owing to the rapid IMR decline recorded by Bangladesh. The reason for the good IMR performance during

³ Conclusion about changes in health status based on LEB are biased by the fact that such variable is upper bounded at around 100 years of age, a fact which forces smaller absolute and relative gains in countries with an already high life expectancy. For this reason, the paper relies on 100-LEB, a variable that measures the life years lost in relation to the maximum attainable. Such measure has the advantage of being scale invariant, i.e. that the rate of change of 100-LEB is independent from its value at the beginning of each period. For instance, a 2 year rise in LEB in a country with an initial LEB of 80 years generates a 10 percent fall in 100-LEB that is identical to that generated by a 6 year rise in a country with a LEB of 40. It must be stressed that the selection of an upper bound of 100 years is arbitrary and that replacing it with an upper bound of 90 or 110 years yields different numerical results. Yet, as shown by Cornia and Menchini (2006) the conclusions about the slowdown in the rate of health improvements would not change. More generally, it can be noted that while none of the approaches proposed so far for measuring changes in LEB over time (LEB itself, Kakwani’s transformation, logistic transformation, or 100-LEB) is entirely satisfactory, the one used above is the least dissatisfactory.

the 1980s is to be found in the rapid increase in the coverage of vertical health programmes such as child immunisation, oral rehydration, and spread of primary health care (PHC). In contrast, as confirmed by Ahmad et al. (2000), the rate of reduction of IMR and U5MR diminished sharply in the 1990s in almost all regions as well as globally. Such global slowdown – which is robust to the elimination of Sub-Saharan Africa and the European transition economies from the sample (Table 1) - was likely caused by three factors. First, the decline or premature levelling off of the coverage of vaccination, oral rehydration and other key health programs. As noted by Cutler et al (2006) internationally-supported immunisation campaigns were less well funded in the 1990s than in the past. Second, in the developing regions with IMRs below 30-40 per thousand, the slowdown might have been also due to rising difficulties encountered when dealing with complex and costly to remove perinatal and neonatal mortality problems. Third, the stagnation or rise of IMR and U5MR in Sub-Saharan Africa was undoubtedly related to the rise in AIDS-related deaths among young children. Regression analysis by Cornia and Zagonari (2002) shows for instance that a one percent rise in HIV prevalence among adults raised IMR by 0.9 points. While all relevant, these explanations do not tell the whole story and cannot fully explain the observed IMR slowdown recorded in MENA, the economies in transition, China and the high-income countries. A greater number of factors – including a slower growth of household incomes, greater income volatility, changes in health financing and other factors– likely contributed to this outcome.

Table 1. Average annual population-weighted^c rates of change^d of (100-LEB) and IMR, 1960-2004

	100-LEB				IMR			
	60-80	80-90	90-00	00-04	60-80	80-90	90-00	00-04
- High income countries	-0.84	-0.93	-0.97	-0.35***	-4.8	-3.9***	-3.6	-1.3***
- China	-3.21 ^a	-0.63***	-0.45***	-1.01***	-5.5 ^a	-2.5***	-1.4***	-5.8***
- East Asia & Pacific excl. China	-1.27	-1.28	-1.03**	-1.00	-2.5	-2.1	-3.3***	-2.6*
- Europe & Central Asia	-0.53	-0.70	-0.32***	-0.70***	-2.1	-2.1	-1.9	-3.3***
- Latin America & Caribbean	-1.07	-1.04	-1.02	-0.93	-2.5	-3.5***	-3.6	-2.7***
- Middle East & North Africa	-1.17	-1.58***	-1.33***	-1.06***	-2.7	-4.4***	-1.9***	-2.9**
- India	-0.97	-1.14***	-0.97***	-0.36***	-1.3	-3.4***	-1.6***	-2.4***
- South Asia excl. India	-0.94	-1.07	-1.25	-1.26	-1.2	-1.6	-2.1	-1.8
- Sub-Saharan Africa	-0.68	-0.22***	0.64***	-0.05***	-1.7	-0.7***	-0.7	-0.7
World	-1.42 ^a	-0.88***	-0.65***	-0.74*	-2.2 ^a	-2.2	-1.0***	-1.6***
World without SSA	-1.48 ^a	-0.94***	-0.79***	-0.83	-2.4 ^a	-2.9***	-1.6***	-2.5***
World without SSA and EECA	-1.84 ^a	-1.16***	-0.95***	-0.98	-2.6 ^a	-3.2***	-2.1***	-2.8***

Source: authors' elaboration on WDI (2006) and UN Population Prospects (2002). Notes: East Asia does not include Japan; ^a/ these values are influenced by the Chinese famine of 1958-62 and would be smaller if their long term trend value were used instead. Regional averages are obtained by weighting country data with the live births in the case of IMR and the population in that of (100-LEB). ^c/The results of the unweighted rates of change in IMR and 100-LEB confirm the trends identified on weighted data. ^d/ The stars indicate that a rate of change is different from that of the prior period at the following probability level: *** <0.01, **between 0.01 and 0.05, * between 0.05 and 0.1. The variance of the 'universe' used to carry out the test is the population-weighted variance of the decennial rates of change of the countries of each region for the years 1960-2000.

2.2.Changes in the distribution of health wellbeing across and within countries

The last quarter century witnessed also a rise of health inequality across and within countries that conflicts with the objectives of WHO's Health for All Strategy that in 1984 argued that '... by the year 2000, the actual differences in health status between countries and between groups within countries, should be reduced by at least 25%' (Gwatkin 2000).

(i) evidence of changes in health differentials between countries. As suggested by the famous Preston concave relation (1976) linking GDP per capita and LEB, in the long-term economic growth should lead to a convergence of the life expectancy of developing countries towards that of the developed ones. Part of the empirical research supports such hypothesis. Wilson (2001) found that, starting from 1950, such convergence did actually take place. In contrast, Meyer (2001) suggests that, over the 1960-1997 period, the cross-country distribution of LEB remained twin peaked despite the 'migration' of several countries from a low-LEB peak of 45-50 years to a high-LEB peak of 75-80 years. Likewise, Micklewright and Stewart (1999) found that the standard deviation of the distribution of U5MR of the 15 members of the European Union (EU) declined by 90 percent over 1970-95 as the Southern European countries moved closer to those of Northern Europe because, inter alia, of the subsidies provided by the EU Cohesion Fund and the adoption of EU standards in health related areas.

Yet, the most recent analyses point to growing divergence in health status across countries. Goesling and Firebaugh (2004) found that the Gini coefficient of the country LEB distribution rose between 1992 and 2000 owing to the HIV/AIDS epidemics. In turn, McMichael et al. (2004) found that LEB plateaued in the high-income nations, while in the middle-income ones it converged towards that of the high income countries. In contrast, in a third group (including 42 African and four Central American countries, the economies in transition, Fiji, Iraq and North Korea) in 2001 life expectancy was lower than in 1960, 1980 or 1990. In their view, the usual explanation of health convergence (i.e. a rapid fall in deaths due to infectious diseases in poorer countries and a slow decline in mortality due to chronic diseases in the rich ones) has to be broadened so as to take into account new life-threatening challenges.

To analyze changes over time in health inequality, Cornia and Menchini (2006) calculated the population weighted and unweighted coefficient of variation and Gini coefficient of the global and regional country distributions of 100-LEB and IMR/U5MR (Table 2). They found that the trend of these inequality indexes followed a U shaped pattern, declining until 1990 and increasing thereafter (Table 2). However, for the population weighted indexes the rise in health inequality disappeared when Sub-Saharan Africa was removed from the sample, as the deteriorations registered in the former Soviet Union and nations such as Iraq, North Korea and Haiti were offset by health gains recorded in India, Bangladesh and parts of Central Europe. It must finally be noted that the unweighted coefficients of variation point to rising health inequality also after removing Sub-Saharan Africa from the sample (Table 2). This means that – in terms of countries rather than people - the derailment of the long-term convergence in life expectancy predicted by Preston (1976) is due to more than the spread of HIV/AIDS in Africa.

Table 2 shows also that intra-regional inequality in (100-LEB) followed a U-shaped trend in Eastern Europe but a steadily increasing one in all other regions with the exception of East Asia and Western Europe. Interestingly, between 1990 and 2000 Sub-Saharan Africa experienced a 'downward convergence' in 100-LEB as the nations that suffered the biggest losses (South Africa, Botswana and so on) where those which had previously recorded the largest gains. Except for East Asia, these trends are more pronounced when health inequality is computed without weighing the mortality rates for the population of each country. An analysis of health inequality on the basis of IMR and U5MR (omitted for reasons of space) confirms even more clearly that the recent health gains were distributed in an increasingly less egalitarian way. This conclusion is robust to the choice of the inequality indicator and the weighing of the data by the countries' population.

Table 2. Trend in the coefficient of variation and Gini coefficient of the intra-regional and global distribution of 100-LEB, 1960-2000

100- LEB	Coefficient of variation (pop. <u>weighted values</u>)					Gini coefficient (pop. <u>weighted values</u>)				
	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000
East Asia and Pacific (22)	0.18	0.16	0.16	0.15	0.15	7.98	7.23	7.48	6.51	6.17
L. America & Caribbean (32)	0.12	0.12	0.12	0.12	0.13	6.54	6.17	6.4	6.2	6.49
Middle East & N.Africa (20)	0.10	0.10	0.10	0.12	0.14	3.61	4.06	4.99	6.06	6.78
Sub Saharan Africa (45)	0.07	0.08	0.09	0.11	0.09	3.7	4.33	5.1	5.9	4.59
South Asia (7)	0.05	0.06	0.07	0.07	0.08	1.61	1.89	2.11	2.12	1.94
Eastern Europe & C.Asia (29)	0.15	0.13	0.08	0.05	0.10	6.81	5.55	4.18	2.88	5.44
Western Europe (18)	0.05	0.04	0.04	0.04	0.04	2.29	2.12	2.29	2.10	1.92
North America (2)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
World (175)	0.27	0.24	0.24	0.23	0.27	15.2	13.32	13.19	12.86	14.18
World excl. SSA (130)	0.28	0.22	0.22	0.20	0.19	15.63	12.57	11.98	10.87	10.31
World excl.SSA & EECA (101)	0.26	0.22	0.22	0.20	0.20	14.47	12.21	12.32	11.31	10.67
<i>Memo item: unweighted values</i>										
World (175)	0.27	0.27	0.28	0.30	0.35	15.4	15.6	16.0	16.8	19.4
World excluding SSA (130)	0.25	0.24	0.23	0.23	0.24	14.2	13.3	12.5	11.8	12.5

Source: Cornia and Menchini (2006). Notes: the regional aggregates include only developing countries; the number of countries in each area is in parenthesis; n.a. : not applicable.

(ii) evidence of within-country divergence in health status. Improvements in average national health indicators often conceal different rates of improvement for social groups identified on the basis of gender, rural-urban residence, region, income class, education, labour market status, and so on. Mortality differentials have been documented in the literature for many years and countries (Wagstaff 2000). A recent analysis by Delamonica and Minujin (2003) based on Demographic and Health Surveys for 24 developing countries found that during the 1980s and 1990s the ratio of the U5MR in families belonging to the bottom 20 percent relative to that of children of families in the top 20 percent of the income distribution worsened in 11 of the 24 countries considered, remained constant in 10 and improved in three. Similar results were found by Cornia and Menchini (2006) for the early 1990s-early 2000s, as much of the IMR decline during this period appears to have benefited the children of the urban middle-upper class. Evidence of rising IMR differentials for China is provided by Zhang and Kanbur (2003). Their study shows that the rural/urban IMR ratio rose from 1.5 to 2.1 between 1981 and 1995, that the female/male IMR ratio rose from 0.9 to 1.3 and that the regional variability of health outcomes increased sharply. The authors link these trends to the fiscal decentralization of 1978, dissolution of the communes, diffusion of private medical practices and freedom granted to urban-based SOEs to lay off workers and cut health subsidies. Finally, mortality differentials by age group, gender, level of education, and employment, migrant and marital status have risen sharply in the economies in transition (Cornia and Panicià, 2000). For instance, in Russia the ratio of the life expectancy of the best and least educated adults rose from 1.63 in 1988-9 to 1.89 in 1993-4.

3. Mortality models and pathways of health impact

How can one explain the above changes in health trends? Such task requires the identification of the five main mortality models that explain most of the variation in mortality over time and across countries.

3.1. Material deprivation pathway

In this model – that is particularly suitable for low and middle income countries - an increase in material resources or a reduction in environmental contamination reduce mortality due to infectious, parasitic, airborne, waterborne and nutritionally related diseases. For instance, the mortality decline observed in Europe during the 19th century, well before the introduction of modern medical technologies, was due to improvements in food intake, water systems, housing and sanitation made possible by a rise in incomes per capita (McKeown 1976).

What are the main health determinants in this model? The first is real household income/c, a variable which is particularly relevant in the 100 or so countries with a GDP/c of less than US\$4,000. The second is the instability of household income. The ability to secure a steady supply of food, shelter and medicine depends on the household's ability to spread its income over the year, by borrowing in moments of low earnings and saving in those of high earnings. Where financial markets are imperfect such 'consumption smoothing' is not feasible and families may therefore face a health-threatening fall in consumption during sub-periods of low earnings. In addition, volatility-induced uncertainty raises risk, pushes upward interest rates, raises precautionary savings, and reduces investment (Ramey and Ramey 1995). While in subsistence societies the main source of instability is weather shocks, fluctuations in world commodity markets (Guillaumont et al. 2006), interest rates, and capital flows are the main source of instability in globalized societies.

