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Open Systems Theory and the U.S. Economy: How We're Failing to Close the Loop

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Abstract

In this paper, I intend to explain how open systems theory might have predicted the current decline of the U.S. economic system based on an ideological myopia that ignored feedback on importance variables that could have supported the system, in favor of variables that are leading to the depletion of the systems instead. These variables include low labor rates, limits on education and healthcare spending, infrastructure maintenance and environmental restoration and laws over capital growth and wealth. My theory is that the current misguided conservative ideology saw the need to suppress these areas in order to favor capital growth and wealth, when, in fact, they are critical parts of a feedback loop needed to insure the health of the entire system.

Introduction

A "system" is defined as "any organized collection of parts united by prescribed interactions and designed for the accomplishment of specific goals or general purposes (Boulding, 1956 as cited by Shafritz, 2005). Systems are adaptive and dynamic, constantly changing in relationship to changes in their environment in an effort to seek a state of optimal equilibrium between inputs and outputs. "A change in any element of the system causes change in other elements" (Shafritz, 2005, p. 476).

Open systems theory explains the behavior of systems as "a complex set of dynamically intertwined and interconnected elements, including its inputs, processes, outputs, and feedback loops, and the environment in which it operates and which it continuously interacts" (Shafritz, 2005. p. 476). If there is an imbalance that occurs within a system's input and outputs, the system will change and react to the feedback it receives from its environment, in order to maintain system equilibrium. In this way, systems aggressively work to maintain their own survival by attempting to alter the conditions of their environment in order to meet their own survival needs (Tompkins, 2005). If a system is unsuccessful at adapting to changes in feedback that threaten its survival, and an imbalance continues, the system will eventually lack the inputs needed to maintain itself and will cease to exist. In this paper, I maintain our economy is entering that downturn.

The Changing Role of Our Economic System and its Impacts

Our economy is an example of a complex system. Historically, the purpose of the economy was to meet human needs for food, clothing, services and shelter through a series of exchanges. Labor (input) would transform raw materials (processes) into something of value (output), which would be sold or exchanged for something of importance to the producer, and that item would help provide him or her with whatever they needed (in the form of feedback) to continue the cycle again. This basic economic system of meeting human needs has been in place since the beginning of humankind. However, the advent of the industrial revolution created some fundamental changes to the economic system of the western world.

With the 1776 publication of Adam Smith's "Wealth of Nations," an economy that met simple human needs was no longer enough. Smith advocated for a new type of economy that included free trade, capitalism, and the division of labor. Free trade meant a reduction of government imposed tariffs, barriers, and restrictions to commerce (Retrieved from http://www.answers.com/topic/free-trade?cat=biz-fif) . Capitalism was promoted as an economic and social system in which "the means of production are predominantly privately owned and operated for profit, and which investments, distribution, income, production and pricing of goods and services are determined through the operation of a market economy" (Retrieved from http://en.wikipedia.org/wiki/Capitalism). And the division of labor meant that more products could be produced with fewer people at greater profit.

Capitalism and free trade were as much philosophical concepts as they were practical applications, and they came with a set of assumptions about man and his place in the world characterized as follows:

1. People are fundamentally different from, and superior to, all other creatures.
2. People are masters of their destiny, and can use the rest of nature in any way they choose.
3. The world is an endless resource, and thus provides unlimited opportunities.
3. Human ingenuity will solve all problems, and progress need never cease" (Coates and Leahy, 2006, p. 3).

Capitalism and free trade (aka the free market economy) also came with a set of beliefs that began to direct human behavior. These beliefs were that:

1. Economic well-being is primary and leads to well-being in other parts of life.
2. Technology will solve all problems and the human condition will gradually improve through abundance.
3. Mass production = abundance = consumerism = happiness.
4. Competition for individual benefit means individual interests take priority over communal interests. (Coates and Leahy, 2006, p. 3).

These assumptions and beliefs formed the basis of an ideology that has been with us since the industrial revolution. It has transformed the purpose of our economy from one that met human needs into one that could create huge wealth. This ideological shift was fairly easy to accommodate at the advent of the industrial revolution, as populations were sparse, natural resources were abundant, and the scarcity of material goods and the infrastructure to provide them, were considered the main limits to the advance of human well-being (Costanza, 2008, p. 30).

> It made sense, at that time, not to worry too much about the environmental and social "externalities." {which I will explain shortly} They could be assumed to be relatively small and ultimately manageable. It made sense to focus on the growth of the market economy, measured in terms of gross domestic product (GDP), as a primary means of improving human welfare {with the goal of} increasing the amount of goods and services produced and consumed (Costanza, 2008, p. 30).

