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Health in an Age of Globalization

When economists write about globalization, they focus on the movement of goods, people, information, and ideas, and they look at the effects on economic growth, poverty, and inequality. Health is not a primary focus of their attention. By contrast, much of the literature in public health views globalization as a threat to international health. On the relatively few occasions when economists have addressed health, they focus on the indirect effects, arguing that the economic benefits of globalization are good for health—because poverty is the major determinant of health in poor countries—and that if there are unwelcome side effects on health, they can best be dealt with by suitable public health measures, not by policies that slow the globalization process. Both sides of this (mostly non-) argument have substance, and one aim of this paper is to present some of the arguments from the public health literature as seen through the eyes of at least one economist. There is also much to be learned from looking at previous episodes of globalization and at the history of trade and health, and it is with this that I begin.

If it is true that income is the primary determinant of health—at least in poor countries—then the consequences of globalization for public health depend on its well-researched (although still disputed) consequences for economic growth, particularly for the poorest countries. Although the income-to-health mechanism is undoubtedly present—everything is easier with money, and some improvements are impossible without it—I argue that the transmission of health-related knowledge is ultimately more important. Social forces, including not only income but also education and politics, are central because they govern the way in which new knowledge is transformed into population health. The health and

life expectancy of the vast majority of mankind, whether they live in rich or poor countries, depends on ideas, techniques, and therapies developed elsewhere, so that it is the spread of knowledge that is the fundamental determinant of population health. The trade-borne transmission of infectious disease has been the focus of international health authorities since seventeenth-century Italy and remains important today. But, at least since the middle of the last century, a more important influence has been the international transmission of ideas, techniques, and technologies. It is plausible that the recently accelerated pace of globalization has been accompanied by faster transmission of health information between rich countries, although it is probably too soon to be sure. But the current lack of treatment of HIV/AIDS in sub-Saharan Africa, as well as the annual deaths of 10.5 million children in poor countries—which would not have occurred had they been born in rich countries—are major failures of globalization to date.

Health and Globalization in History

Disease has been an unwelcome companion of trade at least since the plague of Athens in 430 B.C. killed perhaps as much as one-third of the population. The black rats, which carried bubonic and pneumonic plague to Europe in 1347, were most likely brought by trading ships. More than three hundred years later, the city-states of northern Italy developed the first systems of national and international public health in an attempt to control recurrent episodes of the disease.[1] Merchants wanted quarantine restrictions to be internationally coordinated to minimize the disruption to their business. Yet even at this early date, health concerns tended to run second to the needs of trade. In 1630–31, when Pistoia (near Florence) had locked its gates to quarantine itself against the encroaching plague and had expelled all foreigners, mountebanks, and Jews, the city was temporarily opened up to all comers to facilitate the export of its wine.[2] And in the trade and health dispute between Florence and Genoa in 1652, quarantines were used to favor domestic over foreign traders as much as to protect public health. At the same time, the fundamentally mistaken notions of how the plague was spread, particularly the overstatement of the risks of person-to-person contagion, and the lack of understanding of the role of rats and fleas led to the imposition of quarantines that did little to hamper the spread of the plague but which sometimes destroyed the livelihood of a trade-dependent city, as in Verona in 1575.[3] This

1. Cippola (1981, 1992).
2. Cipolla (1981, pp. 53–54.).
3. Cipolla (1992, p. 78).

story of policymaking in the face of a mistaken understanding and of bitterly contested quarantines was to be repeated into the twentieth century.[4]

The Pan-American Sanitary Bureau (now PAHO), founded in 1902, was the first of the international public health agencies. As with the public health magistrates in seventeenth-century Italy, the original function was to deal with merchants' dissatisfaction with the lack of international coordination of health measures. Fifty years earlier, in 1851, the first international sanitary conference was held in Europe, as the rising volume of international trade, driven by reductions in costs from better ships and railways, came into conflict with national health measures. Not only had national quarantine measures failed to halt the spread of cholera during the epidemics of the first half of the nineteenth century, but the measures were costly to merchants, who thus sought international coordination.[5] But these concerns did not lead to international health control until the setting up of the World Health Organization in 1948. International public health has always been as much concerned with facilitating trade as with protecting health, and as many writers have noted, when the two come into conflict, as with Pistoia's wine in 1630, or in the dispute between Florence and Genoa in 1652, trade tends to trump health. In perhaps the most extreme example, Britain went to war with China in 1839–42 to open Chinese markets to the import of British opium from India.

Disease followed the movement of people as well as of goods. The decimation and even eradication of the peoples of Central America and Oceania by European germs are well known.[6] In the slave trade between west Africa and the Americas, around a sixth of the victims died during the middle passage, and enough bodies were thrown overboard for sharks to learn to follow the ships.[7] Daron Acemoglu, Simon Johnson and James Robinson argue that patterns of colonization were shaped by the mortality of white imperialists: in places where it was unhealthy for colonists to settle, the imperial powers set up extractive (plantation and mining) regimes for which the health of the native population was of little direct concern.[8] These regimes permanently compromised the development prospects of the countries they affected. The Bengal famine of 1770, in which a third of the population died, did not inspire the East India Company to suspend its tax collection, and Emma Rothschild has argued that this

4. See, for example, Margaret Humphreys (1992) on yellow fever in the southern United States in the late nineteenth century.

5. Fidler (2001).

6. Diamond (1997).

7. Encyclopedia Brittanica, "The Middle Passage" (www.search.eb.com/eb/article?eu=53857 [April 2004]).

8. Acemoglu, Johnson, and Robinson (2001, 2002).

example was very much in the minds of American colonists in the years leading up to the revolution: taxation without representation was a recipe for impoverishment and famine.[9]

Quarantine is used to control the movement of people, as well as of goods. And as was the case for goods, health policy for immigrants and travelers is always affected by other factors. The National Institutes of Health in the United States was set up to research yellow fever and cholera after the first Federal Quarantine Act of 1878. Only federal (or international) agencies can hope to solve the coordination and verification problems that arise when local (or national) authorities have unfettered authority to restrict the movement of goods and people. The U.S. Immigration Act of 1891 excluded those with "loathsome and contagious diseases," but through a process of labeling immigrants and ethnic groups as inherently diseased, the quarantine measures became methods of discrimination and exclusion, even in the absence of threats to public health.[10] While it makes obvious sense for a harbormaster to refuse admission to a ship signaling cholera on board by flying the yellow jack, it is much less clear that U.S. immigration policies that preclude the entry of those with specified diseases (trachoma a century ago; AIDS, tuberculosis, and syphilis now) has had any positive effect on public health. Indeed, Congress, led by Senator Jesse Helms, made AIDS an excludable disease for immigrants in 1987, against the opposition of the then secretary of health and human services. Once again, the public health was subservient to domestic political needs.

Globalization and Health: Arguments from Economics and Public Health

Although several economists have addressed the health consequences of globalization, health is most notable by its absence from even critical discussions of globalization in the economics literature. Bordo, Taylor, and Williamson's edited volume on the history of globalization has no chapter on health, nor does health appear in the index, an absence shared by the terms colonialism and slavery, as noted by Milanovic.[11] The recent report of the World Commission on the Social Dimensions of Globalization, whose membership included globalization critic Joseph Stiglitz, gives only cursory mention to international health, confining its references to HIV/AIDS and TRIPS (trade-related aspects of intellectual property rights).[12] Health is evidently not one of the discontents of globalization. However, the World Bank's 2002 flagship publication

9. Rothschild (2002).
10. Markel and Stern (2002).
11. Bordo, Taylor, and Williamson (2003); Milanovic (2003).
12. World Commission on the Social Dimensions of Globalization (2004).

on globalization lists good health and good healthcare provision, along with education, as essential preconditions for successful globalization, a view that is shared by many of those who are more critical of globalization, such as Andrea Cornia.[13] Indeed, since these conditions are not met in much of the world, including most of Africa, this argument is consistent with the critics' view that globalization is often harmful to health in the poorest countries of the world.

For economists who are broadly in favor of globalization, the story about health runs something as follows. Fischer notes that much of the current disagreement is around the essentially factual question of whether or not human well-being has improved over the past two or three decades.[14] And as he points out, both life expectancy and child mortality have improved dramatically since 1970, with the notable exceptions—particularly after 1990—of sub-Saharan Africa and, to a somewhat lesser extent, the countries of the former Soviet Union and Eastern Europe. That globalization might have had something to do with these improvements comes from the idea that higher incomes promote better health. In the 1980s and 1990s, there was a broad increase in world incomes and a reduction in poverty, both as a fraction of the world's population and in absolute numbers. What happened to income inequality is disputed, but the most favorable view is that there was no relationship between growth and changes in income inequality so that, on average over countries, the growth in incomes of the poor was the same as growth at the mean, so that growth was a powerful engine of poverty reduction.[15] This argument has many problems—the data on inequality are not very good, GDP growth may be overstated, and many of the items that are growing more rapidly neither reach the poor nor are covered in the inequality statistics—but there is little doubt that there has been real poverty reduction in the world as a whole.[16] The link between income and health in poor countries is typically thought to be strong, so that it is entirely plausible that globalization-induced poverty reduction has improved population health.[17]

Even the strongest defenders of globalization note qualifications. Cheaper and faster travel enhances the dangers of the spread of infectious diseases. When travel was by sea, most infectious diseases would pass through the incubation period during the voyage, and the ship could be prevented from landing. But a traveler could go six times around the world during the incubation period of severe acute respiratory syndrome (SARS).[18] The spread of HIV/AIDS was cer-

13. Collier and Dollar (2002). See also Cornia (2001).
14. Fischer (2003).
15. See Dollar and Kraay (2002).
16. See Deaton (2005) for a discussion of these problems,.
17. On the link between income and health, see Preston (1975, 1980); Pritchett and Summers (1996).
18. Alleyne (2003).

tainly accelerated by the ease and volume of modern travel. Yet it is surely not the case that reversing or slowing globalization, even if it were possible, is the appropriate policy response.[19] Indeed, it can be argued that the same speeding up of communications makes the response to disease faster and more effective.[20] Dollar also notes that the international architecture, particularly the World Trade Organization (WTO) and TRIPS agreements, needs to be set up in a way that ensures that the health of the poor is not threatened—for example, by undermining occupational or environmental health.[21]

