Introduction: The New Normal

Leading active members of today's economics profession…have formed themselves into a kind of Politburo for correct economic thinking. As a general rule—as one might generally expect from a gentleman's club—this has placed them on the wrong side of every important policy issue, and not just recently but for decades. They predict disaster where none occurs. They deny the possibility of events that then happen.… They oppose the most basic, decent and sensible reforms, while offering placebos instead. They are always surprised when something untoward (like a recession) actually occurs. And when finally they sense that some position cannot be sustained, they do not reexamine their ideas. They do not consider the possibility of a flaw in logic or theory. Rather, they simply change the subject. No one loses face, in this club, for having been wrong. No one is dis-invited from presenting papers at later annual meetings. And still less is anyone from the outside invited in.

—James K. Galbraith (economist)

The central assertion of this book is both simple and startling: *Economic growth as we have known it is over and done with.*

The "growth" we are talking about consists of the expansion of the overall size of the economy (with more people being served and more money changing hands) and of the quantities of energy and material goods flowing through it.

The economic crisis that began in 2007–2008 was both foreseeable and inevitable, and it marks a *permanent*, *fundamental* break from past

decades—a period during which most economists adopted the unrealistic view that perpetual economic growth is necessary and also possible to achieve. There are now fundamental barriers to ongoing economic expansion, and the world is colliding with those barriers.

This is not to say the US or the world as a whole will never see another quarter or year of growth relative to the previous quarter or year. However, when the bumps are averaged out, the general trend-line of the economy (measured in terms of production and consumption of real goods) will be level or downward rather than upward from now on.

Nor will it be impossible for any region, nation, or business to continue growing for a while. Some will. In the final analysis, however, this growth will have been achieved at the expense of other regions, nations, or businesses. From now on, only *relative growth* is possible: the global economy is playing a zero-sum game, with an ever-shrinking pot to be divided among the winners.

Why Is Growth Ending?

Many financial pundits have cited serious troubles in the US economy—including overwhelming, un-repayable levels of public and private debt, and the bursting of the real estate bubble—as immediate threats to economic growth. The assumption generally is that eventually, once these problems are dealt with, growth can and will resume at "normal" rates. But the pundits generally miss factors *external* to the financial system that make a resumption of conventional economic growth a near-impossibility. *This is not a temporary condition; it is essentially permanent*.

Altogether, as we will see in the following chapters, there are three primary factors that stand firmly in the way of further economic growth:

- The *depletion* of important resources including fossil fuels and minerals;
- The proliferation of *negative environmental impacts* arising from both the extraction and use of resources (including the burning of fossil fuels)—leading to snowballing costs from both these impacts themselves and from efforts to avert them; and
- *Financial disruptions* due to the inability of our existing monetary, banking, and investment systems to adjust to both resource scarcity and soaring environmental costs—and their inability (in the context

of a shrinking economy) to service the enormous piles of government and private debt that have been generated over the past couple of decades.

Despite the tendency of financial commentators to ignore environmental limits to growth, it is possible to point to literally thousands of events in recent years that illustrate how all three of the above factors are interacting, and are hitting home with ever more force.

Consider just one: the Deepwater Horizon oil catastrophe of 2010 in the US Gulf of Mexico.

The fact that BP was drilling for oil in deep water in the Gulf of Mexico illustrates a global trend: while the world is not in danger of *running out* of oil anytime soon, there is very little new oil to be found in onshore areas where drilling is cheap. Those areas have already been explored and their rich pools of hydrocarbons are being depleted. According to the International Energy Agency, by 2020 almost 40 percent of world oil production will come from offshore. So even though it's hard, dangerous, and expensive to operate a drilling rig in a mile or two of ocean water, that's what the oil industry must do if it is to continue supplying its product. That means more expensive oil.

Obviously, the environmental costs of the Deepwater Horizon blowout and spill were ruinous. Neither the US nor the oil industry can afford another accident of that magnitude. So, in 2010 the Obama administration instituted a deepwater drilling moratorium in the Gulf of Mexico while preparing new drilling regulations. Other nations began revising their own deepwater oil exploration guidelines. These will no doubt make future blowout disasters less likely, but they add to the cost of doing business and therefore to the already high cost of oil.

The Deepwater Horizon incident also illustrates to some degree the knock-on effects of depletion and environmental damage upon financial institutions. Insurance companies have been forced to raise premiums on deepwater drilling operations, and impacts to regional fisheries have hit the Gulf Coast economy hard. While economic costs to the Gulf region were partly made up for by payments from BP, those payments forced the company to reorganize and resulted in lower stock values and returns to

investors. BP's financial woes in turn impacted British pension funds that were invested in the company.

This is just one event—admittedly a spectacular one. If it were an isolated problem, the economy could recover and move on. But we are, and will be, seeing a cavalcade of environmental and economic disasters, not obviously related to one another, that will stymie economic growth in more and more ways. These will include but are not limited to:

- Climate change leading to regional droughts, floods, and even famines;
- Shortages of energy, water, and minerals; and
- Waves of bank failures, company bankruptcies, and house foreclosures.

Each will be typically treated as a special case, a problem to be solved so that we can get "back to normal." But in the final analysis, they are all related, in that they are consequences of a growing human population striving for higher per-capita consumption of limited resources (including non-renewable, climate-altering fossil fuels), all on a finite and fragile planet.

Meanwhile, the unwinding of decades of buildup in debt has created the conditions for a once-in-a-century financial crash—which is unfolding around us, and which on its own has the potential to generate substantial political unrest and human misery.

The result: we are seeing a perfect storm of converging crises that together represent a watershed moment in the history of our species. We are witnesses to, and participants in, the transition from decades of economic growth to decades of economic contraction.

