THE PARADOX OF WEALTH AND THE END OF HISTORY ILLUSION

William J. Bernstein

Efficient Frontier Advisors

Abstract

In the wake of the recent Great Recession, pessimism about the long-run economic prospects of the United States has once again become fashionable. I reprise the history of this strain of thought, and why it is at variance with the long-run improvement in the four basic foundations of modern Western-style prosperity: scientific rationalism, property rights buttressed by rule of law, modern capital markets, and modern communications and transportation technologies.

Nevertheless, both theory and long-run empirical data support the notion that economic growth *lowers* security returns; such is the price of living in an increasingly prosperous, safe, healthy, and intellectually gratifying world.

THE PARADOX OF WEALTH AND THE END OF HISTORY ILLUSION

The headline "Things Generally Getting Better" does not sell a lot of newspapers—not that a lot of newspapers are getting sold these days.

In the November/December 2012 issue of the Financial Analysts Journal, Laurence Siegel (2012) laid out, in a lapidary mix of agreeable prose, data, and humor, the case why this mythical headline has been true over the past few centuries and will continue be so.

I could not resist adding some additional observations on the subject of the sustainability of long-term economic growth, which fall into three categories: First, pessimism on this subject has such a long and ignominious history that it deserves, *ceteris paribus*, to be met with approximately the same degree of skepticism as the Mayan Apocalypse or a Cubs World Series victory. Second, modern economic growth, almost by definition, is primarily the result of productivity increases wrought by technological innovation. For at least the past century, naysayers have posited that the pace of innovation is falling off. Innovation, though, cannot be measured as easily as automobile production or airspeeds, and so it is impossible to gainsay such assertions. What is more important for our purposes is that there is a paucity of empirical evidence for a long-run slacking off of economic growth, and that there are good theoretical reasons why this is so. Third, in the very long run, increasing societal wealth and well-being seem to carry a paradoxical cost, namely a *reduction* in the expected return of both risky and riskless assets, an assertion that also has both a plausible theoretical rationale as well as no small empirical support.

For the past century and a half, observers have predicted that modern prosperity will sooner rather than later run into the brick wall of the earth's limited resources, and thus bring prosperity to a halt. In 1855, four years *before* Drake discovered oil in Titusville, Pennsylvania, an advertisement for Kier's Rock Oil proclaimed, "Hurry, before this wonderful product is depleted from Nature's laboratory!" (Note that the Latin root for petroleum is *petra*—rock.) In 1916, a U.S. Geological Survey report to the Senate stated that peak production would be reached within five years, and that "With no assured source of [new] domestic supply in sight, the United States is confronted with a crisis of the first magnitude." A few years later the Smithsonian gave up the ghost: "There is no hope that new fields, unaccounted for in our inventory, may be discovered." Not two decades later the American Association of Petroleum Geologists Bulletin opined that "It is unsafe to rest in the assurance that plenty of petroleum will be found in the future merely because it has been in the past." (Porter 1995) In 1972, the Club of Rome published *The Limits to Growth* (Meadows 1972), which laid out several pessimistic scenarios centering on a worldwide economic and environmental collapse that, while climaxing sometime this century, would be clearly observable within a decade or two of the book's publication.

Before petroleum, economists worried about running out of coal (and whale oil as well). Perhaps the most full-throated example can be found in a book by the great English economist W. Stanley Jevons (1866), *The Coal Question: An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of our Coal-Mines*. Jevons' thesis was both simple and eerily familiar to the modern reader: Since the prosperity of the Industrial Revolution was built on steam and coal, and since England's coal was running out, so too was the nation's economic growth:

> Coal in truth stands not beside but entirely above all other commodities. It is the material energy of the country—the universal aid—the factor in everything we do. With coal almost any feat is possible or easy; without it we are thrown back into the laborious poverty of early times.[1]

Jevons liberally salted his book with predictions of the dire future awaiting his home country, including this lugubrious forecast: "Some day Britain may be known as a second Crete, a sea-born island crowned by ninety cities. . . We too like Crete may form in remote history a brief and half-forgotten link in the transmission of the arts from the East towards the West.[2]

Jevons was well aware of potential alternatives to coal, particularly wind, tidal, and hydroelectric power generation, but he dismissed all of them out of hand. His skepticism about wind-powered transport was curious, since steam initially conquered sail only at the shortest distances; sail's dominance over the longest-haul routes did not end until the opening of the Panama Canal in 1914 (Harley 1988).