The literature in the health sciences takes a more negative view of globalization. Some of the difference is that noneconomists take a broad definition of globalization, encompassing not only the international transfer of goods, information, and ideas but also such policies as privatization, user fees, and structural adjustment programs. In much of this literature, globalization is seen not as a voluntary expansion of exchange but as the forced adoption of American models of social and economic arrangements. Even when such models would not be freely chosen, developing countries have little choice in the matter because they have little effective power in the international organizations (such as the World Bank, the International Monetary Fund, and the WTO), which are dominated by western and particularly American interests. Poor countries lack both the financial and human resources that would allow them to be equal participants in the international bodies where decisions are made that affect them and, beyond that, in setting the rules under which the international system operates. Globalization is seen as completing the unfinished business of colonization.[22]

One particular source of (widely shared) concern is the 1995 General Agreement on Trade in Services (GATS), whose (not very clearly defined) provisions can be read as requiring governments to open national health services to international commercial suppliers of health services and health insurance. Indeed, only "*services* provided in the exercise of government authority" are clearly excluded, not those supplied "on a commercial basis, nor in competition with one or more service suppliers."[23] Such provisions may limit the ability of governments to design and operate their own health systems and are seen by many as a threat to public health. Privatization of health services, even if incomes are growing rapidly (and perhaps especially if income growth is rapid), is seen as a threat to the health of the poor, who are typically served (if at all) by public provision. That there are grounds for such concern is illustrated by the much slower

19. Dollar (2001).
20. See in particular the WHO description of its response to severe acute respiratory syndrome (World Health Organization, 2004).
21. Dollar (2001).
22. Labonte (2003).
23. Mattoo (2003).

improvement in population health in China that accompanied the rapid economic growth after the reforms.[24] The assessment of the GATS by Belsky and colleagues suggests that the worst fears may be exaggerated, but the authors acknowledge that there is a great deal of uncertainty about how the agreement will operate.[25] There are also concerns about bilateral trade agreements, particularly between the United States and other countries, in which the interests of the U.S. pharmaceutical companies are strongly represented. Press reports indicate that countries, in exchange for access to American markets, are pressed to impose high local prices for drugs, threatening the health of their own citizens, as well as to restrict reexportation of drugs to the United States, threatening the health of Americans.

The multinational (especially American) pharmaceutical industry is under attack by the opponents of globalization for putting profits ahead of lives. Defenders accuse their critics of willfully misunderstanding the trade-offs involved between funding research and selling drugs, although it is not always clear how much of the basic research was funded by the companies as opposed to U.S. taxpayers through the National Institutes of Health. U.S. trade policy is seen as serving corporate interests, particularly those of the pharmaceutical industry. One acrimonious debate has been over the $15 billion promised by the Bush administration for fighting AIDS and whether these funds may be spent on the cheaper (and likely more effective) antiretroviral drugs manufactured in India. Even so, it is far from clear that the unavailability of patented drugs is the main barrier to population health in poor countries, many of whom have weak health delivery systems that already fail to provide many essential drugs that are not under patent.

Other multinational corporations, particularly in tobacco and food, are also seen as a threat to public health. Smoking began as a luxury for the rich in rich countries, but as the health risks became apparent, it became a habit of the poor in rich countries. Even that is now under threat, as public health legislation, lawsuits, and taxation make it more and more difficult to sell tobacco in the west. Consumers in poor countries may be the next safe haven for tobacco, and although WTO rules allow governments to control tobacco sales, provided they do not discriminate between domestic and foreign brands, some countries worry that their ability to regulate is no match for well-funded international corporations. Food companies are also seen as a threat, and the WHO and writers in the public health literature emphasize the growing "epidemic" of obesity in poor countries, noting that Africa is now the only continent in which the majority of

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24. Drèze and Sen (2002, chap. 4).
25. Belsky and others (2004).

deaths are from infectious diseases rather than from heart disease and cancer.[26] Of course, the rise in noncommunicable disease is in large part the result of reductions in infectious disease and in child mortality, both of which are entirely positive developments. And some of the increase in obesity comes from the fact that fewer people in poor countries now engage in manual labor. Even in the United States, there is far from general agreement on the causes of recent increases in obesity and what role, if any, has been played by fast food companies.[27]

Antiglobalizers also challenge the economists on their own ground. They question whether globalization has promoted economic growth in general and argue that it has widened income inequalities, both within countries and between them. Contrary to the standard economic model—in which more open trade reduces the return to labor in the labor-scarce north while increasing it in the labor-rich south, thus narrowing the difference between them—they argue that globalization has benefited the rich and hurt the poor in both the north and south, while leaving behind (or making worse off) whole countries that are unable to participate in globalization because they lack geographical access or an educated and healthy population. Such arguments receive some support from a recent economic literature that investigates trade in intermediate goods, or outsourcing, which replaces high-cost but relatively low-skill western workers with highly trained but much cheaper workers in developing countries, particularly India.[28] It is argued that increases in income inequality undermine social cohesion and are bad for population health, not just for those who lose out but also for everyone who lives in a less equal society.[29] The critics note that, overall, health in the south has not improved as rapidly in the 1990s as it did in the 1980s. For example, infant mortality rates in India fell by 30 percent in the 1980s but only by 12.5 percent in the 1990s.[30] Indeed, the rate of decline in child mortality in the 1990s was lower than in the 1980s in all of the WHO regions except the Western Pacific.[31]

The assertion that the income distribution has widened between countries is correct, and many countries have indeed seen widening domestic income inequality. Yet it is also true that because the economies of India and China have grown so rapidly in the 1990s, income distribution among the citizens of the world has become more equal. In any case, there is no evidence that income inequality by itself is a risk to population health.[32] The early (and immensely

26. World Health Organization (2004).
27. See, for example, Cutler, Glaeser, and Shapiro (2003).
28. Feenstra and Hanson (2001); Zhu and Trefler (2001).
29. Wilkinson (1996, 2000); Kawachi, Wilkinson, and Kennedy (1999).
30. Deaton and Drèze (2002).
31. Ahmad, Lopez, and Inoue (2000).
32. Deaton (2003).

influential) cross-country correlations between life expectancy and income inequality published by Wilkinson were driven by flawed measures of inequality and cannot be reproduced with credible data.[33]

Life Expectancy, Incomes, and the Gifts of Globalization

The starting point for any discussion about incomes, health, and knowledge is Samuel Preston's investigation into the changing relationship between life expectancy and GDP.[34] The millennium version of the Preston curve is shown in figure 1, which plots country life expectancy (using circles whose size is proportional to population) against per capita GDP in purchasing power parity dollars. The curve is a nonparametrically fitted regression function, weighted by population. For the current argument, the main feature of this curve is that the slope of life expectancy with respect to income is steep among the poorest countries. While no one would argue that the slope of a regression function is the same as the effect of income on life expectancy, many writers have found it plausible that, at low incomes, income itself is an important (perhaps the most important) determinant of health. Preston himself argued that technical change in private and public health knowledge was more important overall (or about equally important) than changes in income, but he noted that the poorest countries had benefited little from new knowledge, presumably because the implementation and adoption of even inexpensive techniques cannot be done without money.[35] Adequate nutrition is also an important determinant of health in poor countries, and the link between income, food, and nutrition is a direct and obvious one. The same can be said for the construction of clean water supplies and for waste disposal. Such arguments are central to the economists' case that globalization is indirectly good for health, at least in those countries where globalization has increased per capita income.

Figure 2 uses the same data as figure 1 to plot changes in life expectancy from 1960 to 2000 against the corresponding average annual rate of growth of GDP in real purchasing power parity dollars. The relationship here is much weaker, and the positive slope depends almost entirely on China (an unweighted regression has an insignificant slope that is only one-fifth of the size), whose increase in life expectancy since 1960 reflects not only genuine new progress but also that 1960 was a year of crisis mortality during the "Great Leap Forward." Between 1970 and 2000, when life expectancy in China increased, not by thirty-four years
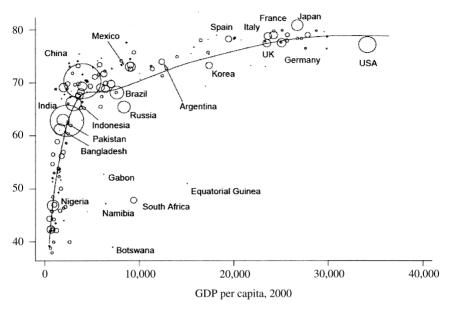
33. Wilkinson (1992); Deaton (2003).
34. Preston (1975).
35. Preston (1980).

Figure 1. The Millennium Preston Curve, 2000[a]

Life expectancy (years)

GDP per capita, 2000

Source: Author's life expectancy calculations are based on *World Development Indicators* (World Bank, 2003), and GDP calculations based on Alan Heston, Robert Summers, and Bettina Aten, "Penn World Table Version 6.1," Center for International Comparisons at the University of Pennsylvania, October 2002 (http://www.pwt.econ.upenn.edu/php_site/pwt_index.php [September 2004]).
a. Circles have diameter proportional to population size. GDP per capita is in current purchasing power parity dollars.

but by only eight and a half years, the worldwide correlation between the growth rate of GDP and the change in life expectancy is only 0.18, and the population-weighted regression corresponding to figure 2 has a slope of 0.2 with a *t* value of only 1.9. Both the slope and its significance increase somewhat among the initially poorest countries: for the twenty-six (fifty-eight) countries whose logarithm of real per capita GDP in 1970 was less than 7 (8), the slope is 0.49 (0.32), with a *t* value of 2.1 (2.2). The connection between income and life expectancy at low incomes may be plausible, but even among the initially poorest countries, differences in income growth explain less than a sixth of the variance in improvements in life expectancy, and even an increase in the thirty-year growth rate by 2 percent a year would add only one year to life expectancy. Thus, even if it were accepted that globalization increases growth rates under suitable conditions, this is a weak channel through which globalization might improve health. Of course, the argument works the other way, too. If globalization has
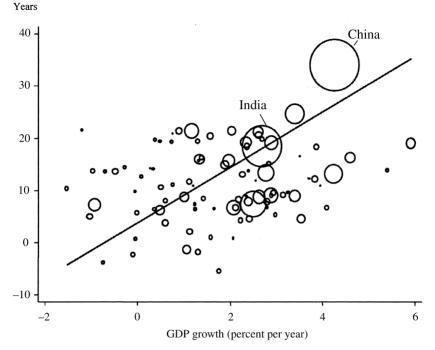
Figure 2. Change in Life Expectancy and GDP Growth, 1960–2000[a]

Years

Source: See figure 1.

a. Circles have diameter proportional to population size. The life expectancy gain in China, which is the largest circle, is artificially inflated by the famine conditions in 1960.

indeed impoverished some countries, the effect on their population health has also likely been modest.

