

Summer 2003

Response to Mokyr - 2

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Recommended Citation

Ferderer, J. Peter (2003) "Response to Mokyr - 2," *Macalester International*: Vol. 13, Article 10.

Available at: <http://digitalcommons.macalester.edu/macintl/vol13/iss1/10>

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Response

J. Peter Ferderer

Over the past two centuries, material living standards have increased dramatically. In 5000 BC, annual per capita income for the world was about \$130 (year 2000 dollars).¹ In 1500 AD, 6500 years later, per capita income had barely risen and stood at \$175. By 1900, after the Industrial Revolution had begun to work its magic, per capita income rose to \$850. Today, world per capita income stands at around \$8,200—almost ten times larger than it was 100 years earlier! Over this same 100-year period, world population has increased from 1.6 to 6.1 billion people, indicating a relief from want on a scale unimaginable a few centuries earlier.

Professor Mokyr argues persuasively that the incredible rise in material living standards can be largely attributed to technological progress and the institutional development that made this progress possible. The list of breakthroughs over just the past 130 years is stunning: electricity (1873), automobile (1886), airplane (1903), radio (1906), assembly-line production (1908), refrigeration (1913), television (1926), radar (1934), computer (1946), satellite (1958), laser (1960), micro-processor (1971), personal computer (1975), and the worldwide web (1991).²

Nevertheless, not all nations have shared equally in the growing prosperity and, as we begin the 21st century, the world is increasingly divided into the “haves” and “have-nots.” How do we explain this incredible disparity? Why is it that not all nations have taken advantage of technological change to enrich their citizens?

The first section of this essay summarizes Mokyr’s answers to these questions. His analysis is first-rate, as one might expect from one of the world’s leading economic historians. However, it focuses primarily on the Industrial Revolution while the gap between rich and poor nations has grown most dramatically in the past several decades. The second section of the essay examines the link between technology, institutions, and economic growth during the 20th century. Section three offers some observations about the conclusions drawn by Professor Harvey in his keynote address to the International Roundtable. The final section offers some concluding remarks.

Mokyr begins by outlining the three dominant theories of economic growth. The first, which economists refer to as “Solowian Growth,” focuses on the role of capital accumulation. According to this perspective, the virtues of thrift and abstinence are key to the wealth of nations. A country that defers consumption and saves more is able to accumulate more machines and factories and is thus able to produce more output. Anyone who has traveled to China in recent years has seen this process at work. Construction cranes dot the urban landscape and new buildings are popping up at an astounding rate.³ The one-child-per-family policy in China also has Solowian motivations. By lowering population growth, there are fewer mouths to feed and each worker has more capital at his or her disposal.

The second theory of economic growth is called “Northian growth.” In this case, changes in institutions—the formal and informal rules of the economic game and the penalties for their violation—raise living standards by expanding the potential for specialization and gains from trade. A recent example is the 1994 North American Free Trade Agreement (NAFTA), which removed many of the governmentally imposed trade barriers between the United States, Canada, and Mexico.

The final theory, what economists refer to as “Shumpeterian growth,” emphasizes technological change. Technology advances when new “ideas” about how to transform raw materials into finished goods are developed. For example, the discovery of how to make steel from iron ore is technology. So is the idea, codified in a blueprint, of how to use steel to build skyscrapers. The reason technology is such a potent force in development is that it is *non-rival*. If the Japanese discover a better way to make cars, Ford and GM can employ these techniques without diminishing the ability of the Japanese to use them. That is, unlike other factors of production, technology can be used in two places at the same time.

According to Mokyr, the Enlightenment triggered the Industrial Revolution and the epic of modern economic growth in two different ways. First, it led to great advances in science that expanded our *background knowledge* and made it easier to develop new technologies. However, causality can run in both directions. Advances in science set the stage for the invention of the computer and computers allow us to improve science. As Mokyr states: “Technology leads to more science just as much as science provides the knowledge base for new technol-

ogy. It has created a positive feedback circle the like of which has never been seen before.”