Jevons was alert to the possibilities of recently discovered American oil, which he also discounted:

> Petroleum has of late years become the matter of a most extensive trade, and even has been proposed by American inventors for use in marine steam-engine boilers. It is undoubtedly superior to coal for many purposes, and is capable of replacing it. . . . Its natural supply is far more limited and uncertain that that of coal . . .. All things considered, it is not reasonable to suppose or expect that the power of coal will ever be superseded by anything better. [3]

Jevons even considered the possibility of solar power: "It is just possible that some day the sunbeams may be collected, or that some force now unknown may be detected. But such a discovery would simply destroy our peculiar industrial supremacy."[4]

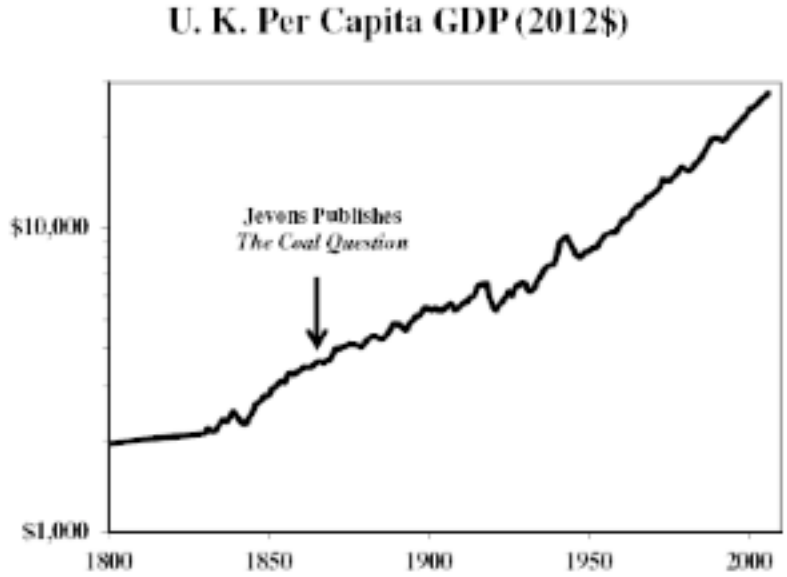
Following publication of *The Coal Question,* England's economic growth stubbornly refused to slow down; in fact, it experienced an acceleration that has continued to this

---

1 Jevons (1866), 2.
2 Ibid., xxi–xxii.
3 Jevons (1866), 164–165.
4 Ibid., 168.

day, as shown in Figure 1. To rephrase an old joke, we shall never know whether stone age economists worried about running out of rocks.

Figure 1



Source data: http:/www.ggdc.net/MADDISON/Historical_Statistics/horizontal-file_02-2010.xls.

England did eventually lose her industrial supremacy, but not in the way Jevons envisioned. The rest of the world simply grew more rapidly, the inevitable fate of any era's leading-edge economy; in 2000 Mexico's per capita GDP was higher than that in the year 1900 in England, then the world's wealthiest nation.

Jevons was wrong because he confused natural resources with wealth. We now know that an abundance of mineral resources is a curse, not a boon. Most famously, Juan Pablo Pérez Alfonso, a former Venezuelan oil minister and OPEC founder, opined of oil, "It is the devil's excrement. We are drowning in the devil's excrement." (Another OPEC founder, Sheik Ahmed Yamani, put it more mildly: "All in all, I wish we had discovered water.") The reasons for the "resource curse" are complex, and likely relate most strongly to the corruption and sapping of entrepreneurial vigor attendant on vast wealth that springs from a relatively few holes in the ground. (Ross 1999) The current wealth of the United States, along with most of the rest of the world's developed nations, fortunately does not flow primarily from oil and minerals.

More recently, one of America's most distinguished economists, Robert Gordon (2002) of Northwestern University, expressed a modern variant of Jevons' refrain; we're not only running out of resources, we're also running out of ideas. As a result, "the rapid progress made over the past 250 years could well turn out to be a unique episode in human history." Fossil fuel scarcity is not the only thing on Professor Gordon's mind; five other headwinds, he postulates, may combine with it to stop U.S. economic growth dead in its tracks: demographics, education, inequality, globalization, and debt.

Gordon portrays what he calls Industrial Revolution #2, which saw the advent of the electrical age and the internal combustion engine, as a golden age of innovation that will never be repeated. (IR #1 was the classic steam-driven Industrial Revolution of common parlance, and IR #3 was a rump period of digitally driven productivity increases lasting only from 1996 to 2004.) How seriously we take these concerns depends upon our time frame. The longest possible lens, admittedly somewhat imperfect, through which to view American productivity is per capita GDP, which is plotted in Figure 2.

Figure 2

Source data: U.S. Department of Labor

First, notice how closely per capita GDP follows the trendline, which slopes upwards at 1.8%; it's almost as if an invisible hand (to coin a phrase!) brings the trace back to the trendline when it deviates too far up or down. Over the past century, close adherence to a slope of approximately 2% observed in most other advanced economies; Japan and Germany, whose economies were devastated during the Second World War, saw their per capita GDP return to this trendline by the 1960s (Bernstein 2002). While in the past several years a slight downward deviation from the trendline has occurred, this is certainly not the first or the worst such squiggle in the plot.

Let's deal individually with Gordon's six headwinds. First, he cites the nation's deteriorating demographic profile. This is beyond dispute; the modified dependency ratio, as defined by Arnott and Casscells (2003), will increase from about 0.36 to 0.52 over the next several decades; in other words, the number of individual-equivalents, including themselves, supported by each working person will increase from 1.36 to 1.52 over the next 40 years; this translates into a loss of about 0.3% of per capita GDP growth during that period, after which it equilibrates out. A bit of a dent, to be sure, but hardly the end of economic growth.

