

In 100 Years

Leading Economists Predict the Future

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2 Through the Darkness to a Brighter Future

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The Threatening Sky

When Keynes wrote his famous essay, "Economic Possibilities for Our Grandchildren," times were tough and a dim future loomed. But Keynes warned his readers not to confuse the short run with the long run and reassured them that the long-term fundamentals were sound. The technical progress that had brought the world so far could be relied on to take it a great deal further. He worried that there were circumstances that could derail progress, and he made his predictions conditional on there being "no important wars and no important increases in population." World War II and the population explosion surely qualify as important, yet living standards today are as high as he predicted.

Today, too, times are tough. The United States is limping out of the Great Recession, the worst since Keynes's own time. The future of the European economy is far from guaranteed, and the possible collapse of the euro could precipitate long-term stagnation or worse. Growth in India and China is stalling. I write in the immediate aftermath of the devastation wrought by Hurricane Sandy in the northeastern United States. The steady rise of sea level all but guarantees that such hurricanes will grow more frequent, and while the repairs and (possibly futile) defensive expenditures will stimulate GDP, this is a classic case of GDP and human well-being moving in opposite directions.

Perhaps, like Keynes, we can predict that these short-run threats will dissipate under the relentless drive of human ingenuity to make life better. In the long run, we will all be dead. A hundred years from now, even my grandchildren will (almost certainly) be dead, but my grandchildren's

grandchildren will perhaps be richer and healthier than we can imagine. Yet today, it is not just the immediate environment that threatens. The short-term problems look like symptoms of deeper processes that are not about to go away.

Population growth and world wars are perhaps not the threats today that they were for Keynes, but unregulated climate change is a new and enormous danger. The long-term prospects for climate control are poor; the 2012 presidential election in the United States was notable for its avoidance of the issue; and lower growth rates in India and China, even if moderating the growth of emissions, will also lower the priority that Indians and Chinese assign to tackling climate change.

The growth in living standards was threatened even before climate change. The growth of per capita GDP in the United States had been falling decade by decade even before the financial crisis. Even starting after the reconstruction spurt in Europe after World War II, European growth rates were falling long before the euro crisis. Perhaps the gods of technical change have abandoned us. Many writers have bemoaned that current technical progress is almost entirely information based, that other aspects of production and consumption have changed little in the last thirty years, and that the Internet, e-mail, smart phones, iPods, and tablets are no more than beguiling toys that add as little to human welfare as they add to productivity growth.

Many of us are also concerned that the grotesque expansions in inequality of the past thirty years will undermine economic growth. When growth is not widely shared and when a small fraction of the population grows fabulously wealthy, the power that the rich poses is a risk to the prosperity of everyone else. The superwealthy have little need for public goods, public health care, or public education, or even for some kinds of basic infrastructure. Yet education and health are part of welfare in and of themselves, and a broadly educated and healthy population is required to support the innovation on which growth depends. At the same time, the rich often have both the incentives and the means to block the creative destruction that is required at each new round of innovation.

Those who are doing well will organize to protect what they have, including in ways that benefit them at the expense of the majority—for example, by lobbying for special interest rules and regulations. Financial crises have happened throughout history, just as hurricanes have happened

throughout history. But just as the latest hurricane is worse because it was fueled by rising sea levels and so is a portent of ever more frequent hurricanes, the latest financial crisis is worse if it was partly caused by an overly powerful and underregulated financial sector.

The United States spends 18 percent of its gross domestic product (GDP) on health care, much of it on procedures and devices that do little to improve health. Technical progress in health care is driven as much by what the government will pay for as by its payoff in extending life spans. And the bigger and richer the health care industry becomes, the more power it has to influence the payment rules and prevent the establishment of any authority that could check the cost effectiveness of new procedures. A system in which the government pays for most of health spending while lobbyists set the rules and prices is a system that allows the few to plunder the many. Overgrown financial and health care sectors are effective rent-seeking machines for their executives while they reduce the well-being of the rest of us. Such processes put a brake on economic growth, and their pervasiveness can justify pessimism about the prospects for long-run growth.

The long-established increase in life expectancy is also losing momentum. The reductions in infant and child mortality that propelled the first expansion in life spans have been replaced, over the past half-century, by reductions in mortality at higher ages. Reductions in cardiovascular mortality among the middle-aged and elderly have been driven by reductions in smoking, drug-based methods for controlling hypertension, and better treatments for those who have had heart attacks. Any reductions in mortality that once came from better nutrition have long been exhausted, and we are now going the other way as the increasing prevalence of obesity and diabetes acts to reverse the mortality decline.