Human well-being was increasingly measured and defined as the ability to accumulate wealth and material goods, and was (and still is) considered key to achieving a happy, secure life (Costanza, 2006, p. 4). This directional shift in ideology, trade laws and values encouraged the free market economy to grow in order to meet an increasing need for

material goods. And as it did, this increased economic activity began to produce a growing number of social, political, and environmental problems. (Costanza, 2008).

This is due, in part, to the exploitative nature of the free market system as part of its drive to maximize profit. Coates and Leahy (2006) refer to this model as an "extractive economy" (p. 2). An extractive economy "depletes non-renewable resources, exploits renewable resources beyond their capacity to survive, and causes irreparable damage to land, sea and air" (Coates and Leahy, 2006, p. 2). Though the free market system has had many achievements, the authors explain, the "dark side" is social and environmental injustice (p.2).

For example, in a free market system, in order to maximize profit, a business must generate as much production for as little cost as possible. This is done through the manipulation of input and output variables involved in each business. If a business wants to increase their profits, one way they can do so is by maintaining low wages for its workers and paying them few benefits. This will keep the cost of production low and ensure greater profit. In addition, if a business is involved in resource extraction (fish or timber harvests, mining, oil drilling, etc…), they will want to extract that resource as cheaply as possible, which can have negative environmental consequences. They also will likely attempt to reduce their tax burden any way possible, in an effort to keep their earnings as profits instead of paying them to the government to provide services to the nation.

Externalities and Feedback

Unfortunately, the process of underpaying workers, avoiding taxes and extracting resources cheaply, can create, what are known as "externalities." Externalities are defined

as the costs of doing business and can include such things as poverty, pollution, resource depletion and tax cuts which produce cuts in government programs and services, in addition to "unemployment, falling worker wages, biodiversity loss, environmental degradation, and disintegration of the social fabric" (Costanza, 2008, p.2).

The goal of a business intent on producing as much profit as possible is to pass those external costs onto someone else in an effort to boost their own profits. One of the things overlooked in the free market model, however, is the reality of open systems theory in which those "externalities" eventually become part of the feedback loop of the larger environment in which the free market system operates. Open systems, according to Tomkin's (2005) "rely on continuous feedback from their environments so that they can take corrective action, thereby maintaining system equilibrium" (p. 241). And, while it may have been possible for a business to pass it's external costs off to someone or something else for awhile, open systems theory dictates that eventually those negative external costs will become part of the feedback system that gets fed back to the businesses themselves. And this appears to be what is happening now.

When businesses, for example fail to pay their workers well, workers are not able to spend much. As consumer spending makes up 2/3rds of U.S. economic activity (retrieved from http://www.trade10.com/monitor.htm), lack of consumer spending will eventually create an economic contraction and less market for whatever it is that a business produces. Cuts in healthcare benefits mean workers cannot afford to go to the doctor, and sick workers are not productive workers. Cuts in taxes mean cuts in government spending for things like education and infrastructure (roads, bridges, trains). Cuts in education spending will eventually impact a businesses ability to hire trained and

educated workers. And a decaying infrastructure will eventually create problems for businesses needing to transport their products. In addition, resource extraction, without proper limits, will eventually mean a depletion of the resources needed by many businesses to produce their products. In short, an open system is not an infinite system. An open system has limits. And, as it turns out, the free market system is only a subsystem of a much larger system. That system is the biosphere.

Biosphere: The Ultimate System

In his article, *Institutions to Sustain Ecological and Social Systems*, David Brunckhorst (2002) outlines five different subsystems, referred to as "capital" that make up the biosphere upon which the economy (and human life) is dependent. He states that "Economic systems at all levels…rely on the value of services flowing from the total stock of five distinct kinds of capital – natural, social, human, physical and financial (Hawken, 1993; Brunckhorst, 1995 & 1998; Gunderson et al, 1995, Costanza, et al, 1997; Daily 1997' Pretty, 1998 as cited in Brunckhorst, 2002).