Thirdly, given an average GDP/c, an egalitarian distribution improves health status by ensuring that most households control enough income to satisfy their basic needs, while high inequality limits the access of the poor to basic resources. In addition, high inequality affects future health status because of its negative effect on GDP growth (Alesina and Rodrik 1994, Aghion et al. 1999, Bourguignon 1998, Birdsall 2000). Fourthly, rises in the relative prices of essential goods reduce households' real consumption and worsen health status as the prices of food and medicines grow faster than the consumer price index, or CPI, i.e. the index used to convert nominal into real incomes. Fifthly, the level of education of family members, and of mothers in particular, is a major determinant of the health status of all family members and of children in particular. Educated parents have been shown to make more rational consumption decisions and a better use of public health services. Education also facilitates enhancements in health knowledge and practices and avoiding unhealthy lifestyles (Bicego and Boerma 1993). In 1979-82, for instance, death rates for 30-34 year old Czech males with basic education were 5.7 times higher than for those with university education (Hertzman 1995).

Sixthly, access to public or private health services and the number and quality of health workers are closely associated with health coverage and health outcomes (WHO 2006). In addition, for any given amount of health resources, their allocation to different levels of care and their financing method is equally important. Free public provision of basic health services is the least discriminatory approach, and such advantage persists when 'nominal' user fees are introduced to reduce service overuse, but it disappears when 'substantial' user fees are adopted. Private health financing is the most exclusionary, while the impact of health insurance varies but tends to be regressive in economies with a large informal sector. Seventh, the time available to women for food preparation and the care of children, elderly and sick is also an important resource for health. Eight, health outcomes also depend in an important way also on the demographic structure of the family, as families with unfavorable dependency ratios tend to have worse health outcomes. The risk of death of children and mothers correlates also with the child's birth order and mother's age. Ninth and final, environmental contamination affects life expectancy, particularly among the poor who are exposed to air-, water- and vector-borne diseases, pollutants, industrial wastes and pesticides. While vector and viral contamination has been gradually controlled in the course of the last decades, malaria infestation has not declined while new diseases such as hepatitis D, Ebola, AIDS, tularaemia and lassa fever have appeared, the emissions of CO₂ and other pollutants has increased, and growing international trade in toxic waste has augmented the health risks of people in marginal areas of low income countries.

3.2. Progress in health technology

According to this model, medical technology and health knowledge are the most important factors of mortality decline. During the post World War II period, progress in this area in low income countries sharply reduced mortality due to infectious, parasitic and communicable diseases through malaria spraying, vaccination, the distribution of antibiotics and similar programs (Preston 1976). In advanced societies, medical progress made possible a sharp decline in cardiovascular- and cancer-related mortality among the middle-age and elderly population. Cutler et al. (2006) suggest for instance that medical advances in controlling cardiovascular problems explain 70 percent of the seven year gains in life expectancy recorded in the US between 1960 and 2000. These authors see no reduction in the flow of new inventions but note that the related health benefits will mainly accrue to high income countries, enlarging in this way mortality differentials among countries.

The measurement of progress in the medical field is quite difficult as there are no synthetic indexes reflecting a myriad of new discoveries. In addition, the health impact of such discoveries depends on their accessibility by the population, which in turn depends on the existence of non-exclusionary delivery channels. In regression analysis the impact of medical progress can be captured by linear, convex or concave time trends or by period dummies. Such variables, however, may capture also the unobserved effects. In developing countries, progress in health technologies can also be proxied by the coverage rate of vertical programs such as immunization, control of malaria, AIDS and TBC, oral rehydration, clinic-based delivery, and access to fresh water, while in countries with a large share of elderly people it can be proxied by the coverage of the screening of chronic and degenerative diseases.

3.3 Acute psychosocial stress

Stress is a key factor in deaths due to heart problems, hypertension, alcohol psychosis, neurosis, suicide and accidental deaths, ulcers and cirrhosis. According to Serafino (1994, cited in Shapiro 1994) 'Stress is the condition that results when person/environment transactions lead the individual to perceive a discrepancy—whether real or not—between the demands of the situation and resources of the person's biological, psychological or social systems'.

In countries hit by social upheavals or experiencing a tumultuous globalization, death due to acute stress results from increased pressures to adapt to new situations, the absence of strategies for coping with them, and inadequate public policy responses. Epidemiological research has shown that acute stress leads to physiological and psychological arousal, which provokes sudden changes in heart rate, blood pressure and viscosity, a reduction in the ability to maintain emotional balance, a pervasive sense of powerlessness, and loss of social role, personal control and purpose in life (Marmot and Bobak 2000). Acute psychosocial stress has been shown to lead to increased consumption of health-damaging 'stress-relievers' such as alcohol and drugs, which further affect mental balance and social behavior.

It is difficult to provide a universal list of stressors, as these may be better managed in some societies than others. Yet, as suggested by the Social Readjustment Classification of Stress, the stressors discussed hereafter have been shown to affect health in many places (De Vogli 2004). To start with, stress may arise from loss of employment, especially if this is unanticipated and unaddressed by public policy. Follow-up studies found evidence of short-term adverse effects of unemployment on mental health, suicide, ulcer prevalence, and circulatory diseases (Cornia and Paniccià 2000). Marmot and Bobak (2000) estimate that jobless workers face on average a 20 per cent greater risk of death than the employed. In addition to a loss of income, unemployment causes a loss of skills, cognitive abilities, motivation, sense of control, and feelings of being unwanted, unproductive, dependent, and without a role (Sen 1997). Unemployment may also erode the social norms and cause an increase in crime rate and family violence. Other sources of work-related stress include rapid job turnover, unstable employment, firm restructuring, bankruptcy and, for small producers, sudden deteriorations in inputs/output price ratios.

Secondly, stress may arise from the sense of frustration caused by failure to fulfill one's own obligations. In the patriarchal societies, wage declines do not raise mortality among household heads

because of a shortage of basic goods, but because of their perceived inability to provide to their families goods considered 'socially necessary'. Thirdly, rapid changes in social hierarchies (proxied by changes in social mobility or income inequality) entail for many a loss of role, reputation and influence, as observed for instance among the former industrial workers and communist cadres of the economies in transition. In addition, if the ascent of new elites is perceived to be due to corruption rather than merit, the losers experience frustration, envy, loss of purpose and social disorientation as the values, norms and roles of their lifetime are replaced by new ones.

A final source of stress concerns personal living arrangements. At all ages, stress-related mortality is significantly higher for people who are widowed, divorced and single than for people who are married. For instance, Ruzicka et al. (1989) suggests that the increase in suicides observed in the developed countries during the 1970s and 1980s may have been partly due to a decline of marriage rates and rise in divorce rates. In addition, distress migration is a source of ill health, as it entails material hardship, loss of control, breakdown of family and social relationships, housing problems, social exclusion, and a difficult redefinition of survival strategies.

3.4. Unhealthy lifestyles pathway

According to this model, the promotion of health information and changes in personal behavior are more the most important determinants of health status. Smoking is a main factor in premature deaths due to different types of cancer, emphysema, cardiovascular diseases, cirrhosis, and non-medical fatalities. Non-smokers are also affected by cigarette smoke (World Bank 1999) while pregnant women who smoke are more likely to have low birth weight babies. Smoking currently kills one in every ten people and, if the current trend continue, by 2030 smoking will be the leading cause of death in the world (ibid.). Of the 1.1 billion people smoking, 85 per cent lives in developing countries (Ezzati et al. 2005) where quit-rates are very low (2 percent in India, 5 percent in China as opposed to 32 percent in the UK) (Gaziano 2007). Excessive consumption of salt and saturated fats raises the incidence of cardiovascular problems, especially if associated to lack of physical exercise, while a low intake of antioxidants is associated with a high risk of myocardial infarction (Bobak and Marmot 1996). In turn, excessive alcohol consumption is related to deaths due to cirrhosis of the liver, psychosis, accidents and injury. The incidence of these risks correlates weakly with the level of income but is inversely related to the level of education.

For years, the unhealthy lifestyles model has guided mortality analyses in developed countries but the recent literature on the 'nutritional transition' and 'communicability of smoking to developing countries' suggests it applies also to the urban population of middle and some low income countries. While there are numerous clinical studies on the health impact of unhealthy lifestyles, few analyses focus on their overall impact due to the lack of nationwide statistics in this area. Aggregate data on alcohol consumption are notoriously deficient, data on physical activity and diet composition are difficult to obtain in broad surveys and data on aggregate smoking prevalence in developing countries is scant.

3.5. Income inequality, hierarchy and social disintegration

High inequality may also affect health status by raising social stratification and eroding social cohesion (Wilkinson 1996 and 2000)⁴. Highly stratified societies generally feature a high degree of heterogeneity, divergent social objectives, limited capacity to undertake collective action, low taxation and provision of public health services, residential

⁴ This approach remains controversial and some authors (Deaton, 2001) suggest that the findings of these studies should be treated with caution because of theoretical problems (e.g. due to the impact of omitted variables that correlate with inequality) and the weakness of the evidence provided. Deaton emphasizes also the limited reliability of the inequality measures used in international comparisons. He does not exclude the possibility that inequality is one of the factors affecting health, but rejects the view that it is its main determinant.

segregation and restricted political participation. Such phenomena are not the prerogative of the US and UK (where they have been the object of many studies) but have been observed also in poor rural settings as in the study by Godoy et al (2006) on 13 Bolivian villages.

Second, high inequality erodes social cohesion and control, i.e. essential factors for the diffusion of health information, control over deviant health behavior and criminal activity, and promotion of interpersonal help among community members (Kawachi et al, 1999). According to House et al. (1988), the health risk associated with low social integration in unequal societies are comparable in magnitude to the risks associated with smoking, high blood pressure, and obesity. Third, according to Wilkinson and Pickett (2006) who reviewed 168 analyses of the relation between inequality and health in developed countries, chronic stress associated to inequality has a large impact on health. One particular source of such stress arises from a hierarchal organisation of work in which most decision making is concentrated in the hands of a few people, while the rest is engaged in simple tasks, has little control over work decisions and, for these reasons, may suffer from “learned helplessness”.

Table 3 summarizes the main determinants of health by type of mortality pathway.

Table 3. Summary of variables affecting mortality by main pathway

	Material deprivation	Technical progress	Psychosocial-stress	Unhealthy lifestyles	Inequality and social cohesion
1. Income/c	XXX	----	----	----	----
large changes in wage	----	----	XXX	----	----
Income instability	XXX	----	XXX	----	----
2. Gini income	XXX	----	XXX	----	XXX
rise in Gini income > 4	----	----	XXX	----	----
3. Unemployment rate	XXX	----	XXX	----	XXX
Δ employment rate	----	----	XXX	----	----
Invol. Empl. turnover	----	----	XXX	----	XXX
Bankruptcies	----	----	XXX	----	----
4. Inflation rate	----	----	XXX	----	----
Relative price of food	XXX	----	XXX	----	----
5. Female Illiteracy	XXX	----	----	XXX	----
Women with 1ary educ..	XXX	----	----	XXX	----
Women with 2ary educ.	XXX	----	----	XXX	----
6. Health expenditure/c	XXX	XXX	----	----	----
Doctors/1.000	XXX	XXX	----	----	----
Out of pocket expend	XXX	----	----	----	XXX
7. Techn. Progress inhealth	-----	XXX	----	----	----
Coverage of PHC progr	-----	XXX			
Screening of degen dis.	-----	XXX	----	----	----
8. Time use	XXX	----	----	XXX	----
Dependency ratio	XXX	----	----	XXX	----
9. % incomplete families	XXX	----	----	XXX	----
Migrants/pop ratio	XXX	----	XXX	----	----
10. Environ. contamination	XXX	----	XXX	----	----
11. Alcohol consumption	----	----	XXX	XXX	----
Smoking incidence	----	----	----	XXX	----
Unbalanced diet	----	----	----	XXX	----

Source: authors' compilation, Notes: XXX indicates that the variable is relevant, --- that it is not.

4. Changes in the determinants of health over 1980-2005 vs. 1960-80

This section discusses the changes intervened during the last two decades in the determinants of health listed in Table 3.

4.1. Income Growth

Trends in this area are well known (Berry and Serieux 2006) and are only briefly recalled hereafter (Table 4). To start with, world growth slowed down over 1980-2000 ('the era of the recent globalization') in relation to 1960-1980 (the 'Second Golden Age of Capitalism'). Growth was particularly weak in the 1990s owing to stagnation in Europe, Japan, Latin America, MENA and –to a lesser extent– the Asian economies affected by the 1997 financial crisis and recession in the transition economies and Sub-Saharan Africa.