Gordon also cites the deterioration of U.S. educational outcomes, rising inequality, and the increasing debt overhang. All true enough as well, but Gordon sees these problems as permanent and insoluble. American history is, in fact, rife with crises in education, inequality, and debt that have proved more than tractable. (Think, respectively, of Sputnik; the Gilded Age and the response it evoked, the New Deal; and the mountains of IOUs incurred by the Revolution, Civil War, and World War II.) Gordon's fear of globalization and factor-price equalization may already be out of date; a major "insourcing" trend seems to be underway as the increasing, and often hidden, costs of transcontinental (and more importantly, transcultural) supply chains become apparent, and advanced manufacturing techniques, particularly 3-D printing, drive manufacturing back home (Fishman 2012).

Gordon makes the same basic assumption as Jevons: that energy technology will stop cold in its tracks, and that we shall engage the rest of the planet in a grim struggle for ever more scarce energy reserves. In addition, Gordon did not attempt to identify, as did Jevons perversely but presciently, those technologies that might supersede those of the present day.

Let's give the petroleum scarcity argument the benefit of the doubt, avoid the alternative energy parlor game, and instead perform a small thought experiment: Imagine what would have happened if the earth had never been seeded with petroleum deposits. How much would economic growth have suffered? Probably some, but I submit that most, and perhaps all, of the damage would have been compensated for by ever-more efficient steam devices and the attendant stimulation of solar and wind substitutes. By the turn of the century, for example, the Royal Navy's Babcock & Wilcox forged steel steam tubes could generate 250 pounds per square inch of pressure, yielding compact marine engines delivering several hundred horsepower (Bernstein 2002). Hardest of all without oil would have been powered flight—a tough nut indeed without the high energy density of that fuel. But once again, the payoff to solve this admittedly challenging technological barrier would have been so high that the industrious and imaginative would have eventually devised working substitutes, such as internal combustion or jet engines powered by hydrogen produced from solar driven electrolysis. (Doubters should recall that the second and third stages of the Saturn V moon rocket burned hydrogen, not fossil fuels.)

Gordon, in fact, makes a classic heuristic mistake, conflating that which cannot be *conceived* with that which is not *possible*. Technological breakthroughs, almost by definition, cannot be conceived of, since if they could be, they would already have been invented; it is as difficult for us to conceive of the shape of communication, transportation, and energy technologies a century hence as it was for the average world citizen of 1900 to conceive of modern jet transport, the Internet, and the prosperity that these would impart. Go back another century to consider whether anyone in the year 1800, an era in which neither information nor people could move faster than a horse, would have been able to conceive of instantaneous global communication through walls and thin air using radio waves, a phenomenon whose underlying physical principles would not elucidated for more than another half century.

The impossibility of conceiving of future technological development naturally gives rise to a variant of the so-called "end of history illusion," which occurs when humans, faced with a difficult-to-predict future, default to a belief in the simplest outcome: no change (Quoidbach et al. 2013).

My optimism about our long-run economic prospects stems not just from the remarkable and largely unforeseen technological advances of the past century, but also from a wide-angle view of the deeper sources of modern prosperity. Siegel emphasizes the importance of the breeding of knowledge—"ideas having babies," in Matt Ridley's (2010) memorable turn of phrase. Indeed, in making this assertion he is not only on very firm ground, but also in very good company, particularly that of Paul Romer (1986), who postulates that knowledge constitutes, in addition to land, labor, and capital, a fourth essential economic input.

Siegel downplays the importance of institutions, particularly hard and fast property rights secured by an independent judiciary. His argument against these institutional factors is historical: why did the Chinese and ancient Romans, Greeks, and Mesopotamians not achieve sustained growth during those periods when they enjoyed secure property rights?

Not so fast: Even a casual look around the world map, and at recent history, demonstrates the modern centrality of these key institutions; it cannot be a coincidence, for example, that China's economy exploded almost immediately after rudimentary property rights were introduced in 1978; more systematic research confirms the centrality of these essential institutions (Barro and Sala-i-Martin 2003). I find the spatial arguments even more persuasive; this familiar night photograph of the Korean Peninsula in Figure 3 is the picture that is worth a thousand regressions.

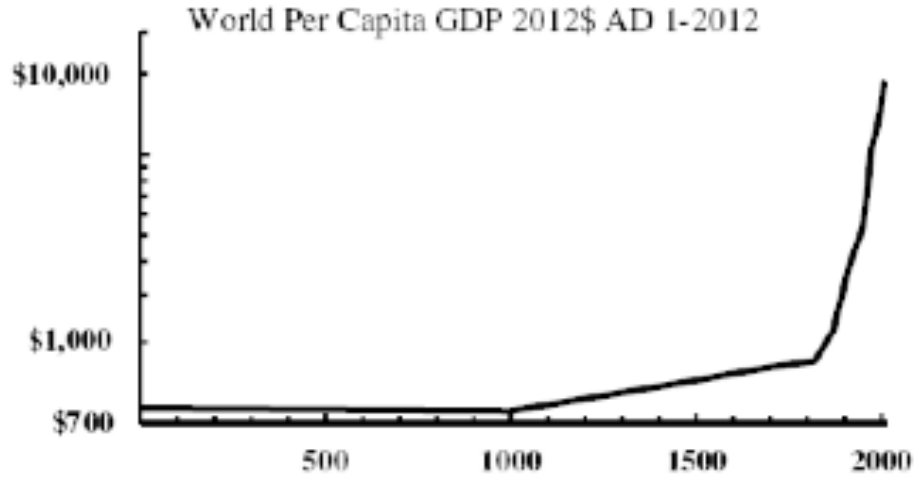
Figure 3
Night Satellite Photo of the Korean Peninsula

Source: NASA: Visible Earth: Earth's City Lights, 23 October 2000.