The weak relationship between growth and gains in life expectancy calls for discussion. It simply defies belief that the low levels of life expectancy on the left of the Preston curve in figure 1 have nothing to do with poverty. Therefore, those countries that have done the most to eliminate poverty over the last forty years should show the greatest gains in life expectancy. Among many economists, including those who believe in the indirect health benefits of globalization, that this relationship holds is taken as proven fact, and the citation most frequently given is Pritchett and Summers's aptly titled paper "Wealthier Is Healthier." Yet Pritchett and Summers, although they use a different selection of data and a shorter time period, find exactly the same result as here, that changes in life expectancy are insignificantly related to changes in real income.[36] The finding of

36. Pritchett and Summers (1996).

their title comes from the relationship between income and infant (or child) mortality, not life expectancy. As they point out, estimates of life expectancy for a good number of countries are derived from measures of infant and child mortality (though this is less so now, given the importance of HIV/AIDS), which makes it surprising that the relationships with income would be so different. The tracking down of these discrepancies is an important task, but one beyond the scope of this paper.

The literature on mortality decline in poor countries provides many clues toward resolving the conflict between the strong effects of income in figure 1 and the weak or absent effects in figure 2. While income makes many things possible in the long run, the more important proximate determinants of mortality decline are clean water, health systems—adequately financed and operated— and basic sanitary knowledge. The provision of the last two has much to do with education, particularly the education of women, and all seem to depend on the active participation of the population in health matters.[37] To this "integrated" route to mortality decline, many would add the "vertical" and externally driven (by the WHO and other international agencies) disease eradication campaigns against malaria, smallpox, river blindness, and polio, as well as the later campaigns for immunization, breast-feeding, growth monitoring, and oral rehydration therapy. All of these routes to mortality decline have been effective—and sometimes have been so in the absence of economic growth. In some cases, as in China after the economic reforms, growth may actually hinder progress, at least for a time. Yet it is hard to imagine many of these programs being sustained in the long run in the absence of growth, if only because education and health are themselves the foundations of higher incomes in the future. Indeed, Drèze and Sen argue that it is unlikely that postreform growth in China could have occurred without the health and literacy achievements that preceded it. More broadly, the WHO Commission on Macroeconomics and Health has recently emphasized the economic benefits that are to be expected from improvements in health.[38] While the statistical analysis to support this picture largely remains to be done, it is consistent with the evidence in both figures 1 and 2.

I now turn to the distributions of growth and increases in life expectancy over countries. The first panel of table 1 shows the changes in life expectancy by decade, starting in 1960. Even if China is excluded between 1960 and 1970, the rate of improvement of life expectancy was declining throughout the period. To some extent, this is a consequence of the population health reversals during the last decade in sub-Saharan Africa and in Eastern Europe and the countries of the

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37. See, in particular, Caldwell (1986, 1991); Drèze and Sen (2002).
38. World Health Organization (2001).

Table 1. Change in Life Expectancy and Growth Rates of GDP per capita and of Full Income, by Region and Decade[a]
Units as indicated

	All	East Asia and Pacific	South Asia	Sub-Saharan Africa	Latin America and Caribbean	Middle East and North Africa	Eastern Europe and Central Asia	North America and Western Europe
Change in life expectancy (years)								
1960–70	8.4	18.0	5.0	4.0	4.1	5.3	2.1	1.5
1970–80	3.9	5.1	4.7	3.4	4.1	5.8	−0.9	2.5
1980–90	2.7	2.8	4.9	2.4	3.3	6.1	1.4	2.1
1990–2000	1.2	1.8	3.9	−3.5	2.4	3.5	−1.5	1.9
Growth rate of real GDP per capita (percent per year)								
1960–70	3.1	4.9	2.2	1.8	2.8	4.7	n.a.	3.4
1970–80	2.0	2.9	0.7	0.4	3.0	1.1	n.a.	2.5
1980–90	1.7	3.4	3.6	−0.5	−0.8	0.5	n.a.	2.1
1990–2000	2.2	3.9	3.5	−0.3	1.9	2.4	−1.8	2.0
Growth rate of real GDP per capita x life expectancy (percent per year)								
1960–70	4.8	8.6	5.0	3.9	3.5	5.7	n.a.	1.6
1970–80	2.6	3.7	4.8	3.4	3.7	2.0	n.a.	2.5
1980–90	2.1	3.8	4.9	2.4	−0.2	1.5	n.a.	2.0
1990–2000	2.5	4.2	4.0	−4.0	2.2	3.0	−2.1	1.8

Source: *World Development Indicators* (World Bank, 2003); Alan Heston, Robert Summers, and Bettina Aten, "Penn World Table Version 6.1," Center for International Comparisons at the University of Pennsylvania, October 2002 (www.pwt.econ.upenn.edu/php_site/pwt_index.php [September 2004]).

a. Life expectancy from *World Development Indicators*, population weighted by year for all countries available in 1960, 1970, 1980, 1990, and 2000, and changes calculated on a regional basis. GDP is real chain-weighted gross domestic product per capita from the Penn World Table (PWT) and is also population weighted. The last two panels are calculated only for those countries with nonmissing values for both life expectancy and PWT GDP. There are 106 such countries in 1960, 110 in 1970, 115 in 1980, and 131 in 1990 and 2000. The life expectancy values in the first panel use data from 161 countries in 1960, 162 in 1970, 173 in 1980, 188 in 1990, and 191 in 2000. n.a., Not available.
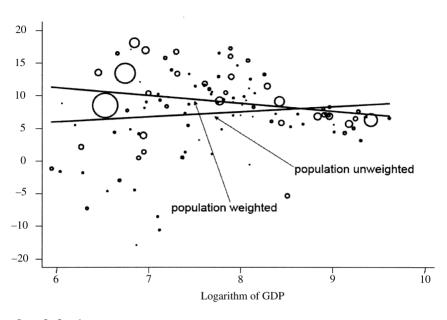
Figure 3. Change in Life Expectancy, 1970–2000, versus per capita GDP, 1960[a]

Years gained

Source: See figure 1.
a. GDP is in real per capita purchasing power parity.

former Soviet Union. But life expectancy rose less rapidly in the 1990s than in the 1980s, even though per capita growth rates were typically higher. In poor countries not affected by HIV/AIDS, this slowdown comes from a virtually worldwide reduction in the rate of decline in child mortality rates.

The second panel presents the data on growth rates of GDP. World growth rates were higher in the 1990s than in the 1980s, a result that is driven by Asia, the Middle East and North Africa, and Latin America, which partially recovered from negative growth in the 1980s. Notable exceptions to the pattern are sub-Saharan Africa and Eastern Europe. One simple way of looking at both health and income together is to multiply income per capita by the number of years that a newborn can expect to receive it; the growth rates of this product are presented in the final panel. The behavior of this more comprehensive measure is similar to that of real income. Sub-Saharan Africa does much better in the 1960s and 1970s because there were substantial reductions in child mortality in spite of weak or nonexistent economic growth, and does much worse in the 1980s and 1990s because of HIV/AIDS. In Asia, strong economic growth has been accom-

Figure 4. Change in Life Expectancy, 1970–2000, versus Life Expectancy in 1960

Years gained

Source: See figure 1.

panied by substantial reductions in mortality, and the growth of the compound measure has been consistently high.

The relationship between income and health is further explored in figures 3 and 4. As is often the case with international comparisons, results depend on whether countries are treated as single points, with each country treated as a unit, as is appropriate when looking at the effects of policies of which there is one per country, or whether countries are weighted by population, as is required for welfare calculations where people, not countries, are the concern. Figure 3 shows that the improvement in life expectancy between 1970 and 2000 was greater for *people* living in countries with lower GDP in 1960 (the weighted line) but was lower for *countries* with lower GDP in 1960 (the unweighted line). In figure 4, for both countries and people, the gain in life expectancy from 1970 to 2000 was greater for those whose life expectancy was lower in 1960. In the bottom left of both figures, the countries that show a fall in life expectancy are mostly in sub-Saharan Africa, and without them and the effects of HIV/AIDS, both relationships would have been stronger. I have drawn figure 4 with 1960 on the x-axis, in order to avoid a spurious negative slope from measurement error (or white noise) in life expectancy estimates. Another way to do the same thing is to regress the change in life expectancy from 1970 to 2000 on life expectancy

in 1970, using life expectancy in 1960 as an instrument. It is also possible to look at the joint effect of base ln(GDP) and life expectancy simultaneously, but both become individually (although not jointly) significant. The data cannot support estimates of their separate effects.

That the least healthy countries have seen the largest increases in life expectancy does not necessarily imply that international inequality in life expectancy is decreasing. However, table 2 shows that inequality has, in fact, fallen. Between 1960 and 2000, when the population-weighted average of life expectancy at birth rose from forty-nine years (heavily affected by China) to sixty-seven, the standard deviation of life expectancy across countries fell from 12.8 to 11.1 years in 1990, rising to 12.0 in 2000 as a consequence of HIV/AIDS in Africa. Across people the decline in inequality is even more dramatic, from 12.9 to 8.1 in 1990, rising only to 8.7 years in 2000. Both sets of numbers ignore the within-country component of dispersion in life expectancy at birth, and the population-weighted numbers are heavily affected by India and China and downplay the African experience. As the next two columns show, the behavior of the cross-country dispersion of per capita GDP is quite different from that of life expectancy. Convergence, if it takes place at all, is much weaker. With each country as a unit, the variance of logs of GDP has been increasing, and there is no convergence in GDP per capita, even in logarithms. This is the "increasing inequality between countries" that is emphasized in the public health literature. By contrast, once countries are weighted by population, the standard deviation of log GDP declined from 1980 to 2000. Because I ignore inequality within countries, which has been increasing in many instances (including India and China), these figures overstate the decline in interpersonal inequality. But because the between-country component contributes more to overall inequality than does the within-country component, overall inequality in the world has been improving.[39] As has been widely recognized, rapid progress in India and China since 1980 is driving much of this result.

In a recent paper, Becker, Philipson, and Soares have argued that changes in income should be combined with the changes in life expectancy to give a more comprehensive ("full income") measure of well-being, and that once this is done, the divergence in per capita incomes across countries turns into convergence in full income.[40] Their calculations use values of additional life years from Viscusi and Aldy's international compendium of market-based estimates and also include a calculation of the utility gain from the increased opportunities for intertemporal substitution associated with longer life.[41] A cruder (albeit simpler)

39. See, for example, Bourguignon and Morrisson (2002).
40. Becker, Philipson, and Soares (2003).
41. Viscusi and Aldy (2003).

