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*Article*

# Entrepreneurship Creates Sustainable Progress

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**Abstract:** Sustainability means that the current use of resources does not compromise the well-being of future generations. Ever since Malthus (1798) forecast that population tends to grow faster than the growth of resources to support the population, people have claimed that current resource use is unsustainable, so future generations will be materially worse off than those in the present, yet for more than two centuries this has not been the case. The reason is that markets, and market prices, act to conserve scarce resources, and in market economies, entrepreneurs have an incentive to discover more efficient ways to use resources. The claim that twenty-first century market economies are not sustainable is not supported by the evidence. This paper explains why entrepreneurship in market economies produces sustainable economic progress.

**Keywords:** entrepreneurship; sustainability; economic progress

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## Introduction

Sustainability is a broad concept that has been defined in various ways. This paper considers an economic system to be sustainable if the current use of resources does not compromise the well-being of future generations. More than two centuries ago, Malthus (1798) warned that population tended to grow more rapidly than resources to support the population, which meant that most people would be condemned to live at a subsistence level of income, and the size of the population would be constrained by the availability of resources to support it. Similar arguments have since been made by many others, right up into the twenty-first century, yet for more than two centuries since Malthus wrote, the standard of living of most people has continued to increase even as the world's population has increased. So far, the forecasts of Malthus and his pessimistic successors have not been borne out by the facts.

At the time that Malthus wrote, the world's population was estimated to be about one billion. By 2023, it had increased to more than eight billion, and the vast majority of those eight billion people had standards of living well above the average standard of living in 1800. The development of capitalism as an economic system appears to be correlated with this increase in global material well-being.<sup>1</sup> Across the globe, nations with market economies have the highest standards of living, and nations that have transitioned toward more market-oriented institutions saw rapid increases in their standards of living.

The Fraser Institute's Economic Freedom of the World (EFW) index (Gwartney et al. 2022) is a good measure of the degree to which a nation's economies are characterized by market institutions. Per capita incomes across countries are strongly correlated with their EFW scores, and countries that have shown the most improvement in their EFW scores have shown the highest rates of economic growth.

This is not a temporary situation and it is not an anomaly. As Hayek (1937, 1945) explains, market economies provide a decentralized mechanism to allocate resources efficiently, to prevent resource depletion, and to find alternatives for resources that become more scarce. The market mechanism works to ensure sustainability. Higher prices that result from increased scarcity give people an incentive to conserve those resources, and more significantly, give entrepreneurs an incentive to develop alternatives.

The evidence that has accumulated in the more than two centuries since Malthus wrote points heavily in favor of the hypothesis that capitalism produces sustainable economic development. It has done so since the beginning of the Industrial Revolution. But that evidence, while persuasive, does

not prove the case. The argument that the present standard of living is unsustainable rests on the idea that the resource depletion occurring now means that the resources necessary to maintain the current standard of living will not be available to following generations, implying a lower standard of living in the future. Indeed, some forecasts are more pessimistic, foreseeing widespread famine leading to death and depopulation.

While the evidence since Malthus wrote is compelling, this paper does not rely on it. Note that when Malthus wrote in 1798, the evidence throughout human history up to that point supported his conclusion that limited resources would condemn most people to a subsistence level of income. That had been the case throughout human history up until that point, and Malthus was explaining the facts of human history up until the time he wrote.

Something happened around that time to change the balance of resource availability relative to population. Market institutions in capitalist economies generated rising prosperity by increasing productive resources. Resources are not being depleted; they are being enhanced. The arguments that follow explain why the entrepreneurial incentives in capitalist economies produce sustainable economic development.

### The Malthusian Hypothesis

Thomas Robert Malthus (1798), in his well-known *Essay on Population*, made the observation that population tends to grow faster than the availability of resources to support the population. The size of the population is therefore limited by the resources available to support it, and the continued pressure of population growth against available resources will cause most people to be forced to exist at a subsistence level of income.

This theme was extended by David Ricardo (1911 [orig. 1817]) who noted that while population grows, the amount of land is fixed. The most fertile land will be cultivated first, requiring that less and less fertile land to be used to feed a growing population. The marginal cost of providing a subsistence income to the population increases as a result. This squeezes profits, and Ricardo (1911: 72) says that before profits reach zero, “the very low rate of profits will have arrested all accumulation, and almost the whole produce of the country, after paying the labourers, will be the property of the owners of land and the receivers of tithes and taxes.”