Economic growth, of course, is not unifactorial; secure property rights may not be sufficient for economic growth, but they are almost certainly necessary. The same is also true of scientific knowledge, capital markets, and the mastery of internal and external combustion and of electronic communications.

For very good reasons, ideas do not have many babies in North Korea, nor did they have many in the People's Republic of China before 1978. In order to understand how we got to where we are, and where we are going, we must first examine world prosperity through the widest possible lens: per capita GDP over the past few millennia. The primary authority in this area, the late Angus Maddison, painted a picture of striking temporal contour: almost no growth before the early nineteenth century, followed by steady 2% annual growth thereafter.

Figure 4



Source data: http:/www.ggdc.net/MADDISON/Historical_Statistics/horizontal-file_02-2010.xls.

Since the dawn of the Industrial Revolution, economic growth has sprung primarily from increases in productivity. T. S. Ashton's (1967) delightful monograph on its history describes a young student asked to define this event. He stammers, "About 1760 a wave of gadgets swept over England." Although Asthon's tone was mocking, the quote doesn't fall far from the truth. Per capita GDP and productivity are connected simply by hours worked, and if we want to understand how productivity increases, we must consider how the industrial gadgets are invented and produced.

In order to conceive of a gadget, the inventor must first command an accurate working model of the physical universe and of the laws that govern it. In addition, his society must have established a methodical way of testing those laws—the scientific method. While we venerate the great mathematical and engineering feats of the ancient Greeks and the invention of gunpowder, mechanical printing, the magnetic compass, and dozens of other key technologies by the medieval Chinese, those two marvelous civilizations did not what we would today call science—the rigorous, methodical collection of facts, the formulation of hypotheses and mathematical models, and the iterative testing of the latter with the former.

This inductive collect-hypothesize-test cycle first saw the light of day when Francis Bacon rejected the then dominant stifling, deductive Aristotelian system in favor of one based on induction. His treatise, *Novum Organum* (*The New Organon*), published in stages in the early seventeenth century, inspired the likes of Hooke, Boyle, and Wren, who in their turn midwifed the birth of the Royal Society in 1660, which institutionalized the process.

Second, the inventor must rest secure in the knowledge that he will get to keep at least some of the device's economic benefits; this is where property rights come in. And while Siegel is right to point out the origins of property rights in the ancient world, the first full

flowering of its bulwarks—a truly independent judiciary steeped in the tradition of equality under the law—did not see light of day until the emergence of English common law during the early medieval period. In the early seventeenth century, equality under the law and judicial and parliamentary supremacy over the crown were extended under the tutelage of the towering jurist Edward Coke, who did epic battle with James I's claim to the divine right of kings, and was finally cemented by the Revolutionary Settlement of 1689 (Siegan 2001).

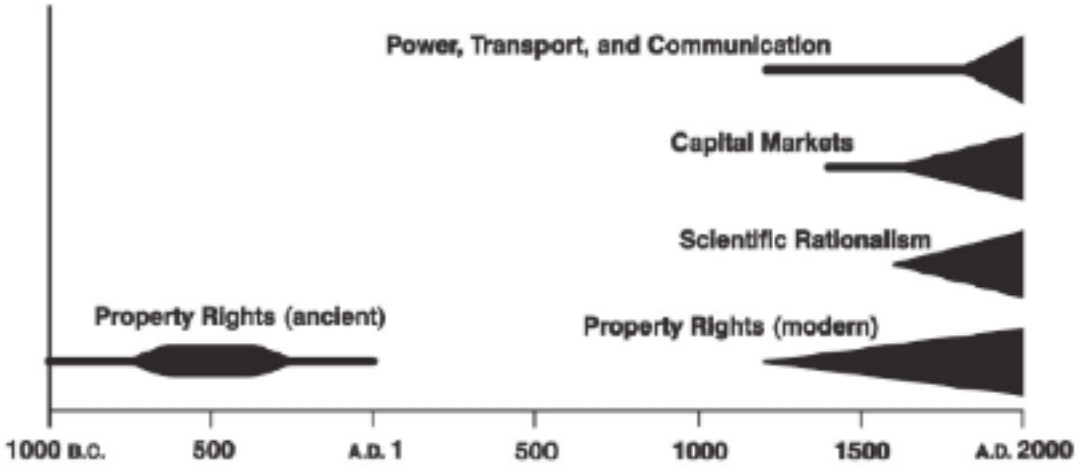
Third, in order to scale up production of these gadgets, capital is needed. Consider, for example, Edison's incandescent light bulb. Although the great inventor crafted prototypes on his own dime at his Menlo Park laboratory, he could not finance the production of millions of them, let alone the new electrical generating stations and power grids to supply them with electricity. That would take not just the capital of the Morgan Bank, but of an entire consortium organized by Morgan, an electricity enthusiast, to underwrite the Edison Electric Light Company. When did such large-scale financing become routinely available to entrepreneurs? Probably as early as 1600, as evidenced by the stock flotations of both the Dutch and English East India companies, and certainly by the Revolutionary Settlement of 1689, which ignited the development of the English debt markets.