Cancer is the other great killer, and the war on cancer, long declared, is far from won. And even if progress continues, future mortality declines must come—not among the young, among whom mortality is already very low, but among the elderly. While I (and other old people) am better off with a few more years to spend with my grandchildren, and even to speculate about the lives of my great-great-grandchildren a century from now, advances at the end of life merely postpone the inevitable for a few years and do little to advance life expectancy.

This is a gloomy picture, and it would not be hard to persuade oneself that there is little hope for further increases in living standards or life

expectancy. Perhaps we can feel better about this if, unlike me, you can bring yourself to accept the argument that living standards are overrated in any case, that human well-being does not improve with economic growth, and that we should seek improvements in well-being elsewhere, through better social relationships, better health, and more leisure.

Even so, I remain cautiously optimistic.

As I have stated them, the negative arguments are too strong and, in some cases, wrong. They are also too narrow in both scope and content. Their scope includes only rich countries, ignoring what has been happening and might happen for most of the people on the planet. Even if my great-great-grandchildren may not be much richer or much longer lived than their grandparents, the prospects for Africans, Indians, and Chinese are brighter. Keynes's content was also too narrow. He talked about material living standards, not about health and life expectancy. But even health and wealth are far from exhausting the possibilities for improvement for our (and others') descendants.

The Brighter Side: Growth

For much of the quarter-millennium history of economic growth, progress was measured by how much stuff was made, by more goods per person. Today, goods are less important than services, and quality is more important than quantity, so the growth of quality has replaced the growth of quantity as the basis for increases in well-being. Yet it is very hard to measure services, and almost impossibly hard to measure quality.

A more general point is that GDP is much worse measured than is suggested by its cultural prominence. Gross concepts make no allowance for the depreciation or destruction of capital. There are both conceptual issues—no value is attached to nontraded services, the most important of which is unpaid work in the home, or to leisure—and practical issues—assumption-based estimates ("imputations" rather than measurements) that play an increasing role (up to one-third of household income) in advanced economies. There are good reasons for current practice, and almost equally good reasons to change. In the meantime, the magnitude of conceptual and practical uncertainty is large and growing, and we should treat the declining growth measures with a good deal of skepticism.

The output of many services is hard to measure, so the statisticians do what they can and measure inputs, not outputs. They make productivity

adjustments—within each country's national accounts and among countries when making international comparisons—but these are imputations with large margins of error. In many cases, such as government services, productivity growth is ignored. Exceptional productivity growth in services goes largely unmeasured. One of the most important services—the benefits that owners get from living in their own homes—is almost entirely imputed, often by extrapolating from small and unrepresentative rental markets or by imputing the user cost of the asset. Technical improvements that make our homes better consumption machines go largely unmeasured.

While there is no evidence of systematic understatement of service growth, this is not true for improvements in quality or for the benefits of radically new goods. Many quality improvements and new goods are patched in to the national income accounts, and many scholars have argued that the benefits of the major consumer innovations of our time—ATMs, cell phones, e-mail, Internet shopping, personal entertainment devices—are seriously underestimated. No one knows how to fix this, and statistical offices make some allowances for improvements in quality in existing devices, like cars and computers, but the growth in material living standards is almost certainly being underestimated by the treatment of these items.

I also challenge the proposition that the information revolution and its associated devices do little for human well-being. Many have documented the importance of spending time and socializing with friends and family, but this is exactly the feature of everyday life that the new communication methods work to enhance. All of us can remain in touch with our children and friends throughout every day, videoconferencing is essentially free, and we can cultivate close friendships with people who live thousands of miles away. When my parents said good-bye to relatives and friends who left Scotland to look for better lives in Canada and Australia, they never expected to see or talk to them again, except perhaps for a brief and astronomically expensive phone call when someone died. Today, we often do not even know where people are physically located when we work with them, talk to them, or play with them. We can also enjoy the great human achievements of the past and the present, cheaply accessing literature, music, and movies at any time and in any place. That these joys are not captured in the growth statistics tells us about the growth statistics, not about the technology. If they are belittled by those who do not use them, it tells us only to pay no attention to those who purport to use their own preference to pass judgments on the pleasures of others.