John Stuart Mill (1848: 746) extended Ricardo’s reasoning and foresaw an end to the economic progress that had been occurring since the beginning of the Industrial Revolution, saying “It must always have been seen, more or less distinctly, by political economists, that the increase of wealth is not boundless: that at the end of what they term the progressive state lies the stationary state, that all progress in wealth is but a postponement of this, and that each step in advance is an approach to it.” Economic progress, Mill said, is not sustainable.

Half a century after Mill forecast an end to economic progress, cities were becoming electrified, automobiles had begun displacing horse-drawn carriages, and telephone service was spreading throughout developed nations. The economic development that Mill said was unsustainable in 1848 has continued, as of this writing, for another 175 years.

Recognizing the issue of sustainability, Jevons (1906 [orig. 1865]) published *The Coal Question*, in which he discusses economic problems that lie ahead for Britain because the nation was rapidly depleting its coal resources. Britain’s coal consumption was not sustainable, Jevons claimed. A century after Jevons wrote, this same concern was popularized in the 1970s, but with a different energy resource, in the debate about peak oil and the rapid depletion of oil reserves. Issues of sustainability have continued to receive high-profile attention through the twentieth century and into the twenty-first.

The Club of Rome (Meadows et al. 1972) published their *The Limits to Growth*, reporting the results of computer simulations that forecast, in Malthusian fashion, a collapse in available resources followed by a necessary substantial decline in population that was likely to occur in the early twenty-first century. They advocated eliminating growth, which is unsustainable, and replacing it with a steady state society, saying (1972: 184) “Without such a goal and a commitment to it, short-term

concerns will generate the exponential growth that drives the world system toward the limits of the earth and ultimate collapse.” Having now passed the fiftieth anniversary of the publication of that book, global per capita income continues to rise even as global population rises, and no collapse is in sight.

Another well-known volume by Ehrlich (1968) argued, again in Malthusian fashion, that population growth would lead to a world-wide famine. Ehrlich (1968) begins, “The battle to feed all of humanity is over. In the 1970s hundreds of millions of people will starve to death in spite of any crash programs embarked upon now. At this late date nothing can be done to prevent a substantial increase in the world death rate.” In 1970 the global population was 3.6 billion, less than half its current population.

Diamond (2005: 495) cites environmental problems caused by increasing production and a rising standard of living, saying “the biggest problem is the increase in total human impact as the result of rising Third World living standards, and of Third World individuals moving to the First World and adopting First World living standards” Diamond (2005: 496) goes on to say “But no one at the U.N. or in First World governments is willing to acknowledge the dream’s impossibility: the unsustainability of a world in which the Third World’s large population were to reach and maintain current First World living standards.” Diamond (2005: 509) acknowledges that “gloom-and-doom predictions of fearmongering environmentalists have proved wrong” many times in the past, but argues that they have rested on a solid foundation and are likely to prove true in the future.

These are a few prominent examples that are spread over the past several hundred years in which thoughtful and educated people foresaw an end to progress, with at best, stagnation, and at worst, collapse, looming in the near future. The point here is not to argue that their forecasts have been wrong, although they have, but to see the arguments that economic progress is unsustainable. The lines of reasoning rest on three interrelated arguments: first, resources are being depleted; second, population growth means more people competing for the same resources; and third, real income growth means that each individual is consuming an increasing amount of resources. The underlying premise in all these factors is that resources are finite, and as they are used up, that leaves less for the generations that follow.

### **The Smithian Alternative**

In contrast to the dismal forecasts of Malthus and his successors, Adam Smith (1937 [orig. 1776]) painted a more optimistic picture of people’s economic future. Smith begins his book by stating that the increase in the wealth of nations has been the result of the division of labor—specialization that makes each worker more productive. Smith continues to say that the division of labor is limited by the extent of the market. As economic growth, coupled with advances in transportation and communication technology, enlarges markets, the wealth of nations increases.

In Smith’s optimistic framework, income growth enlarges markets, and that increase in the extent of the market enables a greater division of labor, which then produces income growth. As Smith describes it, this process of growth could seemingly increase without limit. It (almost) goes without saying that Smith is not describing a steady state economy. While Smith does not use the term, entrepreneurship introduces new products and new production methods into the economy that lead to continual economic progress.

