

MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT

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INTRODUCTION

This is the economic history of humanity in a nutshell. From 2 million or 200,000 or 20,000 or 2,000 years ago until the 18th century there was slow growth in population, almost no increase in health or decrease in mortality, slow growth in the availability of natural resources (but not increased scarcity), increase in wealth for a few, and mixed effects on the environment. Since then there has been rapid growth in population due to spectacular decreases in the death rate, rapid growth in resources, widespread increases in wealth, and an unprecedentedly clean and beautiful living environment in many parts of the world along with a degraded environment in the poor and socialist parts of the world.

That is, more people and more wealth has correlated with more (rather than less) resources and a cleaner environment—just the opposite of what Malthusian theory leads one to believe. The task before us is to make sense of these mind-boggling happy trends.

The current gloom-and-doom about a "crisis" of our environment is all wrong on the scientific facts. Even the U.S. Environmental Protection Agency acknowledges that our air and water have been getting cleaner rather than dirtier in the past few decades. Every agricultural economist knows that the world's population has been eating ever-better since World War II. Every resource economist knows that all natural resources have been getting more available rather than more scarce, as shown by their falling prices over the decades and centuries. And every demographer knows that the death rate has been falling all over the world—life expectancy almost tripling in the rich countries in the past two centuries, and almost doubling in the poor countries in just the past four decades.

POPULATION GROWTH AND ECONOMIC DEVELOPMENT

The picture also is now clear that population growth does not hinder economic development. In the 1980^s there was a complete reversal in the consensus of thinking of population economists about the effects of more people. In 1986, the National Research Council and the

National Academy of Sciences completely overturned its "official" view away from the earlier worried view expressed in 1971. It noted the absence of any statistical evidence of a negative connection between population increase and economic growth. And it said that "The scarcity of exhaustible resources is at most a minor restraint on economic growth."⁴ This U-turn by the scientific consensus of experts on the subject has gone unacknowledged by the press, the anti-natalist environmental organizations, and the agencies that foster population-control abroad.

LONG-RUN TRENDS POSITIVE

Here is my central assertion: Almost every economic and social change or trend points in a positive direction, as long as we view the matter over a reasonably long period of time.

For proper understanding of the important aspects of an economy we should look at the long-run trends. But the short-run comparisons—between the sexes, age groups, races, political groups, which are usually purely relative—make more news. To repeat, just about every important long-run measure of human welfare shows improvement over the decades and centuries, in the United States as well as in the rest of the world. And there is no persuasive reason to believe that these trends will not continue indefinitely.

Would I bet on it? For sure. I'll bet a week's or month's pay—anything I win goes to pay for more research—that just about any trend pertaining to material human welfare will improve rather than get worse. You pick the comparison and the year.

Let's quickly review a few data on how human life has been doing, beginning with the all-important issue, life itself.

THE CONQUEST OF TOO-EARLY DEATH

The most important and amazing demographic fact—the greatest human achievement in history, in my view—is the decrease in the world's death rate. Figure 1 portrays the history human life expectancy at birth. It took thousands of years to increase life expectancy at birth from just over 20 years to the high twenties about 1750. Then about 1750 life expectancy in the richest countries suddenly took off and tripled in about two centuries. In just the past two centuries, the length of life you could expect for your baby or yourself in the advanced countries jumped from less than 30 years to perhaps 75 years. What greater event has humanity witnessed than this conquest

of premature death in the rich countries? It is this decrease in the death rate that is the cause of there being a larger world population nowadays than in former times.

FIGURE 1: HISTORY OF HUMAN LIFE EXPECTANCY
AT BIRTH (3000 B.C.E.—2000 C.E.)

Then starting well after World War II, the length of life you could expect in the poor countries has leaped upwards by perhaps fifteen or even twenty years since the 1950s, caused by advances in agriculture, sanitation, and medicine. (See Figure 2)

Let's put it differently. In the 19th century the planet Earth could sustain only one billion people. Ten thousand years ago, only four million could keep themselves alive. Now five billion people are living longer and more healthily than ever before, on average. The increase in the world's population represents our victory over death.