For most of the world's population, who do not live in the rich countries, there has been no slowdown in growth. Indeed, the more than 2.5 billion people who live in India and China have recently experienced sustained growth rates that are unparalleled in any country or period. Can we expect those to continue?

Indian and Chinese growth rates have slowed in the aftermath of the financial crisis and were likely overstated by the official statistics of both countries. While the slowing is likely a short-term effect, we should also remember that country growth spurts are rarely sustained as long as have been India's and China's, so perhaps they are due to stop. China's political regime is not one that will easily tolerate creative destruction, and its corrupt and extractive regime will increasingly be a drag on growth.

Even so, to go back to Keynes, there are fundamental reasons that India, China, and at least some other now-poor countries should grow rapidly in the future. Catch-up growth is easier than growth on the frontier; many new ideas, new devices, and new ways of doing things can be imported from abroad and do not need to be reinvented from scratch. And while such importation requires local innovation, adaptation (and destruction) that does not come for free, catch-up growth is easier and, in the right circumstances, can be much more rapid than the original growth. Even sub-Saharan Africa, which was the basket case of economic growth in the 1980s and early 1990s, is showing signs of revival. Some of this comes from higher commodity prices, which cannot be relied on for the long run, but some also comes from better macroeconomic management learned from abroad. If the West can wean itself off the destructive foreign "aid" that it is currently pouring into Africa, governance is likely to improve too, and growth will follow.

The Brighter Side: Health

American life expectancy has increased by about thirty years since 1900, though the annual rate of increase before 1950 was about twice as fast as the annual rate of increase since 1950. At the same time, life expectancy gaps between the rich and the poor world have narrowed. If we were to use some compound of life expectancy and income as a welfare measure—for example, per capita income multiplied by life expectancy—overall growth in rich countries has been slowing even faster than income growth alone, and poor countries have been catching up with rich countries. Or at least they were

catching up except for those affected by HIV/AIDS, and we might hope that those countries will catch up again once the epidemic is controlled.

The slowing in the rich countries, and the catching up of the poor with the rich, are both mechanical features of life expectancy. Life expectancy is a convenient but essentially arbitrary measure of population health, and it gives much higher weight to deaths of children than to deaths of adults. So the decelerating growth in life expectancy cannot be taken to mean that the decline in all mortality rates is slowing down or that all mortality gaps between poor and rich countries are narrowing. As for the future, the slowing down in the rate of growth of life expectancy cannot be taken as a sign of things to come. There are real threats to future mortality decline—whether HIV/AIDS is controlled is one—but the deceleration of life expectancy is not one of them.

In both rich and poor countries, life is riskier in early childhood and in old age, with little risk of death in adulthood. But in poor countries today, as in rich countries in the past, the chance of dying in the first few years of life is much higher than it is in rich countries. About 50 out of every 1,000 children born in India die in their first year, close to the fraction who died in Scotland in the year that I was born (1945). In 2010, fewer than 4 out of every 1,000 infants died in Scotland, the lowest figure ever recorded and one of the lowest rates in the world. In rich countries today, death stalks the elderly. In rich countries in the past and in poor countries today, death stalks the young. In poor countries today, as in rich countries in the past, progress comes from reducing mortality among children. In the rich countries today, progress comes from reducing mortality among adults.

The first health improvements came (and in some places are still coming) from better public health—such things as clean water, sanitation, vaccination, and the elimination of pests that cause disease. These things can bring rapid falls in infant and child mortality, and life expectancy zooms upward. Once those "easy pickings"—at least for life expectancy—are gone, health improvements have to come from reducing adult mortality, which means reducing heart disease and cancer. There has been enormous progress in rich countries in reducing mortality from heart disease, and many middle-aged and elderly lives have been saved. This kind of progress does much less for life expectancy than progress in reducing mortality among children.

We can argue either way about whether the life of a newborn is worth more or less than the life of someone in middle age or someone in old age,

but there can be no automatic presumption in favor of the simplistic view that saving more years of life is always the best thing to do. The slowdown in the rate of improvement of life expectancy is essentially a measure of success, not of failure. In the rich countries, we have largely disposed of the early life killers, which are the ones that have the big effects on life expectancy and have moved on to the next killers, which strike at older ages.