Table 2. Convergence and Divergence in Life Expectancy and GDP per Capita[a]
Units as indicated

| | | *Life expectancy (years)* | | *ln(GDP per capita)* | | *ln(GDP per capita x life expectancy)* | |
| | *Mean* | *Standard deviation* | | *Standard deviation* | | *Standard deviation* | |
Decade	*Weighted*	*Weighted*	*Unweighted*	*Weighted*	*Unweighted*	*Weighted*	*Unweighted*
1960	49.0	12.9	12.8	1.03	0.90	1.26	1.11
1970	58.3	9.4	12.0	1.09	0.98	1.20	1.17
1980	62.2	8.9	11.5	1.10	1.03	1.20	1.20
1990	65.2	8.1	11.1	1.02	1.10	1.12	1.26
2000	66.9	8.7	12.0	0.95	1.11	1.07	1.29

Source: See table 1.
a. Calculated for those countries for which both sets of values are available: life expectancy from *World Development Indicators 2003*, and real purchasing power parity chain-weighted per capita GDP from the Penn World Table. There are 106 countries in 1960, 110 in 1970, 115 in 1980, and 131 in 1990 and 2000. All weighted statistics are weighted by population in the relevant year, including life expectancy at birth.

calculation comes from ignoring the value of intertemporal substitution and looking at the measure used in the last panel of table 1, the product of life expectancy and per capita GDP. As is the case for income per capita, dispersion in the logarithm of this approximation to full income has been increasing, while dispersion over people has been decreasing. Because the gain in life expectancy adds more to the growth in full income in the poorest countries, the reduction in dispersion over people of (log) full income is a good deal more marked than that in per capita income.

The increase in health and full income in the poorest countries—in Latin America and Africa in the 1970s and 1980s and in Asia since 1960—represents a large increase in well-being. And these gains followed even faster gains in many poor countries in the decade immediately after the Second World War, an issue to which I shall return.[42] While it is unlikely that much of the health gains came from growth in income, let alone from globalization-induced growth in income, globalization in the broader sense has much to do with them. A substantial fraction of health gains in poor countries is generated by the transfer from rich countries of knowledge about vaccines, about antibiotics, and ultimately about the germ theory of disease, all of which was originally discovered or formulated in the (now) rich countries. In this sense, the first world has been responsible for producing the global public goods of medical and health-related research and development, from which everyone has benefited, in poor and now-rich countries alike. Of course, not all of the gains are pure gifts from North to South; many cannot be implemented without substantial investments in education and physical infrastructure, nor without a sometimes lengthy process by

42. See Gwatkin (1980).

which new information and ways of doing things are absorbed into the population as a whole.

There is also a serious question as to whether "full income" or life expectancy does not overstate, or at least seriously mismeasure, the true welfare gains in poor countries. The estimates of the value of life are computed from a conceptual experiment in which adults reveal their willingness to pay for a reduction in the risk of dying. Even if one accepts that such measures of the value of risk reduction can be legitimately converted, using expected utility theory, into the value of extending life, it still does not necessarily follow that these measures can be used to assess the value of reductions in infant and child mortality which, until the advent of HIV/AIDS, was the main force driving changes in life expectancy in poor countries.

To illustrate, suppose that in the initial situation, half of all children die at or immediately after birth, while those who do not die live until they are sixty, so that life expectancy is thirty years. Then immunization, oral rehydration therapy, and antibiotics are introduced, and the water supply is cleaned up, after which only one quarter of children die, so that life expectancy rises by fifteen years to forty-five. Using my approximation to full income, everyone gets an additional fifteen years, each of which is valued at per capita annual GDP. But this is hardly the end of the story. In the initial situation, women had many children, knowing that many would die. In a healthier world, they will have fewer. Suppose, after a possibly long transition, the total fertility rate is reduced from six to four, so that each woman has exactly the same number of children (three) who survive beyond birth. Once this new equilibrium has been established, both the size and the age-structure of the population are exactly the same as they were before the health innovations.

It is clear that, in this situation, the increase in welfare is not correctly assessed by valuing the additional life expectancy at per capita GDP or any other income-based number. Indeed, given that there are exactly the same number of people as before, enjoying (by assumption) the same level of lifetime income, it would be tempting to conclude that welfare has not changed. But that would miss the gain to the mothers, who now bear fewer children in order to have the same number of surviving offspring, whose own health is improved, who have wider opportunities to do other things, and who are (at least in part) spared the agony of watching their children die. But there is no reason to suppose that these gains to the mothers are related to the increased life expectancy at birth of their infants. (Although the mothers themselves are likely to live longer.) What about the value of the lives of the children who are saved? One possibility is to count, as a welfare gain, the sixty years of life for the quarter of children who would

have died but now survive. This would be one additional sixty-year lifespan for each mother. But if one counts these lives, one must also subtract the value of the equal number of lives that would have been but which are now not lived because their mothers choose not to give birth to those who would have lived them.[43] There are two babies per mother who would not have been born, one of whom would have survived and whose lost lifespan needs to be offset against that of the born child who survives. Either way, one reaches the same result, which is that the only gain, and certainly the most important one, is the better lives lived by the mothers.

Globalization and the Determinants of Health

It is hard to think about the relationship between globalization and health without examining the determinants of the long-term worldwide decline in mortality rates. If income is the primary determinant of mortality decline, then the globalization and health question depends on the familiar argument about the effects of globalization on income, on which I have nothing new to say. But as argued above, growth in income is not strongly predictive of declines in mortality, and the finding here is consistent with other evidence, both econometric and historical, that the transmission of health knowledge and technology is at least as important as changes in income.[44]

Another possible argument, following the arguments of Richard Wilkinson, is that mortality in rich countries is primarily determined not by income but by income inequality, so that the effect of globalization on rich-country health depends on the effects of globalization on rich-country income inequality.[45] Like its effects on income, the effects of globalization on income inequality are well debated. But even if one accepts the argument that, at least in some rich countries, some of the increase in income inequality has come from globalization, there is no good evidence that national mortality rates are affected by national income inequality.[46] The possible exception is infant mortality rates, where low income still has an effect, even in rich countries, so that at a given level of income per head, more income inequality means more poverty and higher infant mortality.[47]

43. Broome (2002).
44. For the former, see Jamison, Sandbu, and Wang (2001); for the latter, Easterlin (1996, 1999), Preston (1975, 1980, 1996), and Mokyr (2002).
45. Wilkinson (1992, 1996, 2000).
46. Deaton (2003).
47. See Judge, Mulligan, and Benzeval (1998).

Perhaps the most promising line of enquiry is one that considers the effects of globalization on the transmission of health knowledge and health technology. Lowering the costs of trade will speed the rate at which new therapies, having been proved effective in one country, are installed in another. This might be important for such health-benefiting items as neonatal intensive care units, kidney dialysis equipment, screening equipment, and cardiac units, for example, as well as for earlier and lower technology interventions in poor countries, all of which have been connected with declining mortality. Similarly, cheaper and more rapid telecommunication, through international television transmission and the Internet, will speed up the dissemination of information about the health consequences of smoking, exercise, or the use of salt, for example, as well as about inexpensive medical procedures, such as the use of beta-blockers or aspirin in the treatment of heart attacks. While these ideas do not change health without being incorporated into behavior, institutions, and access, processes that sometimes take time, there remains a presumption that cheaper and faster information flows will enhance the speed at which health knowledge is transmitted.

These transmission effects, if they are important, will show up in the data in two ways. First, international movements in health indicators, particularly mortality rates, should be more closely coordinated than once was the case, particularly for causes of death where health technology and knowledge are relevant. Second, as emphasized by Easterlin, there will be pressure for mortality rates to converge across countries.[48] In the simplest case, a new technique is introduced in one place so that the relevant mortality rate falls, followed by similar falls elsewhere. If the transmission of ideas or technology is delayed or prevented, mortality rates can diverge, and initially similar mortality rates may become widely dispersed, at least for a while. And if there is a stream of new therapies, with some places adopting more rapidly than others, there will be a variable gap between leaders and followers, albeit with mortality rates falling everywhere. Matters are complicated further if disease depends in part on cumulative exposure, as in the link between smoking and cancer.

That transmission of technology is important was previously argued by Deaton and Paxson, who compared the time-series evidence on age-specific mortality rates for males and females between the United States and the United Kingdom.[49] Although mortality rates are higher in the United States until about age sixty, their evidence showed that changes in mortality trends for infants and for middle-aged men and women tended to show up in the United States about four years before a similar appearance in the United Kingdom. Although tech-

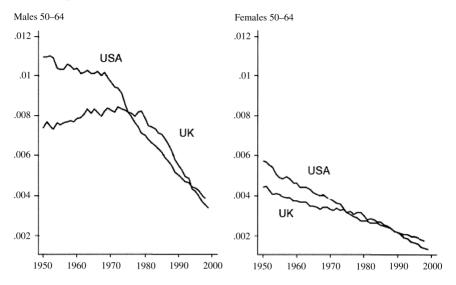48. Easterlin (1996).
49. Deaton and Paxson (2004).

Figure 5. Age-Adjusted Mortality Rates from Cardiovascular Disease, United States and United Kingdom, 1950–2000

Males 50–64   Females 50–64

Source: Author's calculations based on World Health Organization mortality database.

niques are not necessarily invented in the United States, the competitive and for-profit healthcare system allows their speedier introduction than in the government-controlled and less well funded British system.[50] Hence, if new technologies such as neonatal intensive care units, cardiac bypass grafts, beta-blockers, and catheterization do actually save lives, one would observe this pattern of lags in mortality rates. Of course, none of this rules out alternative explanations, such as the spread of infectious disease (AIDS mortality shows a similar pattern of the United States, leading the United Kingdom in mortality increase) or the prevalence of health-related behaviors, particularly smoking.

Figure 5 refines the all-cause mortality plots used by Deaton and Paxson by focusing on cardiovascular disease for males and females aged fifty to sixty-four from 1950 to 2000 for the United States and Britain.[51] This cause of death is one where technical progress has arguably had the greatest impact. For males, the patterns are the same in both countries, with mortality relatively flat or rising in the early years and then declining thereafter, by a half or more in both countries. However, the decline in mortality in the United States starts around 1970, which appears to be before the new techniques were available, but not until a decade

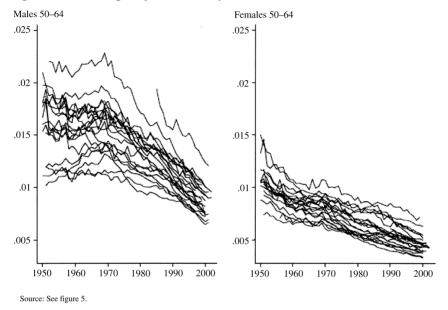50. See, for example, Aaron and Schwartz (1984).
51. Deaton and Paxson (2004).