Finally, once the entrepreneur has piled his warehouses high with gadgets, he needs to advertise and transport them across the nation and around the globe, and for that steam and telegraph are necessary, which came on line in the early to mid-nineteenth century.

It's not all about gadgets, of course; once they are put under the command of workers, the methodical superimposition of organizational and marketing processes becomes critical, as exemplified by Ford's assembly lines, and more than a century before that, Josiah Wedgwood's ceramics factories. Even in the absence of gadgets, simple Smithian labor specialization, as lyrically described in *Wealth of Nations*' famous pin factory, does yield modest economic growth all on its own.

Finally, once civilizations start down the technological path, the process becomes self-sustaining: the first wooden turnpikes have vanished, but railroads, telegraph, and highways followed in their routes. Similarly, while mirror making ceased being a major locus of industrial production in the medieval period, the skills involved proved indispensable in the production of movable type, whose impact on economic development is beyond calculation.

Figure 5
Schematic drawing of the historical trajectory of the four essential institutional and technological elements of sustained economic growth



This four-factor paradigm solves three of the basic puzzles of modern economic development:

(1) Why it ignited sometime during the early 19th century. This is simply the point at which the last of the four conditions—steam and telegraph—came online. It is interesting to note that prior to 1800, the Netherlands had secure property rights, the world's most advanced capital markets, and a budding scientific environment. And while it did not yet have access to steam power or telegraph, this flat nation did possess a dense system of towpathed canals that allowed for effective inland transport, allowing it to become "the first modern economy," experiencing up to a half percent growth in annual productivity for three centuries before the Industrial Revolution (de Vries and van der Woude 1997).

(2) Why, when we look around the world today, secure property rights and rule of law seem to cleave most cleanly rich nations from poor ones. This is because in the modern world these institutional strengths are scarcer than the other three factors: capital is readily available for most large-scale entrepreneurial projects, no mystery exists to set up an educational apparatus that will impart scientific rationalism, and modern communications and transport infrastructure are there for the purchasing (though maintenance may prove problematic). But for reasons that are likely cultural, property rights and rule of law do not find fertile soil in all nations, and in those where they are absent, this lack nullifies the benefits of the other three factors.

(3) Why the Industrial Revolution first took hold in Protestant Europe. Simply put, the Vatican opposed lending at interest, scientific rationalism (as Galileo found out), and was more concerned with its own property rights than with those of its flock, and so retarded economic development in Catholic nations. The above

formulation also explains why England, the home of the common law, Bacon, the Royal Society, and the advances in the capital markets attendant on the Revolutionary Settlement of 1689, was its epicenter.

None of these critical four factors—property rights/rule of law, scientific rationalism, capital market development, and transportation/communication technology—seem to be currently in retreat. Far from it, in fact. The history of the past two centuries is one of the gradual, if sputtering, ascendancy of all four, and for this reason alone, the future looks bright.

In the end, long-term forecasting in any field is a mug's game; this is particularly true in a highly complex area such as economic growth. Philip Tetlock (2005) studied 284 recognized experts in history, sociology, political science, international relations, economics, national security/arms control, journalism, diplomacy, and international law, among others, over more than a decade. The news was mostly bad; specialists in a single area and/or ideologues with grand, overarching theories (hedgehogs, in Isaiah Berlin's bestiary) performed poorly. Forecasters with a broad, but necessarily shallower knowledge of many areas who are willing to simultaneously entertain alternative hypotheses (foxes) performed better than the hedgehogs, but only marginally; both groups proved stunningly inaccurate. (Tetlock found, in addition, that fame and frequent media attention significantly corroded forecasting performance in both groups.)

He also found that simply adopting baseline probabilities trounced both hedgehogs and foxes. (I.e., it's tough to do better than "There is a two out of three chance that the stock market return will be positive next year.") Applying simple regression statistics can improve things even further. (I.e., "Since the market is historically cheap, there is a three out of four probability the market return will be positive next year.")

So even if you don't buy Siegel's and my admittedly heuristic institutionally rooted optimism, the now two centuries-long baseline of economic growth by itself, independent of any qualitative arguments, favors more of the same.

The Paradox of Wealth

You might think, then, that I am optimistic about security returns. Alas, I am not.

Let's perform another thought experiment. Imagine a subsistence level society plodding along at the precipice of starvation. Such a society has little excess capital—nearly every last basket of grain and every last piece of silver is consumed for food and shelter.