Natural capital, Brunckhorst explains, includes the ecological environment: Air, water, food, soil, raw materials, wildlife, weather, climate regulation, and the functioning of this system (waste assimilation, decomposition, carbon control, cycling) as it attempts to sustain and regulate itself. Social capital includes the health of human relationships; the interconnectedness and cohesiveness of people in their communities as is required in order to work together for a common good. Human capital includes the well-being of people as individuals; their health, nutrition, education, access to services and necessary technologies that can support and enhance their well-being. Physical capital includes human infrastructure including homes, buildings, roads, bridges, electrical grids, energy

supplies, communication systems, financial markets and transportation. And financial capital is the supply of money, wealth, savings, credit, government payments, grants, stocks and income. (Brunckhorst, 2002, p. 110).

These five systems work together to support life on earth. They can be impacted by government policies, processes, organizations and institutions to produce either positive or negative outcomes. If managed properly, these five assets can produce desirable outcomes, “such as jobs, welfare, economic growth, clean environment, sustainable use of natural resources, better health and education and so on. If achieved, these desirable outcomes then contribute feedback to help build up the five capital assets” (Brunckhorst, 2002, p. 110).

However, if these assets are managed poorly, in an unsustainable fashion that simply depletes the assets without reinvestment, spending capital “as if it were income” (ibid), then eventually these capital assets, like income, will run out. In the process, this capital depletion produces undesirable externalities such as crime, poverty, pollution, global warming, social breakdown, natural resource depletion, even government instability. And these become part of the feedback mechanism that can further deplete the subsystems within the biosphere.

An important aspect of systems theory is that, when conflict occurs in the form of negative externalities, systems can adapt. "In the view of systems theory, conflict and adaptation are inseparable concepts. Conflict is essential for growth, change, and the evolution of living things. It also is a system's primary defense against stagnation, detachment, entropy, and eventual extinction" (Ruben, 1978 as cited in Denhardt, 2002, p. 333).

Governments, as the creators of the rules and laws that govern our humanly controlled systems, have an important role to play in this process of adaptation and change. The question is which system(s) are they acting in support of (human, natural, financial, social) and how effectively have they acted?

Isomorphism and the Economic Subsystem

Meyer and Rowan (1977) describe a process of highly evolved organizational and institutional isomorphism in which organizations and institutions help create the laws and rules that support their own survival. As an example, they provide a detailed description of the functioning of automakers and lawmakers that helped "create a demand for roads, transportation, and fuels that made automobiles virtual necessities…" (Meyers and Rowan, 1977, as cited in Shafritz, 2005, p. 510). This included the passing of laws and the creation of an infrastructure and institutions that support the growth of the auto industry, its function and survival at, perhaps, the cost of other, less environmentally damaging forms of transportation. In short, automakers support, through political contributions, lawmakers that pass laws that support automakers…etc…This is part of the process through which our free market system has been institutionalized throughout our government and our culture, to the benefit of its own survival.

Limits

The problem is that the financial subsystem, in the form of the free market system, with the acquiescence of governments and the government leaders they support, do not appear to fully comprehend the extent to which they are dependent upon the well-being of the other subsystems for their survival. Farber and Bradley (n.d.) explain:

> Economies are inextricably embedded in larger natural ecosystems, and exchange flows of materials and energy with natural systems….What makes humans and

> their economies unique as a sub-ecosystem is their ability, through willful effort, ignorance and human designed tools, to dramatically restructure and reform processes in ecosystems of which they are a part; and to such a magnitude that human welfare can be diminished or enhanced by those original actions (p. 1).

Acting on an increasingly outdated set of ideologies and beliefs (that man can control nature, that nature is limitless, that free market capitalism will create wealth and prosperity for all, and that technology can solve any of the problems created by free markets), the free market economy continues to act as if it were a closed system, not accountable to the well-being of the other systems for survival. Other systems (human, natural, social) are seen as resources to be extracted as inputs in support the generation of profit for the free market system. But by failing to invest in the health and maintenance of these other capital stocks, all systems now find themselves in decline.

Signs of Decline

"The world economy depends on a base of natural resources…that is showing signs of severe degradation….The productive capacity of the planet is in decline" states the World Resource Institute, in their publication, *Natural Capital: Preserving the Resource Base* (n.d. Retrieved from http://pdf.wri.org/tm_03_natural_capital.pdf) Natural capital, according to the World Wildlife Fund's *Living Planet Report 2002* "is suffering such a rapid loss of its natural resources - its biodiversity - that we are now eating into its capital stocks of forest, fish and fertile soil…humanity now exceeds the planet's capacity to sustain its consumption of renewable resources (retrived from http://www.wwf.org.uk/news/n_0000000602.asp)

The United Nations report "Millennium Ecosystems Assessment" found:

> Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. This

> has resulted in a substantial and largely irreversible loss in the diversity of life on Earth (Watson, Zakri, et al, 2005, Retrieved from http://www.millenniumassessment.org/documents/document.356.aspx.pdf).