More recent scholars have supported Smith’s more optimistic views on progress. Countering Ehrlich’s (1968) *The Population Bomb*, Simon (1981) declared people to be *The Ultimate Resource*. The increased standard of living people have experienced since the beginning of the Industrial Revolution is primarily the result of innovation that has introduced new and improved goods into the market and increased the efficiency of production. Progress is driven by ideas, and more people generate more ideas. Population growth has increased the number of creative and entrepreneurial people, leading to greater prosperity. Ridley (2010) builds on Simon’s idea by noting that when creative people interact with each other, their ideas interact with each other to produce even more new ideas. More specialization and greater interaction lead to economic progress.

Are resources really becoming more scarce? Tupy and Pooley (2022) use time prices to measure the scarcity or abundance of resources. How many minutes of work does it take to acquire specific resources or goods? They find that the prices of almost everything have fallen substantially over time, indicating that resources are becoming more abundant, in contrast to the claims of Malthusian alarmists that resources are becoming more scarce. Reiterating their predecessors, they note that more people produce more ideas which lead to more innovations and more economic progress. Resources provide little benefit in the absence of knowledge about how they can be used, and that knowledge continues to accumulate, generation after generation.

The arguments are plausible, and seem to correspond more closely with several centuries of economic history than the more pessimistic Malthusian arguments. They address sustainability concerns by suggesting that there are not finite limits to resources, because when some resources become more scarce, entrepreneurs find more efficient ways to use them, and find substitutes for them. The sections that follow undertake an economic analysis of the role of entrepreneurship in maintaining sustainable economic progress.

### **Market Prices Conserve Resources**

One of the concerns of sustainability is that at current rates of use, essential resources will be depleted. Markets and market prices provide a mechanism for ensuring that resources will never be completely depleted. As resources become more scarce, their prices rise, and as that happens, people reduce their consumption at higher prices, and look for less expensive substitutes.

Coming up with good examples is problematic, because the resources people perceive as rapidly depleting change over time. In the late 1800s people were concerned about running out of oil, but at that time it was whale oil they were concerned about, and the over-harvesting of whales. By the 1970s, another oil crisis was on the horizon as the world approached peak oil. The argument was the same as Jevons' coal question, but substituting oil for coal. In the twenty-first century many people argue that oil consumption is damaging the planet, and the problem is too much oil, not too little. Meanwhile the unsustainable consumption of rare earth elements has become a new source of concern.

The price system works to mitigate increasing scarcity, because prices rise when resources become more scarce, giving people an incentive to conserve and seek substitutes. Resources will never be completely depleted, because before that happens, their prices rise high enough to retain some supply for those who value them the most.

### **Conserving Resources for the Future**

One feature of market prices is that they offer a mechanism within which people who are not yet born are able to bid for resources. This happens because current owners of resources have the choice to use them, sell them now, or hold onto them as investments. If they anticipate that their value will rise in the future, they have the incentive to hold the resources as investments rather than sell them or use them. If they do decide to sell under these circumstances, the likely buyer of resources anticipated to increase in value will be another investor, who will hold the resources as they increase in value.

People who believe resources will be worth the most in the future are the people who have the biggest incentive to buy them now, and conserve them to sell them at their future higher value. Those buyers then have an incentive to conserve those resources to capture that higher value when they sell. This can happen generation after generation, so the market mechanism gives unborn people the ability to have a say in the consumption of resources today.

A simple example exists in houses that are a century or more old. People build houses with the anticipation that the house will remain long after they have passed on, because they will be able to sell the house to a subsequent owner. A more durable house will have more value when it is sold. The subsequent owner has the same incentive. The original owners are building their houses not only to house themselves, but to house people who have not yet been born. Owners of natural resources



have the same incentive to preserve their value for future owners. If they forecast rising prices, they have a financial incentive to conserve rather than consume. If they do not foresee prices rising, that is a signal that the resources will not be more scarce in the future.

What if people disagree regarding whether resources will become more scarce? People who believe they will increase in value will place a higher value on them now, so the market mechanism works to transfer resources to those more interested in conserving them, and away from those who are inclined to consume them now.