Second, the Enlightenment produced the utilitarian notion that the economic rules of the game should be judged by the degree to which they serve the material well-being of society. A classic example of this is the development of the patent system. Looked at from a static perspective, patents reduce economic efficiency because they give their holder monopoly power. To use a modern example, Bill Gates is richer and the rest of us are poorer because the law prevents would-be entrepreneurs from selling knock-offs of Word© at lower prices.⁴ From a dynamic perspective, however, patents make us better off because they raise the incentive to create technology.

As in the case with science and technology, Mokyr argues that causality runs in both directions so that better technology leads to institutional development. However, Mokyr is not entirely clear about how advances in technology lead to better institutions. Perhaps a modern example is the Internet, which allows for greater information dissemination that promotes political activism and the establishment of a better set of “rules” governing the economic system. In fact, some have argued that the anti-globalization movement is an example of this dynamic. However, it is not at all clear that advances in technology necessarily lead to “better” institutions. As history shows, many of the ideas pushed by the anti-globalization movement would actually lead to falling living standards.

To explain the modern divide between rich and poor nations, Mokyr, like a growing number of economists, emphasizes institutional differences.⁵ That is, the primary reason for the great disparities in wealth across nations is that the rules of the game in rich countries promote economic growth while those in poor nations do not. Moreover, Mokyr observes:

These institutions tend to be persistent and unlike knowledge, better institutions do not easily ‘diffuse’ across national boundaries. It turns out to be easier for countries such as Pakistan to import Western nuclear technology than to import institutions that will allow its economic and political processes to allocate resources in an efficient way and to avoid the worst excesses of rent-seeking.

Positive feedback between science, technology, and institutions have led to a condition in which success breeds more success in some coun-

tries, while in others, failure breeds more failure. In other words, there are multiple equilibria. Once a country converges to an equilibrium—and the specific equilibrium a country finds itself stuck in can be a matter of luck, geography, colonization, and other external forces—positive feedback and path dependence make it difficult to puncture.

My goal in this section is to outline how economists have gone about exploring the link between institutions and economic performance in the post-World War II era. In the end, I believe this leaves me somewhat more optimistic than Mokyr appears to be about the prospects of poor nations.

While it is easy to despair about the great divide between rich and poor countries, it is important to keep in mind that the grouping is not fixed. One hundred years ago, Argentina and Canada had per capita GDPs that were roughly equal. Today, Argentina's per capita GDP is less than one-half of Canada's, and it provides a clear example of a country whose living standard has fallen in relative terms.⁶

In contrast, several Southeast Asian countries have rapidly moved in the other direction. Consider the case of South Korea. When World War II ended, Korea was dirt poor with a per capita income of \$100—a level that made it poorer than many African countries.⁷ Korea had just suffered through 45 years of Japanese colonization, was soon to be split in half with much of the manufacturing and energy generation capacity remaining in the north, and had the highest ratio of people to arable land of any nation on earth. Fifty years later, South Korea has joined the club of rich nations and has a per capita income that is 20 times that of its communist neighbor to the north.

It is interesting to note that when England went through the Industrial Revolution, it took 58 years for per capita GDP to double during the period of most rapid economic growth (1780–1838). When the United States went through its Industrial Revolution, it took 47 years (1839–86) for per capita GDP to double. By contrast, South Korea has doubled its per capita GDP about every 11 years since the 1960s.⁸ What these statistics suggest is that countries that develop later can develop faster. Why? It is because they can learn from those who went before them. That is, they can adopt existing technologies rather than invent them from scratch.

How did the East Asians achieve such miraculous growth over such a short span of history? They read Adam Smith's *Wealth of Nations*, a product of the Scottish Enlightenment, and applied its basic precepts. They paid heed not only to the sections that discuss the virtues of the "invisible hand" of the marketplace, though that was key to their success, but also to those that discuss the role of government in the provision of *public goods* and internalization of *externalities* (what modern economists refer to as *market failures*). Then, in the late 1950s, the South Koreans and other Asian "Tigers" overhauled the "rules of the game" that governed their economic systems.⁹

First, they scaled back government-mandated minimum wages (or what are now referred to as "living wages" in the United States) to make exports more competitive. In this instance, they let the "invisible hand" operate in labor markets.