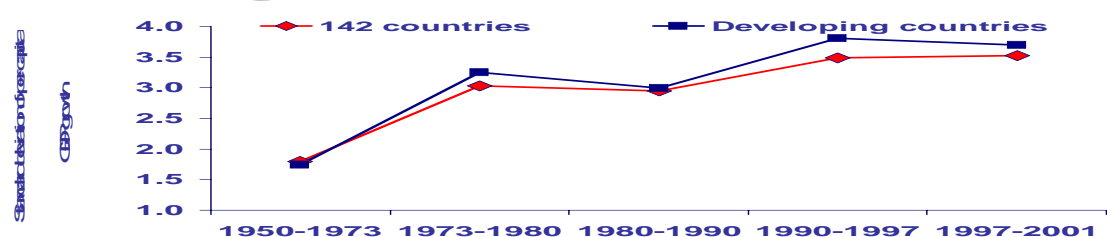
Table 4. Period GDP/c growth rates** by main regions

	1960-70	1970-80	1980-90	90-2000	1960-80	1980-00	2000-5
- High income countries	4,11	2,60	2,39	1,88	3,35	2,13	1,45
- China	1,49	4,31	7,71	9,26	2,89	8,48	8,77
- East Asia & Pacific (excl. China)	2,87	4,51	3,47	3,18	3,69	3,32	3,60
- Eastern Europe & Central Asia	5.0*	2.3*	2.1*	-1,03	n.a	n.a	5,07
- Latin America & Caribbean	2,54	3,15	-0,89	1,68	2,85	0,39	0,94
- Middle East & North Africa	n.a	n.a	0,14	1,88	n.a	1,01	2,15
- India	1,69	0,68	3,58	3,62	1,19	3,60	5,25
- South Asia (excl. India)	2,60	0,40	2,82	1,93	1,50	2,38	2,52
- Sub-Saharan Africa	2,31	0,76	-1,04	-0,32	1,53	-0,68	1,96
- World	3,25	1,83	1,38	1,41	2,54	1,39	1,53

Source: authors' calculation on WDI (2004), Notes: Japan is not included in East Asia; * The data refer to the periods 1950-70, 1970-80, 1980-90 and are from Cornia and Danziger (1997); ** average yearly compounded and population weighted growth rate computed on a point-to-point decennial basis.

Second, the unweighted standard deviation of the growth rate of GDP/c increased (Figure 1). Indeed, over the last two decades, negative or zero growth was recorded in 32 percent of the countries analyzed, and growth of less than 1% in another 18 percent. With such changes, health status deteriorated or improved slower. In contrast, growth improved in East and South East Asia, India and China. Third, the engines of world growth shifted from the OECD to the Asian countries. However, given their initial low weight, their growth surge was overshadowed by the slowdown in the OECD countries, leading in this way to a global growth deceleration. Finally, during the period 2000-5, the growth rate of GDP per capita showed a timid recovery due to continued growth in the Asian economies, a moderate recovery in Sub-Saharan Africa and Japan, strong growth in transitional Europe.

Figure 1 Standard deviation of GDP growth rates, 1950-2001



Source

4.2. Economic instability

In most low and high income countries, ‘macro instability’ remained broadly unchanged during the last quarter century (Table 5), though ‘micro instability’ rose also in several of them. For instance, in the early 1990s Japanese companies were allowed to scrap the old lifetime employment system in favor of a more flexible one. As a result of this change, unemployment rose from zero in the late 1980s to 5.4 percent in 2002. While mortality rates for most causes declined slowly, the number of suicides grew by 80 percent between 1990 and 2000, entailing for the decade as a whole 80 thousand excess suicides among the newly unemployed and bankrupt managers (Lamar 2000).

In contrast, both macro and micro instability rose perceptibly in most middle income countries. Indeed, with the possible exception of South Asia, globalization appears to have heightened the instability of GDP/c growth rate (Table 5), private consumption (Prasad et al. 2003), investment and FDI/GDP (ibid.).

Table 5. Average standard deviation of GDP/c growth rate by country groups, 1960-2005

	1960-1970	1970-1981	1982-1990	1990-2005
Low income	4.69	6.32	4.95	4.58
Low and Middle income	2.77	3.48	4.44	5.62
High income	1.93	2.69	1.91	2.58

Source: authors’ elaboration on WDI (2006). Notes: the above values are obtained by computing the decadal standard deviation of each country, that were then averaged by the three main areas.

A main contribution to the surge in instability of the last 20 years was an epidemic of banking, financial and currency crises (Figure 2) which followed the financial deregulation of the mid-late 1980s and the capital account liberalization of the 1990s. In a world closely interlinked by flows of trade, remittances, technology and finance, such crises were quickly propagated from the countries affected to the rest of the world, as shown by the parallel rise in banking and balance of payments crises over the 1980-95 period (Table 6).

Table 6. Number of banking and financial crises

Type of Crises	1970-1979		1980-1995	
	Total	Average per year	Total	Average Per year
Balance-of-payments	26	2,6	50	3,13
Twins	1	0,1	18	1,13
Single	25	2,5	32	2
Banking	3	0,3	23	1,44

Source: Kaminsky and Reinhart (1998)

The health impact of growing instability is documented by a few recent analyses. A study on macro data by Guillaumont et al. (2006) found that in 68 developing countries the standard deviation of the average quadratic deviation of GDP/capita growth rate from its trend was negatively correlated to the survival rate of children of less than five years of age, and that a five points rise in instability augmented on average U5MR from 110 to 128. The most shocking case of mortality caused by macro instability is that observed during the transition in the former Soviet Union which recorded during the 1990s 10 million excess deaths (Cornia and Paniccià, 2000). Likewise, the Russian financial crisis of August 1998 and the subsequent one hundred percent rouble devaluation caused a sudden three-point rise in unemployment as well as and three year fall in male life expectancy between 1997 and 2000.

Micro studies of the health impact of instability are less common but point in the same direction. An example is given by the sharp rise in suicides among cotton farmers in the Warangal District in Andhra Pradesh (Cornia 2004). In July 1991 the Indian government cut state support to seeds, fertilizers, rural credit and output prices, liberalized trade in agriculture and encouraged subsistence farmers to enter the production for export of input-intensive commodities such as cotton. Following the introduction of these reforms, the Warangal District experienced a surge in suicides among small cotton farmers caused by rising volatility in world cotton prices, the absence of price stabilization mechanisms, declining support to rural activities, and the feudal nature of local inputs and output markets dominated by moneylenders. Squeezed between volatile world prices and rising costs and indebtedness, several increasingly desperate cotton farmers took their life. Another example is that of South Korea, where health deteriorated following a rising instability in the labor market caused by the financial crisis of 1997-8. The unemployment rate rose from 2 percent prior to the crisis to 8.4 in the first three months of 1999, to return to 4.6 by 2001 while the share of part time and daily workers jumped from 42.5 to 52.5 percent. As a result, between 1996 and 1999, the number of deaths rose by 10 percent for work accidents, by 18 percent for occupational ailments, by 100 percent for ischemic diseases and by 80 percent for suicides (ibid.).

4.3. Income inequality

From the early 1980s income inequality started rising in most countries of the OECD, Latin America, the European economies in transition and China (Cornia 2004). A reversal of inequality trends was observed also in the egalitarian economies of East Asia and in India since the liberalisation of 1991 (Deaton and Drèze 2002). Inequality rose also in Sub-Saharan Africa where, however data problems impede a systematic assessment of recent trends. The results of case studies are confirmed by overall econometric analyses. Janti and Sandstrom (2005) conclude that inequality increased in most of the 115 countries they analyzed because of a rise in the income share of the richest quintile. In turn, Cornia and Rosignoli (2007) suggests that income inequality rose by different extents, and with different timing and health impact in 60 of the 85 countries for which it was possible to construct a long term inequality trend (Table 7). However, their study shows also that in eleven of the 60 countries that recorded a rise, inequality stabilized in the 1990s or 2000s after completing the shift from Keynesian to liberal policies (in the UK) or following a recovery of growth (in Romania).

Table 7. Trends in the Gini coefficients of the distribution of income from the 1950s to the 2000s for 85 developed, developing and transitional economies

Inequality trend	n.OECD countries	n. transition countries	n. developing countries	n.world countries	% countries	% population	% GDP-PPP
Rising	13	24	23	60	70	76	71
Constant	1	1	14	16	19	19	18
Declining	6	0	3	9	11	5	12
Total	20	25	40	85	100	100	100

Source: Cornia and Rosignoli (2007).

4.4. Inflation and prices of basic goods

Prices rose slowly for most of the 1980s and 1990s (Figure 2) due to the emphasis placed by the IMF and many governments on the achievement of low inflation. Yet, the reforms of the last quarter century emphasized measures, such as price liberalization, removal of subsidies to key goods and devaluation, that could have led to rises in food prices faster than in the CPI. Examination of the trend of the food price index/CPI ratio (Figure 3) did not find evidence of such effect, except for the transition economies.

Figure 3. Trend in the median inflation rate for all countries, 1960-2002

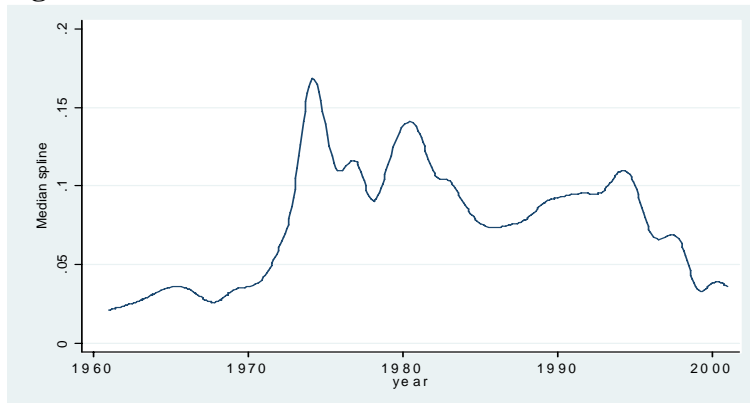
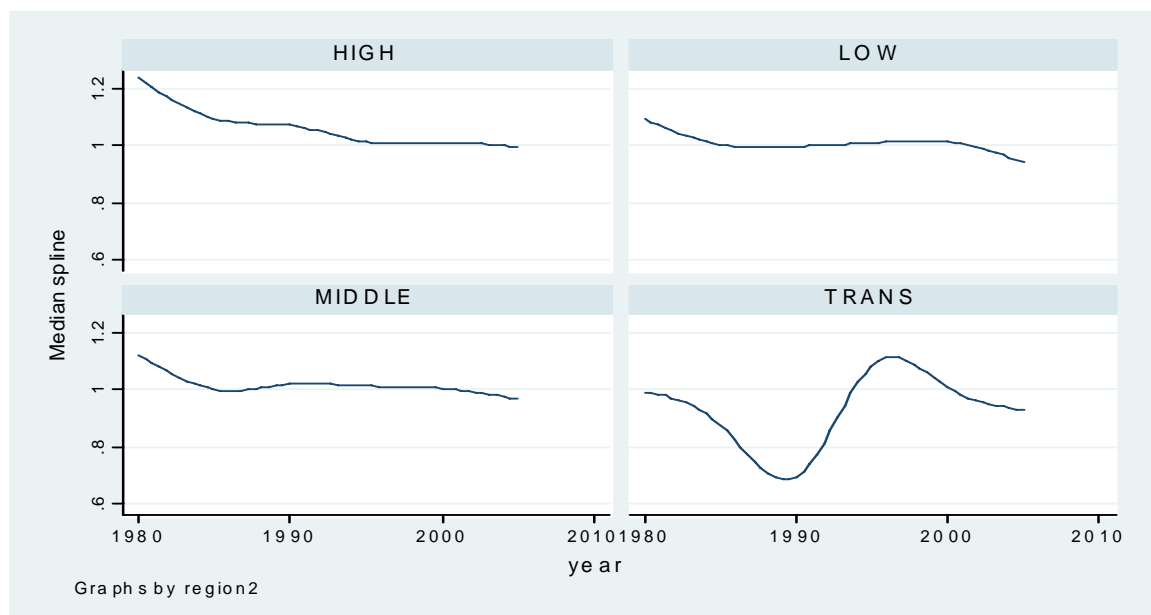


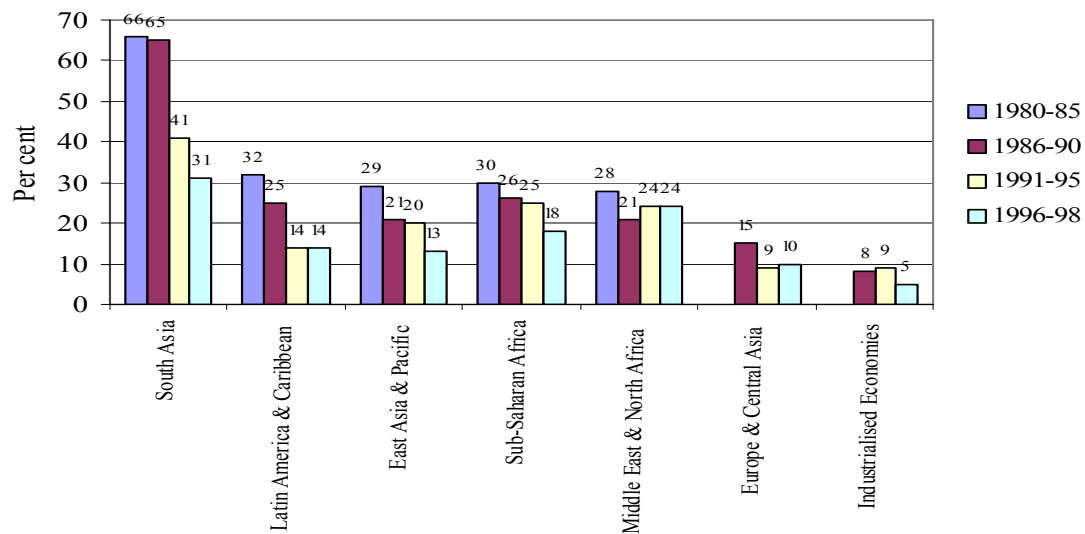
Figure 4. Trend in the ‘food-price/consumer price’ index by country groups 1980-2005



4.5 Taxation, public expenditure on health and health financing

In the industrialized countries, health expenditure rose because of population ageing and the high income elasticity of the demand for health care. The situation in developing countries is heterogeneous. With declining deficits due to the introduction of stringent stabilization policies, the spending capacity of governments became increasingly determined by the tax revenue it collects. In this regard, the reduction of tariffs following trade liberalization (Figure 5) reduced – *ceteris paribus* - the spending capacity of liberalizing governments. Furthermore, in the new world of mobile capital and immobile labor, developing countries simultaneously aiming at attracting FDI engaged in a downward bidding entailing a reduction in the corporate income tax, and the concession of tax holidays to foreign investors. A recent analysis of the trend in the tax/GDP ratio on a panel of developing countries points to an average drop of one percentage point in the tax/GDP ratio over the 1980s-1990s period, as opposed to a rise of 1.6 points between the 1970s and 1980s (Chu et al.2000). As a result of such decline, public health expenditure dropped in several countries (as in China between 1978 and 1990, and India after 1991) though in other cases it did not change much or even increased, as in the Middle East and North Africa.