Figure 6. All-Cause Age-Adjusted Mortality Rates, OECD Countries, 1950–2000

Source: See figure 5.

later in Britain, a substantially longer lag than the four years in all-cause mortality. The pattern for women, if it exists at all, is much less pronounced. For both men and women, these mortality rates are essentially the same by the end of the century. While the acceleration in mortality decline in Britain after 1980 is apparent, there is no obvious sustained change in the United States. Of course, there are other factors affecting mortality, of which likely the most important is smoking. However, patterns of tobacco use were similar in the two countries over the two periods. In the 1950s, both American and British men were much more likely to be smokers than women. While the prevalence of smoking among men declined throughout the period, that among women increased until the mid-1970s, achieving parity with men in Britain and close to it in the United States. Thereafter, the prevalence of smoking declines in parallel for both men and women. Smoking is a risk factor for heart disease, although, unlike lung cancer, the risk is thought to be reduced or eliminated immediately after quitting. In consequence, these patterns of smoking do little to explain the differences in male-female mortality from cardiovascular disease, nor do they offer an alternative to the technology explanation for the increase in the rate of mortality decline.
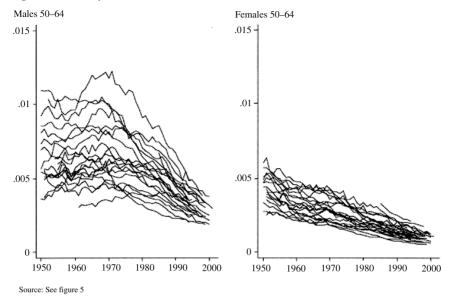
Figure 7. Mortality Rates from Cardiovascular Disease, OECD Countries, 1950–2000

Males 50–64

Females 50–64

Source: See figure 5

Figure 6 shows all-cause mortality for the countries in the Organization for Economic Cooperation and Development (OECD). Once again, there are the characteristic patterns of health transmission among males but not among females. The patterns of mortality decline are strongly correlated across countries, and beyond that, there is increasing convergence of rates for males but not females. In 1950 mortality rates for men in this age group ranged from 1 percent to more than 2 percent. By 2000, and with the exception of latecomer Korea, the rates cluster between 0.8 and 1.3 percent. Figure 7 shows the same plots but for mortality from cardiovascular disease alone. Because this is such a large share of total mortality, it shows that much of the convergence in mortality rates is driven by what has been happening to cardiovascular mortality. Unlike the case of all-cause mortality, there is evidence of convergence and of some acceleration in the rate of mortality decline among women as well as among men.

These patterns can be reconciled with reference to international patterns of smoking. Figure 8, taken from the International Mortality and Smoking Statistics database, shows survey-based estimates of prevalence rates of smoking (of manufactured cigarettes) for five-year periods from 1951 to 1995.[52] These figures are age-adjusted by applying five-year, age-specific prevalence to a standard

52. P. N. Lee Statistics and Computing, "IMASS: International Mortality and Smoking Statistics" (www.pnlee.co.uk/imass.htm [September 2004]). See also Forey and others (2002).
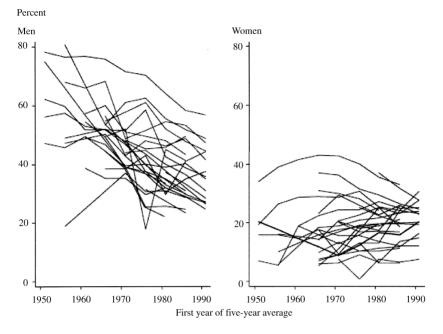
Figure 8. Smoking Prevalence Rates, OECD Countries, 1950–95

Percent

First year of five-year average

European population. It is clear that different countries have responded very differently to the common knowledge about the health risks of smoking. Almost everywhere at the beginning of the period, men were more likely than women to smoke, and almost everywhere the differential narrowed between 1950 and 2000. In most OECD countries, although not all, there has been a consistent, long-term decline in the prevalence of smoking among men. In some countries, particularly the English-speaking countries—the United States, Canada, Britain, New Zealand, Australia, and Ireland—the prevalence of cigarette smoking was falling for both men and women well before the end of the century. However, for much of the rest of Europe, the fraction of women smoking is still rising in the latest surveys, and there are some countries, particularly in Eastern Europe, where prevalence continues to rise for both men and women. Overall, smoking prevalence is generally declining for men, and there is some international narrowing in the dispersion of rates. For women, by contrast, there is no general decline in prevalence and little convergence.

These smoking patterns have clear counterparts in international patterns of mortality from lung cancer, which are shown in figure 9. For men, lung cancer
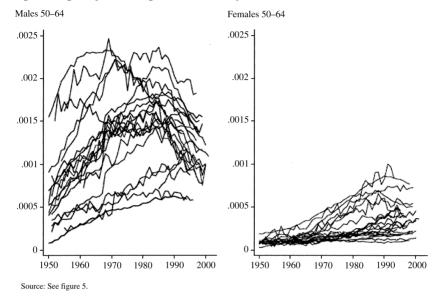
Figure 9. Age-Adjusted Lung Cancer Mortality Rates, OECD Countries, 1950–2000

Males 50–64   Females 50–64

Source: See figure 5.

mortality rates rose for most of the period, and international rates diverged along with international smoking patterns, but by the late 1980s, mortality rates were declining in many countries and beginning to converge. Among women, lung cancer mortality, like the prevalence of smoking, started from much lower levels than for men but is still rising and diverging in most countries, although the beginnings of a decline can be seen in some. These lung cancer mortality rates are only a fraction of the mortality rates from cardiovascular disease—only a fifth for men and less for women—and cigarettes are likely responsible for more deaths through heart than lung disease. But taking both together, it is clear that, at least after the mid-1970s, therapeutic improvements have been working together with changes in behavior for men but largely against one another for women. (Note that there has been little or no progress in the treatment of lung cancer.) And because the smoking behavior of women differs so much from country to country, with no convergence, the convergence in mortality that is so clear among men is not seen among women. Note, too, that an "all smoking" explanation is insufficient, if only because of the (albeit limited) progress and convergence in female mortality, in spite of the lack of a general decline in smoking and a divergence in its prevalence. Nor is there overall any sharp decline in the prevalence of smoking among men around 1970–80 that would explain the marked acceleration in the rate of mortality decline, in general, and for cardiovascular disease in particular.

Conclusion

The health of nations is as globally interdependent now as it has been in the past. In the first wave of globalization, in the form of colonization, the transmission of disease to populations with no immunity played a central role, not only in the decimation of peoples but in the conquest of the New World by the Old. Later in the colonization era, patterns of settlement and exploitation, including who colonized whom, and what mode of colonization and exploitation resulted, depended on the ability of potential settlers and colonizers to deal with the burden of local disease. The movement of people propagated, and was conditioned by, the patterns of disease. Today, the health of most people in the world, in rich as well as poor countries, depends on their ability to locally adopt health knowledge and health technologies that have been discovered and developed elsewhere.

In the middle of the twentieth century, child mortality rates, and with them life expectancy, improved throughout poor countries. Gwatkin labels this as the third of three great waves of mortality decline.[53] The first, starting at the end of the nineteenth century, began in North and Western Europe and was quickly transmitted to the United States. The second wave, beginning in the 1920s, was in South and Eastern Europe, and the rate of gain in life expectancy was even more rapid than in the first wave, with some countries showing increases in life expectancy of more than half a year per year over a decade or more. Because this second wave had the experience and knowledge of the first to draw on, it could be more rapid, and by the middle of the twentieth century, life expectancies in the south and east of Europe were close to those in the north and west. Gwatkin's third great wave was in the poor countries, and it began in earnest after the Second World War, greatly aided by international public health efforts, particularly by the WHO and the United Nations Children's Fund. In some countries, the increase in life expectancy was greater than a year per year and in a few cases, such as Mauritius and Sri Lanka, greater than two years per year.

Again, much of the progress came from applying the knowledge gained in the earlier waves. As Preston writes: "With the exception of water and sewerage improvements and smallpox vaccination, the techniques of preventative and curative healthcare that have been widely deployed in less developed countries are twentieth-century products. Virtually all were facilitated by the ultimate acceptance of the revelatory germ theory of disease at the turn of the century."[54] Yet there were new tools, too, and much of the most rapid progress in the 1940s and

53. Gwatkin (1980).
54. Preston (1980, p. 304).

1950s came from vector control, particularly DDT spraying against malaria, and from the use of newly developed antibiotics against tuberculosis. Although some of the progress was subsequently reversed, new treatments became available, particularly oral rehydration therapy after 1979, and there were further gains in the coverage of immunization programs. And while gains in income were undoubtedly important for improving nutrition and funding better water and sanitation schemes, some countries made progress in reducing child mortality even in the absence of economic growth, recapitulating the history of health improvements in Europe fifty to seventy-five years before. This wave of health improvement ultimately came from the globalization of knowledge, facilitated by local political, economic, and educational conditions.

More recently, mortality decline among the rich countries of the world has depended on transmission of new knowledge and technology, and in particular, as I have tried to demonstrate above, on diffusion of knowledge about the risks of cigarette smoking and about new techniques for saving the lives of those with cardiovascular disease. Although they may be expensive, medical techniques diffuse more rapidly than changes in behavior, which respond slowly and unevenly to changes in knowledge about risks. Indeed, there are important parallels between the slow changes in smoking habits and the slow adoption of the germ theory of disease into individual behavior almost a century earlier.[55]

Among countries that are not in the richest group, the convergence of health status slowed toward the end of the twentieth century. When one looks at the fifty-to-sixty-year-old group outside of the OECD and redraws the figures on all-cause and cardiovascular mortality rates, the picture is very different. Eastern Europe and the countries of the former Soviet Union show mortality rate increases and divergence, not decreases and convergence. And in Latin America and the Caribbean, the other area that is covered by the WHO mortality statistics, the decline of mortality is much slower, with only very limited evidence of convergence. There is clearly a long way to go before the habits and technology of the rich countries are fully adopted even in middle-income countries.

Among the poorest countries, the gifts of global health have been diminishing or otherwise limited in the 1990s. Declines in child mortality have been less rapid in the 1990s than they were in the 1980s, perhaps because the easy gains were made earlier. Because of the HIV/AIDS epidemic, the gap in life expectancy between Europe and North America, on the one hand, and sub-Saharan Africa, on the other, was greater in 2000 than it was in 1950. If one accepts the argument that health is largely determined by the transfer of technology and knowledge, the current state of mortality from the epidemic in Africa is evi-

55. Tomes (1998).

dence of the failure of globalization to transfer effective antiretroviral drug-based technology and treatment from the rich countries to sub-Saharan Africa. More broadly, there are 10.5 million child deaths each year that are preventable in the sense that those children would not have died had they been born in rich countries.[56] The model in which global public health goods are produced by the rich countries and made available to all has yet to work in this case.