Second, they liberalized trade. At first, most of the tariff reduction was only for imported capital goods that were used to produce exports. In this instance, the South Koreans used international trade as a mechanism for diffusing Western technology embodied in capital goods. Tariffs and quotas on imported consumption goods remained in place and served as a tax on consumption. This allowed the South Koreans to save more and accumulate capital at a more rapid rate. In recent years, many of these barriers have also been removed and South Koreans are now freer to enjoy the fruits of their labor.

Third, the South Korean government provided universal access to primary education. They recognized, like Adam Smith did long ago, that private markets sometimes fail to produce levels of goods and services that maximize social welfare. That is, people "underconsume" education because they do not take into account the positive spillovers of their decision on society (e.g., a more informed electorate, less crime, the possibility of producing another Thomas Edison, etc.). Governments can improve market outcomes by subsidizing education and making it broadly available. When they do so, human capital rises and technology transfer from abroad is made easier. The Southeast Asians recognized this early. Unfortunately, this has not been the case in many parts of Latin America where access to primary education has not been universal.

Fourth, the South Korean government became smaller and did not live beyond its means. This raised savings and promoted private capital accumulation. In addition, fiscal discipline has helped the South

Koreans avoid the currency crises that have plagued Latin America in the past few decades.

One important lesson to draw from the East Asian experience is that there is great hope for poor nations. As the South Korean example shows, countries do not have to wait 250 years to achieve the living standards seen in the U.S., Canada, or Germany. By adopting the right institutions, poor countries can experience rapid technological progress and grow at fast rates.

Since the collapse of communism over a decade ago, we have seen a seismic shift in the “rules of the game” that govern economic systems around the world. Nevertheless, considerable institutional variation remains. Economists have recently attempted to measure these differences and explore their relationship with living standards. For example, an ongoing project undertaken by the Heritage Foundation and the *Wall Street Journal* uses an Index of Economic Freedom (IEF) to measure institutional differences across countries.¹⁰ Individuals are economically free “if property that they have legally acquired is protected from invasions and intrusions by others, and if they are free to use, exchange and give away their property so long as their actions do not violate other people’s similar rights.”¹¹

The index measures four areas in which governments influence property rights and exchange:

- Government protection of money as a store of value, measured by the volatility of inflation, the growth rate of monetary aggregates, and the rights of citizens to hold foreign-currency accounts.
- Government influence in production and consumption decisions, measured by the size of the state-controlled sector and the pervasiveness of price controls.
- Freedom to keep earnings, measured by transfer payments as a share of GDP, the level of marginal tax rates, and other factors.
- Openness to foreign trade, measured by tariff rates, the size of black markets in foreign exchange, restrictions on capital flows, and the size of trade flows.

When the IEF is correlated with income, the findings are stunning. In 1999, the ten countries receiving the highest rankings for economic freedom (Hong Kong, Singapore, Bahrain, New Zealand, Switzerland, the United States, Ireland, Luxembourg, Taiwan, and the United Kingdom) had an average annual per capita GDP, in 1996 dollars, of

\$22,292. In contrast, the ten countries with the lowest IEF rankings (North Korea, Cuba, Libya, Laos, Iraq, Somalia, Bosnia, Iran, Congo, and Vietnam) had an average per capita income of \$2,100. While the causality between institutions and income can run in both directions, as Mokyr points out, the strong correlation between the two is not in doubt.

Based on factors measured by the IEF, many Latin American countries have done poorly in recent decades. In Argentina, for example, monthly inflation rates reached 200 percent in the 1980s, as the government ran huge deficits paid for by printing money. Such high inflation produces a dramatic redistribution of wealth from those who are unable to protect themselves from it—usually the poor who hold cash—to those who have access to inflation hedges. It is ironic that much of the criticism of the International Monetary Fund (IMF) in recent years has come from those who claim to speak for the poor in countries like Argentina and who fault the IMF for requiring governments to balance their budgets before they are eligible for IMF loans.