The End of Growth Should Come As No Surprise

The idea that growth will stall out at some point this century is hardly new. In 1972, a book titled *Limits to Growth* made headlines and went on to become the best-selling environmental book of all time.[1]

That book, which reported on the first attempts to use computers to model the likely interactions between trends in resources, consumption, and population, was also the first major scientific study to question the

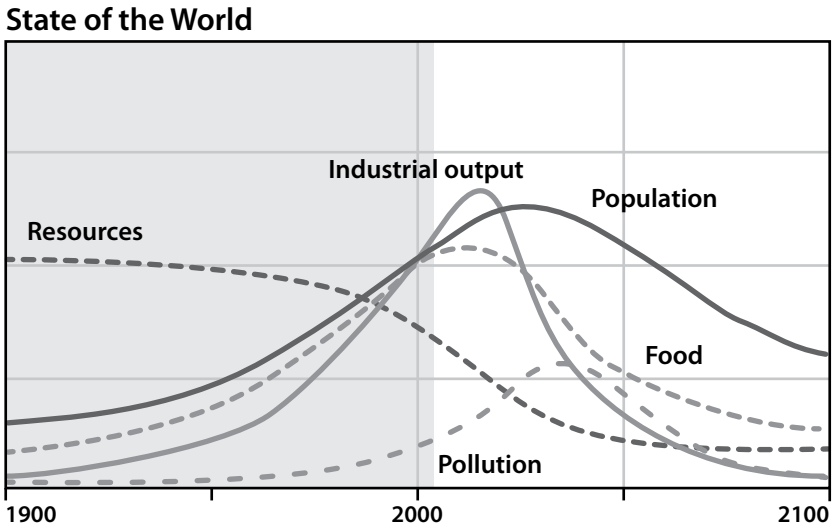

FIGURE 1. Limits to Growth Scenario. Source: *The Limits to Growth: The 30-Year Update* (2004), p. 169.

assumption that economic growth can and will continue more or less uninterrupted into the foreseeable future.

The idea was heretical at the time—and still is. The notion that growth *cannot* and *will not* continue beyond a certain point proved profoundly upsetting in some quarters, and soon *Limits to Growth* was prominently "debunked" by pro-growth business interests. In reality, this "debunking" merely amounted to taking a few numbers in the book completely out of context, citing them as "predictions" (which they explicitly were not), and then claiming that these predictions had failed.[2] The ruse was quickly exposed, but rebuttals often don't gain nearly as much publicity as accusations, and so today millions of people mistakenly believe that the book was long ago discredited. In fact, the original *Limits to Growth* scenarios have held up quite well. (A recent study by Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) concluded, "[Our] analysis shows that 30 years of historical data compares favorably with key features of [the *Limits to Growth*] business-as-usual scenario. . . .")[3]

The authors fed in data for world population growth, consumption trends, and the abundance of various important resources, ran their computer program, and concluded that the end of growth would probably

arrive between 2010 and 2050. Industrial output and food production would then fall, leading to a decline in population.

The *Limits to Growth* scenario study has been re-run repeatedly in the years since the original publication, using more sophisticated software and updated input data. The results have been similar each time.[4]

Why Is Growth So Important?

During the last couple of centuries, economic growth became virtually the sole index of national well-being. When an economy grew, jobs appeared and investments yielded high returns. When the economy stopped growing temporarily, as it did during the Great Depression, financial bloodletting ensued.

Throughout this period, world population increased—from fewer than two billion humans on planet Earth in 1900 to over seven billion today; we are adding about 70 million new "consumers" each year. That makes further economic growth even more crucial: if the economy stagnates, there will be fewer goods and services *per capita* to go around.

We have relied on economic growth for the "development" of the world's poorest economies; without growth, we must seriously entertain the possibility that hundreds of millions—perhaps billions—of people will never achieve the consumer lifestyle enjoyed by people in the world's industrialized nations. From now on, efforts to improve quality of life in these nations will have to focus much more on factors such as cultural expression, political freedoms, and civil rights, and much less on an increase in GDP.

Moreover, we have created monetary and financial systems that *require* growth. As long as the economy is growing, that means more money and credit are available, expectations are high, people buy more goods, businesses take out more loans, and interest on existing loans can be repaid.[5] But if the economy is not growing, new money *isn't* entering the system, and the interest on existing loans cannot be paid; as a result, defaults snowball, jobs are lost, incomes fall, and consumer spending contracts—which leads businesses to take out fewer loans, causing still less new money to enter the economy. This is a self-reinforcing destructive feedback loop that is very difficult to stop once it gets going.

In other words, the existing market economy has no "stable" or "neutral" setting: there is only growth or contraction. And "contraction" can be just a nicer name for recession or depression—a long period of cascading job losses, foreclosures, defaults, and bankruptcies.

We have become so accustomed to growth that it's hard to remember that it is actually is a fairly recent phenomenon.

Over the past few millennia, as empires rose and fell, local economies advanced and retreated—while world economic activity overall expanded only slowly, and with periodic reversals. However, with the fossil fuel revolution of the past century and a half, we have seen economic growth at a speed and scale unprecedented in all of human history.[6] We harnessed the energies of coal, oil, and natural gas to build and operate cars, trucks, highways, airports, airplanes, and electric grids—all the essential features of modern industrial society. Through the one-time-only process of extracting and burning hundreds of millions of years' worth of chemically stored sunlight, we built what appeared (for a brief, shining moment) to be a perpetual-growth machine. We learned to take what was in fact an extraordinary situation for granted. It became *normal*.

But as the era of cheap, abundant fossil fuels comes to an end, our assumptions about continued expansion are being shaken to their core. The end of growth is a very big deal indeed. It means the end of an era, and of our current ways of organizing economies, politics, and daily life.

It is essential that we *recognize and understand the significance of this historic moment*: if we have in fact reached the end of the era of fossil-fueled economic expansion, then efforts by policy makers to continue pursuing elusive growth really amount to a flight from reality. World leaders, if they are deluded about our actual situation, are likely to delay putting in place the support services that can make life in a non-growing economy tolerable, and they will almost certainly fail to make needed, fundamental changes to monetary, financial, food, and transport systems.

As a result, what could be a painful but endurable process of adaptation could instead become history's greatest tragedy. We can survive the end of growth, and perhaps thrive beyond it, but only if we recognize it for what it is and act accordingly.

BOX I.1 But Isn't the US Economy Recovering?

