

From Systemic Collapse to Rebirth

A message of hope amidst the current economic chaos

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Since the early 1960s earth's biological carrying capacity – the foundation of our global economic system – has declined in sync with US and world GDP growth. As this decline gained momentum, it has been accompanied by an alarming expansion of financial engineering. Today, these excesses have coalesced into a crisis that likely marks the end of the industrial era.

Until the mid-1980s the decline in earth's bio-capacity and the increase in financial engineering both appear linked to growth in consumer demand, primarily in the US. However, since that time feedback effects appear to have generated a perverse cycle of increasing financial engineering as world bio-capacity declines – where one feeds the growth of the other – creating a maelstrom of economic chaos.

Looking beneath the surface of this perturbation, a counter-revolution in economic and corporate thinking has emerged that looks on economies as living sub-systems of the biosphere – not as engines designed to conquer or control Nature. Firms embracing this paradigm shift model themselves on bio-systems rather than machines. Beyond being more earth friendly than their conventional peers, they are also more profitable.

Although understandably vulnerable to the economic vortex now playing out, these life-mimicking firms are integral to a larger transformation that in many ways resembles the Renaissance. Both periods of expansive thinking emerge from tragedy and chaos into a new era of renewed possibilities.

What's Going on Here?

The industrial capitalist model of economic development has run up against its biological limits. The ecological footprint of the global economy now exceeds earth's bio-capacity by more than 30 percent, and the gap between demand and supply has been growing at an accelerating pace. This acceleration is due in large part to a parallel surge in borrowing and commodity speculation facilitated by the derivatives market.¹

The situation at present can best be described as a tragedy of the commons. As the biosphere becomes more stressed and less productive for humanity, we invest more money and technology into extracting value from it. We buy more fishing boats with more sophisticated gear to pursue diminishing schools of fish. We drill deeper into more ecologically sensitive areas to extract depleting supplies of oil and gas. We add more chemicals to exhausted soils to maintain our food stocks. We spend billions diverting rivers and tapping aquifers as these fresh water supplies run down and become more saline. And we over harvest forests in order to make room for agriculture, commerce and cities – all of which further increase our demands on earth's bio-capacity.

¹ Derivatives are financial contracts whose values are derived from the value of something else. They were originally conceived to help commodity producers and consumers hedge financial risk on items they intended to sell or buy. Today, however, they are used more speculatively to bet on future price changes on countless items ranging from plain vanilla things, such as commodities or equity indices, to more complex structured and hybrid products based on price changes in multiple areas, including other derivative contracts.

Since 1982 this vicious cycle of money and technology pursuing a declining resource base has become progressively more desperate. Seeing this, many business and financial leaders, in order to convey the impression of healthy growth, began to leverage returns on investment (ROI) with increasing amounts of debt and speculation in derivatives.

As can be seen in the following chart, the ratio of debt to GDP in the US has more than doubled since 1980. And this was before the massive federal bailout of the collapsing US banking system that began in late 2008. More troubling, the use of derivatives has expanded far beyond the legitimate purpose of hedging risk on property an investor actually owns. It has now shifted voraciously to bets on the future value of property that someone else owns – a move from economically stabilizing risk management to utter speculation. Consequently, at yearend 2008 the notional value of derivatives on the books of the US’s largest banks was 11 times greater than domestic GDP.

***Growth of US Debt & Bank Derivatives vs. Decline of Earth’s Bio-capacity
As Reflected by Inflation-adjusted S&P 500 Index***

<u>Year</u>	<u>1. Financial Leverage Ratios Debt/GDP</u>	<u>2. Derivs/GDP</u>	<u>3. GDP as % of Bio-capacity USA</u>	<u>4. World</u>	<u>5. Infl-Adjusted S&P 500 Idx</u>
1980	1.73		128.66	0.95	100.00
1985	2.08		139.87	0.98	119.15
1990	2.40	1.19	146.32	108.30	153.31
1995	2.52	2.31	147.57	111.06	245.12
2000	2.80	4.13	171.96	119.09	464.92
2005	3.36	7.64	187.65	130.58	387.60
2008	3.62	11.02	195.00E	135.86E	140.33

Note: Bio-capacity declines as GDP extends beyond the limits of earth’s ecosystem. Ratios shown for 2008 are extrapolations based on 2005 data.

Sources: US Federal Reserve, US Treasury, Global Footprint Network, Standard & Poor.

Since 2000, this explosion of speculative risk-taking coincides with a sharp depletion of earth’s bio-capacity as can be seen in column four. Global GDP now requires the resources of one and a third planet earths. Lacking this capacity, earth’s resources have gone into a decline that gains momentum each year.