Problems arise when ownership of resources is unclear. Common pool problems can lead to overuse, but this is not a problem with the market, but a problem caused by the absence of a market.<sup>2</sup> Hardin (1968) offers a frequently referenced discussion. Where markets exist, resources are allocated to their highest values, and that often means conserving them for future owners. Where markets do not exist, entrepreneurs have an incentive to create them.<sup>3</sup>

Where markets do not exist, there is an impulse to suggest that government take over stewardship of resources. Unlike private ownership, government stewardship gives nobody an incentive for sustainable resource use. Resources are allocated based on political power rather than their value to consumers. Political victories are temporary. Government policies made this year can be overturned next year, so those counting on government stewardship must continually lobby to maintain the government policies they prefer. Meanwhile, others lobby in support of different policies that further their own goals. Anderson and Leal (2001) explain why government ownership does not promote sustainability the way that private ownership does.

### Factors of Production

Economists at least since Ricardo (1817) have depicted output as being produced within a production function framework in which output is a function of inputs. While Ricardo did not use mathematical notation, in his formulation, output is a function of the inputs of land, labor, and capital. The earlier discussion noted the significance of land in Ricardo's production function. Population growth can provide more labor, capital can be increased by investment, but land is a fixed factor, and as those variable factors grow relative to the fixed factor, their marginal productivity falls. This makes continued growth unsustainable.

The production function approach to output continues within mainstream economics, but in the twentieth century and into the twenty-first, output,  $Q$ , is depicted as a function  $f$  of the inputs of capital,  $K$ , and labor,  $L$ , which is commonly represented as  $Q = f(K, L)$ . All economists are familiar with this notation. One interesting feature of it is that when compared to Ricardo's production function, land has disappeared as an input. In Ricardo's framework, the unsustainability of a growing economy is due to the fixed factor of land. In the modern production function framework, that fixed factor appears so unimportant that it is not even taken into account. The sustainability problem Ricardo foresaw has been assumed away in contemporary economic analysis.

If the modern production function is taken to be descriptive, there is no sustainability issue and no limits to growth. Capital can be increased through investment, and labor grows both as population grows and as the human capital of each laborer increases.<sup>4</sup> Technological advances increase  $f$ , the productivity of those factors of production, and that technology, once developed, remains available for use by future generations.

One might view the omission of land in the modern production function as a simplifying assumption, and indeed it is, but simply reflecting on modern economies, land plays a small part in the total amount of resources that are inputs into the production process. That production function is approximately descriptive of a firm or an economy if scarce natural resources have a minor effect on overall productivity. That argument, made by Simon (1981), Ridley (2010), and Tupy and Pooley (2022), is represented in the economist's modern production function.

### Innovation in a Market Economy

Adam Smith (1776: 14) observed, “It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest.” In a market economy, people enhance their own well-being by producing value for others. In that sense, everyone is entrepreneurial. Everyone is looking for ways to create value for others, because doing so benefits themselves. People who operate businesses understand that if they do not provide at least as much value to their customers as competing businesses, they will lose their customers. This necessarily means innovating when the opportunity arises, to increase the value of one’s services to customers.

In a competitive market economy, product differentiation is a key element in the competitive process. As Holcombe (2007; ch. 3; 2009) notes, producers do not differentiate their products just to make them different, they differentiate them to make them better. Entrepreneurs are continually seeking profit opportunities, and improving one’s products and production processes are ways that entrepreneurs can gain customers and gain profits.

In this sense, the neoclassical theory of the competitive firm is a blueprint for business failure if managers try to follow that model. In the model, firms buy homogeneous inputs to produce homogeneous outputs, and in the long run can do no better than earning normal profits. The actual profit maximizing strategy for those firms, as opposed to what textbooks say, is to look for ways to differentiate one’s products, which can gain some market power and increase profits.

Because some firms are innovating, all must innovate, or be left behind by their innovating competitors. Entrepreneurs spot previously unnoticed profit opportunities, as Kirzner (1973) describes, and the new and improved products they introduce into markets generate continuing economic progress. Joseph Schumpeter (1950: 82) says “...with capitalism we are dealing with an evolutionary process. ... Capitalism, then, is by nature a form or method of economic change and not only never is but never can be stationary.” The reason is that entrepreneurs continually introduce innovations into the economy.