The real question for our grandchildren and their grandchildren is whether the progress in mortality reduction can be expected to continue. Once again, the sky is not entirely clear, but I believe that the answer is yes.

The current reduction in mortality from cardiovascular disease still has some way to go. Antihypertensive drugs are cheap and effective but require patients to have their blood pressure regularly checked by a physician, something that many people do not do. There are many lives here that can be cheaply saved. Smoking rates have come down among men and, with a lag, among women, so that the gap in life expectancy between women and men is now smaller than it has been for many years. If women continue to quit as men have done, many fewer of them will die from cardiovascular disease and lung cancer.

What about cancers other than lung cancer? The most important are breast cancer (primarily among women), prostate cancer (entirely among men), and colorectal cancer (among both men and women). In very recent years, serious progress has been made against all three of these cancers, driven by a combination of screening and new drugs, some developed in the traditional way, by trial and error, and some using new scientific advances in understanding how cancer works. Unlike mortality reduction through antihypertensive drugs, giving people aspirin after a heart attack, or smoking reductions, these treatments are expensive, and their widespread use could be limited by lower growth rates of income should those come to pass. But many scholars believe that over the next fifty years, we will see the progress against cancer that we have seen in the past fifty years against cardiovascular disease.

One of the deep reasons that health will continue to improve is that people want it to improve and are prepared to pay for the innovations, basic science, discoveries about behavior, drugs, procedures, and devices that support it. Innovations cannot be bought off the shelf and do not always come along when they are needed. But there is no doubt that urgency helps. As

each disease is conquered, the next becomes the main target; no one cared about Alzheimer's when a quarter of the population did not reach its fifth birthday. But as life expectancy increases, these later-life diseases become priorities, and as people get richer, they will devote larger and larger shares of their incomes to dealing with them, so that spending rises faster than national income.

In poor countries, infant and child mortality remains a major curse, even if there has been enormous improvement over the past half-century. The children who die in these countries would not have died had they been born in rich countries, and to that extent, we should be able to prevent their deaths. They are not dying from incurable exotic diseases but from respiratory infections, diarrheal disease, and vaccine-preventable diseases, all of which have been eradicated among children in rich countries. So the potential for progress is enormous. Some will come through more widespread education, particularly of women, which brings a wider understanding of the germ theory of disease and its implications, like the need for hand-washing and for clean water.

The major roadblock here is not the availability of medicines, many of which are cheap and readily available, but the capacity of many governments to develop a system of maternal and child care that will bring known remedies to these children and their mothers. Much will depend not so much on economic growth in poor countries—China did much better in reducing child mortality before it began to grow, and the same is true in India to a lesser extent—but on improvements in state capacity and state commitment.

Apart from sub-Saharan Africa, most deaths in the world today are from noncommunicable diseases such as heart disease and cancer, not from the infectious diseases that have been the primary enemy for much of human history. As we have seen, cardiovascular disease mortality has fallen rapidly in rich countries and has done so based on cheap drugs and on smoking reduction. While the new cancer treatments may be difficult for public health authorities to afford in many nonrich countries, cost is not a consideration for aspirin or for diuretics, and we can expect to see a spread in treatment rates from both public and private providers around the world. Again, the constraint may be the rate at which adequate physician-based health systems can evolve (public sector) and be regulated (private sector).

The outlook for smoking rates in poor countries is less positive, if only because rising incomes will work to increase smoking and because tobacco companies are targeting consumers in some middle-income countries.

Even HIV/AIDS, which has wiped out the life expectancy gains of the past fifty years in several countries in Africa, is being tackled by the provision of antiretroviral drugs. Between 2003 and 2010, the number of people receiving these drugs in poor countries increased from under 3 million to more than 10 million. With luck, the epidemic will be history long before the century is up.

There are links from income growth to health improvements; better nutrition comes with more money, public health projects (water and sanitation) cost public money, and the pressure for innovation is both fueled and financed by rising living standards. Yet it is a mistake to think that income and health always march together. Catch-up health improvements, like catch-up growth, require modest innovation—more in process than in concept—and historically there have been many occasions where there were massive reductions in mortality—through antibiotics, water provision, and mosquito control—in places where living standards were stagnant. Policy matters too. When China decided to encourage rapid economic growth in the mid-1970s, it turned away from the public health measures that had been a successful part of the previous regime. When thinking about the future, we must not suppose that everything depends on economic growth, so that even if growth falters, there is nothing that guarantees it will bring down health with it.