Bio-capacity is here defined as the amount of biologically productive land and sea area needed to regenerate the resources humanity consumes each year, and to absorb and render harmless the corresponding waste. This is typically measured in terms of global hectares area (gha) per capita. In 2005, for example, the average biologically productive area per person worldwide was 2.06 gha against which humanity consumed 2.69 gha per capita, indicating an excess of 30.58 percent. The US ecological footprint in that

year was 9.42 gha per capita versus a bio-capacity of 5.02 gha, indicating an excess of 87.65 percent as can be seen in column three.²

The troubling message in this data is the pace at which the developing world is growing its living standards. Between 1999 and 2005 China's ecological footprint grew 43 percent. If the whole world rose to just half current US consumption rates (9.42 gha), it would consume the resources of 2.3 planet earths. This raises complex problems where economic justice appears in direct conflict with the sustainability of life on earth.

The implications of this conflict are clear. The central premise of the industrial era and classical economics – that supply creates its own demand – has run up against its limits. Known as “Say's Law,” it has driven a reinforcing cycle of industrial output and demand growth that its proponents believed would never end. Framed in the early 19th century, when earth's biological carrying capacity was not a relevant concern, its author, French economist, Jean Baptiste Say (1767 – 1832), was obviously unaware of today's realities.

The stock market now senses the broad outlines of this maelstrom, although few commentators understand its linkages to earth's declining bio-capacity. In inflation-adjusted terms, the S&P 500 Index lost 70 percent of its value between yearend 2000 and 2008, and its descent has continued into 2009.

Stock Market Reaction

The stock market is normally a good barometer of economic wellbeing because it embodies the combined wisdom of global producers, consumers, savers and investors via their collective buying and selling decisions. That wisdom is naturally influenced by popular beliefs about how the world actually works.

The 15-year lag between the time when world GDP overshoot global bio-capacity (1985/86), and the time when stock prices started their long-term descent (1999/2000) is understandable in the context of those beliefs.³ The worldview that drove the industrial revolution from the early 19th century forward was strongly rooted in classical economic doctrine; and was forcefully reaffirmed in 1980 by newly elected US president, Ronald Reagan. His supply-side economic policies, as the name suggests, was an explicit reassertion of Say's Law. It was sold to a believing world as getting back to basics, an engine of growth that would eventually eliminate poverty.

Between 1980 and 2000 the ratio of debt to GDP in the US increased 62 percent – indicating a broad acceptance that financial leverage would accelerate the reinforcing cycle of industrial output and demand growth that Say proposed. Driven by this mindset, the S&P 500 boomed to its ultimate peak in March 2000.

² Global Footprint Network, *National Footprint Accounts*, 2008 Edition. Because it takes time to collect and assimilate ecological footprint (EF) data, there is normally a 3-year time lag in published information. As a result, data published in the 2008 Edition is for calendar year 2005. To refresh EF data, see: www.footprintnetwork.org

³ The MSCI World Index peaked in December 1999, although its internal dynamics, reflected in the ratio of declining stocks to advancing ones, deteriorated many months earlier.

The wealth effect generated by that boom accelerated speculation and GDP growth as can be seen in columns two and three. This drove the S&P 500 to its inflation-adjusted peak in March 2000.⁴ However, from that point on the combined weight of bio-capacity loss, debt service and speculative excess so overwhelmed the US and global economies that all industrial market indices went into sharp declines.

End of the Industrial Era

The industrial era is now at a dead end in terms of its excessive demands on the biosphere and its failure to productively allocate financial resources. In essence, it has been spending down the earth's mineral and biological capital, and calling the financial return "income" and "profit." This discredit to correct accounting procedure is rooted in an utter misconception of the way the world works.

The worldview adopted by most classical economists is rooted in Newtonian mechanics, which holds that the world works by physical laws, and that these can be reduced to mathematical formulae. This is a half-truth at best because it totally misses the defining attributes of living systems, which distinguish earth from every other known planet.

Unlike machines, the defining attributes of living systems – whether single cells, a bird, a flower or an organization of people – are properties of the whole that cannot be discerned by studying their individual parts. We know, for example, that the human heart is more than a pump, the brain more than a computer, and our skin more than a wrap. Combined with the other systems in our bodies, they endow us with consciousness and capacities to self-organize, self-heal, reproduce and adapt as the world about us changes. No machine can do this, and no physical laws can describe with reliable accuracy how living systems behave.

Like Newton's laws of mechanics, most economic models are based on linear equations. They are therefore blind to the workings of the living world, whose behaviors are predominantly non-linear. When living systems become stressed, as they are today, their behavior changes. Changes in ocean temperature and chemistry, for example, have huge effects on weather, food production, public health, government social spending, insurance premiums, and thousands of things beyond the scope of linear cause-and-effect analysis.