## Entrepreneurship and Sustainability

When resources become more scarce in an economy, their prices rise, which gives consumers an incentive to reduce their consumption. Entrepreneurs have an incentive to seek ways of conserving those resources, and of creating substitutes for resources that are becoming increasingly scarce. Prices guide entrepreneurs to find the most efficient means of satisfying consumer preferences. The most efficient means is also the most sustainable, because unsustainable resource use will drive up the prices of those resources. Prices are the common denominator that allows entrepreneurs to judge the relative scarcity of different resources.

Entrepreneurs do not have to be seeking the most sustainable ways to use resources to find them. Prices guide their choices so that entrepreneurs are led by an invisible hand toward sustainable resource use. Thinking back to Jevons’ coal question, even though coal is a depletable resource, how concerned are people today that the present rate of coal consumption will deprive future generations of coal? Should coal be in danger of depletion, the price would rise so people would conserve it, but the real sustainable answer in this case is that future generations are increasingly likely to substitute away from coal toward other energy sources.

This answer applies to the sustainability of resources more generally. Sustainability does not mean that specific resources will last forever. It means that they will be available to be used as long as there are not better substitutes. Those resources actually will last forever—rising prices will assure that—but that is of secondary importance to sustainability. A significant part of economic progress is substituting old ways of doing things for new.

Are resources better conserved by making soft drink containers out of aluminum, plastic, steel, or glass?<sup>5</sup> There is no way to tell without using prices as the common denominator to measure value. Entrepreneurs, who are looking for the least-cost way of producing value for their consumers, have the incentive to choose the most sustainable option, even if that is not their goal.

Entrepreneurs are not infallible, of course. They may err in their judgments. Profit comes from producing output that has greater value than the cost of inputs used to produce the output. Profit is

a reward for increasing the value of resources. Losses come to entrepreneurs who produce goods that have less value than the value of resources used to produce them. Unsuccessful entrepreneurs—those who use resources inefficiently—will take losses and be displaced by those who are better able to spot profit opportunities.

Knight (1921) concludes that successful entrepreneurs have superior judgment that allows them to spot profit opportunities, and Foss and Klein 2012() build on this idea. Those who succeed in increasing value in an economy will prosper and can expand; those who do not succeed will take losses and lose their control over resources.

Seeking profit opportunities means looking for more efficient ways of allocating resources, which means substituting out of resources that are becoming more scarce. The profit motive pushes entrepreneurs to seek sustainable methods of production, which means least-cost methods of production. Entrepreneurs do not have to be motivated to further sustainability. In the process of their entrepreneurial activity, they are led by an invisible hand to use resources sustainably.

### **A Note on Climate Change**

The arguments in this paper discuss the ways that entrepreneurship addresses the issues of resource depletion, population growth, and per capita income growth from a sustainability standpoint. These same arguments apply to climate change. Because climate change can affect human well-being, people are willing to pay for strategies to mitigate its effects. Entrepreneurs rise to the occasion, not because they are trying to mitigate climate change but because they have an incentive to provide what consumers want.

The World Meteorological Organization (2021) reports that “weather-related disasters increase over past 50 years, causing more damage but fewer deaths.” A major reason damage has increased is that global population was about 4.4 billion in 1980, rising to nearly 8 billion by 2021. With more people who are on average wealthier and so have more property that can be damaged, it is not surprising that weather-related damage has increased. However, it is remarkable that with the increase in global population, weather-related disasters killed 667,000 people in the 1980s and only 186,000 in the 2021s.

As people become wealthier, they can better afford expenditures on mitigation, so entrepreneurship plays a double role in addressing climate change. First, it makes people wealthier so they can better afford to protect themselves, and second, entrepreneurs can profit from developing ways to minimize the effects of climate change.

The increase in wealth also makes people more interested in combating climate change. Poverty causes people to be concerned about how they will put food on the table and take care of their basic needs. People focus more on the public interest as they become wealthier. To the extent that this is a common pool problem (Hardin 1968), there will be a lack of market incentives to address it, unless consumers demand green products, and increasing wealth makes this more likely.

The technology already exists to eliminate (almost) all greenhouse gas emissions. For example, solar panels could be used to generate electricity that could then be used to separate water into hydrogen and oxygen. When hydrogen burns, it combines with oxygen to produce water vapor, which recycles the water and produces no greenhouse gasses. Nuclear power is a zero-emission source of electricity. The technology to stop increases in greenhouse gas emissions already exists, but it is not used more because it is more costly than using fossil fuels. The problem lies in incentives, and wealthier people have a greater incentive to act in the public interest.