While AIDS is arguably unique, and indeed antiretrovirals are the only important case where drugs listed as "essential medicines" by the WHO are still on patent, it is hardly an exception that can be ignored.[57] From 25 to 28 million people in sub-Saharan Africa are infected with HIV/AIDS, of which 2.2 to 2.4 million are dying each year. Many of these deaths are preventable and could be prevented with adequate resources. People who live in rich countries have full access to the technology that prevents, or at least long postpones, death from AIDS. People who live in poor countries do not. And it is this inequality in outcomes, not only from AIDS, but also from measles, diarrhea, and pneumonia, that fuels much of the anger that is so characteristic of the literature in health. As illustrated earlier, the last half century has seen enormous advances in knowledge that have generated unprecedented declines in mortality among the citizens of the rich countries. These advances will eventually reach the poor of the world so that, in the long run, they too will benefit. But in the meantime, there are appalling inequalities, in which the poor of the world die of AIDS and, more broadly, where poor people around the world die of diseases that are readily preventable elsewhere, including in the first-world hospitals and clinics that serve the rich in poor countries. What is required is not less globalization but more, or at least more globalization of a different kind. Deaths that can be prevented should be, and they will be if faster ways can be found to diffuse first-world health technologies, including the creation of the economic, educational, and political conditions that would permit this to happen.

56. Lopez (2000).
57. Attaran (2004).

Comments
and Discussion

William Jack: Is globalization good for your health? This likely depends crucially on whether globalization increases your income and that of your fellow citizens. But even if it does not make you rich(er), globalization might make you healthier if it facilitates the speedier transfer and adoption of ideas and practices that lead to health improvements.

In his thoughtful review of a broad range of literature, Angus Deaton examines the impact of globalization on health, through a number of links. The first is the direct link that associates a larger volume of trade and interaction among nations with changes in health status. One obvious mechanism here is through the income channel, although this is not the only one. As the author notes, "Everything is easier with money," and staying healthy is no exception, although the link from income to health is a subtle one. With a nod to the notion that unequal societies might be less healthy, the paper examines the idea that globalization could be bad for population health if it leads to an increase in income inequality. Finally, the paper turns to what Deaton seems to consider the main avenue by which globalization can effect health, that is, through the transfer of knowledge and techniques. This represents a kind of globalization of public goods. But it begs the question of how the *provision* of such public goods might be affected when the benefits are spread more diffusely. If freeing up the transmission of knowledge and ideas makes the generation of new ideas less profitable, the full potential benefits of globalization will be realized only if institutions are developed to address the associated free-rider problems inherent in public good provision.

Freeing up the international movement of goods can also make it easier for diseases to be transmitted around the world, as the spread of severe acute

respiratory syndrome (SARS) in 2003 made clear. In fact, Deaton reminds us that trade and health have been historically linked, at least since the institution of quarantine regulations in seventeenth-century Italy.

Another example of the link between trade and changes in health status arises from the general equilibrium effects associated with relative price changes. Opening up trade in goods can lead to a shift in production processes that are accompanied by changes in environmental conditions and occupational choices, with associated changes in health status. Brazilian and Southeast Asian deforestation would be more limited without an international market for hardwoods, and South African mining accidents would likely be much rarer in the absence of the international gold trade.

Deaton recognizes that to noneconomists, globalization often means more than trade liberalization; it encompasses the perceived forced adoption by poor countries of economic policies such as privatization, structural adjustment, user fees, and certain provisions of the General Agreement on Trade in Services. Similarly, some of the critics of globalization see western tobacco companies and fast-food franchises as exporting health-damaging habits to the unsuspecting third world.

If gains from trade manifest themselves in higher average incomes, and if increases in incomes are linked to better health, then globalization can be expected to improve the health status of individuals living in countries that participate in the globalization process. Deaton notes that although average incomes did indeed increase over the 1980s and 1990s, the distribution of incomes within many countries widened, suggesting that some at the bottom of the distribution did not gain from globalization. However, the impressive growth in India and China meant that the distribution of world income actually became more equal.

What do these changes in incomes mean for health status? Money clearly matters in determining nutritional intake (mostly as a function of private expenditures) and for protection from disease (for which the provision of local public goods, such as water and sanitation services, are key determining factors). Both the cross-sectional and time series data suggest the impact of higher income on health status, as measured by life expectancy, is positive, but this effect diminishes at higher income levels: increases in average incomes seem to have a larger impact on health in poorer countries, and yet improvements in life expectancy have fallen off in countries that have nonetheless continued to exhibit positive growth. However, this is surely simply confirmation of the inherent boundedness of the measure of health used, given the current state of scientific knowledge.

What is arguably more intriguing is the finding that while there is a strong positive (though concave) relationship between income and health levels, there is a much more limited link between changes in these variables: *growth* in average incomes over a forty-year period from 1960 is only weakly associated with *improvements* in life expectancy. Deaton proposes that this puzzle can be resolved by examining more closely the proximate causes of mortality decline. He observes that while income growth is important in the long run (which is apparently longer than forty years), it is clean water, health systems, and sanitary knowledge that help save lives, and these have as much or more to do with education (particularly of women) and participation as they do with income growth. In addition, externally driven (by the World Health Organization, for example) disease eradication programs (against polio, for instance) and health awareness campaigns (such as breastfeeding) have probably improved life expectancy.

That income growth and improvements in life expectancy are not closely related is consistent with the targeting of international health campaigns to slow-growing countries or, more weakly, with their universal provision. But it is less obvious that educational attainments should be similarly uncorrelated with income growth since, as the author notes, "education and health are themselves the foundations of higher incomes in the future."

On the subject of inequality, Deaton presents compelling evidence that health status, as measured by life expectancy, has converged both across countries and, ignoring within-country inequality, across people over the last forty years. However, there is little evidence that per capita GDP has converged in a similar fashion. In fact, incomes have diverged across countries, but due to growth in India and China, they have weakly converged across people. This finding is consistent with the author's earlier work showing that there is no evidence that national mortality rates are directly affected by national income inequality.[1] He notes, however, that a negative correlation between inequality and average health status is more likely to arise at low average incomes because inequality is then collinear with poverty.

The empirical evidence on the relationships between the level of and changes to income and life expectancy supports the proposition that the transfer of ideas and techniques to poor countries has played a significant role in the global evolution of health status. In his discussion on globalization and the determinants of health, Deaton explores in detail the dynamics of mortality due to cardiovascular and lung disease in the United States and the United Kingdom. In brief, this analysis highlights the importance, on the one hand, of the transfer of

1. Deaton (2003).

technology and surgical techniques and, on the other hand, of behavioral norms (such as smoking) in determining health trends. The implication is that just as disease-specific mortality rates in these two rich countries have responded to the acquisition and adoption of new technologies, so too the health of people in the developing world has improved and will continue to improve with the transfer of technologies and ideas.

In poor countries, knowledge of how to avoid some of the main causes of death and illness is probably widespread—if not among all individuals, then certainly among public officials. For example, the benefits of clean water are arguably well understood by officials in ministries of planning, health, and the like, and technologies surely exist to improve water quality. Low incomes, credit market constraints, and possibly coordination problems associated with collective action hold these countries back from making use of such technologies. Is this a problem then of a lack of technology transfer from rich countries to poor, or is it a problem of poverty? Of course, water treatment plants could be donated to poor countries, but they are unaffordable when sold at marginal cost.

Other diseases that place high burdens on people in developing countries, such as malaria, are less easily avoided or controlled. In this case, the absence of the relevant technology—for example, a vaccine—holds back health improvements.[2] Again, one could characterize this as a case of inadequate technology transfer, assuming there is a vaccine out there somewhere waiting to be discovered (by scientists in rich countries). But one should remember that in some (parts of some) now-rich countries, malaria was once endemic, and it is tempting to say that getting richer was what made them malaria free.

Finally, consider the case of HIV/AIDS. Rich countries have controlled the spread of this disease and reduced its negative health effects through behavioral change and drug therapies, respectively. In some countries, particularly in Africa, behavioral change has been slow to occur, perhaps in spite of the efforts of rich countries to transfer the relevant information. On the other hand, the technology embodied in antiretroviral drugs has not been transferred to an extent that would allow its widespread use. The marginal cost of this technology is, of course, close to zero (unlike that of a water treatment plant), but the unwillingness of rich countries to finance research and development incentives through mechanisms other than patent protection extended to poor countries holds back the use of antiretroviral technology. This point allows me to finish by concurring strongly with Deaton's final sentiment, that "what is required is not less

2. Antimalarial drugs clearly help, but they require informed individual action and, in any case, are not free.

globalization but more, or at least more globalization of a different kind." For example, some elements of trade-related aspects of intellectual property rights (TRIPS) in fact impede the free flow of ideas and techniques across countries, as a means of ensuring profitable returns to innovation. But rewards for innovation can be provided in other ways that would facilitate a greater flow of health technologies to poor countries and bring about a corresponding improvement in health outcomes.

Gary Burtless: What is the impact of globalization on health? Angus Deaton summarizes the views of two kinds of people who write or opine about this question. First are the international and development economists, or if you prefer, the apologists for Coca-Cola capitalism, third world sweatshops, and immiseration of the world's poor. Second are the health scientists and leaders of nongovernmental organizations who view globalization from the perspective of public health. Most folks in the latter group are innocent of any first-hand contact with Economics 101.

In the first camp are conventional economists who interpret globalization from the narrow perspective of comparative advantage. For these folks, globalization is another word for the cross-border integration of markets—including those for goods, services, capital investment, intellectual property, and possibly labor. If exchange between parties is perfectly free and uncoerced, economists have long claimed that the joint value of what is produced is greater when exchange barriers are lifted compared with a world in which there are tariffs or other obstacles to trade at international borders. According to this view, the process of cross-border economic integration must improve potential consumption (and income) among trading partners after exchange barriers are removed. If higher income and consumption causes health to improve, which seems plausible, then economic integration must also contribute to improvements in population health.