As recent demonstrations against “globalization” and “corporate capitalism” suggest, a large number of people would certainly disagree with this last point. On many college campuses the ruling ideology is one in which poor nations are viewed as the victims of the IMF and other Western organizations (i.e., corporations, governments, the World Bank, etc.), and many turn a blind eye to economic history and the lessons it teaches us. In my view, there is a problem in the American academy and we risk turning what has been a positive feedback loop—running from technology to institutional development—into a negative one. I return to this theme below.

In his keynote address, David Harvey takes a rather pessimistic view of 20th-century technological change and economic growth. First, he argues that our “fetish of technology” causes us to ignore its negative impact upon social relations and our relationship with nature. For example, the invention of the automobile and the organizational form used to produce it, the corporation, have soured the relationship between capital and labor. In addition, technological change (e.g., robotics) has disempowered workers by increasing unemployment. Second, the fantasy that technology can shrink space and time has increased stress and reduced the quality of our lives. Third, the eco-

conomic boom of the 1990s was built on “fictitious capital” and we are now in for a 1930s-style crisis.

Looking at the experience of the typical American worker over the past 130 years, it is difficult to argue that we are worse off. If you go back to the year 1870, the typical American began work at the age of 13 years, labored 61 hours per week, retired at death, and had a life expectancy of 62.5 years (if he or she reached the age of 20).¹² By 1950, after 80 years of rapid technological progress and growth of per capita incomes, the typical American began work at age 17.6 years, worked 39.8 hours per week, spent 3.5 years in retirement, and had a life expectancy of 72 years. By 1996, the typical American began work when they were 19.4 years old, worked 34.4 hours per week, spent 14.9 years in retirement, and had a life expectancy of 77.1 years.

How many of us would trade places with our grandparents or even our parents? While many of us complain about the long hours we put in and the stress in our lives, there is no question that, on average, we work less, enjoy more leisure time, and live longer than those who came before us.

What about the argument that technological change has hurt social relations? First, the distinction between “owners of capital” and “labor” has become blurred in recent decades as now over 50 percent of American adults own shares of stock in corporations. Second, the argument that technological change has raised unemployment fails to make an important distinction. Certainly, technological change produces *temporary* increases in unemployment as workers move from contracting industries to expanding ones. However, unemployment falls *over time* as people respond to market incentives and acquire the skills required by the new technology. If this were not the case, then the unemployment rate would be extraordinarily high after a century of unprecedented technological change. Of course, in some locations, such as continental Europe, unemployment rates have remained high for decades. However, the culprit here is not technological change but rather labor market institutions (e.g., high minimum wages, large employment taxes, and generous benefits for the unemployed) that stifle market forces.

Third, a strong case can be made that technological change has actually improved social relations in many areas and has been a potent source of liberation. Consider the case of women. In the 1970s, feminist economists argued that technological innovations, such as the washing machine, contributed to the women’s movement by freeing up time

that could be used for other purposes, such as social activism. For instance, it would have been less likely that Betty Friedan could have written *The Feminine Mystique* if she had to trudge down to the river each day to do the family's laundry. In addition, the invention of the birth control pill has given women greater control over their bodies and reproduction, thus allowing them to better compete with men in labor markets. When you think about it, why is it that women won the right to vote in 1920? Why not 1820 or 1720? Is it mere coincidence that women gained greater political power immediately following a period of intense globalization and technological progress that dramatically raised material living standards?

Finally, Harvey's claim that the economic boom of the 1990s was built on "fictitious capital" simply does not hold water. We saw a rapid accumulation of both physical and human capital during the 1990s in response to technological progress that increased the returns to both forms of capital. Even during the recent recession, labor productivity continued to rise at historically high rates. While it is easy to make such doom-and-gloom assessments in the post-Enron era, the facts suggest that the 1990s was a decade of unprecedented economic growth. Across a wide spectrum of social indicators — crime rates, poverty rates, home ownership, unemployment rates, inflation, etc. — considerable progress has been made.