### **Public Policy Toward Sustainability**

For hundreds of years educated individuals have been making persuasive arguments that current patterns of resource use are unsustainable, yet economic progress continues. The previous sections explain why. Entrepreneurs are led by an invisible hand to allocate resources sustainably, even if that is no part of their intention. The most effective public policy toward sustainability is to



allow the decentralized activities of entrepreneurs to respond to market price signals, which conserves resources and promotes economic progress.

Sustainability is not automatic, and some of the biggest challenges to sustainability come from those who are its biggest advocates. They claim that capitalists sacrifice sustainability for profits, so government intervention is necessary to require that resources be used responsibly and sustainably. Mazzucato (2015, 2021) has argued that governments should be entrepreneurial, and should address issues like sustainability and climate change in the same way that, in the past, they have embarked on missions to land men on the moon and to build nuclear weapons. Wennberg and Sandstrom (2022) address these arguments, explaining why political decision-making stands in the way of entrepreneurial action, and presenting empirical studies showing how government attempts at entrepreneurial activities have failed.<sup>6</sup>

The initial problem is that government decision-makers do not have an incentive to engage in profitable activity (Niskanen 1971), which means that they do not have an incentive to allocate resources to create value greater than cost. A substantial literature has described inefficiencies in political decision-making that lead to rent-seeking (Tullock 1967; Krueger 1974), regulatory capture (Stigler 1971), and interest group activities that benefit a small subset of the population at the expense of everyone else (Olson 1965, 1982; Holcombe 2018).

As Baumol (1990) explains, market institutions provide incentives for productive entrepreneurship, but when government intervenes in markets, entrepreneurs have the incentive to seek government benefits rather than producing products that produce value for consumers. When government interventions fail to accomplish their stated goals, the common public sector response is to develop more interventions to rectify the previous unsatisfactory outcomes (Ikeda 1997), which leads to greater inefficiencies.

Two lessons can be drawn from this literature. First, entrepreneurship does not automatically result in sustainability. Market institutions are required to produce entrepreneurial economies (Holcombe 2021), and absent the right institutional framework, entrepreneurial incentives lead to destructive and unsustainable entrepreneurship. Second, even well-intentioned government interventions to promote sustainability are unlikely to move toward that goal, because the political decision-making process pushes entrepreneurs to seek government benefits for themselves rather than to produce value for or consumers.

## Conclusion

Market economies are sustainable economies, because markets and market prices provide people with the incentive to conserve scarce resources. As resources become more scarce, their prices rise, giving entrepreneurs an incentive to offer consumers ways to conserve scarce resources, and to develop substitutes for resources that are becoming more scarce. Entrepreneurs do not have to consciously seek ways to promote sustainability, they are led by an invisible hand to develop innovations that create a sustainable economy.

Entrepreneurial innovations lead to sustainable economic progress partly because entrepreneurs profit from finding sustainable ways to use resources, but also because successful innovations, once introduced into the economy, tend to replicate themselves to the advantage of those in the future. The steam engine played a substantial role in the early days of the Industrial Revolution, and since has been supplanted and often displaced by other types of power. Jevons' coal question was answered by entrepreneurial innovation. That example illustrates that sustainability does not mean that resources last forever, but that they are used until something more economical is developed to take their place.

There may be a temptation to interpret this message as saying that people should not be concerned about sustainability. The problem will take care of itself. That is certainly not the case. The problem does not take care of itself. Rather, sustainable economic activity is the result of the entrepreneurial innovations that are produced within market institutions which require that to

prosper, people must respond to market price signals as an indicator of scarcity. Decentralized decision-making within free markets results in sustainable progress.

The threat to sustainability is not free markets or capitalism, but rather the impulse to employ government interventions, even if well-intentioned, to override market incentives. Government interventions are often proposed as if government is an omniscient benevolent dictator that can perceive and implement optimal policies. This is not descriptive of government. Government is not omniscient, and bottom-up initiatives from millions of entrepreneurs generate more and better ideas than top-down policies proposed by experts.<sup>7</sup> Government is not benevolent, and the creation of government programs brings with it rent-seeking interest groups that lead to inefficiencies and government failure. Government is not a dictator. Democratic governments are prone to compromises that pander to multiple interests rather than seeking optimal policies. Realistic approaches to sustainability must be based on realistic assessments of real-world institutions and real-world human nature.