The Brighter Side: Everything Else

Living standards mean little if people are not alive to enjoy them, yet for people who are alive, it is difficult to live a good life in deprivation and misery. So I have focused here on mortality and living standards. But there are many other aspects of the good life, and here too, there is hope for further improvement.

For example, health is more than just being alive, and there is evidence not just that people are living longer, but they are healthier when they are alive. Some of this is medicine—I have a hip replacement that has enabled me to live a full and active life that would have been impossible without it. Others have replacement knees or even replacement hearts. Cochlear

implants are beginning to reduce the fraction of people who cannot hear. Cataract surgery restores sight to many.

Better nutrition and better disease environments in childhood have increased adult heights around the world. For more than a century, Europeans have been growing taller at about 1 centimeter for each decade, and the Chinese are currently growing taller at the same rate. Americans seem to have stopped growing, Indians have barely started, and Africans born in the 1980s were shorter as adults than those born a decade before. Higher incomes and better childhood health produce taller adults. Height seems to help people lead better lives, sometimes because taller people are stronger and can earn more. Childhood nutritional failure and childhood disease hold back not only physical growth but the development of the brain, so that people who have less disease and better nutrition as children have better cognitive function as adults. And indeed, measured IQs have been rising around the world.

Violence has fallen; people have much lower chances of being murdered than used to be the case. This improves not only health but also the quality of life for those who do not have to live in insecurity.

Democracy is more widespread in the world than was the case fifty years ago. Oppression of one social group by another is scarcer, whether women by men, homosexuals by heterosexuals, workers by capitalists, farm workers by aristocrats, one ethnic group or caste by another. People have greater opportunities to participate in society than has ever before been the case.

Education has been on the rise in most of the world. Four-fifths of the people of the world are literate compared with only half in 1950. There are areas of rural India where almost no adult women ever went to school and now almost all of their daughters do so. Yet once again, much remains to be done, particularly in Africa. But if people are indeed the ultimate resource, healthy, well-educated people living in an open society are the most valuable of all, and the ideas and innovation that come from them benefit everyone and are the basis for continuing economic growth.

Of course, none of these things can be expected to improve everywhere or to do so uninterruptedly. Bad things happen. Wars destroy, and positive political regimes can be replaced by negative regimes that can reverse many years of progress. Epidemics like HIV/AIDS can eliminate decades of health improvements. Yet I expect those setbacks to be overcome in the future, as they have been in the past.

Perhaps the major uncertainty, on a world scale, is whether it will be possible to deal with climate change. It is hard to be optimistic about any global agreement today, and perhaps there will have to be great suffering and destruction before people come together to make changes. I do not know how this will come about. But the forces for progress and for collective action against imminent danger are also strong, and I would put my money on their winning out.

3 The Cone of Uncertainty of the Twenty-First Century's Economic Hurricane

Avinash K. Dixit

Brilliant minds, including Niels Bohr and Yogi Berra, are supposed to have declared that prediction is very difficult, especially about the future. And I can safely predict that several contributors to this book will invoke that dictum. Then why are we doing it?

Speaking for myself, I have a mixture of motives. First, following in Keynes's footsteps and in the company of such distinguished fellow contributors is irresistible. Second, I will not be around to be ridiculed when my predictions go spectacularly wrong. Weather forecasters and prognosticators of financial markets have thicker skins; they blithely make new predictions every day even as their previous ones prove to be mistaken. I will have the safety of absence. Third, and most important, indulging in wild speculation is simply too much fun.

Weather forecasters do take some precautions. They usually attach a probability to their forecasts of "precipitation" and recognize that forecasts further out into the future have larger margins of error by showing "cones of uncertainty" around their projected paths of hurricanes. Economic forecasts should do likewise.

The hurricane analogy seems especially apt as I write this. The winds buffeting the world economy, assisted and in some respects even caused by policy follies, have already produced the Great Recession, with fears of more to come. Therefore, I shall begin in the hurricane-forecasting mode and suggest possible paths within its cone of uncertainty.

At least one prediction can be made with high confidence; think of it as the central path in the cone. On it, in the course of the next century, there will be several financial and economic crises. Each crisis will be preceded by a boom and by a state of euphoria, when almost everyone will believe that "this time is different; we have learned how to avoid crises, and have