FIGURE 2: FEMALE EXPECTATION OF LIFE AT BIRTH

Here arises a crucial issue of interpretation: One would expect lovers of humanity to jump with joy at this triumph of human mind and organization over the raw killing forces of nature. Instead, many lament that there are so many people alive to enjoy the gift of life. And it is this worry that leads them to approve the Indonesian, Chinese and other inhumane programs of coercion and denial of personal liberty in one of the most precious choices a family can make—the number of children that it wishes to bear and raise.

THE DECREASING SCARCITY OF NATURAL RESOURCES

Throughout history, the supply of natural resources always has worried people. Yet the data clearly show that natural resource scarcity—as measured by the economically-meaningful indicator of cost or price—has been decreasing rather than increasing in the long run for all raw materials, with only temporary exceptions from time to time. That is, availability has been increasing. Consider copper, which is representative of all the metals. In Figure 3 we see the price relative to wages since 1801. The cost of a ton is only about a tenth now of what it was two hundred years ago.

FIGURE 3: COPPER PRICES INDEXED BY WAGES

This trend of falling prices of copper has been going on for a very long time. In the 18th century B.C.E. in Babylonia under Hammurabi—almost 4000 years ago—the price of copper was about a thousand times its price in the U.S. now relative to wages. At the time of the Roman Empire the price was about a hundred times the present price.

In Figure 4 we see the price of copper relative to the consumer price index. Everything that we buy—pens, shirts, tires—has been getting cheaper over the years because we know how to make them cheaper, especially during the past 200 years. Even so, the extraordinary fact is that natural resources have been getting cheaper even faster than consumer goods.

FIGURE 4: COPPER PRICES DIVIDED BY CPI

So by any measure, natural resources have getting more available rather than more scarce.

Regarding oil, the shocking price rises during the 1970^s and 1980^s were not caused by growing scarcity in the world supply. And indeed, the price of petroleum in inflation-adjusted dollars has returned to levels about where they were before the politically-induced increases, and the price of gasoline is about at the historic low and still falling. Concerning energy in general, there is no reason to believe that the supply of energy is finite, or that the price of energy will not continue its long-run decrease forever. I realize that it sounds weird to say that the supply of energy is not finite or limited; for the full argument, please see my book, *The Ultimate Resource*.ⁱⁱ (Science is only valuable when it arrives at knowledge different than common sense.)

FOOD—"A BENIGN TREND"

Food is an especially important resource. The evidence is particularly strong for food that we are on a benign trend despite rising population. The long-run price of food relative to wages is now only perhaps a tenth as much as it was in 1800 in the U. S. Even relative to consumer-products the price of grain is down, due to increased productivity, just as with all other primary products.

Famine deaths due to insufficient food-supply have decreased even in absolute terms, let alone relative to population, in the past century, a matter which pertains particularly to the poor countries. Per-person food-consumption is up over the last 30 years. And there are no data showing that the bottom of the income-scale is faring worse, or even has failed to share in the general improvement, as the average has improved.

Africa's food production per person is down, but by 1996 almost no one any longer claims that Africa's suffering results from a shortage of land or water or sun. The cause of hunger in Africa is a combination of civil wars and collectivization of agriculture, which periodic droughts have made more murderous.

Consider agricultural land as an example of all natural resources. Though many people consider land to be a special kind of resource, it is subject to the same processes of human creation as other natural resources. The most important fact about agricultural land is that less and less of it is needed as the decades pass. This idea is utterly counter-intuitive. It seems entirely obvious that a growing world population would need larger amounts of farmland. But the title of a remarkable prescient article in 1951 by Theodore Schultz tells the story: "The Declining Economic Importance of Land."ⁱⁱⁱ

The increase in actual and potential productivity per unit of land have grown much faster than population, and there is sound reason to expect this trend to continue. Therefore, there is less and less reason to worry about the supply of land. Though the stock of usable land seems fixed at any moment, it is constantly being increased—at a rapid rate in many cases—by the clearing of new land or reclamation of wasteland. Land also is constantly being enhanced by increasing the number of crops grown per year on each unit of land and by increasing the yield per crop with better farming methods and with chemical fertilizer. Last but not least, land is created anew where there was no land.