The public health view of globalization is different. As described by Deaton, it places little stress on the removal of trade barriers. Instead, it emphasizes the political economy reforms that are supposedly forced on poor and middle-income countries to enable them to participate in a world trading system organized for the benefit of rich capitalist countries. Whereas trade economists interpret liberalization to mean policies that eliminate trade and capital barriers at international borders, public health advocates consider the domestic policy changes that third world governments are obliged to accept in order to become full-fledged members of the International Monetary Fund–World Bank–Davos club of nations.
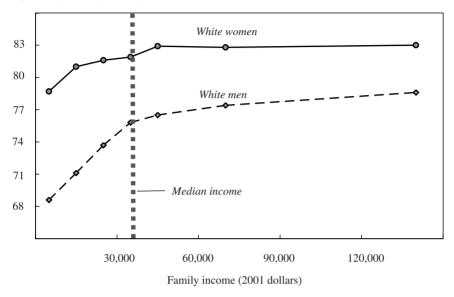
**Figure 1. Expected Age at Death among White Americans Who Survive to
Age Twenty-five, by Family Income[a]**

Source: Rogot, Sorlie, and Johnson (1992).
a. Based on 1979–85 mortality experience.

If the two sides to this debate do not share a common understanding of the word "globalization," they are unlikely to agree on what evidence would allow us to decide whether globalization has been good or bad for population health.

I confess to being a conventional economist and a published defender of globalization as narrowly construed. For me, the debate over the impact of globalization on health hinges on two questions:

—Has closer economic integration improved incomes in countries that have below-world-average incomes?

—Has it improved the incomes of people with below-national-average incomes in both rich and poor countries?

The reason I believe these two questions are important is that I think higher income contributes to better health, especially for people who have below-average income. Figures 1 and 2 in Deaton's paper contain evidence suggesting that such a relation exits. The cross-national evidence in the charts shows that life expectancy is strongly correlated with income—at least up through per capita income levels of about $5,000 a year—and that life expectancy *gains* are associated with *gains* in income per capita.
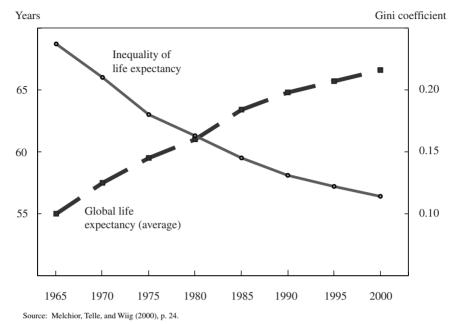
Figure 2. Worldwide Life Expectancy and Inequality of Life Expectancy across Nations, 1962–97

Source: Melchior, Telle, and Wiig (2000), p. 24.

   People who are not persuaded by this kind of evidence can read a longer paper by Lant Pritchett and Larry Summers, called "Wealthier Is Healthier."[1] It marshals a range of evidence showing that the relationship between average income and health is probably causal. This does not mean that improvements in average income *always* translate into gains in longevity, but it does mean that over the past fifty years, increases in income have on average produced declines in mortality.

   Figure 1 contains another piece of evidence. It is based on mortality experience in a single country, the United States.[2] Americans were interviewed about their income in 1979, and their mortality experience was tracked over the following six years. The age-specific mortality rates were translated into estimates of life expectancy at age twenty-five. This figure covers the experiences of white men (the lower broken line) and white women (the upper solid line). The x-axis shows estimates of the average income in each of seven income categories into which respondents were divided; the y-axis shows the analysts' estimates of life expectancy in each of the income categories.

   1. Pritchett and Summers (1996).
   2. Rogot, Sorlie, and Johnson (1992).

Notice that the chart has the same general shape as Deaton's figure 1: gains in life expectancy are much bigger moving from the lowest category toward the median income level (the broken vertical line) than they are for family income gains above the median. For white men below the median, every $10,000 increase in family income lengthens life by about 2.4 years. Once family income reaches the U.S. median, it takes another $90,000 to raise male life expectancy 2.4 years. One possible interpretation of this graph is that if U.S. income were to be equally distributed and every family had exactly $42,000 in income, life expectancy at age twenty-five would rise 1.3 years among white men and 0.6 years among white women. Holding average income constant, a more equal distribution of income is good for average health.

It is naïve to think the relationship between income and mortality is entirely causal. If a white male who drinks, smokes, gambles, and makes $5,000 a year wins the lottery and receives an annuity of $140,000 a year, it is unlikely his life expectancy at age twenty-five would increase by ten years, which is the gain implied by this picture. However, it seems plausible to conclude his life expectancy would improve by more than that of a man who initially earns $70,000 a year and then obtains a salary increase to $210,000 a year.

What does this imply for globalization and health? It means that equal absolute income gains for rich and poor people in a society probably generate bigger life span improvements for the poor than for the rich. For this reason, one must worry about the impact of globalization on the distribution of income gains *within* rich and poor countries as well as across them. If economic integration increases average income in every trading partner, as is assumed by conventional economists, but reduces the real incomes of low-income people in many of the trading partners, it seems plausible that globalization might be linked to worsening population health. I therefore conclude that it is important to know whether globalization lifts the average incomes of poor *countries* as well as whether it lifts the average incomes of poor *people* in rich and poor countries.

My impression is that globalization—that is, closer economic integration—does boost the average incomes of poor countries. Whether these gains are bigger or smaller than the gains enjoyed by rich countries, any gain at all attributable to globalization probably generates health improvements in the poor countries—assuming that incomes in the lower ranks of poor countries' income distributions are not absolutely reduced as a result of closer economic integration.

Many critics of globalization believe it has inflicted actual harm on poor countries, lowering their average incomes. Some critics base this inference on an erroneous belief that, with respect to between-country differences, "the rich are getting richer, and the poor are getting poorer." Statistics on world income

contradict this view. Most of the world's poor live in poor countries. Since the early 1980s, most of them also live in countries that have enjoyed faster real income gains than the average income gains experienced by the rich member countries of the Organization for Economic Cooperation and Development. China and India contain a large percentage of the world's poor, and those countries have experienced faster real income growth than the world's richest countries.

Has globalization (in the sense of closer economic integration) accelerated or depressed income gains in the poor countries? I am reasonably confident that it has accelerated growth, though perhaps not everywhere. But that still leaves me uncertain as to whether globalization has increased or depressed the real incomes of *poor people* in rich and poor countries. If incomes within a country have declined on the bottom, longevity might have fallen even though average income in the country rose.

Income inequality has risen in about half of the rich countries, including the United States, United Kingdom, and Japan. For no big rich country is there evidence that inequality has declined since 1980.[3] Some of the increase is due to closer economic integration, and this effect has probably reduced the absolute incomes of some people in the lower ranks of the U.S. income distribution. As far as the effect of globalization on average population health in the United States since 1980, I would guess that it has been very, very small. Still, there is a valid case for thinking it may have been slightly negative. In other rich countries, where inequality has increased to a much lesser degree, the effects of closer integration are probably even smaller.

It is likely that inequality has also increased on average in the poor countries. In some sense, closer economic integration is probably responsible for part of the increase. In particular, globalization has accelerated income gains in favored parts of the population that have benefited the most from integration into a bigger world market. Whether globalization has reduced the absolute incomes of poor people in poor countries below what their level would have been in the absence of integration is an open question. If real incomes at the bottom declined, globalization has conceivably contributed to a deterioration in average health in poor countries. The income losses at the bottom end of the distribution probably count more in determining average longevity than income improvements at the top. My guess, however, is that even if globalization increased absolute and relative *inequality* in poor countries, it did not reduce the *absolute incomes* of the poor. Thus I am very skeptical that globalization, narrowly construed, has caused a deterioration in population health in poor

3. Burtless and Jencks (2003).

countries. It seems far more likely that it produced improvements in third world health by increasing incomes, even at the bottom of the distribution in many developing countries.

In this paper, Deaton steers clear of the controversy over whether globalization, narrowly construed, has increased the gap between rich and poor *countries* or reduced the absolute incomes of poor people *within* rich and poor countries. Instead, he makes a persuasive case for considering a third channel through which globalization improves population health—namely, through the faster transmission and adoption of new medical and public health technologies. New technology has improved health and longevity, even in places with little observable change in average income.

Deaton's argument is surely correct. It is hard to find a country where life expectancy has failed to rise over the past half century. (However, life expectancy has declined in some countries during the past two decades.) Sadly, it is easier to find countries where average incomes have failed to rise or have risen very little. Unless one believes life span improvements would have occurred in poor countries *without* any rise in income and *without* the adoption of new health practices developed elsewhere, one is pushed toward the conclusion that globalization, in Deaton's sense, has improved life expectancy in the third world.

If average longevity is used as an indicator of population health, both relative and absolute inequality in longevity have generally fallen over the past half century. Life spans around the world have increased, between-country differences have shrunk, and cross-national inequality has fallen. Table 1 shows unweighted data on average longevity in thirty-four countries for which the Census Bureau reports valid life expectancy for 1950 and 1998.[4] I have divided the countries into fifths (without weighting for differences in national population) and calculated average life expectancy in each fifth of countries when countries are ranked from lowest to highest life expectancy around 1950. As shown in the second column, the unweighted average life expectancy around 1950 was a bit less than fifty-six and a half years. Someone born in the shortest-lived one-fifth of countries could expect to live thirty fewer years than someone born in the longest-lived countries. The third column shows the 1950–98 *gains* in life expectancy in each of the five groups of countries, measured in years of extra life. Note that people in the shortest-lived countries in 1950 saw life expectancy increase more than sixteen years, whereas people in the longest-lived countries saw their life spans rise about eight and one-half years. If the life span gains are translated into percentage changes in average life span since

4. Kinsella and Gist (1998).

Table 1. Average Life Expectancy and Gains in Life Expectancy for Thirty-Four Countries, 1950–98

Country rank in 1950	Life expectancy circa 1950 (years)	Gain in life expectancy, 1950–98 (years)	Gain in life expectancy, 1950–98 (percent)
Bottom fifth in 1950	39.4	16.1	40.9
Second fifth	48.9	19.0	38.9
Middle fifth	59.7	14.3	23.9
Fourth fifth	64.6	12.2	18.9
Top fifth	69.5	8.5	12.2
Unweighted average	56.3	14.0	24.9

Source: Kinsella and Gist (1998).

1950, the biggest percentage gains occurred in the countries with the shortest 1950 life spans. The average life span in all thirty-four countries increased by 25 percent, but the improvement was 41 percent of the initial average life span in the shortest-lived countries versus just 12 percent in the longest-lived countries.

Some Norwegian statisticians have tried to calculate the *weighted* world life expectancy and the population-weighted Gini coefficient of life expectancy using data on national life expectancies.[5] Figure 2 shows the trends in these two variables between 1962 and 1997. Over that thirty-five-year span, the global average life expectancy increased while inequality of life expectancy declined. Martin Ravallion in his paper in this volume tells us that different people use different standards in assessing inequality. Economists prefer a *relative* concept, while noneconomists emphasize measures that stress *absolute* income differences. In this case, it does not matter whether you prefer absolute or relative measures of inequality: people in the shortest-lived countries have gained more years of expected life since the 1950s or 1960s than people in the longest-lived countries, whether you use a relative or an absolute measure.