From July 2009 through the end of 2010, the US economy posted GDP gains—i.e., signs of growth. Nominal GDP surpassed pre-recession levels in mid-2010, while inflation-adjusted GDP nearly returned to its pre-recession level.[7] This followed GDP contraction in the months December 2007 through June 2009.[8]

But, as we will see in Chapter 6, GDP is a poor gauge of overall economic health. Even if GDP has returned to former levels, the economy of the United States is fundamentally changed: unemployment levels are much higher and tax revenues for state and local governments are severely reduced. Some economists may define this technically as a recovering and growing economy, but it certainly is not a healthy one.

Moreover, much of this apparent growth has come about because of enormous injections of stimulus and bailout money from the Federal government. Subtract those, and the GDP growth of the past year or so almost disappears.

On the basis of historical analysis of previous financial crises, economists Carmen Reinhart and Kenneth Rogoff conclude that the economic crisis of 2008 will have

"…deep and lasting effects on asset prices, output and employment. Unemployment rises and housing price declines extend out for five and six years, respectively. On the encouraging side, output declines last only two years on average. Even recessions sparked by financial crises do eventually end, albeit almost invariably accompanied by massive increases in government debt.… The global nature of the [current] crisis will make it far more difficult for many countries to grow their way out through higher exports, or to smooth the consumption effects through foreign borrowing. In such circumstances, the recent lull in sovereign defaults is likely to come to an end."[9]

But this analysis considers only the financial aspects of the crisis and ignores the deeper issues of energy, resources, and environment. The "recovery" that began in 2009 occurred in the context of energy prices

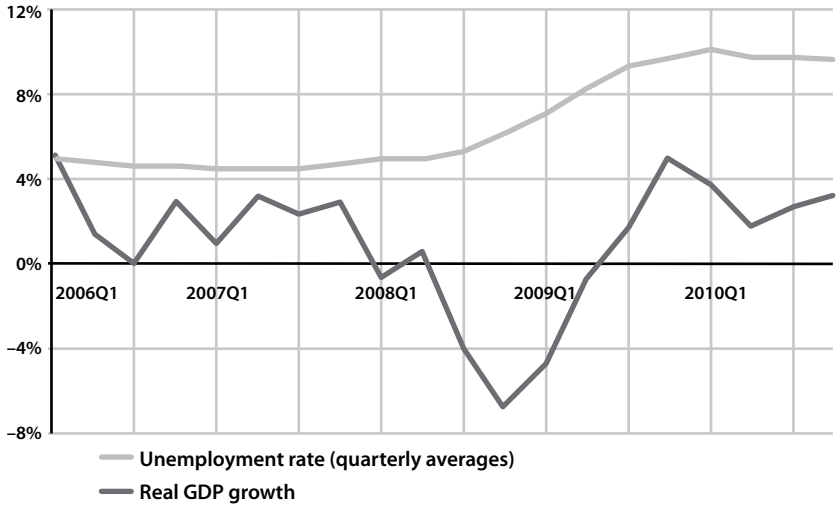

FIGURE 2. Economic Growth and Unemployment, 2006–2010. As the US economy contracted from the financial crisis in 2008, economic growth went negative and the unemployment rate shot up. Source: US Bureau of Labor Statistics, US Bureau of Economic Analysis.

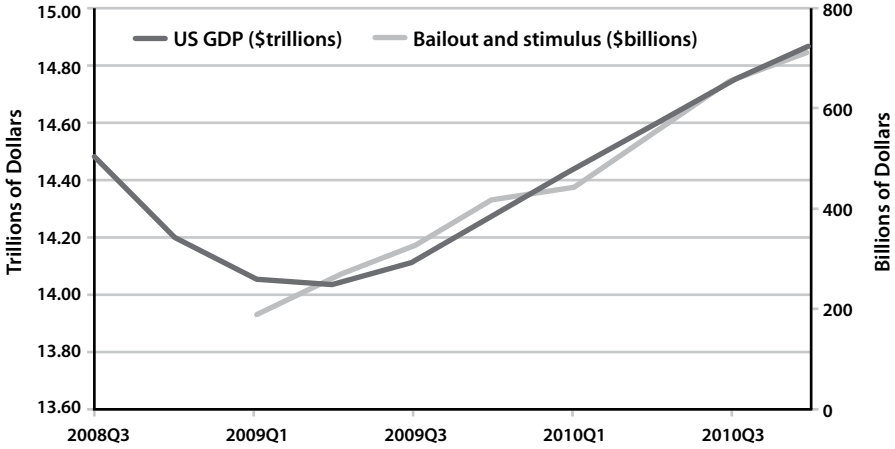

FIGURE 3. Economic Growth, Stimulus, and Bailouts. "Bailout and Stimulus" refers to the Troubled Asset Relief Program (TARP) and the American Recovery and Reinvestment Act of 2009. As this graph shows, these federal government expenditures appear to have been the primary source of economic growth since the financial crisis in 2008. What happens when the federal government can no longer bail out the banks and stimulate the economy? Source: US Bureau of Economic Analysis, The Committee for a Responsible Federal Budget.

that had fallen substantially from their peak in mid-2008; but as consumer demand showed tepid signs of revival in late 2010, oil prices lofted upward again. If this "recovery" continues, energy prices will rise even further and contraction will resume.

In short: while the US economy may have posted growth (as technically defined) in 2009–2010, it is operating in a fundamentally different mode than before: it is led to a greater extent than before by government spending (as opposed to consumer activity), and it is hostage to energy prices.

But Isn't Growth Normal?

Economies are systems, and as such they follow rules analogous (to a certain extent) to those that govern biological systems. Plants and animals tend to grow quickly when they are young, but then they reach a more or less stable mature size. In organisms, growth rates are largely controlled by genes, but also by availability of food.

In economies, growth seems tied to the availability of resources, chiefly energy ("food" for the industrial system), and credit ("oxygen" for the economy)—as well as to economic planning.

During the past 150 years, expanding access to cheap and abundant fossil fuels enabled rapid economic expansion at an average rate of about three percent per year; economic planners began to take this situation for granted. Financial systems internalized the expectation of growth as a promise of returns on investments.

Most organisms cease growing once they reach adulthood; if curtailment of growth weren't genetically programmed, plants and animals would outgrow a range of practical constraints: imagine, for example, the survival challenges faced by a two-pound hummingbird. If the analogy holds, then economies must eventually stop growing too. Even if planners (society's equivalent of regulatory DNA) dictate more growth, at some point increasing amounts of "food" and "oxygen" will cease to be available. It is also possible for wastes to accumulate to the point that the biological systems that underpin economic activity (such as forests, crops, and human bodies) are smothered and poisoned.