THE ONE SCARCE FACTOR

There is only one important resource which has shown a trend of increasing scarcity rather than increasing abundance. That resource is the most important of all—human beings. Yes, there are more people on earth now than ever before. But if we measure the scarcity of people the same way that we measure the scarcity of other economic goods—by how much we must pay to obtain their services—we see that wages and salaries have been going up all over the world, in poor countries as well as in rich countries. The amount that you must pay to obtain the services of a barber or a cook has risen in India, just as the price of a barber or cook—or economist—has risen in the United States over the decades. This increase in the price of people's services is a clear indication that people are becoming more scarce even though there are more of us.

About pollution now: Surveys show that the public believes that our air and water have been getting more polluted in recent years. The evidence with respect to air indicates that pollutants have been declining, especially the main pollutant, particulates. (See Figure 5). With respect to water, the proportion of monitoring sites in the U.S. with water of good drinkability has increased since the data began in 1961. (Figure 6).

Every forecast of the doomsayers has turned out flat wrong. Metals, foods, and other natural resources have become more available rather than more scarce throughout the centuries. The famous Famine of 1975 forecast by the Paddock brothers—that we would see millions of famine deaths in the U.S. on television in the 1970s—was followed instead by gluts in agricultural markets. Paul Ehrlich's primal scream about "What will we do when the [gasoline] pumps run dry?" was

followed by gasoline cheaper than since the 1930s. The Great Lakes are not dead; instead they offer better sport-fishing than ever. The main pollutants, especially the particulates which have killed people for years, have lessened in our cities. (Socialist countries are a different and tragic environmental story, however!)

FIGURE 5: NATIONAL AMBIENT CONCENTRATIONS OF POLLUTANTS: USA, 1960-90

DAMAGE OF WRONG FORECASTS

The wrong forecasts of shortages of copper and other metals have not been harmless, however. They have helped cause economic disasters for mining companies and for the poor countries which depend upon mining, by misleading them with unsound expectations of increased prices; similarly with airplane design, U.S. government-mandated mileage-per-gallon standards (CAFE) have misdirected valuable resources. But nothing has reduced the doomsayers' credibility

with the press or their command over the funding resources of the federal government.

FIGURE 6: NATIONAL AMBIENT WATER QUALITY IN RIVERS AND STREAMS, USA, 1973-90: FECAL CALIFORNIA BACTERIA (200+ CELLS PER 100 ML)

Let's dramatize these sets of changes with a single anecdote. The trend toward a better life can be seen in most of our own families if we look. For example, I have mild asthma. Recently I slept in a home where there was a dog, and in the middle of the night I woke with a bad cough and shortness of breath. When I realized that it was caused by the dog-dander, I took out my twelve-dollar pocket-inhaler, good for 3000 puffs, and took one puff. Within ten minutes my lungs were clear. A small miracle. Forty years ago I would have been sleepless and miserable all night, and I would have had to give up the squash-playing that I love so much because exercise causes my worst asthma in the absence of an inhaler. ...Or diabetes. If your child had diabetes a hundred years ago, you had to watch helplessly as the child went blind and died early. Now injections, or even pills, can give the child almost as long and healthy a life as other children. ...Or glasses. Centuries ago you had to give up reading when your

eyes got dim as you got to be 40 or 50. Now you can buy magnifying glasses at the drugstore for nine dollars. And you can even wear contact lenses for eye- problems and keep your vanity intact. Is there not some condition in your family that in earlier times would have been a lingering misery or a tragedy, that nowadays our increasing knowledge has rendered easily bearable?

With respect to population-growth: A dozen competent statistical studies, starting in 1967 with an analysis by Nobel prizewinner Simon Kuznets, agree that there is no negative statistical relationship between economic growth and population- growth. There is strong reason to believe that more people have a positive effect in the long run.