Figure 5. Average un-weighted tariff rates (in percent) by region. 1980-1998



Source: World Commission on the Social Dimension of Globalization 2004, Global Economic Perspectives (2001) (background presentation).

Access to health care and health status was also influenced by changes in health sector financing introduced during the last 25 years. These were often instituted in the wake of the budget crises of the early-mid 1980s and of the structural adjustment programs introduced to tackle them. Such reforms introduced user fees in state clinics, decentralized service provision, opened up to private providers, privatized government hospitals, and introduced health insurance. Most of these reforms remain highly controversial. Research has shown that market-based reforms in the health sector of Sub-Saharan Africa reduced service utilization over the past 20 years (Reddy and Vandemoortele, 1996). A survey-based review of 11 Asian countries by van Doorslaer et al. (2006) shows that out-of-pocket payments (medical fees, charges for public care, purchases of medicines, insurance co-payments and so on) became very important, but that in Malaysia and Indonesia the state raised sufficient revenue through taxation, enabling charges in the public sector to be kept to a minimum.

Similar effects are reported in most economies in transition. With the Doi Moi of 1986, Vietnam reformed the provision of health care from a state-financed system to one based on health insurance for those working in the formal sector, user fees in public hospitals, legalization of private medical practice and liberalization of drugs sales. Such reforms led to a drop in public health expenditure from 1.57 to 1.34 of GDP and a rise in out-of-pocket costs from 59.6 to 74.2 percent of the total health expenditure between 1995 and 2000. Microeconomic analyses for 1993 and 1998 show that as a result of such reforms the share of sick people not seeking care rose from 6 to 17.6 percent (Tiberti 2006). The Chinese data point to an even more worrisome situation. With the health reforms of the 1980s and 1990s the public health system was replaced by the privatization and marketization of health services, a drop in the public health expenditure/GDP ratio from three to one percent, and the transfer of responsibility for public services to the local governments. After almost 30 years of transition, only half of the urban workforce and ten percent of the rural population are now covered by health insurance. For most people, out-of-pocket payments, that rose from 20 to 56 percent percent of total health expenditure over 1978-2003, have become the only way to secure medical care (Lu 2006). As a result, despite the rise of public and private health outlays to 5.6% of GDP, a growing part of the population was left with no coverage (Table 8).

Table 8. Access to health care and financial problems in China, 1993 and 1998

Year	Big Cities	Medium citi	Small Cities	Rural areas			
				I	II	III	IV
% of patients not seeking medical treatment due to financial difficulties							
1993	3.2	2.4	9.6	15.1	21.4	19.5	24.4
1998	36.7	23.5	42.9	30.1	31.7	42.3	38.7
% of patients not hospitalized when they should due to financial difficulties							
1993	34.1	33.9	53.4	47.9	63.5	61.1	67.7
1998	53.1	58.4	70.8	63.8	54.1	70.2	69.4

Source: Lu (2006) on data from the 2nd National Health Service Survey of 1998. Notes: I-IV refers to groups of rural areas ordered in declining income order.

4.6 Migration and family arrangements

In 2005, the world stock of migrants reached 190 million. While migrants may have suffered a decline in life expectancy, they might have helped improving that of the people in the countries of destination. This effect – seldom discussed in the literature - might have taken place via a better staffing of health services and care of the elderly in the OECD and Gulf states. For instance, 30 percent of the Ghanaian and 43 percent of the Liberian physicians work in the US or Canada (Bach 2006). Likewise, over half of the doctors registered in the UK in 2002 were trained outside the country (ibid.). Secondly, migrants often work in low-skilled jobs no longer filled by locals, contributing in this way to overall growth. Thirdly, migration moderates the growth of wages in the countries of destination, thus enhancing the competitiveness of their declining sector. More controversial is the health impact of migration in the countries of origin. While migration of medics and paramedics is a source of ‘brain drain’, their remittances may raise the consumption of food and drugs at home and so contribute to better health outcomes.

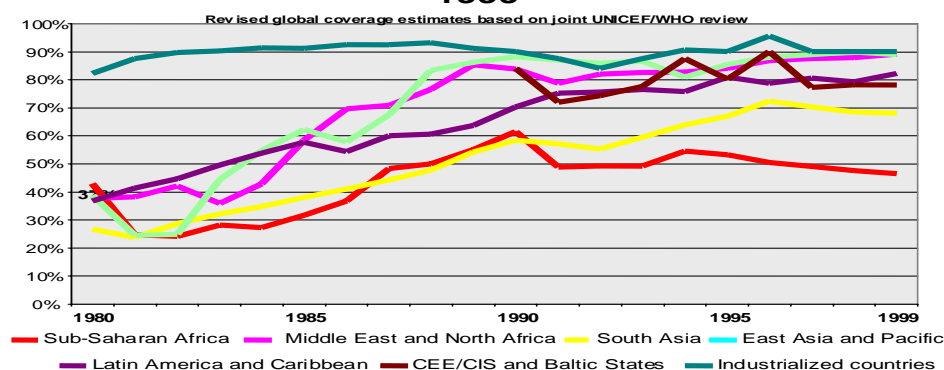
4.7 Technical progress in health

Assessing the impact of medical progress on health requires addressing three questions: has globalization enhanced the incentives to produce new research to address the health problems of advanced and developing countries? Have international trade and technology transfer policies facilitated the shift of medical knowledge to the less advanced countries? And, third, have domestic policies enhanced the access to the transferred technologies?

It is difficult to prove whether liberal policies led to an acceleration in health discoveries, though this is likely what happened in the advanced countries. What is abundantly clear, however, is that research continued to focus on the health conditions typical of advanced societies. As noted in Labonte and Schrecker (2006), only 10 percent of research expenditure is allocated to diseases common in developing countries and accounting for 90 percent of the global burden of diseases. Of 1393 new drugs patented between 1975 and 1999, only 16 were for tropical diseases and tuberculosis (ibid.), and as of today no vaccine against malaria has been developed. Second, trade liberalization affected favorably the transfer of health knowledge and technology by reducing tariffs. Likewise, a cheaper and faster transmission of data via the internet sped up the diffusion of information on appropriate health practices. For instance, the diffusion of new knowledge about the risks of cigarette smoking and new drugs for cardiovascular diseases reduced mortality in the advanced countries (Deaton 2004). The last twenty years have also seen the diffusion in developing countries of vaccines, oral rehydration salts, nutritional supplements, antibiotics, aspirin and drugs whose patents expired. The spread of these low-cost health technologies played a key role in reducing infant and overall mortality. As

shown in Figure 5, the immunization rate of DPT3 rose sharply in all regions between 1980 and 1990, though after 1990 it stagnated everywhere and fell in Sub-Saharan Africa.

Figure 5. DPT3 Percentage Immunization rate, 1980-1999



Source: authors' elaboration on Unicef data

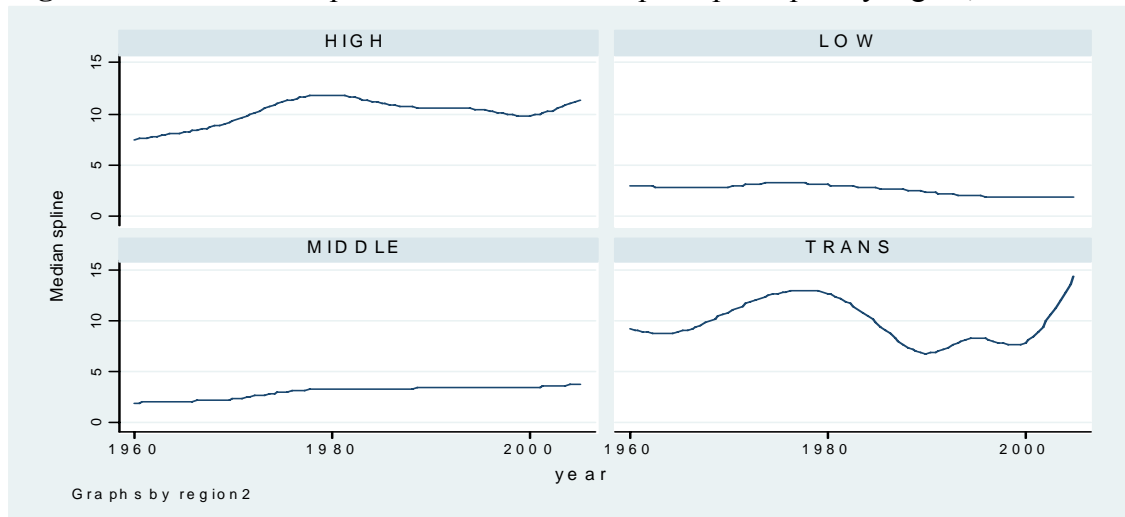
The transfer of sophisticated drugs and technologies including beta-blockers, screening equipment, cardiac units and antiretroviral drugs was more limited due to the adoption of the TRIPS agreement that raised the cost of newly patented drugs and medical technologies. As put by Deaton (2004, p. 30) '... There is clearly a long way to go before the [health] habits and technology of the rich countries are fully adopted even in middle-income countries'. Thirdly, the free market policies adopted also in the health sector emphasized the adoption of user fees in state facilities, health insurance, and privatization of health, i.e. measures that tend to exclude the poor from health care.

4.8 Smoking, drinking and obesity

During the last quarter century, these risk factors have become relevant for a growing share of the population of developing countries. The International Mortality and Smoking Statistics database shows that, after rising from 1960 till about 1980 smoking incidence among men (though not always for women) steadily fell in most OECD countries as a result of awareness campaigns, a variety of prohibitions, and class actions against the tobacco companies. In contrast, in Eastern Europe, smoking prevalence continues to rise for both men and women. These smoking patterns clearly mirror international patterns of mortality from lung-cancer (Deaton 2004). Data on the developing countries are few but the tendency is towards rising smoking incidence including because the relocation of TNCs in these countries made possible by the liberalization of FDI.

In developing countries, supermarkets purchases of Western processed foods and drinks rich in salt, sugar and fat and low in fiber have risen steadily and already account for a quarter of total food purchases (Hawkes 2004). The results of such transition to Western diets at low income levels is analyzed by Ezzati et al (2005) who, after reviewing a large number of clinical studies for over 100 countries, argue that such early nutrition transition has led to a rapid increase in obesity, cholesterol, blood pressure, cardiovascular diseases and diabetes among the urban poor. As a result of these changes, cardiovascular mortality is rising in developing countries at much lower stage of economic development than implied by the 'diseases of affluence paradigm'. Finally, the consumption of alcohol exhibits a rising trend during the last twenty years, with the exception of the low income nations (Figure 6). Such trend is particularly marked for the transition economies, where alcohol prices and sales were liberalized in the early 1990s.

Figure 6. Trends in the spline of alcohol consumption per capita by region, 1960-2005



4.9 Random shocks ⁵.

Major food shortages were recorded in Sub-Saharan Africa over 1983-5, Sudan and Southern Eastern Africa in 1990-92, and North Korea in the mid 1990s. At present, an important part of the population of Eastern Africa depends on food aid for its survival. Hunger-related deaths were particularly severe in war zones where civil unrest prevents the delivery of humanitarian aid. This variable can be proxied by a dummy variable or by the number of war deaths. The last quarter century witnessed also a sharp rise in the number of internal wars, ethnic struggles and complex humanitarian emergencies which climbed from 25 per year in the early 1980s to almost 60 in the mid-late 1990s 2000⁶. Sub-Saharan Africa and the former Soviet Bloc were the two regions most affected. For instance, in 1994, there were no less than 13 full-fledged wars in sub-Saharan Africa. Such conflicts raised the number of deaths due to violence, starvation and infectious diseases. While in some cases the related mortality spikes quickly returned to pre-crisis levels at the end of the shock, this is not true in parts of Sub-Saharan Africa where conflicts have become endemic. The CRED (www.cred.be) database shows that the number of casualties involved in such conflicts can be considerable, i.e. between 200-500.000 in Rwanda, 100.000 in Angola in 1994, Burundi in 1993, and Mozambique in 1992, about half in Liberia in 1993, and smaller but non negligible numbers in Sudan and S.Africa in 1993. This variable can be expressed through a dummy or the number of war casualties.

Mortality increases over the last quarter century were also due to the spread of HIV-AIDS that currently kills about 2.3 million people a year, mostly in Sub-Saharan Africa. Its incidence is highest in Eastern and Southern Africa where in the late 1990s, urban adult prevalence rates ranged from 12 percent in Tanzania and 35 percent in Botswana.