The only way we can comprehend these feedback effects is to think holistically and try to understand the complex layers of feedback effects that reside within living systems. This is not to dismiss Newtonian science. It has helped us create useful things from inert (lifeless) materials. But it is blind to the things that matter most: our relationships to one another and to the living world in which we exist.

One might say the death of the industrial era, then, is the result of partial blindness. Nowhere is this more evident than in our generally accepted accounting principles (GAAP). These measure only the *transactions* necessary to render a good or service.

⁴ The S&P 500 peaked in March 2000, after most world stock markets, because investors believed the US was a relatively safer place to invest.

Anything that is external to a transaction – such as environmental degradation or social disruption – is called an “externality” and generally ignored. In other words, the industrial capitalist model counts what it wants to count and ignores the rest.

The failure of the industrial era, then, was a failure to count what matters most. It defined its playing field too narrowly within the limited scope of 18th century Newtonian physics. And it ignored the lessons of new sciences, such as ecology, quantum and chaos theory and non-linear math, which give deeper insight into the living world that defines our economic space.

The Way Forward

The global economy is today in transition in much the same way Europe was at the end of the 14th century. Just as the black plague hastened the demise of hierarchical medieval power structures and rigid (theocratic) laws of behavior, the same is now happening in the global economy. Six hundred years ago in Europe this transition ushered in the expansive humanistic thinking of the Renaissance, the scientific revelations of the Enlightenment and ultimately the modern era. It was nothing less than a transformative paradigm shift.

Today, we are undergoing a shift of similar magnitude. The hierarchical structures of industrial capitalism and the rigid physical laws of Newtonian physics are being replaced by more open, flexible networked structures modeled on the new sciences. We therefore find leadership companies in major industry/sectors that mimic living systems rather than machines in the ways they operate.⁵

The transitions now taking place are difficult to see because people are so accustomed to seeing the world through industrial age filters that their vision is also blurred. To them, nothing has changed on the surface. Companies that mimic life look much like those that mimic machines in that they have CEOs, boards of directors, marketing strategies and financial reports. But within their corporate structures everything is different.

In organization, the new corporate leaders are more networked than hierarchical; and their networks tend to be more informal and self-organizing than prescribed by top management. To grow network capacity, they practice servant leadership, where the role of managers is to teach and guide employees rather than to boss. These leadership companies sustain the life of their networks by being exceptionally frugal in their use of energy, materials and financial resources. They are leaders in industrial ecology and typically have credit ratings several notches or more above their peers. In order to innovate and adapt as the world about them changes, such companies are exceptionally open in the ways they collect and share information. Knowledge is rapidly transmitted through the network rather than hoarded at the top. Finally, the new corporate leaders understand how closely they and their employees are bonded to the larger living systems of Nature and society, and they work to strengthen those bonds.

⁵ For a descriptive outline of companies that mimic life in the ways they are organized and operate, see: Joseph H. Bragdon, *Profit For Life* (Cambridge, MA: Society for Organizational Learning. 2007). www.solonline.org/PFL

Employees find meaning in their work that transcends profit and so work with their hearts as well as their minds.

The operating leverage in companies that so care, serve and integrate with the world around them is huge. They are generally far more profitable than their traditionally managed peers.⁶

The New Renaissance

Hard as it is to see at this time of egregious corporate corruption, failing financial markets, and crashing eco-systems, the world is entering an expansive period of rebirth. Our worldview is once again broadening as it did during the Renaissance.

Humans are an intelligent, adaptive species, capable of thinking far into the future. With few exceptions, our story is one of expanding our knowledge of the world. In the late 14th century, we turned away from theocratic law, and its view that scientific thinking was heresy, and towards a more open, liberal humanism that gave us greater scope for learning and progress. Today we are turning away from the limited vision of mechanistic linear thinking that has arisen from Newtonian physics towards a more open bio-centric metaphysics based on the centrality and unity of life.

It will not be an easy transition. The Renaissance was a turbulent time. Old hierarchies did not relinquish their authority without a struggle. There were wars, famine and re-visitations of the plague. But humanity pulled through by sheer force of will. I have no doubt this will happen again.

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⁶ Case studies and data cited in *Profit For Life* were obtained from a broadly diversified global learning lab of 60 companies that were rigorously screened for their living system attributes. The investment results of this lab have been consistently superior to comparable benchmark indices since 1996, and have been independently verified through yearend 2007 by Northfield Information Services (www.northinfo.com)