But many economists don't see things this way. That's probably because current economic theories were formulated during the anomalous historical period of sustained growth that is now ending. Economists are merely generalizing from their experience: they can point to decades of steady growth in the recent past, and they simply project that experience into the future.[10] Moreover, they have theories to explain why modern market economies are immune to the kinds of limits that constrain natural systems: the two main ones have to do with *substitution* and *efficiency*.

If a useful resource becomes scarce, its price will rise, and this creates an incentive for users of the resource to find a substitute. For example, if oil gets expensive enough, energy companies might start making liquid fuels from coal. Or they might develop other energy sources undreamed of today. Many economists theorize that this process of substitution can go on forever. It's part of the magic of the free market.

Boosting efficiency means doing more with less. In the US, the number of dollars generated in the economy for every unit of energy consumed has increased steadily over recent decades.[11] Part of this increasing efficiency is a result of outsourcing manufacturing to other nations—which must then burn the coal, oil, or natural gas to make our goods. (If we were making our own running shoes and LCD TVs, we'd be burning that fuel domestically.)[12] Economists also point to another, related form of efficiency that has less to do with energy (in a direct way, at least): the process of identifying the cheapest sources of materials, and the places where workers will be most productive or work for the lowest wages. As we increase efficiency, we use less—of energy, resources, labor, or money—to do more. That enables more economic growth.

Finding substitute resources and upping efficiency are undeniably effective adaptive strategies of market economies. Nevertheless, the question remains as to how long these strategies can continue to work in the real world—which is governed less by economic theories than by the laws of physics. In the real world, some things don't have substitutes, or the substitutes are too expensive, or don't work as well, or can't be produced fast enough. And efficiency follows a law of diminishing returns: the first gains in efficiency are usually cheap, but every further incremental gain tends to cost more, until further gains become prohibitively expensive.

In the end, we can't outsource more than 100 percent of manufacturing, we can't transport goods with zero energy, and we can't enlist the efforts of workers and count on their buying our products while paying them nothing. Unlike most economists, most physical scientists recognize that growth within any functioning, bounded system has to stop sometime.

BOX I.2 Cooking the Books on Growth

Are government economic statistics accurate and credible? Not according to consulting economist John Williams of shadowstats.com. After a "lengthy process of exploring the history and nature of economic reporting and interviewing key people involved in the process from the early days of government reporting through the present," Williams began compiling his own data and publishing them on his website. In some cases, as with unemployment statistics, he simply highlights the discrepancy between current definitions and reporting practices and former ones: if unemployment numbers were reported today the way they were in the 1970s, the current figure would be in the range of 16–18 percent rather than the officially reported 9–10 percent (for example, people who have given up looking for jobs are no longer categorized as "unemployed").

"Shadow stats" for inflation are consistently higher than the government's reported figures, and GDP growth rates consistently lower.

Regarding Figure 4, Williams notes, "The SGS-Alternate GDP reflects the inflation-adjusted, or real, year-to-year GDP change, adjusted for distortions in government inflation usage and methodological changes that have resulted in a built-in upside bias to official reporting."

All of which raises the question: How much of the economic "recovery" is actually only smoke and mirrors?

The Simple Math of Compounded Growth

In principle, the argument for an eventual end to growth is a slam-dunk. If any quantity grows steadily by a certain fixed percentage per year, this implies that it will double in size every so-many years; the higher the percentage growth rate, the quicker the doubling. A rough method of figuring

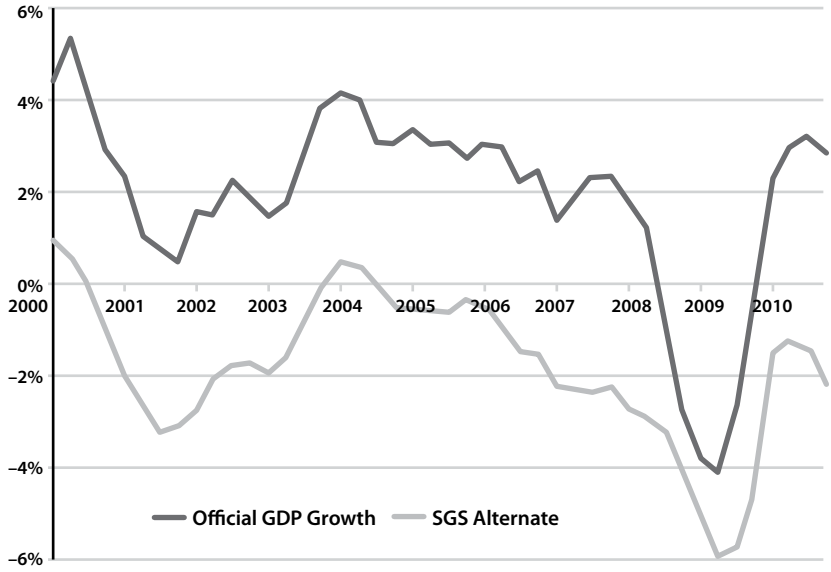

FIGURE 4. US GDP Growth, Official vs. Shadowstats, 2000–2010. Official GDP data comes from the Bureau of Economic Analysis. The SGS Alternate comes from Shadow Government Statistics. Both datasets are adjusted for inflation. Source: Shadow Government Statistics, American Business Analytics and Research LLC, shadowstats.com

