Revisiting the Simon-Ehrlich Wager 40 Years On

Written by Marian L. Tupy and Gale L. Pooley, published on Oct. 13, 2020

It is 1980, and you are getting married. Your parents decide to celebrate your nuptials by inviting 100 guests to a wedding reception. The reception cost them $100 per person or $10,000 in total. Fast forward to 2018. Now it is you who is throwing a wedding reception for your child. The guest list has increased by 72 percent (some of the old folk are no longer around, but the cousins have exploded in number). That means that you are now catering to 172 people. The price per guest remained the same (suspend your disbelief and ignore inflation for now), and you expect to get a bill for $17,200. Instead, the bill comes to $4,816, which is less than half of what your parents paid for you. How is that possible, you ask the caterer? The caterer responds that for every one percent increase in attendance, the bill fell by one percent. And so, while the number of guests rose by 72 percent, your bill declined by 72 percent. Surely, things like that don't happen in real life, or do they?

In fact, that's exactly what has happened to the affordability of 50 basic commodities between 1980 and 2018. Over those 38 years, the world's population rose from 4.458 billion to 7.631 billion or 71.2 percent. Over the same time period, basic commodities, including energy, food,

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materials, and metals became 71.6 percent more affordable on average. For every one percent increase in population, in other words, resources became slightly more than one percent more abundant. Put differently, the time it took to earn enough money to buy one unit in that basket of 50 commodities in 1980 bought 3.62 units in 2018. The compounded growth rate of abundance came to 3.44 percent per annum. That means that the affordability of our basket of commodities doubled every 20.49 years. This relationship between population growth and resource abundance is deeply counterintuitive, yet it is no less true. The facts surprised us, and they will surprise you too.

Generations of people throughout the world have been taught to believe that there is an inverse relationship between population growth and availability of resources, which is to say that as population grows, resources become more "scarce." That was, historically speaking, true. In the animal world, a sudden increase in the availability of resources, such as grass after unusually plentiful rain, leads to an animal population explosion. The population explosion then leads to the exhaustion of resources. Finally, the exhaustion of resources leads to population collapse. If you take the Theory of Evolution seriously—and we do—you'll appreciate that human beings evolved from much humbler beginnings and were, as such, much more exposed to vicissitudes of fortune.

Over time, however, humans have developed sophisticated forms of cooperation that increase their wealth and chances of survival. Consider, for example, trade and exchange. As the British writer Matt Ridley observed in his 2010 book *The Rational Optimist: How Prosperity Evolves*, "There is strikingly little use of barter in any other animal species. There is sharing within families, and there is food-for-sex exchange in many animals including insects and apes, but there are no cases in which one animal gives an unrelated animal one thing in exchange for a different thing." Trade is particularly important during famines. A country struck by drought, for example, can purchase food from abroad. This is not an option available to other animals.

But the most important difference between people and nonhuman animals is our superior intelligence and the use of that intelligence to invent and to innovate. "In a way, everything is technology," noted one of the world's greatest economic historians Fernand Braudel (1902–1985) in his book *Civilization and Capitalism*. "Not only man's most strenuous endeavors but also his patient and monotonous efforts to make a mark on the external world; not only the rapid changes… but also the slow improvements in processes and tools, and those innumerable

actions which may have no immediate innovative significance but which are the fruit of accumulated knowledge."

And so, over many millennia of trial and error, we have accumulated a store of knowledge that has allowed us to reach escape velocity—from scarcity to abundance—somewhere toward the end of the 18th century. The Four Horsemen of the Apocalypse (war, famine, pestilence, and death) have not completely disappeared—that would be a miracle, not progress. But the world is incomparably richer than it was just two centuries ago. If you don't believe us, ponder for a moment the 768 types of breakfast cereal that you can buy at Walmart for just a few minutes of labor on a minimum wage.