⁵ Most random shocks analysed in this section can be linked to policy decisions. Natural disasters might be the result of an unsustainable development model, conflicts of the instability provoked by TNCs operating in the commodity sector, and HIV-AIDS of policies that raise inequality. There is a grain of truth in these claims, but it is difficult to convincingly link these shocks to specific domestic and globalisation policies.

⁶ Contrary to the CRED database, the 2005 Human Security Report suggests that the number of internal conflicts and humanitarian emergencies has declined since the mid-late 1990s. Both sources agree, however, that the number of such events rose from the mid 1980s to the mid-late 1990s.

5. Econometric models of LEB, IMR and U5MR

5.1 The Globalization-Health Nexus Database (GHND)

The GHND includes variables on IMR, U5MR and LEB, their determinants, indexes of policies that may influence the determinants of health for Latin America and Eastern Europe, and random shocks. Information for these variables was compiled for the 1960-2005 period on the basis of existing databases, national sources and specialized literature. GHND comprises 136 countries and ten quinquennia (1960, 1965, ..., 2005) and, in the case of the European economies in transition, annual observations for the period 1985-2005⁷. If data for all countries and years were available, the 'quinquennial GHND' would count 1360 (136x10) data points for each of the variables in Table 5. Missing data, especially at the beginning and end of the period analyzed, reduced the number of country-years for which all data are available. When missing data for one or two years and for variables concerning a qualitatively well-known phenomenon threaten to reduce the number of complete data-strings, the missing data were filled in by interpolation or on the basis of information taken from the literature. The data points added in this way represents 6 percent of the total number of observations, except for DPT vaccination for which expert information on the stability of vaccination at low coverage during the 1960-80 period allowed to add missing data that account for 18 percent of the data on vaccination⁸ used in regression analysis. GHND and its complete documentation is available on http://www.dse.unifi.it/sviluppo/database_eng.html.

The 136 countries included in GHND were grouped into eight regions (Sub-Saharan Africa, South Asia, South East and East Asia, MENA, Latin America, OECD, Eastern Europe, and former USSR). These were further grouped into four regions characterized by different mortality patterns and affected by globalization policies through different pathways. The first (low income developing countries) includes Sub-Saharan Africa, South Asia and China. The second (middle income developing countries) comprises South East and East Asia but China, Latin America and MENA, while the third includes the transitional economies of Central Europe and the former USSR. The developed nations group comprises the OECD countries⁹.

5.2 Model specification and regression plan

The GHND is organized as a tri-dimensional matrix, with 136 countries on one axis, ten quinquennia on the second and the dependent and explanatory variables on the third. Such kind of dataset demands that the estimation procedure chosen for the estimation of the mortality model takes into account that each country is observed over several periods. Such and takes therefore the following form:

$$y_{it} = \alpha + x_{it} \cdot \beta + u_i + \varepsilon_{it}$$

where y is the dependent variable, x is a vector of explanatory variables, the subscripts i and t represent respectively the countries and the quinquennia of the panel, u_i the error term for each country, ε_{it} a joint error term for countries and time periods, and α and β the parameters

⁷ For this region, data for the 1960-1980 period are mainly unavailable, making it necessary to rely on annual data in the estimation of a mortality model for the transition countries.

⁸ The vaccination data imputed in the database are 44 percent of all DPT data, but only 18 percent was used in the regression analysis. Not using this 18 percent of imputed data would have prevented the use of all info for the years 1960-75. In any case, the descriptive statistics before and after imputation change very little.

⁹ The robustness of this regional classification was tested through a k-mean cluster analysis identifying country groups on the basis of four variables describing well the economic-health nexus in most countries, i.e. U5MR, log of GDP/c, total fertility rate and Gini coefficient of the income distribution. This analysis shows there is a large overlap between the cluster-based groups and the regional aggregates described above.

to be estimated. Given the nature of GHND, the OLS procedure yields inefficient estimates and distorts the values of α and β as information on the countries' fixed effect would be neglected (Baltagi 2006, Wooldridge 2001). The estimation procedure best suited to situations in which u_i varies from country to country is the fixed effects model¹⁰ in which u_i is not treated as a random variable. The Hausman test confirmed that such model is the most appropriate under these circumstances, and is preferable to a random effect model. Furthermore, the computational algorithm chosen as part fixed effects model estimation procedure takes automatically into account the fact that the GHND panel is unbalanced, as several data are missing for 1960, 1965 and 2005.

To improve the goodness of fit, improve the robustness of the estimates and avoid multi-collinearity problems, a few explanatory variables were either dropped or normalized. For instance, the Gini coefficient¹¹ was in some cases standardized for the time trend (proxied by 'year- 1959') to remove its inverse correlation with GDP/C. In turn, the variable 'log doctors per 1000 people' was divided by the Gini coefficient or by the log of GDP/c, obtaining an index of availability of distribution of health personnel relative to the GDP/c norm. Output volatility was proxied by the maximum value in any five year period of the five year rolling standard deviation of GDP per capita. The health impact of technical progress was proxied in two ways. First, the coverage of immunization against diphtheria, pertussis and tetanus (DPT) was used as a proxy of overall immunization coverage, oral rehydration therapy and delivery care. In addition, regional time dummies were introduced for the period 1985-2005 to capture the effect of health progress during the recent Globalization Era in relation to the period 1960-80. All other variables were included without changes in their usual metric. The age dependency ratio was introduced only in the transition economies (where such variable changed markedly during the last twenty-five years) but not in the other regions or in the global model as such variable is very heavily trended and therefore correlates closely with GDP/c.

5.3 Results of the global mortality model

Table 10 presents the results of the estimation of the global relation between health status (measured alternatively by LEB, IMR, U5MR) and its determinants. The parameters in Table 10 capture the average global impact of the explanatory variables included in the five mortality pathways analyzed and of the random shocks discussed in sections 3. Given the large number of very different countries and long time span on which the estimation is based, the estimates of this 'multi-pathway model' are quite stable. The regression results on LEB are presented separately for the entire 1960-2005 period and the sub periods 1960-80 (the Second Golden Age) and 1985-2005 (the current Globalization).

Models (1), (4) and (5) presents the results of the estimation of a multi-pathway mortality model over the 1960-2005 period. Though based on 556 observations (553 for U5MR) out of a theoretical maximum of 1360 for 97 countries (out of 136), the estimates in Table 10 are

¹⁰ The estimates of the fixed effects model include an intercept for each of the 136 countries in the GHND panel. Such intercepts capture specific country effects due to geography, institutions and unobservables. For this reason, adding a dummy for tropical countries would cause problems of multi-collinearity.

¹¹ Gini coefficients are taken from WIDER's World Income Inequality Database, the most updated and complete dataset of aggregate high-quality and well documented statistics on income inequality (see <http://www.wider.unu.edu/wiid/wiid.htm>).

very satisfactory. Practically all variables have the expected sign and plausible and statistically significant coefficients¹².

Table 10. Results of worldwide regression analysis for 1960-2005 on LEB^a, IMR, U5MR

	LEB			IMR	U5MR
	1960-2005	1960-1980	1980-2005	1960-2005	1960-2005
	(1)	(2)	(3)	(4)	(5)
Constant term	38.966***	52.707***	39.673***	165.088***	254.926***
Dummy tech progr 1980-05 OECD	0.792*	...	...	3.818	8.297** WS
Dummy tech progr 1980-05 E.Asia	1.362**	...	...	1.192	1.051
Dummy tech progr 1980-05 Trans	-2.461***	...	...	-3.064	1.2714
Dummy tech progr 1980-05 LAC	3.311***	...	...	-21.126***	-31.583***
Dummy tech progr 1980-05 MENA	3.432***	...	...	-44.478***	-56.951***
Dummy tech progr 1980-05 S.Asia	3.397***	...	...	-8.411**	-25.279***
Dummy tech progr 1980-05 SSA	2.438**	...	...	-12.971***	-18.3312***
Log GDP/c	3.203***	2.307***	3.148***	-14.19***	-21.75***
GDP/c volatility	-.0009**	-.0007	-.0008*	.0042*	.0093***
Gini income distribution	-0.057**	-.1058**	-.0498***	.3215***	.4424**
Δ Gini coeff > 4 points	-.0423*-	-.0645	-.0398	.0861	.2821
Female illiteracy (%)	-.098***	-.2763***	-.0427*	.5779***	.9464***
Log physicians per 1000 people /Gini	36.89***	7.305	55.392*-	-90.98*-	-158.69*
DPT Immunisation rate (%)	.0861***	.1425***	.0828***	-.3631***	-.6155***
Immigrants stock/ Total population	.0026***	.0040***	.0042*-	-.0007	-.0042
Alcohol consumption/c	-.2536***	-.4074***	-.2702***	.4841*	.3820
War and humanitarian emergencies	14.95**WS	-24.420	13.56*-WS	-15.63	-4.332
Disasters	.2864	.4415	.2106	2.6132*	3.2774*-
HIV/AIDS	-.8495***	-2.099***	-.7737***	1.1505***	1.8334***
F statistic	126.89***	56.45***	77.02***	113.39***	113.64***
R square	.897	.847	.890	.820	.845
Number of observations	556	234	385	556	553
Number of countries	97	65	97	97	97

Source: authors' calculations based on GHND. Notes: *** significant at the 1% level; ** between 1 and 5% level; * between 5 and 10% level; *- significant at 10-15%. ws = wrong sign. ^{a/} The use of LEB (instead of 100-LEB, as in Table 1) does not change the results of the model, as every linear transformation of the dependent variable in a regression model does not change the value of the parameters (which however take the opposite sign) obtained when using LEB as dependent variable.

Models (1), (4) and (5) suggest that an important part of the gains in LEB, IMR and U5MR (ranging between 0.74 years in the OECD to 3.4 LEB years in South Asia and MENA) in relation to 1960-1980 was due to the 'technical progress in health' realized over the 1985-2005 period. The negative and significant value recorded by this variable in the transition economies is correct as it reflects the disarticulation of the socialist health care model during

¹² This does not exclude however the possibility of reverse causation which is usually tested by means of the Granger test. However, such test is not suitable for the GHND quinquennial dataset in which each variable has at best ten observations (Hurlin and Venet 2001). It is therefore more appropriate to deal with this problem in theoretical terms. In this regard, it must be noted that reverse causality makes no sense in the majority of the relations in Table 10 (for instance it is not plausible that an increase in IMR can raise economic volatility, or that a fall in LEB will rise the interperiodal Gini variations larger than four points). The only relation in which reverse causation may be plausible is that between LEB and GDP/c. In this case, however, the relation between rising LEB (due for instance to a fall in U5MR) and higher GDP/c would be characterized by time lags, thus excluding the possibility of reverse causation on synchronous data. The parameters are also affected by estimation bias caused by the omission in the regression analyses of a few variables discussed in section 3 - such as out-of-pocket health costs and coverage of health insurance which were dropped because of insufficient data. In addition, the parameters may be further distorted by the possible endogeneity of some explanatory variables, which are simultaneously determined by the dependent and policy variables. Solving formally this endogeneity problem by means of a simultaneous equations system is however a difficult task in a panel with 136 countries. In addition, such problem is likely less severe if one considers that economic theory does not suggest - with the possible exception mentioned above - that LEB is a main current determinant of the explanatory variables.

the 1990s and the difficulties met in replacing it with a new system. It must be noted, however, that ‘technical progress in health’ is proxied by a time dummy that could capture other unexplained effects such as – in the case of the economies in transition - the institutional shock experienced after 1990. The impact of technical progress in health is captured also by the highly significant values of the coefficient of DPT vaccination. For instance, model (5) suggests that raising the DPT immunization rate by 30 points would reduce U5MR by 18.4 points.

Log GDP/c is also highly significant for the 1960-2005 period as well as for the two sub-periods considered. The same is true for the volatility of GDP/c that affects negatively, if modestly, LEB, IMR and U5MR. In turn, income inequality affects strongly and significantly all three health indicators. Increases in income inequality greater than 4 Gini points from one quinquennium to the next were also found to be significant in all three LEB models, though they are – as expected – weakly significant in the case of IMR and U5MR. For instance, rises in the Gini coefficient of 10 points from one quinquennium to the next reduces at the margin LEB by one year, strengthening the conclusions of prior studies about the effect of sudden shifts in inequality on cardiovascular and violent mortality. Female illiteracy is strongly significant in all five models, confirming on panel data the findings of the micro-studies cited in section 3. For instance, a reduction by ten percentage points in female illiteracy raises average LEB by 0.76 years, and reduces IMR and U5MR by 5.1 and 8.2 points respectively.

The availability of health services (measured by log physicians per 1000/ Gini) is significant in all five models in Table 10, but is weakly significant for the 1960-80 period. In turn, adopting health-damaging health behaviors – such as excessive alcohol consumption – affects LEB and, surprisingly, IMR. Finally, the model confirms a positive, if small, impact of migrant stocks greater than 3.5 percent of the resident population on the LEB of the countries of destination. This result is interesting in the light of the debate on the impact of migration.

As for the ‘random shocks’, HIV-AIDS appears to have a large and significant effect on LEB, IMR and U5MR. Raising its prevalence rate by 30 points reduces LEB by a staggering 25 years (as observed in Botswana), and raises child mortality by 52 points, i.e. values similar to those estimated in Cornia and Zagonari (2002). ‘Disasters’ and ‘war and humanitarian emergencies’ are non significant and often have the wrong sign. This may be due to their low frequency (only 87 and 63 have non-zero values out of 556 observations) or to low coverage of the CRED database, or because the variable was poorly proxied in the GHND¹³.