Subsistence societies, however, do need capital for seed, implements, and housing. In early agrarian societies, the cost of capital was high indeed—the rich farmer could lend his grain or livestock at a prodigious rate of interest, traditionally a bushel of wheat or a calf paid twice over at harvest or calving time, for a one hundred percent return in less than a year. As a society becomes more productive, wealth slowly accrues in the hands of the fortunate few with grain, domesticated animals, and money to spare, and capital

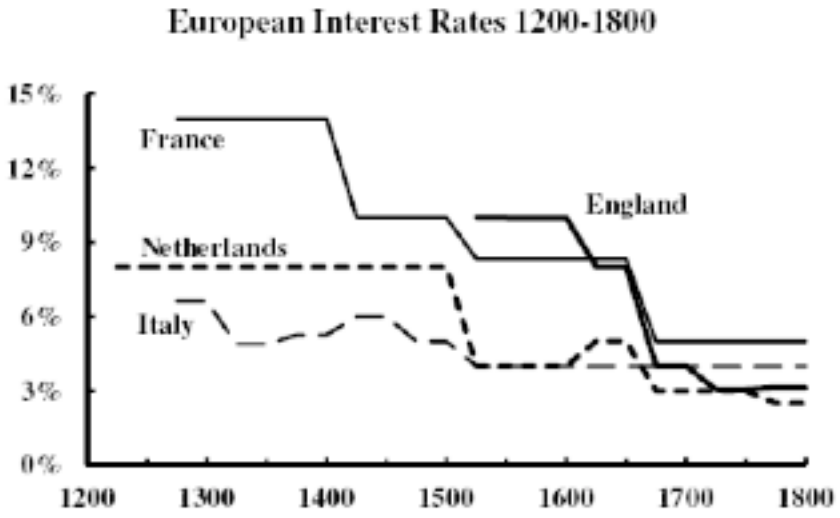
becomes more plentiful, not only in an absolute sense, but also, as we've just seen, relative to the need for it.

Wealthy societies do consume more capital than poor ones, but the above paradigm suggests that as societies get richer, the supply/demand equation shifts in favor of capital's consumers. During the stone age, archaeologists estimate that the average person consumed energy at the subsistence level of around 4 kilocalories per day, mainly as foodstuffs, which correlates with the 100 percent per growing/calving season cost of capital. In ancient Mesopotamia and Greece's more advanced societies, energy consumption increased to about 20 kilocalories per day, and interest rates decreased slowly to low double-digit levels; by the height of the Roman Republic and Empire around the dawn of the common era, daily energy consumption increased to over 30 kilocalories, and prime interest rates fell to as low as 4 percent (Morris 2010).

After Rome's fall, almost the entire panoply of advanced civil engineering was lost; energy consumption fell, and in western Europe it did not reach Roman levels again until approximately 1700; from AD 400 to 1200, the trace of interest rates disappears entirely (Homer and Sylla 2005).

Between 1200 and 1800, western Europe emerged from the Dark Ages to become the world's wealthiest region—from approximately the subsistence level to three times it, and it is no coincidence that during that period interest rates fell so dramatically, as demonstrated in Figure 6.

Figure 6



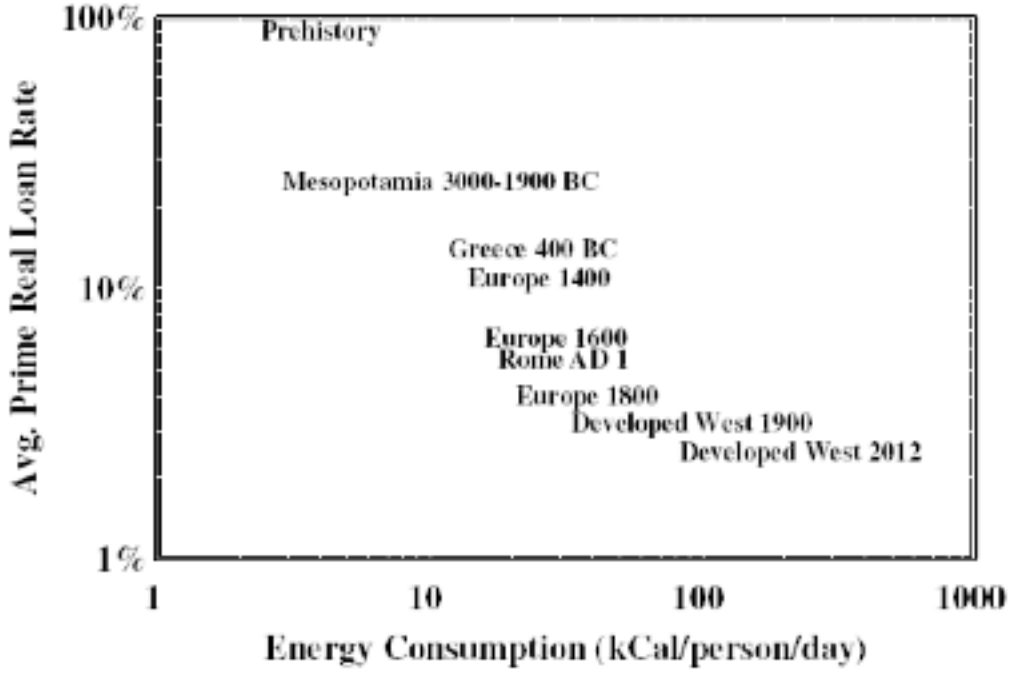
Source data: Homer and Sylla (2005).