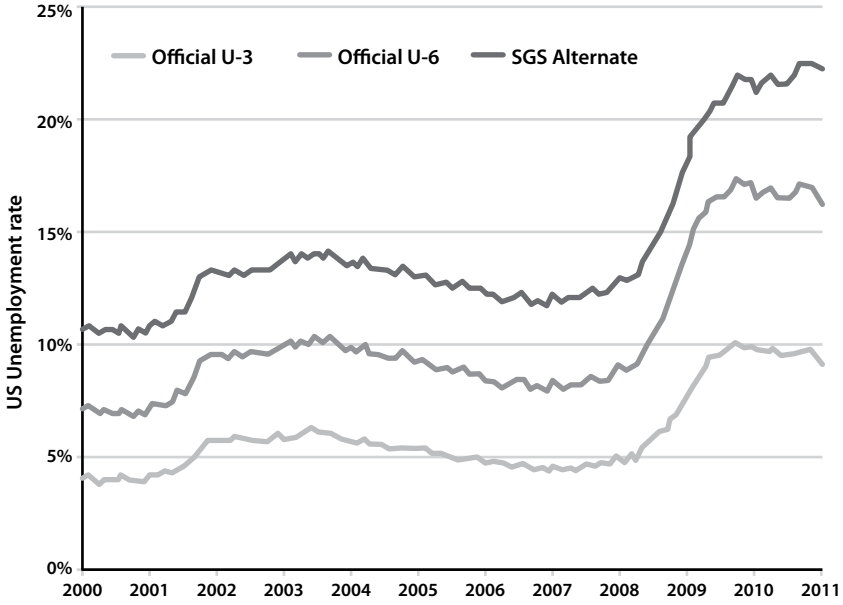

FIGURE 5. Civilian Unemployment, Official vs. Shadowstats, 2000–2010 (Seasonally Adjusted). The SGS-Alternate Unemployment Rate reflects current unemployment reporting methodology adjusted for the significant portion of "discouraged workers" no longer included after 1994. The Bureau of Labor Statistics U-6 rate includes both discouraged workers as currently defined (discouraged less than one year) and long-term discouraged workers (discouraged more than one year). Source: Shadow Government Statistics, American Business Analytics and Research LLC, shadowstats.com.

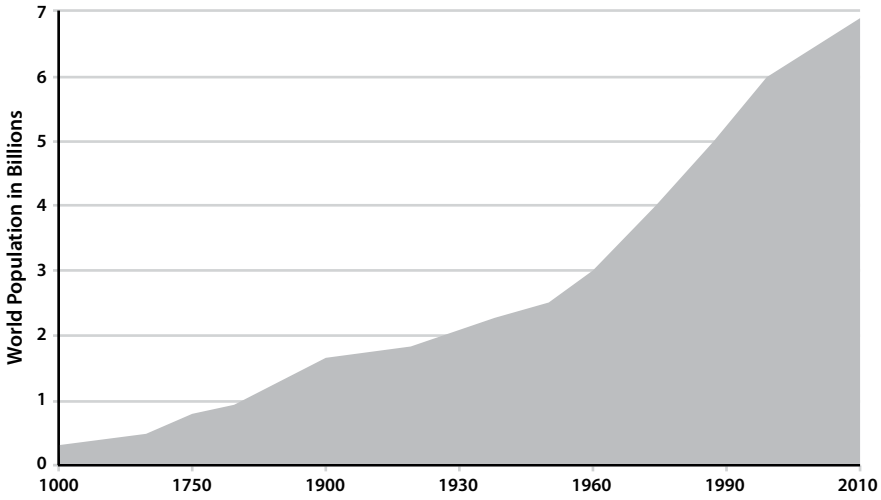

FIGURE 6. World Population Growth, 1000–2010. Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, "World Population Prospects: The 2008 Revision" (2009–10 population data based on 2008 projection).

doubling times is known as the rule of 70: dividing the percentage growth rate into 70 gives the approximate time required for the initial quantity to double. If a quantity is growing at 1 percent per year, it will double in 70 years; at 2 percent per year growth, it will double in 35 years; at 5 percent growth, it will double in only 14 years, and so on. If you want to be more precise, you can use the Y^x button on a scientific calculator, but the rule of 70 works fine for most purposes.

Here's a real-world example: Over the past two centuries, human population has grown at rates ranging from less than one percent to more than two percent per year. In 1800, world population stood at about one billion; by 1930 it had doubled to two billion. Only 30 years later (in 1960) it had doubled again to four billion; currently we are on track to achieve a third doubling, to eight billion humans, around 2025. No one seriously expects human population to continue growing for centuries into the future. But imagine if it did—at just 1.3 percent per year (its growth rate in the year 2000). By the year 2780 there would be 148 trillion humans on Earth—one person for each square meter of land on the planet's surface.

It won't happen, of course.

In nature, growth always slams up against non-negotiable constraints sooner or later. If a species finds that its food source has expanded, its numbers will increase to take advantage of those surplus calories—but then its food source will become depleted as more mouths consume it, and its predators will likewise become more numerous (more tasty meals for them!). Population "blooms" (or periods of rapid growth) are nearly always followed by crashes and die-offs.[13]

Here's another real-world example. In recent years China's economy has been growing at eight percent or more per year; that means it is more than doubling in size every ten years. Indeed, China now consumes more than twice as much coal as it did a decade ago—the same with iron ore and oil. The nation now has four times as many highways as it did, and almost five times as many cars. How many more doublings can occur before China has used up its key resources—or has simply decided that enough is enough and has stopped growing? The question is hard to answer with a specific number, but it is unlikely to be a large one.

This discussion has very real implications, because the economy is not just an abstract concept; it is what determines whether we live in luxury or poverty, whether we eat or starve. If economic growth ends, everyone will be impacted, and it will take society years to adapt to this new condition. Therefore it is important to know whether that moment is close at hand or distant in time.

The Peak Oil Scenario

As mentioned, this book will argue that global economic growth is over because of a convergence of three factors—resource depletion, environmental impacts, and systemic financial and monetary failures. However, a single factor may be playing a key role in bringing the age of expansion to a close. That factor is oil.

Petroleum has a pivotal place in the modern world—in transportation, agriculture, and the chemicals and materials industries. The Industrial Revolution was really the Fossil Fuel Revolution, and the entire phenomenon of continuous economic growth—including the development of the financial institutions that facilitate growth, such as fractional reserve banking—is ultimately based on ever-increasing supplies of cheap energy.