Population-growth does not lower the standard of living—all the evidence agrees. And the evidence supports the view that population-growth raises it in the long run.

Incidentally, it was those statistical studies that converted me in about 1968 from working in favor of population-control to the point of view that I hold today. I certainly did not come to my current view for any political or religious or ideological reason.

The basic method is to gather data on each country's rate of population-growth and its rate of economic growth, and then to examine whether—looking at all the data in the sample together—the countries with high population-growth rates have economic growth rates lower than average, and countries with low population-growth-rates have economic growth rates higher than average. All the studies agree in concluding that this is not so; there is no correlation between economic growth and population-growth in the intermediate run.

Of course one can adduce cases of countries that seemingly are exceptions to the pattern. It is the genius of statistical inference, however, to enable us to draw valid generalizations from samples that contain such wide variations in behavior. The exceptions can be useful in alerting us to possible avenues for further analysis, but as long as they are only exceptions, they do not prove that the generalization is not meaningful or useful.

POPULATION-DENSITY FAVORS ECONOMIC GROWTH

The research-wise person may wonder whether population-density is a more meaningful variable than population-growth. And indeed, such studies have been done. And again, the statistical evidence directly contradicts the common-sense conventional wisdom. If you make a chart with population- density on the horizontal axis and either the

income-level or the rate of change of income on the vertical axis, you will see that higher density is associated with better rather than poorer economic results.

You can check for yourself: fly over Hong Kong—just a few decades ago a place seemingly without prospects because of insoluble resource-problems—and you will marvel at the astounding collection of modern high-rise apartments and office buildings. Take a ride on its excellent smooth-flowing highways for an hour or two, and you will realize that a very dense concentration of human beings does not prevent comfortable existence and exciting economic expansion—as long as the economic system gives individuals the freedom to exercise their talents and to take advantage of opportunities. And the experience of Singapore demonstrates that Hong Kong is not unique. Two such examples do not prove the case, of course. But these dramatic illustrations are backed by the evidence from the aggregate sample of countries, and hence do not mislead us.

(Hong Kong is a special thrill for me because I first saw it in 1955 when I went ashore from a U. S. Navy destroyer. At the time I felt great pity for the thousands who slept every night on the sidewalks or on small boats. It then seemed clear to me, as it must have to almost every observer, that it would be impossible for Hong Kong to surmount its problems—huge masses of impoverished people without jobs, total lack of exploitable natural resources, more refugees pouring across the border each day. But upon returning in 1983, I saw bustling crowds of healthy, vital people full of hope and energy. No cause for pity now.

The most important benefit of population-size and growth is the increase it brings to the stock of useful knowledge. Minds matter economically as much as, or more than, hands or mouths. Progress is limited largely by the availability of trained workers. The more people who enter our population by birth or immigration, the faster will be the rate of progress of our material and cultural civilization.

Here we need a qualification that tends to get overlooked: I do not say that all is well everywhere, and I do not predict that all will be rosy in the future. Children are hungry and sick; people live out lives of physical or intellectual poverty, and lack of opportunity; war or some new pollution may finish us off. What I am saying is that for most relevant economic matters I have checked, the aggregate trends are improving rather than deteriorating.

Also, I don't say that a better future happens automatically or

without effort. It will happen because women and men will struggle with problems with muscle and mind, and will probably overcome, as people have overcome in the past—*if the social and economic system gives them opportunity to do so.*

THE EXPLANATION OF THESE AMAZING TRENDS

Now we need some theory to explain how it can be that economic welfare grows along with population, rather than humanity being reduced to misery and poverty as population grows.

The Malthusian theory of increasing scarcity, based on supposedly-fixed resources—the theory that the doomsayers rely upon—runs exactly contrary to the data over the long sweep of history. Therefore it makes sense to prefer another theory.

The theory that fits the facts very well is this: More people, and increased income, cause problems in the short run. Short-run scarcity raises prices. This presents opportunity, and prompts the search for solutions. In a free society, solutions are eventually found. And in the long run the new developments leave us better off than if the problems had not arisen.