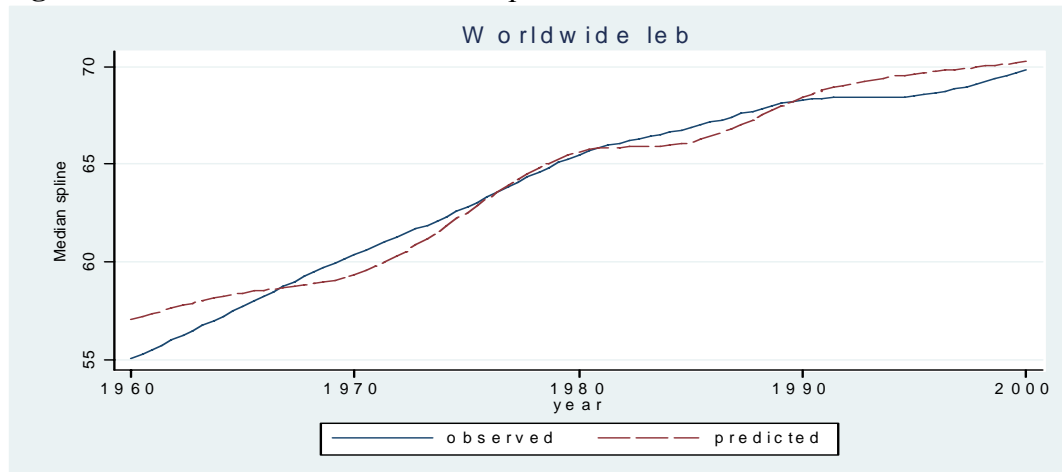
Figure 7 shows (solid line) the observed trend in the LEB spline (the unweighted median of LEB for all 136 countries included in the panel) that, as discussed in section 2, since the early 1980s grew slower than during the prior twenty years. It also shows that the LEB predicted by model (1) (dotted line) fits very well the actual trend except, perhaps, for the first 5 years. A comparison of the stability of the estimates in models (1), (2) and (3) shows that while the sign and size of the parameters remained broadly unchanged, the significance of a few parameters was lower over 1960-80, as in case of the volatility of GDP/c and alcohol consumption, possibly because these two phenomena were less pronounced over the years 1960-80. It shows also that female illiteracy became non significant over 1985-2005 as such

¹³ ‘Wars’ have been more common in low and middle income countries. Their significance was thus tested separately for these country groups. It would thus appear that – while wars do increase sharply mortality on occasion of large conflicts, their impact is comparatively small in relation to the deaths due to traditional causes.

phenomenon became less common. The loss of significance is also due to the smaller number of observations and reduced variance of the variables in each of the two sub-periods.

To conclude, it must be noted that the reduced form models in Table 10 include variables alluded to in more than one of the five models discussed in section 3, and that in these case the impact estimated by model (1) is the sum of the effects of different mortality models. While log GDP/c captures unambiguously the importance of resources for health in the ‘material deprivation pathway’, income inequality captures simultaneously the effects described in the ‘psychosocial stress’, ‘material deprivation’ and ‘social cohesion’ models.

Figure 7. Observed and fitted median spline of world LEB



5.4 Regional results

The mortality models described in Table 10 were further validated on the high-income, medium-income, low-income, and transition-economies to test if the intensity of the relations described above holds also in quite different country groups. The variables that do not influence mortality in each specific region considered were omitted (e.g. the relative price of food, wars and disasters in the advanced countries, or HIV-AIDS in the economies in transition), while the expected sign of some variables (e.g. the migrant stock/resident population) is expected it might change from region to region, and that of others (e.g. log GDP/c) may become insignificant in the high income group. Also, the same phenomenon (e.g. female education) was proxied in ways relevant to local conditions, e.g. using the percentage of women with post-secondary education in the high income and transition group and female illiteracy in the medium income one. When available, regional variables were added, as for smoking in the high income group, while variables with no or only few regional observations were omitted. Finally, it must be noted that the estimation of models similar to those in Table 10 at the regional level entails dividing the sample of 556 data in four sub samples, a fact that causes by definition some loss of significance of the parameters, particularly for regions with few data and large measurement errors in the variables. This is the case of the transition countries, for which lack of sufficient quinquennial data imposed to test the model on annual data for 1980-2005.

The results for the high income countries (130 observations) are satisfactory (Table 11). Of the ten variables explaining LEB all but one (log of physicians per 1000/log GDP/c) have the right sign and are significant. Smoking and drinking depress LEB in a significant way, while

the immigration has a positive (but modest) effect on LEB. As predicted by the Preston curve (1976), GDP/c is not significant if considered alone but turned out to be significant when interacted with its volatility. Likewise, increases in Gini coefficients > 4 are not significant as this phenomenon was seldom observed in the region. All other variables have correct signs and plausible parameters. In the case of IMR-U5MR, half of the variables have the right sign and are statistically significant, though the economic variables measuring stress and resources (log GDP/volatility, income inequality and sudden changes in inequality) have, as expected, non significant signs. As expected on the theoretical ground, smoking and the migrant stock are also not significant suggesting that such variables do not affect significantly the survival of children while they that of adults.

The mortality models are validated in an equally satisfactory way for the middle income countries (218 observations), as all twelve variables (including war and disasters) have the expected sign and are highly significant with the exception of Δ Gini > 4, GDP volatility, disasters, wars and medical progress in East Asia. Similar results are obtained for IMR and U5MR. Interestingly, the latter rise when the 'migrant stock' increases (though the parameters are not significantly different from zero).

Table 11. Results of the regression analysis on LEB, IMR, U5MR for high and middle income countries, 1960-2005

	High income countries (5 quinquennial data)			Middle inc. countries (5 quinquennial data)		
	LEB 1960-2005	IMR 1960-2005	U5MR 1960-05	LEB 1960-05	IMR 1960-05	U5MR 1960-05
Constant term	94.43***	2.5942*-	-5.4486	38.56***	158.22***	208.53***
Dummy med progr 80-05OECD	1.06***	-3.9686***	-5.1890***			
Dummy med progr 80-05 E.Asia				0.6603	9.19**ws	12.49*-WS
Dummy med progr 80-05 LAC				1.8315***	-13.40***	-19.07***
Dummy med progr 80-05MENA				1.2796*	-22.96***	-34.55***
Log GDP/c	.....	.....		2.5239***	-13.31***	-18.37***
Log GDPc / volatility	74.78***	-30.22	-102.16			
GDP/c volatility	.....	... ..		-.00003	.0071	.0169*
Gini income distribution	-.0482*	.3415***	.5013***			
Gini income distribution / t	.....	.....		-.0679***	.2534***	.4695***
Δ Gini coeff > 4 points	.1002	-.5582	-.7957	-.0456	.1780	.6743*-
% women>25 with post 2ary educ	.2888***	-.7689***	-.9792***	.....	.....	.....
Female illiteracy	.....	.....		-.1918***	1.1433***	1.7979***
Log phys. per 1000/ Log GDP/c	-28.9***ws	20.80	36.57	11.2796***	-14.75	-31.33
DPT Immunisation rate (%)	.0775***	-.1969***	-.2514***	.0701***	-.3296***	-.5999***
Immigrants stock/ Population	.0017***	.0029*-WS	.0027	.0035*-	.0099	.0128
Alcohol consumption/c	-.2582***	.4301**	.5003***	-.4350***	1.4932***	1.7121**
Smoking	-.0544***	-0.0210	-.0306	No data	No data	No data
War and human. emergencies	Unobserved	Unobserved	Unobserved	-10.3808	94.22	136.06
Disasters	Unobserved	Unobserved	Unobserved	-.2075	1.6205	1.3079
HIV/AIDS	Unobserved	Unobserved	Unobserved	Unobserved	Unobserved	Unobserved
F statistic	69.81***	40.97***	40.85***	185.63***	115.03***	127.17***
R square	.287	.509	.513	.837	.684	.721
Number of observations	130	130	130	212	212	212
Number of countries	22	22	22	34	34	34

Source: authors' calculations

For the low income countries (125 observations) the LEB model shows very satisfactory results (Table 12) as all variables have the expected sign (except for alcohol consumption,

disasters and wars which are also non significant), and are statistically significant (but for Δ Gini > 4), thus confirming the conclusions arrived at on the basis of the global model. It must be noted, that the value of the parameters (e.g. of log GDP/c, Gini, DPT and so on) is generally greater than in the global or middle income model confirming the theoretical expectations that changes in such variables have much greater effects in poor rather than rich countries. Furthermore, in this country group, the variable disasters takes the correct sign in the case of IMR and U5MR though it is still not significant.

Finally, the estimates for the transition countries are less comprehensive than those of the other three regions, as the estimation was carried out on yearly data for 1980-2005, and as no information was available for DPT immunization, migration, alcohol consumption, war and disasters. Several of the key effects are, however, correctly estimated also in this case: the LEB model (Table 12) captures most effects discussed so far, i.e. those related to the negative progress in medical research (due to the change in institutions), GDP volatility, GDP per capita, large Gini increments, female enrolment rate in 2^{ary} education, the availability of doctors, and the dependency ratio, a variable which is particularly relevant in this region that suffered in the 1990s a true demographic collapse. The Gini of income distribution is statistically non significant, though its large increments are. Finally, similar results were obtained for the IMR and U5MR, though also in these two models the Gini of income distribution had the wrong sign, and log GDP was non significant. A more complete dataset is needed to test fully the above mortality models for this region.

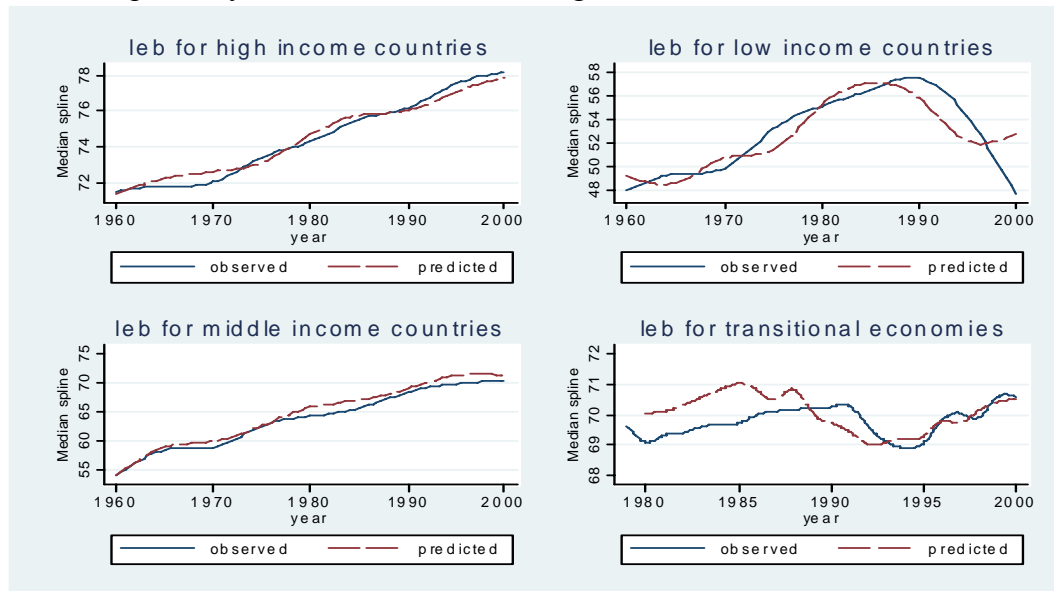
Table 12. Results of the regression analysis on LEB, IMR, U5MR for low income and transitional economies, 1960-2005

	Low income countries 1960-2005 (quinquennial data)			Transition countries 1980-2005 (yearly data)		
	LEB	IMR	U5MR	LEB	IMR	U5MR
Constant term	22.10**	158.73***	291.25***	54.37***	80.29***	67.92***
Dummy TechProgr80-05	3.041***	-19.06***	-33.58***	.....	.....	.....
Dummy Trans 90-05	.....	.....	.....	-.15139	-1.128**	-.9778*-
Log GDP/c	3.6640***	-7.8231*	-18.91**	1.6664**	-2.9997**	-2.2838
GDP/c volatility	-.0064*	.0065	.0396*-	-.0012***	0.0007*-	.0009*-
Gini income distribution	-.2032***	.8179***	1.5343***	-.0062	-.2843*** WS	-.3061*** WS
Δ Gini income > 4pts	.0641	-.2959	-.7060	-.1421**	.3840***	.7762***
% enrolment in 2 ^{ary} education	.....	.....	.....	.0346***	-.0761***	-.0504***
%women with completed 1 ^{ary}	.1913**	-.6223*	-1.0926*	.....	.....	.....
Log physicians x1000 people / Log GDP/c	14.2350**	-14.48	-24.7722	8.6528**	-36.66***	-32.9712***
DPT Immunis rate (%)	.1147***	-.5339***	-.8950***	.....	.....	.....
Immigrants stock/ Population	-.0276**	.0030	.0818	.....	.....	.....
Age dependency ratio	.....	.....	.....	-15.2211***	45.395***	59.2501***
Alcohol consumption/c	-.0240	-.2135	-1.4582	No data	no data	No data
War	26.66	-198.94	-291.25	No data	No data	No data
Disasters	.0246	4.7663**	7.353*	No data	No data	No data
HIV/AIDS	-.7208***	.6006***	.9750***	Unobserved	Unobserved	Unobserved
F statistic	32.21***	32.60***	27.49***	28.95***	43.66***	45.36***
R square	.743	.661	.613	.170	.586	.605
Number of observations	123	123	114	325	316	316
Number of countries	23	23	22	24	24	24

Notes: the years 1960 and 2005 have a low coverage

A confirmation of the good results of the estimations presented in Tables 11 and 12 is given by Figure 8 that describes the good fit of the LEB estimates (dotted lines) in relation to the observed values (solid line) for the respective reference periods and four regional groups.