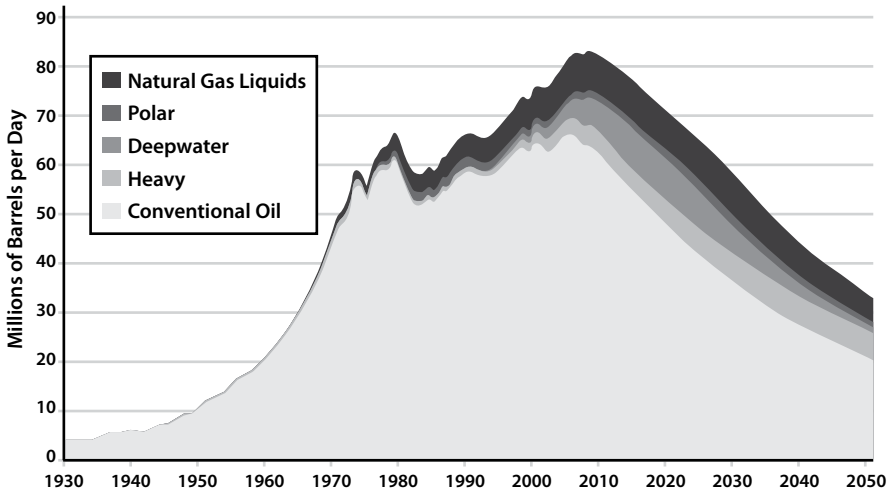

FIGURE 7. World Oil Production. Source: Colin Campbell, personal comunication.

Growth requires more manufacturing, more trade, and more transport, and those all in turn require more energy. This means that if energy supplies can't expand and energy therefore becomes significantly more expensive, economic growth will falter and financial systems built on expectations of perpetual growth will fail.

As early as 2000, petroleum geologist Colin Campbell discussed a Peak Oil impact scenario that went like this.[14] Sometime around the year 2010, he theorized, stagnant or falling oil supplies would lead to soaring and more volatile oil prices, which would precipitate a global economic crash. This rapid economic contraction would in turn lead to sharply curtailed energy demand, so oil prices would then fall; but as soon as the economy regained strength, demand for petroleum would recover, prices would again soar, and as a result of that the economy would relapse. This cycle would continue, with each recovery phase being shorter and weaker, and each crash deeper and harder, until the economy was in ruins. Financial systems based on the assumption of continued growth would implode, causing more social havoc than the oil price spikes would themselves directly generate.

Meanwhile, volatile oil prices would frustrate investments in energy alternatives: one year, oil would be so expensive that almost any other

energy source would look cheap by comparison; the next year, the price of oil would have fallen far enough that energy users would be flocking back to it, with investments in other energy sources looking foolish. But low oil prices would discourage exploration for more petroleum, leading to even worse fuel shortages later on. Investment capital would be in short supply in any case because the banks would be insolvent due to the crash, and governments would be broke due to declining tax revenues. Meanwhile, international competition for dwindling oil supplies might lead to wars between petroleum importing nations, between importers and exporters, and between rival factions within exporting nations.

In the years following the turn of the millennium, many pundits claimed that new technologies for crude oil extraction would increase the amount of oil that can be obtained from each well drilled, and that enormous reserves of alternative hydrocarbon resources (principally tar sands and oil shale) would be developed to seamlessly replace conventional oil, thus delaying the inevitable peak for decades. There were also those who said that Peak Oil wouldn't be much of a problem even if it happened soon, because the market would find other energy sources or transport options as quickly as needed—whether electric cars, hydrogen, or liquid fuel made from coal.

In succeeding years, events appeared to be supporting the Peak Oil thesis and undercutting the views of the oil optimists. Oil prices trended steeply upward—and for entirely foreseeable reasons: discoveries of new oilfields were continuing to dwindle, with most new fields being much more difficult and expensive to develop than ones found in previous years. More oil-producing countries were seeing their extraction rates peaking and beginning to decline despite efforts to maintain production growth using high-tech, expensive extraction methods like injecting water, nitrogen, or carbon dioxide to force more oil out of the ground. Production decline rates in the world's old, super-giant oilfields, which are responsible for the lion's share of the global petroleum supply, were accelerating. Production of liquid fuels from tar sands was expanding only slowly, while the development of oil shale remained a hollow promise for the distant future.[15]

From Scary Theory to Scarier Reality

Then in 2008, the Peak Oil scenario became all too real. Global oil production had been stagnant since 2005 and petroleum prices had been soaring upward. In July 2008, the per-barrel price shot up to nearly $150—half again higher (in inflation-adjusted terms) than the price spikes of the 1970s that had triggered the worst recession since World War II. By summer 2008, the auto industry, the trucking industry, international shipping, agriculture, and the airlines were all reeling.

But what happened next riveted the world's attention to such a degree that the oil price spike was all but forgotten: in September 2008, the global financial system nearly collapsed. The most frequently discussed reasons for this sudden, gripping crisis had to do with housing bubbles, lack of proper regulation of the banking industry, and the over-use of bizarre financial products that almost nobody understood. However, the oil price spike had also played a critical (if largely overlooked) role in initiating the economic meltdown.[16]

In the immediate aftermath of that global financial near-death experience, both the Peak Oil impact scenario proposed a decade earlier and

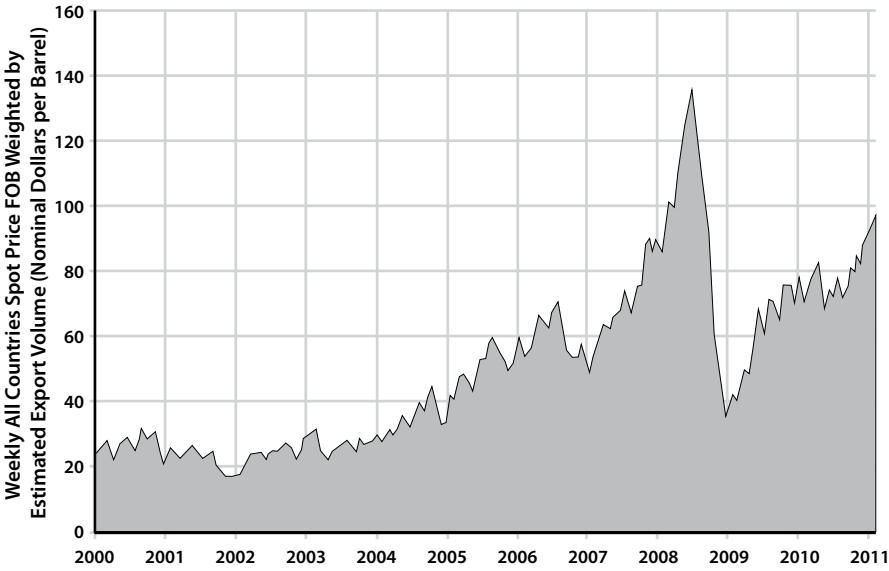

FIGURE 8. World Crude Oil Prices, 2000–2011. Source: US Energy Information Administration.

