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Won't innovation, substitution, and efficiency keep us growing? - Conclusions

by **Richard Heinberg**

This article is the summary of Chapter 4 of Richard Heinberg's new book 'The End of Growth', which is set for publication by [New Society Publishers](http://www.newsociety.com/bookid/4098) (<http://www.newsociety.com/bookid/4098>) in September 2011. This chapter explores the possibilities of innovation, substitution and efficiency to maintain economic growth.

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The near-religious belief that economic growth depends not on energy and resources, but solely on increasing innovation, efficiency, trade, and division of labor, can sometimes lead economists to say silly things.

Some of the silliest and most extreme statements along these lines are to be found in the writings of the late Julian Simon, a longtime business professor at the University of Illinois at Urbana-Champaign and Senior Fellow at the Cato Institute. In his 1981 book *The Ultimate Resource*, Simon declared that natural resources are effectively infinite and that the process of resource substitution can go on forever. There can never be overpopulation, he declared, because having more people just means having more problem-solvers.



How can resources be infinite on a small planet such as ours? Easy, said Simon. Just as there are infinitely many points on a one-inch line segment, so too there are infinitely many lines of division separating copper from non-copper, or oil from non-oil, or coal from non-coal in the Earth. Therefore, we cannot reliably quantify how much copper, oil, coal, or neodymium or gold there really is in the world. If we can't measure how much we have of these materials, that means the amounts are not finite—thus they are infinite.[1]

would have let him get away with it. Clearly, an infinite number of dividing lines between copper and non-copper is not the same as an infinite quantity of copper. While a few critics pointed this out (notably Herman Daly), Simon's book was widely praised nevertheless.[2] Why? Because Simon was saying something that many people wanted to believe.

Simon himself is gone, but his way of thinking is alive and well in the works of Bjorn Lomborg, author of the bestselling book *The Skeptical Environmentalist* and star of the recent documentary film *Cool It*. [3] Lomborg insists that the free market is making the environment ever healthier, and will solve all our problems if we just stop scaring ourselves needlessly about running out of resources.



It's a convenient "truth"—a message that's appealing not only because it's optimistic, but because it confirms a widespread, implicit belief that technology is equivalent to magic and can do anything we wish it to. Modern industrial technology has certainly accomplished miracles, but we tend to ignore the fact that it is, for the most part, merely a clever set of means for using a temporary abundance of cheap fossil energy to speed up and economize things we had already been doing for a very long time.

Many readers will say it's absurd to assert that technology is subject to inherent limits. They may recall an urban legend according to which the head of the U.S. Patent Office in 1899 said that the office should be closed because everything that could be invented already had been invented (there's no evidence he actually did say this, by the way). Aren't claims about limits to substitution, efficiency, and business development similarly wrong-headed now?

Not necessarily. Humans have always had to face social as well as resource limits. While the long arc of progress has carried us from knives of stone to Predator drones, there have been many reversals along the way. Civilizations advance human knowledge and technical ability, but they also tend to generate levels of complexity they cannot support beyond a certain point. When that point is reached, civilizations decline or collapse.[4]

I am certainly not saying that we humans won't continue to invent more new kinds of tools and processes. We are a cunning breed, and invention is one of our species' most effective survival strategies. However, the kinds of inventions we came up with in the 19th and 20th centuries were suited to human needs and interests in a world where energy and materials were cheap and amounts available were quickly expanding. Inventions of the 21st century will be ones suited to a world of expensive, declining energy and materials.

References

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2. Herman Daly, "Ultimate Confusion The Economics of Julian Simon," *Social Contract Journal* 13, no.3 (Spring, 2003).
3. Bjorn Lomborg, *The Skeptical Environmentalist* (Cambridge: Cambridge University Press, 2001); Bjorn Lomborg, *Cool It: The Skeptical Environmentalist's Guide to Global Warming* (New York: First Vintage Books, 2007); *Cool It*, movie by Ondi Timoner and Terry Botwick, 1019 Films, 2011.
4. Joseph A. Tainter, *The Collapse of Complex Societies*, New Studies in Archaeology, (Cambridge UK: Cambridge University Press. 1988).

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“Examine what is said, not who speaks”

Arabian Proverb

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Jerry McManus

It's interesting to look back a hundred years or so, when the industrial revolution was really getting into gear. Optimism in the wealthy resource rich countries was rampant, new machines were transforming life at a breakneck speed, people could easily imagine no limits to the future of humanity.

Even after the cataclysms of the world wars there were large expositions and world fairs that provided rich material for the popular imagination. A brief interlude occurred in the 70's, the energy crisis combined with failures of American political and military power created a deep undercurrent of disillusionment. That... [show more \(#\)](#)

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mmckinl

Yet another great piece by Heinberg.

I would consider the mantra of economic growth, not belief in magic, but a religion in its hold on America ...

Economic "growth" is first rail of politics. It has to be. Without growth the financial system crashes due to private bank fractional reserve banking.

The only antidote to geometric debt increase is geometric growth increase. It can be no other way.

As the physical limits of our planet collide with our need for infinite growth the financial system has stumbled and is soon to fall.

Economic activity will decline and large portions of... [show more \(#\)](#)

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Richard Benton

Modern technology hasnt performed miracles,at all Richard.You concede to much there.Certainly some amazing stuff.

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