Figure 8. Trend in the observed (solid line) and estimated (dotted line) of the median spine of the life expectancy at birth in the four sub regions



6. Simulation of LEB changes due to globalization & shocks

The above global and regional models can be used to assess whether the changes intervened during the recent Globalization Era in the policy-driven health determinants (growth of GDP/c, inequality, instability, health provision, and so on), random shocks (HIV-AIDS, wars and disasters) and endogenous medical progress have led by 2000 to LEB values higher, equal or lower than those which would have been achieved under a ‘counterfactual scenario’ in which the determinants of LEB did not change their 1980 values over the 1980s and 1990s, or followed over these two decades the trend they followed over 1960-1980 or 1960-1990.

In practice, this means fixing for each independent variable a 2000 value obtained by prolonging over time the past trend or keeping constant its 1980 value and, second, simulating on the basis of these counterfactual values and of the parameters of the regional LEB models in Tables 11 and 12 the values that LEB would have taken by 2000. The specific hypotheses made in the construction of the counterfactual scenario are that:

- the log of GDP/c*Gini, log of physicians per 1000/log GDP/c, and migration stock, rise over 1985-2005 according to their 1960-80 trend;
- DPT immunization rates, female illiteracy (or primary or secondary education) and alcohol consumption rise according to their 1960-90 trend;
- GDP volatility, the Gini index of the distribution of income, age dependency ratio, and smoking incidence, remain at their 1980 or 1985 level, and – by consequence – that the Δ Gini coefficient is equal to zero;
- there is no progress in health technologies over 1985-2005
- HIV-AIDS incidence remains at its 1980 level and there are no disasters and wars.

Thus, for each region the simulated values LEB in 2000, indicated as LEB^s_i is equal to the sum of the products of the simulated 2000 values of the explanatory variables by the parameters α_1, α_2 , etc of equations (1) in Tables 11 and 12. In symbols:

$$LEB^s_i = \alpha_0 + \alpha_1 \text{ Dummy Health Progr}^s (=0) + \alpha_2 \text{ Log GDP/c}^{s*} \text{ Gini} - \alpha_3 \text{ GDPvolatility}^s - \alpha_4 \text{ Gini}^s - \alpha_5 \Delta \text{Gini} > 4^s - \alpha_6 \text{ Female Illiteracy}^s + \alpha_7 \text{ Log Phys per 1000/Log GDP/c}^s + \alpha_8 \text{ DPT}^s + \alpha_9 \text{ Migrant stock}^s - \alpha_{10} \text{ Alcohol/c}^s - \alpha_{11} \text{ AIDS}^s$$

The observed values of LEB in 2000, indicated as LEB^o_i , are the sum of the products of the observed 2000 values of the explanatory variables multiplied by the parameters α_1, α_2 , etc. of equations (1) in Tables 11 and 12. In symbols:

$$LEB^o_i = \alpha_0 + \alpha_1 \text{ Dummy Health Progr}^o (=1) + \alpha_2 \text{ Log GDP/c}^{o*} \text{ Gini} - \alpha_3 \text{ GDPvolatility}^o - \alpha_4 \text{ Gini}^o - \alpha_5 \Delta \text{Gini} > 5^o - \alpha_6 \text{ Female Illit}^o + \alpha_7 \text{ Log Phys per 1000/Log GDP/c}^o + \alpha_8 \text{ DPT}^o + \alpha_9 \text{ Migrant stock}^o - \alpha_{10} \text{ Alcohol/c}^o - \alpha_{11} \text{ AIDS}^o$$

It is now possible to compute, region by region, the difference between LEB^o_i and LEB^s_i as the sum of the differences between the observed and simulated values of each explanatory variable multiplied by the parameters α_1, α_2 , etc of equation (1) in Tables 11 and 12, i.e.:

$$LEB^o - LEB^s = \alpha_1 [\text{Dummy Health Progr}^o (=1) - \text{Dummy Health Progr}^s (=0)] + \alpha_2 [\text{Log GDP/c}^{o*} \text{ Gini} - \text{Log GDP/c}^{s*} \text{ Gini}] - \alpha_3 [\text{GDPvolatility}^o - \text{GDPvolatility}^s] - \alpha_4 [\text{Gini}^o - \text{Gini}^s] - \alpha_5 [\Delta \text{Gini} > 5^o - \Delta \text{Gini} > 5^s] - \alpha_6 [\text{Female Illit}^o - \text{Female Illit}^s] + \alpha_7 [\text{Log Phys per 1000/Log GDP/c}^o - \text{Log Phys per 1000/Log GDP/c}^s] + \alpha_8 [\text{DPT}^o - \text{DPT}^s] + \alpha_9 [\text{Migrant stock}^o - \text{Migrant stock}^s] - \alpha_{10} [\text{Alcohol/c}^o - \text{Alcohol/c}^s] - \alpha_{11} [\text{AIDS}^o - \text{AIDS}^s]$$

In this way, for each of the countries/regions identified below in Table 13, it is possible to derive, variable by variable, the LEB gains (+) and losses (-) in the year 2000 due to exogenous globalization policies affecting the determinants of health, endogenous changes and random shocks in relation to a ‘business as usual counterfactual’. World changes in LEB and in each of its determinants are obtained by weighing regional LEB changes by their populations. Table 13 summarizes the results of such hypothetical simulation that seems sufficiently differentiated, and broadly in line with real life changes.

At the global level, policy changes seem to have reduced LEB by 1.52 years as a result of several offsetting effects. Higher income inequality than in the counterfactual scenario depressed LEB by 0.77 years. This loss is counterbalanced by LEB gains (0.73 years) due to a growth in GDP/c faster than in the counterfactual scenario in China, India and the rest of South Asia (in most regions, however, a GDP growth slower than over 1960-80 contributed to a decline in LEB). Smaller LEB losses (0.08 years) were due to large intra-period rises of income inequality, while GDP/c volatility appears to have caused perceptible LEB losses in most regions. A rise during the 1980s-90s in the number of physicians per 1000 normalized by log GDP/c slower than in the counterfactual scenario in several regions led to a global LEB loss of 0.51 years. Smaller effects were observed for illiteracy while improvements in health behavior (alcohol consumption, and cigarette smoking in the OECD) and a rise in the migrant stock faster than in the past generated small but telling improvements in world LEB. To these ‘policy-driven effects’ one has to add the LEB changes due to endogenous progress in medical technology and (for the economies in transition) in age dependency ratios and subtract those due to AIDS, wars and disasters. Interestingly, at the global level, the gains due to medical progress cancel out almost completely the LEB losses due to policy changes and shocks. One may thus wonder how large could these gains have been had the policies towards the transfer of health technology (such as the TRIP agreement and international aid to health programs) been more favorable. A related disturbing message of this simple simulation is that a perceptible LEB loss (0.47 years) was due to the stagnation or decline in DPT vaccination coverage since 1990, a result in line with the findings of Cutler et al. (2006) about the

decline in national and international support to immunization campaigns during the 1990s. Finally, given the low value of their parameters, the variables wars and disasters do not appear to have generated perceptible LEB effects though this, as noted earlier, may be due to data and specification problems.

Table 13. Gains (+, green color) and losses (-, red color) in LEB years by 2000 due to 1980s-1990s changes in policies, endogenous changes and random shocks

Region	OECD	TRANS	USSR	E.Asia	China	Lamer	MENA	India	S.Asia	SSA	WORLD
Policy driven LEB changes	2.02	-1.78	-3.92	0.49	-3.61	-1.54	2.19	-1.07	-1.59	-5.63	-1.52
Log GDP/c	0.00	-0.43	-1.91	-1.22	3.98	-0.80	-2.07	1.71	0.69	-0.99	0.73
Log GDP/c on volatility	-0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.07
Gini of income inequality	-0.03	-0.07	-0.12	0.00	-2.14	0.00	0.00	-1.15	-0.61	-0.45	-0.77
Gini of income inequality / (year-1959)	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00
GDP/c Volatility	0.00	-0.72	-0.49	-0.05	-1.26	0.01	0.04	-0.63	-0.32	-0.09	-0.44
Intra-period D Gini >4 points	0.02	-0.58	-1.60	-0.08	0.00	-0.03	0.00	0.00	0.00	0.14	-0.08
Log physicians per 1000/Log GDP/c	-0.44	0.02	0.37	1.10	-1.67	0.25	0.73	-0.97	-0.44	-0.60	-0.51
Log physicians per 1000/Gini	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Migrant stock/population	0.07	0.00	0.00	0.41	0.00	0.01	0.39	0.00	-0.12	0.06	0.07
DPT immunization coverage	0.31	0.00	0.00	0.70	-0.73	-0.05	-0.29	-0.18	-0.58	-3.37	-0.47
Female education	0.52	0.00	-0.16	-0.57	-1.78	-1.14	3.41	0.15	-0.21	-0.32	-0.31
Cigarette smoking/c	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Alcohol consumption/c	1.21	0.00	0.00	0.20	0.00	0.22	-0.01	0.00	0.00	0.00	0.22
Endogenous driven LEB changes^a	1.07	0.36	0.35	0.66	3.04	1.83	1.28	3.04	3.04	3.04	2.15
Age dependency ratio	0.00	0.66	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
technical progress in health field	1.07	-0.31	-0.31	0.66	3.04	1.83	1.28	3.04	3.04	3.04	2.10
Shocks driven LEB changes^a	0.00	0.00	0.00	0.00	-0.02	-0.04	-0.05	-0.57	-0.34	-6.36	-0.76
War and humanitarian conflicts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.18	0.02
Disasters	0.00	0.00	0.00	0.00	-0.02	-0.04	-0.05	-0.02	-0.02	-0.01	-0.02
HIV-AIDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.54	-0.31	-6.54	-0.76
Total LEB changes	3.08	-1.42	-3.57	1.15	-0.59	0.25	3.42	1.41	1.11	-8.95	-0.13

Source: authors' calculations based on the parameters of the regional models presented in Tables 11 and 12.

Notes: ^a For the distinction between policy, endogenous and shocks driven LEB changes see footnote 2.

^b The result of the above simulation are based on the regional parameters (tables 11 and 12) The results of the simulation based on the global parameters (Table 10) yields similar results for the world as a whole. As for the ten regions, the signs of the variations are similar but the size of the variations are obviously very different, as the parameters of the explanatory variables vary substantially between the global models (that measures an 'average' effect) and the regional models which reflect different regional circumstances.

As expected, there were regional winners and losers from the policies introduced during the recent Globalization Era. The biggest losers of the policy-driven changes are Sub-Saharan Africa and the two regions in transition, but less obvious findings emerge from this hypothetical simulation. Among the winners one can count the OECD, East Asia excluding China, a region that experienced LEB losses due to growing inequality, sudden and large inequality rises and a growth slowdown that were offset by improvements in the field of medical staffing, alcohol consumption and the eradication of female illiteracy. Surprisingly, MENA experienced large policy-driven LEB gains due to a growth in doctors, migrants and – especially- female education faster than in the past. South Asia excluding India exhibits marked LEB losses due to a worse-than-expected performance in all economic and social areas, but large gains due to the transfer of health technologies. Interestingly, the two new 'growth superstars', i.e. China and India, seem to have suffered a policy-driven loss of LEB, as the effect of a growth faster than in the counterfactual was offset by losses due to a sharp rise in inequality, rising volatility, as well as poorer than expected performances in reducing

female illiteracy, alcohol consumption, availability of physicians and DPT vaccination. Both in China and India, progress in health technologies and no or limited LEB losses due to AIDS made that the changes intervened during the recent Globalization Era were – on balance – more positive than in the counterfactual scenario.

Though plausible and possibly interesting, the conclusions of the above simulation suffer from a few problems. First of all, except for AIDS, wars, disasters and endogenous changes in health technologies and dependency ratios, the above approach attributes all LEB gains and losses to the impact of globalization policies on growth, inequality, volatility, vaccination coverage, female illiteracy and so on, while it can be argued that other factors (e.g. institutions, external financing and so on) may be in part responsible for the changes recorded in these determinants. This problem is addressed in part in the next section. Second, though the multi-pathways model used for the simulation is already fairly complex, lack of data prevented the inclusion in the model of a few determinants of health (e.g. diet and smoking) discussed in sections 3 and 4. Thirdly, technical change in health is approximated by DPT immunization coverage and a period dummy. The latter captures the part of LEB unexplained by the variables included in the model and, as such, could reflect the impact of omitted variables. Yet, as the number of variables included in the model is fairly large and its fit rather good, this argument may not carry much weight.

7. IMPACT OF POLICY CHANGES ON HEALTH DETERMINANTS

7.1 Methodological problems and literature review

This section tests to what extent the deteriorations observed during the last two decades in three key determinants of health, i.e. GDP/c, the volatility of GDP/c and income inequality can be attributed to a premature adoption of liberalization and globalization policies ignoring the peculiarities of local conditions. The test consists in running regressions in which GDP/c, inequality and volatility are regressed on indexes of policy reform and control variables¹⁴.