We measure abundance in Time Prices. A Time Price is the length of time that a person is required to work in order to earn enough money to buy something. It is the money price divided by hourly income. Money prices are expressed in dollars and cents, while Time Prices are expressed in hours and minutes. For example, if a barrel of oil costs $75 and you earn $15 an hour, the Time Price will come to five hours. If oil falls to $60 a barrel and your income increases to $20 an hour, the Time Price will decrease to three hours. The money price falls by 20 percent, but because your hourly income rose by 33 percent, the Time Price will fall by 40 percent.

Time Prices make much more sense than money prices for at least three reasons. First, Time Prices avoid the contention and subjectivity of commonly-used inflation adjustments. Second, since innovation shows up in both lower prices and higher incomes (more productive people are better-paid people), Time Prices more fully capture the effects of innovation. Third, Time Prices are independent of currency fluctuations. Instead of gauging the standards of living in India and the United States by comparing the purchasing power parity adjusted prices of a gallon of milk in Indian rupees and American dollars, Time Prices provide a universal and standardized way (hours and minutes) to measure changes in well-being.

Our research into Time Prices and resource abundance began when we looked at updating the famous wager between the late University of Maryland economist Julian Simon and the Stanford University biologist Paul Ehrlich. The wager was based on the inflation-adjusted prices of five metals: chromium, copper, nickel, tin, and tungsten, and lasted from October 1980 to October 1990. Ehrlich predicted that because of population growth, metals would become

more expensive. Simon argued that because of population growth, metals would become cheaper.

Ehrlich thought like a biologist, who did not seem particularly interested in economics. “Since natural resources are finite, increasing consumption obviously must ‘inevitably lead to depletion and scarcity,’” he wrote. He continued:

> Currently there are very large supplies of many mineral resources, including iron and coal. But when they become “depleted” or “scarce” will depend not simply on how much is in the ground but also on the rate at which they can be produced and the amount societies can afford to pay, in standard economic or environmental terms, for their extraction and use. For most resources, economic and environmental constraints will limit consumption while substantial quantities remain… For others, however, global “depletion”—that is, decline to a point where worldwide demand can no longer be met economically—is already on the horizon. Petroleum is a textbook example of such a resource.

Simon, on the other hand, thought like an economist who understood the powers of incentives and the price mechanism to overcome resource shortages. Instead of the quantity of resources, he looked at the prices of resources. He saw resource scarcity as a temporary challenge that can be solved through greater efficiency, increased supply, development of substitutes, and so on. The relationship between prices and innovation, he insisted, is dynamic. Relative scarcity leads to higher prices, higher prices create incentives for innovations, and innovations lead to abundance. Scarcity gets converted to abundance through the price system. The price system functions as long as the economy is based on property rights, the rule of law, and free exchange. In relatively free economies, therefore, resources do not get depleted in the way that Ehrlich feared they would. In fact, resources tend to become more abundant.

Simon, as is well known, won his bet with Ehrlich when the real (which is to say inflation-adjusted) price of the five metals fell by 36 percent between October 1980 and October 1990. Simon’s victory would have been even more impressive had he used, as we do, Time Prices. Those fell by 55 percent between 1980 and 1990. In fact, when we extended the Simon-Ehrlich wager over many decades and greatly expanded the number of commodities analyzed, we found a consistent trend toward greater availability of resources relative to the cost of human labor. It

is, consequently, heartening that, in recent years, scholars have started to write about the age of abundance, a state of affairs in which "technology has the potential to significantly raise the basic standards of living for every man, woman, and child on the planet."

Unfortunately, it will take much more than a single wager between two scholars—or, for that matter, this article—to rid the world of the old and very pernicious idea that population growth and resource depletion go hand in hand. But, we have to start somewhere. And so, as you listen to the purveyors of doom on the television and the radio, and read apocalyptic predictions of humanity's future on Twitter and in the newspapers, bear in mind that with every hungry mouth comes a pair of hands and a brain capable of thought, planning, and innovation.

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