



Population growth leads to abundant resources

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In recent weeks, oil has been moving below \$50 a barrel — owing partly to concerns of oversupply and partly to concerns over a slowing global economy.

Petroleum has helped to fuel the global economy for more than a century, and its relative abundance today contradicts the doomsayers who feared “peak oil” in the past. Cheap oil also is a problem for the environmentalists, who fear that an oversupply of fossil fuels will undermine the global transition to green energy.

Yet petroleum is not special. Resources in general have become cheaper in inflation-adjusted terms — as well as relative to the cost of labor — over the last four decades. That’s all the more remarkable considering the world’s population has massively expanded over the same time period.

Resource depletion has been a hotly debated topic since the publication of Paul Ehrlich’s “The Population Bomb” in 1968. The Stanford University biologist warned that population growth would result in the exhaustion of resources and a global catastrophe.

“Since natural resources are finite,” he said some years later, “consumption obviously must ‘inevitably lead to depletion and scarcity’ ... Petroleum is a textbook example of such a resource.”

The late University of Maryland economist Julian Simon disagreed. In his 1981 book “The Ultimate Resource,” Simon argued humans were intelligent beings, capable of innovating their way out of shortages. And so we have. Fracking, to give just one example, has enabled us to tap previously inaccessible oil reserves, thus turning the United States into a fossil-fuel super-power.

Our findings in a recently published paper confirm Simon’s thesis. We revisited the debate by looking at 50 foundational commodities covering energy, food, materials and metals. Between 1980 and 2017, the real price of commodities fell by 36 percent on average.

Also, due to productivity gains, the price of labor increases faster than inflation. Commodities that took 60 minutes of work to buy in 1980 took only 21 minutes of work to buy in 2017. Put differently, the time-price of commodities fell by 64.7 percent.

We also measured the sensitivity of resource availability to population growth. Between 1980 and 2017, the world’s population increased by 69 percent and time-price of commodities fell by

64.7 percent. That means that the time-price of commodities declined by 0.934 percent for every 1 percent increase in the world's population.

Moreover, we created the Simon Abundance Index: the change in population since 1980 over the change in the time-price of commodities, times 100. (E.g., if population has risen 20 percent since 1980 and the time-price has fallen 20 percent, the numerator will be 1.2, the denominator will be 0.8, and the Simon Abundance Index will be 150.) This takes into account the fact resources are available to more people and more cheaply than they were before. By this measure, the Earth became 379.6 percent more plentiful between 1980 and 2017, a compounded annual growth rate of 4.32 percent.

Population growth and abundance seem to be connected. Adam Smith observed that division of labor, or separation of the work process into distinct tasks, leads to faster growth. Simon took Smith's ideas a step further. He noted in addition to more labor, a growing population produces more ideas. More ideas lead to more innovations, and more innovations improve productivity. Finally, higher productivity translates to better standards of living.

Considering that world population will likely peak at 9.8 billion people at around 2080 and fall to 9.5 billion by 2100 — in the medium fertility scenario calculated by demographer Wolfgang Lutz and his colleagues at the International Institute of Applied Systems Analysis — our descendants may yet find that the Earth is short on the most important resource: people.

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