To put it differently, in the short-run, more consumers mean less of the fixed available stock of goods to be divided among more people. And more workers laboring with the same fixed current stock of capital mean that there will be less output per worker. The latter effect, known as "the law of diminishing returns," is the essence of Malthus' theory as he first set it out.

But if the resources with which people work are not fixed over the period being analyzed, then the Malthusian logic of diminishing returns does not apply. And the plain fact is that, given some time to adjust to shortages, the resource-base does not remain fixed. People create more resources of all kinds.

When we take a long-run view, the picture is different, and considerably more complex, than the simple short-run view of more people implying lower average-income. In the very long run, more people almost surely imply more available resources and a higher income for everyone.

I suggest you test this idea against your own knowledge: Do you think that our standard of living would be as high as it is now if the population had never grown from about four million human beings perhaps ten thousand years ago? I don't think we'd now have electric light or gas heat or autos or penicillin or travel to the moon or our

present life-expectancy of over seventy years at birth in rich countries, in comparison to the life-expectancy of 20 to 25 years at birth in earlier eras, if population had not grown to its present numbers.

SCARCITY AND DISCOVERY

Consider this example of the process by which people wind up with increasing availability rather than decreasing availability of resources. England was full of alarm in the 1600s at an impending shortage of energy due to the deforestation of the country for firewood. People feared a scarcity of fuel for both heating and for the iron industry. This impending scarcity led to the development of coal.

Then in the mid-1800s the English came to worry about an impending coal crisis. The great English economist, Jevons, calculated that a shortage of coal would bring England's industry to a standstill by 1900; he carefully assessed that oil could never make a decisive difference. Triggered by the impending scarcity of coal (and of whale oil, whose story comes next) ingenious profit-minded people developed oil into a more desirable fuel than coal ever was. And in 1990 we find England exporting both coal and oil.

Another element in the story: Because of increased demand due to population-growth and increased income, the price of whale oil for lamps jumped in the 1840s, and the U.S. Civil War pushed it even higher, leading to a whale oil "crisis." This provided incentive for enterprising people to discover and produce substitutes. First came oil from rapeseed, olives, linseed, and camphene oil from pine trees. Then inventors learned how to get coal oil from coal. Other ingenious persons produced kerosene from the rock oil that seeped to the surface, a product so desirable that its price then rose from \$.75 a gallon to \$2.00. This high price stimulated enterprisers to focus on the supply of oil, and finally Edwin L. Drake brought in his famous well in Titusville, Pennsylvania. Learning how to refine the oil took a while. But in a few years there were hundreds of small refiners in the U.S., and soon the bottom fell out of the whale oil market, the price falling from \$2.50 or more at its peak around 1866 to well below a dollar. And in 1993 we see Great Britain exporting both coal and oil.

Here we should note that it was not the English government that developed coal or oil, because governments are not effective developers of new technology. Rather, it was individual entrepreneurs who sensed the need, saw opportunity, used all kinds of available information and ideas, made lots of false starts which were very costly

to many of those individuals but not to others, and eventually arrived at coal as a viable fuel—because there were enough independent individuals investigating the matter for at least some of them to arrive at sound ideas and methods. And this happened in the context of a competitive enterprise system that worked to produce what was needed by the public. And the entire process of impending shortage and new solution left us better off than if the shortage problem had never arisen.

THE ROLE OF ECONOMIC FREEDOM

Here we must address another crucial element in the economics of resources and population—the extent to which the political-social-economic system provides personal freedom from government-coercion. Skilled persons require an appropriate social and economic framework that provides incentives for working hard and taking risks, enabling their talents to flower and come to fruition. The key elements of such a framework are economic liberty, respect for property, and fair and sensible rules of the market that are enforced equally for all.

The world's problem is not too many people, but lack of political and economic freedom. Powerful evidence comes from an extraordinary natural experiment that occurred starting in the 1940s with three pairs of countries that have the same culture and history, and had much the same standard of living when they split apart after World War II—East and West Germany, North and South Korea, Taiwan and China. In each case the centrally planned communist country began with less population "pressure," as measured by density per square kilometer, than did the market-directed economy. And the communist and non-communist countries also started with much the same birth rates.