Deaton is right to argue that much of the third world gain in life expectancy and population health is due to improvements in knowledge and technology. Income gains have played a role, too, as I argued earlier. But the development and transmission of new technology has probably been more important. Since globalization has played an important role in the transmission process and also in the adoption of some lifesaving technologies, it is hard for me to understand the hostility of public health specialists to the influence of globalization.

Even though I agree with Deaton's basic argument, I doubt that his conclusion about globalization will win many converts among public health professionals. Most critics of globalization take it for granted that the best affordable new health technologies should be made available for free or at

5. Melchior, Telle, and Wiig (2000, p. 24).

affordable prices to poor people in the third world. A couple of institutions in the capitalist and already globalized world conspire against this goal. Pharmaceutical companies tenaciously defend their intellectual property rights over drugs, putting some lifesaving medicine beyond the reach of poor citizens in poor countries. Medical researchers and educators in developed countries focus on products and technologies that appeal to consumers in rich countries, probably because they see little payoff in developing or improving inexpensive technologies that can lengthen the lives or improve the health of billions of less affluent people in the developing world.

Capitalist firms ordinarily try to generate as much profit as possible when they choose their investment and pricing policies. Only a fool would claim this goal is always compatible with making good health available for the greatest number at the lowest cost. Private companies and public institutions in the rich countries are responsible for an outsize share of all the lifesaving technology available in rich and poor countries alike. Globalization has brought some of these technologies to the remotest villages in the poorest countries. But from the perspective of one who believes that lifesaving technologies should be inexpensively available to everyone who needs them, the institutions associated with globalization can seem immoral. Instead of celebrating the awesome power of private companies and public universities to generate vital technologies, the critic of globalization sees powerful corporations and national governments determined to withhold some lifesaving technologies from any consumer who cannot pay the going price. It is hard for critics to understand how globalization might be responsible for the creation of valuable new technologies, but it is easy for them to see the steps taken by drug companies, the United States government, and international organizations that deny poor people access to them. Some of these measures, including trade sanctions to defend intellectual property rights, seem inextricably bound up with globalization.

In sum, globalization as narrowly construed has probably produced long-term gains in population health in most rich and poor countries. I am even more persuaded that globalization under the broader meaning suggested by Deaton has contributed to sizeable gains in population health. But it is hard to defend an international trade regime in which poor people in poor countries cannot afford lifesaving technologies, even when the marginal cost of supplying the technologies is very low. And it is even harder to defend national governments and international organizations that insist that the price of these technologies must be kept high in order protect the free-trade regime.

Discussion: I. M. Destler asked whether globalization—with its strong emphasis on market mechanisms, International Monetary Fund adjustment measures, and so forth—undercuts the capacity of the state to provide health services. A related question is whether state-dominated health services do better than market-dominated systems. Casual observation suggests that the evidence is mixed. In the Soviet Union, until the collapse, people believed that the state-centered system was performing well. Yet in reality, in the context of diminishing funding, it was an absolute disaster. The *dwindling* funds were spent on the wrong things (heating hospitals housing convalescing patients who did not really need to be there), and the system was totally disconnected from international communication about new ideas in health. The system is now decades behind those of most developed countries.

On the other hand, Destler noted that if one compares the United States and Europe in terms of healthcare expenditures versus life expectancy (not controlling for other factors), then one finds that Americans spend more for healthcare and have lower life expectancy. There are also those who argue, like Dani Rodrik, that globalization creates pressures on countries to keep public expenditures low to be competitive and thus makes it harder for them to maintain social spending. These issues are intertwined and, as yet, unresolved.

Sylvia Ostry highlighted the rise in the incidence of rich-country diseases in poor countries. Obesity, for example, is now a problem in poor countries, something that would have been inconceivable in the past. She questioned whether this was a result of globalization. Is the transmission of behavior patterns via the increase in global communication and the broader reach of companies that produce rich foods an aspect of globalization's impact on health?

She also noted that, in addition to communication, transportation is another central aspect of globalization that brings both benefits and new dangers. A vivid example is the outbreak of severe acute respiratory syndrome (SARS) in Toronto, which was brought by just one group of Chinese citizens. Finally, Ostry raised the issue of technology, which is typically seen as an innovation that reduces costs. Yet one area where technology may have different effects is in medicine, where technological innovations seem to raise costs.

Henry Aaron made a pointed intervention, disagreeing strongly with Ostry's final argument. Technology inevitably raises costs everywhere that it has made significant advances. Cost is equal to price times quantity. Technological advances have increased the amount of money people spend on transportation, computers, and entertainment. At the same time, it has reduced the price per unit of these items.

In addition, price statistics are notoriously poor in the case of health. Aaron cited recent research that has tried to improve price statistics with respect to treating heart disease and mental illness. That research has concluded that official statistics have the sign wrong on price change. In other words, the price of treating both coronary disease and mental illness has declined even as total spending has increased astronomically. Aaron's research assistant calculated that the United States now spends something in excess of $40 billion a year for coronary surgery and angioplasty, the two major technological advances. The price, adjusted for constant quality unit, has gone down. The quantity, however, has gone up, as has the total cost. This may not be true in other areas of medicine, but this example is both important and illustrative.

Abhijit Bannerjee concurred with William Jack's comments on inequality. Even though any attempt to identify the effect of inequality on health is rife with land mines, that is not a reason for avoiding the question. The following is a good illustration of the difficulties involved. Globalization certainly opens opportunities for specific people with specific skills or luck. Yet this process may attract them away from the village they live in to the cities or to different networks within their villages. Thus they become less engaged in the village political economy. This may reduce inequality in the village, as these better-rewarded individuals go to live in the city.

But the longer term effects could be substantive, as public goods and hospitals in the villages in rural areas deteriorate in quality because the remaining users are less likely to be the kinds of people who pressure for better public goods—or even for maintaining existing quality. Whether this has a positive or negative effect on inequality depends on how you measure it. Inequality probably went up at the national level and down at the village level. Both of these feed into a decline in the quality of the health service provider as measured in the aggregate. While this effect is very difficult to measure, that does not mean that one should not be concerned with it.

Susan Collins noted how the discussion on inequality and health echoed the earlier one about what is behind our inequality measures. For example, there may be no change in measured inequality but a great deal of churning, with some people going up in their income and others going down. It also resonates with the discussion about the different pictures one gets when thinking about absolute income changes as opposed to relative ones. Thus the same inequality measures could have very different health implications depending on how much churning there is and where it is taking place. This highlights the merit in efforts to disentangle and look behind some of the numbers.

Collins then raised a question related to the global response to SARS, which has been widely commended. Is there information about the extent to which globalization has helped or hurt the treatment or response to various diseases? She noted that the focus of the discussion thus far had been more on the transmission than on the responses.

Martin Ravallion questioned the robustness of the relationship between ideas and technology on the one hand and health improvements on the other. For example, there is selection bias in looking at diseases like cardiovascular illness, which is the sort of disease where technology and ideas have the strongest effects. But there are many other sorts of diseases where this is less obvious. He asked how the technology and ideas hypothesis works out in comparison with other explanations, in particular the strong linkages between reducing poverty (not inequality as such, but poverty) and improved health outcomes.

Roger Betancourt cited a paper written a decade or so ago by Anand and Ravallion that posited that some of what explains improvements in life expectancy is income, and some is other factors, such as the percent of national income that is spent on health.[1] There seems to be a broader consensus along these lines. The transmission of technology, which is stressed by Deaton, falls into this "other factors" category. Betancourt also noted William Jack's comment about life expectancy having an upper bound and therefore calling for broader measures. Betancourt agreed that one should take note of the upper bound but questioned the efficaciousness of a search for alternative measures. He also questioned Deaton's point about the failure of globalization to reach poor countries in terms of health. At the least, there has not been a specific assignment of responsibility. It may well be that there are failures in the transmission mechanisms, but there is also evidence that poor countries fail to accept the technology. It is hard to view the latter phenomenon as a failure of globalization. It is, more accurately, a failure of communication, among other things.

Dave Richardson noted the importance of Jeff Sachs's work with the World Health Organization and its Commission on Macroeconomics and Global Health.[2] The basic message that he took away from that report was that public health could be self-financing with respect to some high-profile diseases, in the sense that it would create life years that would repay the cross-boundary transfers. Yet the report did not explore the subsequent distributional effects that would result from a successful self-financing health program, both across and within countries.

1. Anand and Ravallion (1993).
2. Sachs (2001).

Angus Deaton responded by emphasizing what he had stated at the outset—that this is an initial exploration of many interesting relationships, rather than the presentation of strongly held views or well-established truths. For example, he stressed that he believed that income matters a great deal and that he does not believe that the entire story is all technology and ideas. At the same time, the detailed historical evidence on the important role of technology is tremendously persuasive. He also responded to the generous and thoughtful comments by Gary Burtless. It is hard to disagree with the idea that, in the long run, major health improvements cannot take place without growth in incomes. But that is not the same thing as saying that income growth—including income growth from globalization—causes health improvements. For one thing, there are important "third factors," such as education, or health systems, that affect both income and health. And indeed the evidence for a causal role of growth on health is weak. Pritchett and Summers, who are often cited in contradiction, obtain exactly the same results as this paper for the relationship between growth and gains in life expectancy, and although they find a stronger relationship between growth and declines in child mortality, their attribution of causality rests on identifying assumptions that are impossible to take seriously.

The effects on health of income redistribution, both within and between countries, not only depend on income increases causing improvements in health but, furthermore, on the causal effect having the shape of the Preston curve, or of the relationship from the National Longitudinal Mortality Survey shown in Burtless's figure 1. But it is far from clear that those two curves are even consistent. Almost all of the U.S. income distribution lies in the upper part of the Preston curve, which is essentially flat. And although it is true that the distribution of income over the world's citizens has improved in recent decades, it is also true that some of the poorest and least healthy countries in the world are in Africa, whose health and income are drifting apart from the rest of the world. The convergence of life expectancy across the world, like the narrowing of the world distribution of income, gives inadequate recognition to divergence in Africa. And life expectancy is much too crude a tool for examining international health inequalities. As explained in the paper, reductions in infant mortality in poor countries that are matched by reductions in fertility, although producing large increases in life expectancy, cannot be compared with the increases in life expectancy that are being driven by reductions in adult mortality in the rich countries of the world.

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