the *Limits to Growth* standard-run scenario of 1972 seemed to be confirmed with uncanny and frightening accuracy. Global trade was falling. The world's largest auto companies were on life support. The US airline industry had shrunk by almost a quarter. Food riots were erupting in poor nations around the world. Lingering wars in Iraq (the nation with the world's second-largest crude oil reserves) and Afghanistan (the site of disputed oil and gas pipeline projects) continued to bleed the coffers of the world's foremost oil-importing nation.[17]

Meanwhile, the dragging debate about what to do to rein in global climate change exemplified the political inertia that had kept the world on track for calamity since the early '70s. It had by now become obvious to a great majority of people familiar with the scientific data that the world has two urgent, incontrovertible reasons to rapidly end its reliance on fossil fuels: the twin threats of climate catastrophe and impending constraints to fuel supplies. Yet at the landmark international Copenhagen climate conference in December 2009, the priorities of the most fuel-dependent nations were clear: carbon emissions should be cut, and fossil fuel dependency reduced, *but only if doing so does not threaten economic growth*.

Bursting Bubbles

As we will see in Chapters 1 and 2, expectations of continuing growth had in previous decades been translated into enormous amounts of consumer and government debt. An ever shrinking portion of America's wealth was being generated by invention of new technologies and manufacture of consumer goods, and an ever greater portion was coming from buying and selling houses, or moving money around from one investment to another.

As a new century dawned, the world economy lurched from one bubble to the next: the emerging-Asian-economies bubble, the dot-com bubble, the real estate bubble. Smart investors knew that these would eventually burst, as bubbles always do, but the smartest ones aimed to get in early and get out quickly enough to profit big and avoid the ensuing mayhem.

If Peak Oil and other limits on resources were closing the spigots on growth in 2007–2008, the pain that ordinary citizens were experiencing seemed to be coming from other directions entirely: loss of jobs and collapsing real estate prices.

In the manic days of 2002 to 2006, millions of Americans came to rely on soaring real estate values as a source of income, turning their houses into ATMs (to use once more the phrase heard so often then). As long as prices kept going up, homeowners felt justified in borrowing to remodel a kitchen or bathroom, and banks felt fine making those loans. Meanwhile, the wizards of Wall Street were finding ways of slicing and dicing subprime mortgages into tasty collateralized debt obligations that could be sold at a premium to investors—with little or no risk! After all, real estate values were destined to just keep going up. *God's not making any more land*, went the truism.

Credit and debt expanded in the euphoria of easy money. All this giddy optimism led to a growth of jobs in construction and real estate industries, masking underlying ongoing job losses in manufacturing.

A few dour financial pundits used terms like "house of cards," "tinderbox," and "stick of dynamite" to describe the situation. All that was needed was a metaphoric breeze or rogue spark to produce a catastrophic outcome. Arguably, the oil price spike of mid-2008 was more than enough to do the trick.

But the housing bubble was itself merely a larger fuse: in reality, the entire economic system had come to depend on impossible-to-realize expectations of perpetual growth and was set to detonate. Money was tied to credit, and credit was tied to assumptions about growth. Once growth went sour in 2008, the chain reaction of defaults and bankruptcy began; we were in a slow-motion explosion.

Since then, governments have worked hard to get growth started again. But, to the very limited degree that this effort temporarily succeeded in late 2009 and 2010, it did so by ignoring the underlying contradiction at the heart of our entire economic system—the assumption that we can have unending growth in a finite world.

What Comes After Growth?

The realization that we have reached the point where growth cannot continue is undeniably depressing. But once we have passed that psychological hurdle, there is some moderately good news. The end of economic growth does not necessarily mean we've reached the end of qualitative improvements in human life.

Not all economists have fallen for the notion that growth will go on forever. There are schools of economic thought that recognize nature's limits; and, while these schools have been largely ignored in policy circles, they have developed potentially useful plans that could help society adapt.

The basic factors that will inevitably shape whatever replaces the growth economy are knowable. To survive and thrive for long, societies have to operate within the planet's budget of sustainably extractable resources. This means that even if we don't know in detail what a desirable post-growth economy and lifestyle will look like, we know enough to begin working toward them.

We must discover how life in a non-growing economy can actually be fulfilling, interesting, and secure. The absence of growth does not necessarily imply a lack of change or improvement. Within a non-growing or equilibrium economy there can still be continuous development of practical skills, artistic expression, and certain kinds of technology. In fact, some historians and social scientists argue that life in an equilibrium economy can be superior to life in a fast-growing economy: while growth creates opportunities for some, it also typically intensifies competition—there are big winners and big losers, and (as in most boom towns) the quality of relations within the community can suffer as a result. Within a non-growing economy it is possible to maximize benefits and reduce factors leading to decay, but doing so will require pursuing appropriate goals: instead of *more*, we must strive for *better*; rather than promoting increased economic activity for its own sake, we must emphasize that which increases quality of life without stoking consumption. One way to do this is to reinvent and redefine *growth* itself.

The transition to a no-growth economy (or one in which growth is defined in a fundamentally different way) is inevitable, but it will go much better if we plan for it rather than simply watch in dismay as institutions we have come to rely upon fail, and then try to improvise a survival strategy in their absence.

In effect, we have to create a desirable "new normal" that fits the constraints imposed by depleting natural resources. *Maintaining the "old normal" is not an option*; if we do not find new goals for ourselves and plan our transition from a growth-based economy to a healthy equilibrium economy, we will end up with a much less desirable "new normal." Indeed,

we are already beginning to see this in the forms of persistent high unemployment, a widening gap between rich and poor, and ever more frequent and worsening environmental crises—all of which translate to profound distress across society.