The market-directed economies have performed much better economically than the centrally-planned economies. The economic-political system clearly was the dominant force in the results of the three comparisons. This powerful explanation of economic development cuts the ground from under population-growth as a likely explanation of the speed of nations' economic development.

THE ASTOUNDING SHIFT IN THE SCHOLARLY CONSENSUS

So far we have been discussing the factual evidence. But in 1996 there is an important new element not present twenty years ago. The

scientific community of scholars who study population-economics now agrees with almost all of what is written above. The statements made above do not represent a single lone voice, but rather the current scientific consensus.

The conclusions offered earlier about agriculture and resources and demographic trends have always represented the consensus of economists in those fields. And now the consensus of population-economists also is now not far from what is written here.

In 1986, the U.S. National Research Council and the U.S. National Academy of Sciences published a book on population-growth and economic development prepared by a prestigious scholarly group. This "official" report reversed almost completely the frightening conclusions of the previous 1971 NAS report. "Population growth at most a minor factor...." "The scarcity of exhaustible resources is at most a minor constraint on economic growth," it now says. It found benefits of additional people as well as costs.^{iv}

A host of review-articles by distinguished economic demographers in the past decade have confirmed that this "revisionist" view is indeed consistent with the scientific evidence, though not all the writers would go as far as I do in pointing out the positive long-run effects of population-growth. The consensus is more toward a "neutral" judgment. But this is a huge change from the earlier judgment that population-growth is economically detrimental.

By 1996, anyone who confidently asserts that population-growth damages the economy must turn a blind eye to the scientific evidence.

SUMMARY AND CONCLUSION

In the short run, all resources are limited. An example of such a finite resource is the amount of space allotted to me. The longer run, however, is a different story. The standard of living has risen along with the size of the world's population since the beginning of recorded time. There is no convincing economic reason why these trends toward a better life should not continue indefinitely.

The key theoretical idea is this: The growth of population and of income create actual and expected shortages, and hence lead to price run-ups. A price-increase represents an opportunity that attracts profit-minded entrepreneurs to seek new ways to satisfy the shortages. Some fail, at cost to themselves. A few succeed, and the final result is that we end up better off than if the original shortage-problems had never arisen. That is, we need our problems though this does not

imply that we should purposely create additional problems for ourselves.

I hope that you will now agree that the long-run outlook is for a more abundant material life rather than for increased scarcity, in the United States and in the world as a whole. Of course, such progress does not come about automatically. And my message certainly is not one of complacency. In this I agree with the doomsayers—that our world needs the best efforts of all humanity to improve our lot. I part company with them in that they expect us to come to a bad end despite the efforts we make, whereas I expect a continuation of humanity's history of successful efforts. And I believe that their message is self-fulfilling, because if you expect your efforts to fail because of inexorable natural limits, then you are likely to feel resigned; and therefore to literally resign. But if you recognize the possibility—in fact the probability—of success, you can tap large reservoirs of energy and enthusiasm.

Adding more people causes problems, but people are also the means to solve these problems. The main fuel to speed the world's progress is our stock of knowledge, and the brakes are (a) our lack of imagination, and (b) unsound social regulations of these activities. The ultimate resource is people—especially skilled, spirited, and hopeful young people endowed with liberty—who will exert their wills and imaginations for their own benefit, and so inevitably they will benefit not only themselves but the rest of us as well.

NOTES

i. National Research Council, Committee on Population, and Working Group on Population Growth and Economic Development. *Population Growth and Economic Development: Policy Questions* (Washington, D.C.: National Academy Press, 1986).

ii. J. L. Simon, *The Ultimate Resource 2* (Princeton: Princeton Univ. Press, revised edition, 1996 [1981]).

iii. T. W. Schultz, "The Declining Economic Importance of Land" in *Economic Journal* 61 (1951) 725-40.

iv. National Research Council, *op. cit.*