The most successful anti-poverty program in human history is capitalism, which has produced sustainable economic progress since the beginning of the Industrial Revolution. The evidence is there, despite the pessimistic conclusions of Malthusian naysayers that have continued for centuries. Entrepreneurial economies embody a mechanism—the price system—that guides entrepreneurs to introduce innovations that create sustainable progress. The real threat to sustainability is the possibility that those market institutions will be undermined by those who fail to understand the way that markets work—or worse, by those who do understand but seek to use government interventions for their own personal benefit.

## Notes

1. Commerce and market exchange has been going on for thousands of years, but capitalism and market economies, in which people get most of what they consume through market exchanges, are relatively recent. Heilbroner (1962) associates the emergence of capitalism as occurring as a result of the development of markets for factors of production, and in particular, capital markets.
2. Diamond (2005) offers many examples in which specific resources have been depleted, but in all the cases he cites, the resources did not have clear ownership and were not allocated through market prices.
3. For examples, see Anderson and Leal (2001).
4. This is an important point, although relegated to a footnote here because it is only peripherally related to sustainability. Lucas (1988) emphasized that when measuring labor input, human capital is the crucial factor, not just the number of laborers.
5. An interesting bit of trivia on this point: in 1970 a steel 12 ounce soft drink can weighed 42 grams. A modern Aluminum soft drink can weighs 14 grams. Prior to the 1970s soft drinks were sold in refillable glass bottles. While it may seem that re-using glass bottles is more sustainable than single-use aluminum cans, many of those cans are recycled. Which packaging strategy is more sustainable? Considering the cost of transporting the heavier glass bottles, washing them and refilling them, the way to tell is to look at the cost of the two alternatives.
6. A prominent example used by those who advocate entrepreneurial government is the Apollo program that landed men on the moon. But note that this was not an entrepreneurial venture, in the sense of striving to allocate resources to create more value than the program cost. Indeed, the Apollo program was geared to land men on the moon regardless of the cost. A good example of entrepreneurial government is the Anglo-French Concorde project that had the goal of providing a market for supersonic air travel. The program cost more than it returned in value and was terminated. The Concorde project was an engineering success—it did produce a supersonic passenger aircraft—but an entrepreneurial failure.
7. Even if experts, as individuals, know more than others about an issue, they can never take into account all of the decentralized knowledge held by everyone else in an economy. The market mechanism allows everyone to take advantage of that knowledge without having to acquire it themselves. Hayek (1945, 1988) emphasized this advantage of resource allocation through decentralized markets.

## References

1. Anderson, Terry L., and Donald R. Leal. *Free Market Environmentalism*. London: Palgrave-Macmillan, 2001.
2. Baumol, William J. "Entrepreneurship: Productive, Unproductive, and Destructive." *Journal of Political Economy* 98, no. 5, Part 1 (October 1990): 893-921.