These data, in fact, suggest a rough reciprocal relationship between real investment return (R) and societal per capita energy consumption (C), in kcal/person/day:[5]

$$R \sim 5/C$$

This equation yields a theoretical real investment return of 125% in prehistoric periods, 20% in the early medieval period, and 2% today, which roughly approximates the historical data.

Figure 7
Log-Log Plot of High-Quality Loan Rates versus Per Capita Daily Energy Consumption throughout History



Source data: Homer and Sylla (2005) and Morris (2010).

Nearly a century ago, Irving Fisher (1977) noted that in poor nations, interest rates were high, while in rich nations they were low. Ashton approvingly quoted the governor of the East India Company, Sir Josiah Child, who nearly a century before the Industrial Revolution had observed that "All countries are at this day richer or poorer in exact proportion to what they pay, and have usually paid, for the Interest of Money." (In fairness, Child's arrow of causation pointed from low interest rates to wealth, and not in the opposite direction.) Ashton went on, after first cautioning against unifactorial explanations of prosperity, to emphasize the importance of borrowing costs,

[5] For a time series of approximate per capita energy consumption in both the East and West, see Morris (2010), p. 628.

> If we seek—it would be wrong to do so—for a single reason why the pace of economic development quickened about the middle of the eighteenth century, it is to low interest rates we must look. The deep mines, solidly built factories, well-constructed canals, and the houses of the Industrial Revolution were the products of relatively cheap capital.[6]

Fisher furthered our understanding of capital market returns by pioneering the "impatience" theory of interest rate; in less affluent nations a starving and poorly housed populace with short life expectancies is "impatient" for capital and consumption, and so demands higher interest rates for their capital than the well fed and housed inhabitants of richer nations. But no matter how we explain things—in terms of impatience or in terms of the supply/demand status of capital—the effect is identical: the further a nation lives above the subsistence level, the lower its cost of capital.

In the same vein, both Dimson et al. (2002) and Jeremy Siegel (2007) have noted an inverse spatial correlation between economic growth and stock returns. Bernstein and Arnott (2003) found that this seeming disconnect between economic growth and security returns occurs at the level of stock share dilution. Although mature, stable nations demonstrated about two percent annual dilution of stock shares, nations that had undergone wartime disruption suffered dilution of twice this rate. The authors suggested that

> An increased rate of obsolescence effectively destroys the economic value of plant and equipment as surely as bombs and bullets, with the resultant dilution of per share payouts happening much faster than the technology-driven acceleration of economic growth—if such acceleration exists.

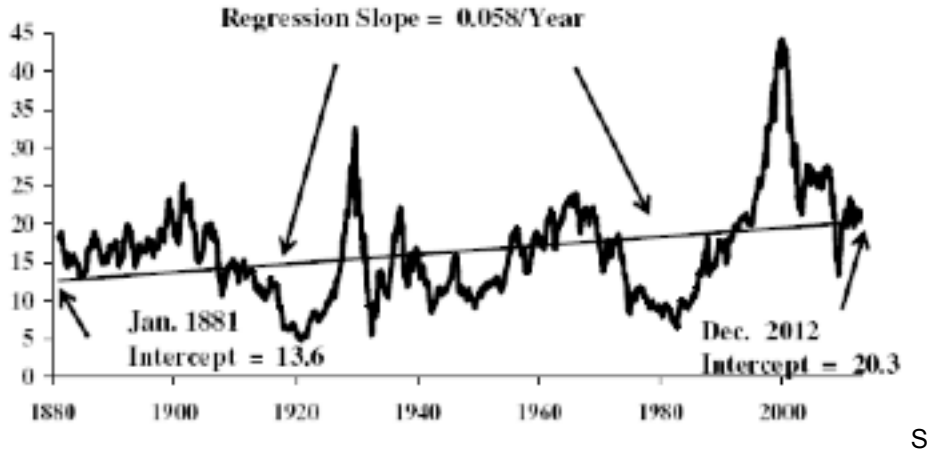
Speidell et al. (2005) confirmed this suspicion by finding share dilution of up to 30% per year in Asia's rapidly growing nations. It bears repeating: high economic growth, far from propelling asset returns, decreases them. Over the broad expanse of history, changes in the relative abundance of capital seem to drive its return, perhaps even more than does risk.

The longest continuous series of high-quality equity valuation data, the familiar Robert Shiller 10-year cyclically adjusted price/earnings ratio (CAPE) series of U.S. stocks, suggests that over the past 132 years, earnings multiples have expanded, with a regression slope of 0.058 points/per year. In other words, this widely followed ratio seems to increase by a point every 17 years or so; the intercepts of this trendline are 13.6 in 1881 and 20.3 at year-end 2012, at which point the actual value was 21.3.

---

[6] Ashton, 9–10.

Figure 8
Shiller PE with Temporal Regression Slope



S

Source data: http://www.econ.yale.edu/~shiller/data/ie_data.xls.

As we've seen, it takes centuries for wealth to drive down security returns, and the data from the Shiller series is not quite long enough to demonstrate convincingly the above noted positive regression slope; its t-stat for the 14 independent 10-year CAPE data points is just 1.65—close, but no cigar yet; maybe in another century or two, we'll know for sure if equity returns have fallen in the same way that loan rates have.