There is truth to the argument that the link between economic growth and material well-being, properly defined, has become more tenuous in recent decades as externalities (e.g., pollution and congestion) and other market failures have driven a wedge between the two.¹³ And it is important that we continually question whether or not we are making *genuine* progress. However, it is also essential that we recognize the gains that have been made and the institutional source of these gains.

Technological progress is a double-edged sword. With great benefits come great risks. The prospect of a nuclear winter is perhaps the starkest example of the latter. As Mokyr puts it: "Institutions and the human behavior that gives rise to them are far more difficult to refine and perfect than human control over the natural world. Without those improvements, however, the enormous control that *homo sapiens* now

exert over the forces of nature may become a frightful development indeed.”

Nevertheless, there is little doubt that the rules of the game, broadly referred to as “capitalism,” have dramatically improved the standard of living of billions of people over the past two centuries. While this observation seems obvious to most economists, it is not well accepted in the general population. This is particularly true on college campuses where the rhetoric against “corporate capitalism” and “globalization” is especially fervent. As Joseph Schumpeter pointed out long ago, the virtues of capitalism—most notably the continuous but gradual rise in material living standards—occur in the long run and are not transparent to most people without deeper reflection.¹⁴ In contrast, the defects of capitalism, such as inequality and monopoly profits, are short-run and visible to all. Consequently, the philosophical case for capitalism is difficult to appreciate.

The social sciences play an important role in the feedback loop that runs from technological change to institutional development. Here at Macalester College, students emerge from Carnegie Hall after four years of deep reflection about the rules of the game that govern society—an experience funded by the vast wealth produced by capitalism and the technological advances that it creates—and enter the world primed to make institutional change. United Nations Secretary-General Kofi Annan is but one example of this process at work. Given the important role we play in this process, it is essential that we convey to our students an accurate and clear sense of the historical trajectories that have led to the current state of affairs. It has been delightful to have Professor Joel Mokyr visit our campus and join us on this important mission.

Notes

1. Joel Cohen, *How Many People can the Earth Support?* (New York: Norton, 1995).
2. W. Michael Cox and Richard Alm, *Myths of Rich and Poor* (New York: Basic Books, 1999), Table 8.2a.
3. When I traveled to China during the summer of 2001, the local lore claimed that over three-quarters of the world’s cranes were operating there.
4. In economics, this inefficiency is referred to as “dead-weight loss.”
5. To get a sense of this developing consensus, see William Easterly, *The Elusive Quest for Growth: Economists’ Adventures and Misadventures in the Tropics* (Cambridge, Mass.: The MIT Press, 2001).
6. See Francois R. Velde and Marcelo Veracierto, “Dollarization in Argentina,” *Economic Perspective* (Federal Reserve Bank of Chicago, First Quarter, 2000), pp. 24–35.

7. Takatoshi Ito and Anne O. Krueger, *Growth Theories in Light of the East Asian Experience* (Cambridge, Mass.: National Bureau of Economic Research, 1995).
8. *The Economist* (16 October 1993). Those who have not paid attention recently might object that the period of tremendous economic growth came to an end with the 1997 Asian financial crisis, much as Karl Marx might have predicted. However, despite a temporary setback, the South Korean economy continues to grow rapidly. Between the end of 1996 and the end of 2001 — a five-year period that includes the crisis episode — real GDP has grown by over 25 percent!
9. Takatoshi Ito and Anne O. Krueger, *Growth Theories in Light of the East Asian Experience*, pp. 16–18.
10. Bryan T. Johnson, Kim R. Holmes, and Melanie Kirkpatrick, *1999 Index of Economic Freedom* (The Heritage Foundation and *The Wall Street Journal*, 1999).
11. *The Economist* (13 January 1996): 21.
12. W. Michael Cox and Richard Alm, *Myths of Rich and Poor*, Tables 3.1 and 3.2.
13. Richard Bronk, *Progress and the Invisible Hand* (London: Little, Brown, 1998). Also, see *The Economist* (31 July 1999): 66.
14. Joseph Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper and Row, 1942).