A key methodological issue to be dealt with in this type of analysis is that the measurement of the liberalization and globalization policies is highly problematic from both a theoretical and empirical perspective. Even in the comparatively straightforward case of trade liberalization, a policy change can be proxied by policy-based measures such as the average tariff rate, tariffs variance and peaks, coverage of contingents, and so on, or a combination of all or part of them, as in the case of the World Bank's index of trade openness and the Sachs and Warner (1995) index. Some authors use instead outcome-based measures of trade liberalization such as the export plus import/GDP ratio, ignoring however that such outcome depends as much on trade policies as on country characteristics such as size, resource endowments, and so on. Measurement problems are even more pronounced when dealing with reforms whose enactment requires changes in many institutional and regulatory areas, as in the case of financial reforms. Finally, in some cases, e.g. that of privatization, some of the most obvious measures (e.g. the share of state assets in total national assets) conceal more than reveal, as similar privatization indexes may refer to radically different models of privatization, ranging from the Chinese egalitarian land reform of 1978 to the Russian insider privatization of the 1990s, that impact economic performance in opposite ways.

¹⁴ The main approaches used to assess the impact of policy reforms are the 'before-after', 'differences in differences', CGE models, structured comparisons of case studies, and cross-country or panel regressions.

To get around these problems, most researchers rely on a synthetic reform index summarizing the changes introduced in all reform areas. The computation of such indexes is generally carried by the staff of international organizations such as the IADB, ECLAC, EBRD, IMF and World Bank. Sectoral and overall reform indexes were developed for instance by Lora (2001) for the years 1970-1999 for Latin America and the European economies in transition. The Lora index suffers from the weaknesses illustrated above but was compiled according to the same methodology and thus allows to compare the extent of reforms across countries and over time. Each policy index varies between zero (no reform) and one (complete reform). The trade reform index is the average of the mean tariff rate and tariff dispersion, while domestic financial reform are proxied by the average value of bank borrowing, lending rates and reserves to deposits ratio. In turn, international financial liberalization is the average of indexes reflecting the control of foreign investments, limits on profit repatriation, controls on external borrowing and capital outflows, while the tax reform index is equal to the average of the maximum marginal tax rate on corporate and personal incomes, and VAT tax rate and efficiency. Finally, the privatization index is expressed as one minus the ratio of value-added in state owned enterprises to non-agricultural GDP. The general reform index is the simple average of the five index just described.

Reasons of space allow only a cursory allusion to prior research findings in this field. Some cross-country studies analyzed the effect of openness on economic growth (Sachs and Warner 1995, Dollar and Kraay 2003 and the literature therein) and conclude that trade policy and openness are key growth determinants. However, these results were criticized by Rodrik et al. (2002) who argue that growth is determined mainly by the quality of institutions that in their words “trumps” everything else including economic openness. Other studies have analyzed the impact of liberalization and globalization on income distribution. The proponents of such policies claim that their distributive impact is likely to be neutral as, in their views, there is no evidence that within-country inequality has risen recently (Dollar 2004). Yet, an analysis of the impact of overall liberalization in 18 Latin American countries over 1980-98 (Berhman et al 2000) found that these policies had a significant short and medium term disequalizing effect, which however declined over time. The study found that trade liberalization did not affect significantly inequality, as country outcomes depended on specific country conditions, but that capital account liberalization, followed by domestic financial liberalization and tax reform had a strong disequalizing effect. Likewise, a review of the effects of liberalization and globalization policies during 21 reform episodes in 13 Latin American countries, Russia, Turkey, Zimbabwe and India over the last two decades (Taylor 2005) found that inequality rose in 13 cases, remained constant in 6 and improved in Chile post-1990 and Costa Rica i.e. countries where the domestic conditions were ripe for trade liberalization.

Other analyses emphasize that the standard theory predicts that in countries with an abundant supply of labor, trade liberalization and opening up to FDI and portfolio flows raise exports of labor intensive manufactures and employment, and so reduce earnings inequality. While this might be true in the textbook model, the stringent conditions under which such predictions apply are rarely verified, and different models are needed to portray the real life situation of countries characterized by widespread market failures (Cornia 2005 and the literature therein). Indeed, the standard theory is unable to predict the growth, inequality and volatility impact of internal and external liberalization, as it is based on models pivoting around highly restrictive assumptions that ignore the impact of institutional weaknesses, structural rigidities, incomplete markets, asymmetric information, protectionism and the complexity of trade and finance in a multi-country environment.

7.2 Empirical results

Conscious of these theoretical and data limitations, this section tests the impact of liberalization and globalization policies proxied by Lora's Overall Reform Index on three social determinants of health, i.e. GDP/c, income inequality and volatility that explain about half of the LEB changes simulated in Table 13. To avoid distortions in the estimated parameters due to the lack of the Lora index for 1960-80, GDP/c was proxied as a GDP index (1980 =100) or as a deviation from its 1960-80 trend, while GDP/c volatility was also expressed as deviation from its 1960-80 trend.

In models (1) and (4) in Table 14 on income inequality the Overall Reform Index was lagged by five years, as reforms normally take time to alter the income distribution, while the reform increments over the subsequent five years were introduced to assess the time profile of the reforms' impact (Behrman et al. 2000). In addition, the Overall Reform Index was interacted with the initial value of the Gini coefficient (G_0) so as to test if the inequality impact of the reform was more pronounced in countries with low or high initial inequality. A GDP/c index and its square were also included to test if the impact of the reforms is more or less pronounced in countries with different income levels. Instead, in models (2) and (5) on the impact of reforms on GDP/c, the Overall Reform Index was expressed in quadratic form as, in the economies in transition, the reform impact followed a concave pattern. The same approach was followed in models (3) and (6) on the impact of reforms on the deviation of GDP/c volatility from its 1960-80 trend. Finally, to remove the confounding effects of other non policy factors, several controls variables (M2/GDP, total external debt, real interest rate, external terms of trade, and inflation) were included among the regressors.

Table 14. Results of the regression of Lora's Overall Reform Index on Income inequality, GDP/c and volatility of GDP/c.

	European transition economies (1989-01)			Latin America (1980-1999)		
	Income Inequality	GDP/c index (1989=100)	GDP volatility (deviation from 60-80 trend)* (3)	Income Inequality	GDP/c (deviation from 1960-80 trend)* (5)	GDP volatility (deviation from 60-80 trend)* (6)
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	18.70***	1.09***	12.61***	37.37***	-.5285***	8.43***
Reform Index	.....	-1.71***	31.29***	.....	-.2328***	8.62**
Reform Index ²	.....	1.74***	-36.68***	.....	-.2090***	-10.57***
Reform Index* Gini 0	.....	.....	.....	-.1851***	.....	.....
Reform Index t-5	15.19***	.....	.....	13.53***	.....	.....
Reform increment t 4-5	12.58***	.....	.....	14.27***	.....	.....
Reform increment t 3-4	12.42***	.....	.....	11.28***	.....	.....
Reform increment t 2-3	10.64***	.....	.....	14.73***	.....	.....
Reform increment t 1-2	9.47***	.....	.....	13.58***	.....	.....
Reform increment t 0-1	6.40***	.....	.....	12.01***	.....	.....
Money supply (M2/GDP)	-.0672***	.0019***	.....	.0179 ^{WS}	.0004	.....
Total external debt	.....	1.66*-	.....	2.36***	-1.08***	.....
Real interest rate	-.0020***	-.00004	-.0273*-	.....	-.0003	.0152**
External terms of trade	no data	no data	no data	-.0047	-.0003*-	.0122 ^{WS}
Inflation	-.0025** ^{WS}	.....	.0100***	.00008	.000001***	.0006**
GDP index	29.08***	.....	.....	14.99***	.6133***	.....
GDP index ²	-14.79***	.....	.....	-4.01**	.....	.....
F statistic	22.41***	29.81***	18.60***	10.08***	80.12***	2.39**
R square	.018	.280	.047	.005	.680	.009
Number of observations	120	127	306	183	191	191
Number of countries	17	17	24	12	17	17

Source: authors' elaboration on GHND; Notes: * the variables have been computed as the difference between the observed values of the variable and that obtained by a prolongation of the 1960-80 trend, divided the value extrapolated on the basis of the 1960-80 trend.

Table 14 presents the results of the econometric estimates obtained by means of a fixed effects model for the two regions and the periods indicated above. In both Eastern Europe and Latin America the Reform Index t-5 has a significant positive effect on income inequality and so do the reform increments during the subsequent five years. In Latin America, the interaction term between the Overall Reform Index and the initial inequality is negative, indicating that the reforms will affect inequality especially in countries with low initial inequality. Finally, the parameters of GDP index and its square suggest that the impact of the reforms appears to be more pronounced in low income countries, as observed for instance in the case of the European economies in transition where the richer Central European economies experienced smaller rises in inequality.

The regression (2) and (4) confirm that economic growth is affected by the reforms in a concave way in Eastern Europe and in an increasingly concave way in Latin America. Similar conclusions apply to GDP/c volatility. Also in this case the negative effect appears to be particularly strong in the initial phase of the reforms. Finally, it must be noted that some of the control variables introduced appear to explain part of the increase in inequality, slowdown in growth and surge in volatility. This is particularly the case for the real interest rate (an exogenous variable reflecting – in an open economy - the monetary policies of large countries and the risk premium set by the rating agencies), inflation (part of which might be endogenous to the reforms) and money supply in the Eastern Europe. The external terms of trade appear in contrast to be little significant.

These results would seem to provide some support to the hypothesis that in the two regions considered the policy reforms of the last twenty years affected negatively three key social determinants of health. In the case of inequality the impact appears to be somewhat delayed, and to affect most countries with low initial inequality and GDP/c. Instead, the control variables explain only a small part of the trends examined. Though with all the precaution of the case, one can tentatively conclude that there is some regional evidence of the potentially adverse effect of the recent globalization policies on health.

Before accepting these conclusions it is necessary to consider, however, a recent observation by Rodrik (2005) who argues that standard growth-policy regressions can be often misleading because of a variety of problems including parameters heterogeneity, omitted variables, model uncertainty, measurement error and endogeneity. In particular, Rodrik notes (p.11) “as long as policy interventions are not random and their presence responds to unobservables, regressing an economic performance variable on policy is uninformative about the degree to which market failures exist, the extent to which policy interventions are targeted on them, the effectiveness with which government policies are deployed, or the extent to which policy interventions are used to create and divert rents for political purposes.”

For these reasons, it is impossible to squarely attribute the negative effect of the reforms to a market failures due to a premature implementation of liberal reforms, rather than to other factors. Yet, while one can only speculate about what lies behind the negative association found between liberalisation-globalisation policies, poor economic performance and unsatisfactory health trends, it is also evident that – for whatever reason – this association seems to be quite robust. Finally, confidence in the above results derives also from theoretical analyses and country studies of the type suggested by Rodrik, in which the predictions of key theoretical models (as the Heksher-Ohlin model) are juxtaposed with the observed values in a variety of economies where the model assumptions are not verified.

8. IN LIEU OF CONCLUSIONS

The main conclusion of the paper is that globalization policies contributed – through different pathways - to a slowdown in the pace of improvement of the social determinants of health which caused, in turn, a corresponding deceleration (relative to the 1960-80 trends) in health gains in several, if not all, regions and globally. Obviously, while this conclusions is plausible, as it is supported by historical and econometric evidence, there is hardly a case for regarding it as final. More data and analysis are required to confirm this initial insights.

This paper is not meant to provide policy recommendations, as these would require considerable space and make sense only in specific country contexts. Yet, some general observations on its key findings and the direction of policy-making and future research can be tentatively advanced. First the paper confirms some of the findings of the literature on the slower growth, higher instability and inequality, reduced access to public health care and increased dependence on out of pocket expenditures observed in many countries between 1980 and 2000, and on the relation between these trends and the liberalization and globalization policies introduced in the 1980s and 1990s. Contrary to expectations, such policies caused a systemic increase in instability and inequality and a weakening of the role of the state in providing basic services. All this, as well as unfavorable changes in the TRIPS agreement reduced the potential impact of the transfer of medical technologies. In addition, while greater awareness of virtuous health behaviors appears to have spread in the OECD, external liberalization contributed to an increase in smoking, drinking and poor nutritional habits in developing economies where the TNCs operating in these sectors have now relocated. For these reasons, there is some merit in the view that sees the unsatisfactory health trends of the Globalization Era to be related to a premature and acritical application of liberalisation-globalisation policies.

A confirmation of the findings about the negative effects of premature liberalization and globalization policies on three key determinants of health (GDP/c, inequality and volatility) and other areas (such as health provision, as discussed in section 4), requires a consideration of the present approach to policy reform, including because of health reasons. It is quite possible that if properly managed, some (not all) globalization policies could lead to health gains. Under ideal conditions, liberalization would reward effort and entrepreneurship, increase employment opportunities, and improve health by raising family earnings and reducing consumer prices. In turn, an opening up of developed countries could help incorporating into the global economy developing nations with narrow domestic markets, while less restrictive policies in the field of property rights would facilitate a North-South transfer of drugs, medical equipment and health knowledge. But, as noted, the conditions for the success of such policies are, at the moment, met only in some countries and it is doubtful whether – under the restrictive and asymmetric rules of access dominating the international markets – any further textbook liberalization and globalization would help the developing countries to improve their market position, economic efficiency, equity and health status. For these countries, a selective integration into the world economy, linked to the removal of the major global asymmetries is preferable to destabilizing big-bang globalization policies. Meanwhile, these countries have a genuine interest in strengthening their domestic conditions and institutions that are key for the success of liberalization policies by rekindling efforts in the field of universal access to basic health and education, redistributive policies, infrastructure and macroeconomic policies.

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