Further, the historical trend towards cheaper capital and lower returns is a noisy one. As early as the late seventeenth century, a bubble in English diving companies drove the cost of capital on the London markets as low as that seen in the recent tech bubble. Contrariwise, as recently as 1974, the entire U.K. stock market could have been bought with a few years' revenue from the Saudi oil flows. In 1982, U.S. equities sold at single-digit multiples, and during the most recent crisis, several corners of the world's stock markets could still reasonably have been called cheap. Today's investors will almost certainly have the opportunity, given adequate discipline, fortitude, and cash, to purchase securities at near historically low prices, but it seems likely that the windows will be more fleeting than in the past.

Rapid technological advancement and the attendant wealth it produces, far from being the friends of the investor, then, are a triple-barreled destroyer of returns: first, by increasing societal wealth (via increased industrial productivity) and thus decreasing the cost of capital by the above-described mechanisms; second, by promoting enthusiasm among, and capital flows from, gullible investors; and third, by the dilution of shares from the increased share issuance necessary to capitalize new technologies, and rapidly growing or reconstructing economies.

While we might envy the high rewards to capital in the ancient and medieval eras, who in their right mind would willing step into a time machine and give up the comfort, safety, and intellectual rewards of our modern society just to improve their portfolio return? Of

what use is investment success in a world of mayhem, disease, high infant mortality, and drastically shortened life expectancies?

As technology makes the world ever more wealthy, the returns on both riskless and risky assets will of necessity fall. Pray that the naysayers are wrong, and that both processes continue.

♓

The author would like to thank Robert Arnott, Laurence Siegel, Edward Tower, and Jason Zweig for helpful comments.

References

Arnott, Robert D., and Anne Casscells. 2003. "Demographics and Capital Market Returns," *Financial Analysts Journal* 59:2 (March-April): 20–29.

Ashton, T. S. 1967. *The Industrial Revolution, 1760–1830* (Oxford: Oxford University Press), 42.

Barro, Robert, and Xavier I. Sala-i-Martin. 2003. *Economic Growth 2nd Ed.* (Cambridge MA: MIT Press).

Bernstein, William J. 2002. *The Birth of Plenty* (New York: McGraw-Hill), 26.

Bernstein, William J., and Robert D. Arnott. 2003. "The Two Percent Dilution," *Financial Analysts Journal* 59:5 (September-October): 47–55.

de Vries, J., and A. van der Woude. 1997. *The First Modern Economy* (Cambridge: Cambridge University Press), 21–33.

Dimson, Elroy, et al. 2002. *Triumph of the Optimists* (Princeton: Princeton University Press) 156.

Fisher, Irving. 1977. *The Theory of Interest* (Philadelphia: Porcupine Press), 375–382.

Fishman, Charles. 2012. "The Insourcing Boom," *The Atlantic Monthly* (December).

Gordon, Robert J. 2012. "Is U.S. economic growth over? Faltering Innovation Confronts the Six Headwinds," NBER Working Paper Series, No. 18315 (August).

Harley, C. Knick. 1988. "Ocean Freight Rates and Productivity, 1740–1913: The Primacy of Mechanical Invention Reaffirmed," *Journal of Economic History* 48:4 (December): 863–864.

Homer, Sidney, and Richard Sylla. 2005. *A History of Interest Rates* 4th Ed. (Hoboken, NJ: John Wiley & Sons), 17–177.

Jevons, W. Stanley. 1866. *The Coal Question* 2nd Ed. (London: Macmillan and Co.).

Meadows, Donella H. 1972. *Limits to Growth* (New York: Universe Books).

Morris, Ian. 2010. *Why the West Rules—For Now* (New York: Farrar, Straus and Giroux), 628.

Porter, Edward D. 1995. "Are We Running Out of Oil?" American Petroleum Institute Discussion Paper #081 (December).

Quoidbach, Jordi et al. 2013. “The End of History Illusion,” *Science* 339:6115 (January 4): 96–98.

Ridley, Matt. 2010. *The Rational Optimist: How Prosperity Evolves* (New York)

Romer, Paul M. 1986. “Increasing Returns and Long-Run Growth,” *Journal of Political Economy*, 94 (October): 1002–1013.

Ross, Michael L. 1999. “The Political Economy of the Resource Curse,” *World Politics* 51:2 (January,): 297–322.

Siegan, Bernard H. 2001. *Property Rights* (New Brunswick, NJ: Transaction Publishers), 1–23.

Siegel, Jeremy. 2007. *Stocks for the Long Run* (New York: McGraw-Hill), 124–125.

Siegel, Laurence B. 2012. “Fewer, Richer, Greener: The End of the Population Explosion and the Future for Investors,” *Financial Analysts Journal* 68:6 (November-December): 20–37.

Speidell, Lawrence S. et al. 2005. “Dilution is a Drag . . . The Impact of Financings in Foreign Markets,” *Journal of Investing* 14:4 (Winter): 17–22.

Tetlock, Philip. 2005. *Expert Political Judgment.* (Princeton, NJ: Princeton University Press).