A Guide to the Book

This book began with a sudden insight on the morning of September 16, 2008 (the day after Lehman Brothers filed for bankruptcy). I was sitting in a meeting of about 40 leaders and funders of non-profit organizations, listening to a former JP Morgan managing director explain what derivatives are and why the financial world seemed to be disintegrating at that very moment. One of the funders in the room took a call on his cell phone and afterward I heard him whisper, "I just lost forty million dollars." The notion occurred to me: *We are witnessing the beginning of the end of economic growth*. I knew the end was inevitable anyway, but now events within the world of high finance were conspiring with environmental limits to bring it about sooner, and more dramatically, than almost anyone had foreseen.

That thought wouldn't have stayed with me if I hadn't been prepared for it—conditioned by having read *the Limits to Growth* decades previously, and by years of following trends in resource depletion. But it did take root, and for months afterward I poked and prodded it every which way, testing to see if it was sound, premature, or plain wrong.

I discussed it with economists, business consultants, energy experts, and resource analysts. I spent countless hours reading about economic history and about the causes of the unfolding financial catastrophe. I consulted my colleagues at Post Carbon Institute, asking: Even if this is true—that the world has indeed essentially outgrown the possibility of growth itself—is this a message that should be broadcast to the world, or would it be better for me to continue writing about energy and resource issues? At last, in mid-2010, for reasons I'll discuss more in Chapter 7, it became clear that the story of *The End of Growth* needed to be told.

The realization that growth may be at an end raises many questions. Will the financial impact be inflationary or deflationary? Will some nations fare better than others, leading to protectionist trade wars? Will the "downsizing" of the economy lead also to a "downsizing" of the human

species? How quickly will all of this happen? What can we do to protect ourselves and adapt?

These are some of the issues we will explore in the chapters ahead.

Chapter 1 is a potted history of economies and the discipline of economics. Readers well-versed in these subjects will find this a quick and dirty tour. This is not because I lack formal training as an economist or historian (though I do), but because the purpose here is only to provide some context. The rest of the book assumes a basic understanding of how and why economies have come to rely on growth, and why most mainstream economic theories ignore environmental limits.

In Chapter 2 we will see why economic growth has stumbled badly for reasons internal to the world's monetary and financial systems. Crucially, we will explore whether there are practical limits to debt, and whether we have broached those limits. This chapter also provides a short history of the current worldwide economic crisis and the efforts of governments and central banks to manage the mayhem.

Chapter 3 examines factors external to the financial system that will make it impossible for the economy to recover and begin growing again — factors that include the depletion of fossil fuels, minerals, and other natural resources, as well as worsening natural and industrial disasters.

Many readers will protest that limits to energy resources and minerals can be overcome with efficiency and substitution, enabling further economic growth. Chapter 4 addresses those arguments, showing why economic strategies that worked well to maintain an expansive trajectory during the 20th century are losing steam.

Chapter 5 explores how the winding down of world economic growth is likely to play out over the coming decades in terms of demography, international development, currency wars, and geopolitical rivalries. This chapter also addresses China's continued rapid economic expansion and examines in some detail the question: Can this continue for long?

In Chapter 6 we will explore ways that governments and central banks could successfully manage the inevitable transition from a growth-dependent economy to a contracting or steady-state economy. We begin the chapter with a rather stark portrayal of a "default scenario" of what is likely to transpire if the managers of the global money system continue

with current policies. Along the way, we learn about alternative currencies, ecological economics, and the economics of happiness.

Finally, Chapter 7 discusses what individuals and communities can do now to prepare for changed conditions ahead, laying the groundwork for the post-growth, post-hydrocarbon economy and way of life. As hopeful signs and opportunities, we explore Transition Initiatives and Common Security Clubs.

I recommend reading these chapters in sequence. The book develops its argument cumulatively.

The process of writing *the End of Growth* changed me. Even though I was well prepared to undertake the project, having spent the past four decades observing how and why our current growth-based economy is unsustainable, I found the process of coming to terms with the implications of an ongoing cessation of worldwide economic expansion more than sobering. Even readers well versed in relevant subjects such as ecological economics will likely find that this book undermines their mental equilibrium in a way that is both deeply uncomfortable and exhilarating—in that it makes explicit a host of fears and misgivings about the economy that I think most of us carry around with us unconsciously.

BOX I.3 The Perils of Prediction

This book is in effect making a prediction—that world economic growth will not return. It is a hedged prediction, because it takes account of the likelihood of relative growth, consisting of temporarily continuing expansion in some economies and occasional partial rebounds in others. Still, hedged or not, predictions are perilous in fields ranging from weather forecasting to horse racing, economics certainly among them.[18]

Some would argue that timing is the essence of prediction.[19] If a forecast is off by a few years (or even milliseconds, in some scientific experiments), the prediction fails. Paul Ehrlich was famously wrong in his 1980 bet with Julian Simon that the prices of five commodity metals would increase over the following decade. Arguably, Ehrlich just had his timing wrong: as we have seen, since 2000 most commodity prices have trended upward. But by calling the commodity price rise for too soon he

lost the $10,000 bet and provided resource optimists with an endlessly repeatable anecdote.

Others would say that, at least in predictive situations that involve a dire warning, the general correctness of the warning is often more important than the precise timing specified. Suppose the National Hurricane Center forecasts that a hurricane will strike Miami at approximately 5 pm, but the storm's speed across water slows temporarily and the hurricane actually strikes at 11 pm, still wreaking devastation. The important thing will have been that people were warned and got out of harm's way; the forecasters' failure to pinpoint the moment of impact will be seen to have been of little importance—it did not make the hurricane disappear.

The end of growth is a process, and, as I hope to have successfully argued, it is an inevitable one. The crash of 2008 was undoubtedly a pivotal moment in that process, but the shift from a general pattern of economic growth to one of general contraction is likely to continue for several years. Relative growth will make confirmation or disconfirmation of the prediction implied in this book's title problematic during this time. However, the real aim of the book is not to score points for accuracy in forecasting an event that must occur in any case (whether it happens this year or a decade from now), but to warn readers, and society in general, so that we can adapt successfully and minimize damaging impacts.