3. Diamond, Jared. *Collapse: How Societies Choose to Fail or Succeed*. New York: Viking, 2005.
4. Ehrlich, Paul R. *The Population Bomb*. New York: Ballantine Books, 1968.
5. Foss, Nicolai J., and Peter G. Klein. *Organizing Entrepreneurial Judgment: A New Approach to the Firm*. Cambridge: Cambridge University Press, 2012.
6. Gwartney, James, Robert Lawson, Joshua Hall, Ryan Murphy, Simeon Djankov, and Fred McMahan. *Economic Freedom of the World: 2022 Annual Report*. Vancouver, BC: Fraser Institute, 2019.
7. Hardin, Garrett. "The Tragedy of the Commons." *Science* 162, issue 3859 (December 13, 1968): 1243-1248.
8. Hayek, Friedrich A. "Economics and Knowledge." *Economica* n.s. 4 (1937): 33-54, reprinted in F.A. Hayek, *Individualism and Economic Order*. London: Routledge and Kegan Paul, 1949.
9. Hayek, Friedrich A. "The Use of Knowledge in Society." *American Economic Review* 35 (1945): 519-530.
10. Hayek, Friedrich A. *The Fatal Conceit: The Errors of Socialism*. Chicago: University of Chicago Press, 1988.
11. Heilbroner, Robert L. *The Making of Economic Society*. Englewood Cliffs, NJ: Prentice-Hall, 1962.
12. Holcombe, Randall G. *Entrepreneurship and Economic Progress*. New York: Routledge, 2007.
13. Holcombe, Randall G. "Product Differentiation and Economic Progress." *Quarterly Journal of Austrian Economics* 12, no. 1 (Spring 2009): 17-35.
14. Holcombe, Randall G. *Political Capitalism: How Economic and Political Power Is Made and Maintained*. Cambridge: Cambridge University Press, 2018.
15. Holcombe, Randall G. "Entrepreneurial Economies." *Economies* 9, no 3 (September 2021): 1-12.
16. Ikeda, Sanford. *The Dynamics of the Mixed Economy: Toward a Theory of Interventionism*. London: Routledge, 1997.
17. Jevons, William Stanley. *The Coal Question: An Inquiry concerning the Progress for the Nation and the Probable Exhaustion of Our Coal Mines*, 3<sup>rd</sup> ed. London: Macmillan, 1906 [1<sup>st</sup> ed 1865].
18. Kirzner, Israel M. *Competition and Entrepreneurship*. Chicago: University of Chicago Press, 1973.
19. Knight, Frank H. *Risk, Uncertainty, and Profit*. Boston: Houghton Mifflin, 1921.
20. Krueger, Anne O. "The Political Economy of the Rent-Seeking Society." *American Economic Review* 64 (June 1974): 291-303.
21. Landes, David S. *The Wealth and Poverty of Nations*. New York: W.W. Norton, 1998.
22. Lucas, Robert E., Jr. "On the Mechanics of Economic Development." *Journal of Monetary Economics* 22 (1988): 3-42.
23. Malthus, Thomas Robert. *An Essay on Population*. London: J. Johnson, 1798.
24. Mazzucato, Mariana. *The Entrepreneurial State: Debunking Public Vs. Private Sector Myths*. London: Anthem Press, 2015.
25. Mazzucato, Mariana. *Mission Economy: A Moonshot Guide to Changing Capitalism*. New York: Harper Business, 2021.
26. Mill, John Stuart. *Principles of Political Economy*. London: Longmans, Green and Company, 1848.
27. Niskanen, William A. *Bureaucracy and Representative Government*. Chicago: Aldine-Atherton, 1971.
28. Olson, Mancur, Jr. *The Logic of Collective Action*. Cambridge, MA: Harvard University Press, 1965.
29. Olson, Mancur, Jr. *The Rise and Decline of Nations*. New Haven, CT: Yale University Press, 1982.
30. Ricardo, David. *The Principles of Political Economy and Taxation*. London: J.M. Dent, 1911 [orig. 1817].
31. Ridley Matt. *The Rational Optimist: How Prosperity Evolves*. New York: Harper, 2010.
32. Schumpeter, Joseph A. *Capitalism, Socialism, and Democracy*, 3rd ed. London: George Allen & Unwin, 1950.
33. Simon, Julian L. *The Ultimate Resource*. Princeton, NJ: Princeton University Press, 1981.
34. Smith, Adam. *An Inquiry into the Nature and Causes of the Wealth of Nations*. New York: Modern Library, 1937 [orig. 1776].
35. Stigler, George J. "The Theory of Economic Regulation." *Bell Journal of Economics and Management Science* 2, no. 1 (Spring 1971): 3-21.
36. Tullock, Gordon. "The Welfare Cost of Tariffs, Monopolies, and Theft." *Western Economic Journal* 5 (June 1967): 224-232.
37. Tupy, Marian L., and Gale L. Pooley. *Superabundance: The Story of Population Growth, Innovation, and Human Flourishing on an Infinitely Bountiful Planet*. Washington DC: Cato Institute, 2022.
38. Wennberg, Karl, and Christian Sandstrom, eds. *Questioning the Entrepreneurial State: Status Quo, Pitfalls, and the Need for Credible Innovation Policy*. Cham, Switzerland: Springer, 2022.
39. World Meteorological Organization. "Weather-Related disasters Increase over Past 50 Years, Causing More Damage but Fewer Deaths." Geneva, August 31, 2021.