In addition, CO2 emissions from human, auto, and economic activities are heating up the planet at a possibly irreversible rate. A recent scientific paper on global warming, authored by NASA scientist and Columbia Professor, Dr. James Hansen, (among others), concluded that "if humanity wishes to preserve a planet similar to the one on which civilization developed and to which life on Earth is adapted, CO2 must be reduced from its present 385 ppm (parts per million) to, at most, 350 ppm…{In addition}, a long-term overshoot of the 350 ppm target level, with potentially disastrous consequences, {is} a near certainty if the world stays on its business-as-usual course. (Hansen, et al, April, 2008, retrieved from http://www.columbia.edu/~jeh1/2008/TargetCO2_20080407.pdf).

Peak oil, and the declining availability of fossil fuel, is another example of natural resource depletion, which will continue to have a profound impact on the economy, the environment and human lives. In his research paper, *Peak Oil Panic* (2006), author Ronald Bailey quotes Princeton Geologist Ken Deffeyes, "who warns that the imminent peak of global oil production will result in 'war, famine, pestilence and death'" (Deffeyes as cited by Bailey, 2006, p. 1.) "There is growing consensus that the world's oil production is likely to reach its peak in the near future and, to alleviate global warming, it is necessary to dramatically reduce the use of all forms of fossil fuel (Minqui, 2007, pp 449, Retrieved from EBSCO); a serious challenge for our current economy under the best of circumstances.

Human capital in the form of health is on the decline in many areas, due to global warming, "Health experts predict that climate change will exacerbate global health

problems that are already huge, such as malnutrition and infectious disease" (Retrieved from http://feeds.feedburner.com/WRI_EarthTrends). This trend is being exacerbated by rapidly rising food and energy prices that are increasing hunger and causing a decline in social capital in the form of social instability. According to a report by the World Resource Institute "Skyrocketing world food prices--up almost 50% since last year--have triggered riots across the developing world….The World Bank recently announced that the current food situation could push 100 million people into deeper poverty, undoing years of progress in the fight against global poverty and hunger." (Davis, 2008, Retrieved from http://earthtrends.wri.org/updates/node/301). Nearly 40 nations are being destabilized by the current food crisis (Ibid). In addition, IMF research (among many others) has shown a direct correlation between lack of spending on education and healthcare and human well-being (Baldacci, Guin-Siu, & de Mello, 2002).

Even the financial capital of the economic subsystem, a cause of much of the current capital stock declines, is, in itself, in decline. According to the BBC World News, The global economy could deteriorate further in the wake of the global credit crunch, a meeting of the G7 group of wealthy nations has warned" (BBC News, February 9, 2008. Retrieved from http://news.bbc.co.uk/2/hi/business/7236123.stm).

The credit crunch is also impacting the price of basic commodities such as food and fuel. In a recent article in the London New Statesman, reporter Iain MacWhirter explains why 100 million people now face starvation:

> Conventional explanations for the food crisis range from climate change to dietary change in China, from global overpopulation to the switch of agricultural production to biofuels. These long-term factors are important but they are not the real reasons why food prices have doubled or why India is rationing rice or why British farmers are killing pigs for which they can't afford feedstocks. It's the credit crisis.

> This latest food emergency has developed in an incredibly short space of time - essentially over the past 18 months. The reason for food "shortages" is speculation in commodity futures following the collapse of the financial derivatives markets. Desperate for quick returns, dealers are taking trillions of dollars out of equities and mortgage bonds and ploughing them into food and raw materials. It's called the "commodities super-cycle" on Wall Street, and it is likely to cause starvation on an epic scale. (Macwhirter, 2008, http://www.newstatesman.com/200804170026)

The United Nations is also blaming free market speculation for exacerbating the current world food crisis. “We have enough food on this planet today to feed everyone," the head of the U.N. Environment Program, Achim Steiner, told The Associated Press in a telephone interview. But "the way that markets and supplies are currently being influenced by perceptions of future markets is distorting access to that food" (Jordans, 2008, retrieved from http://deseretnews.com/article/1,5143,695274565,00.html).

In fact, market speculation may be responsible for 25% - 50% of the current increase in the cost of food and fuel, driving the price of these necessary commodities out of reach for huge numbers of people across the globe. At a recent Senate and Natural Resources Committee meeting, “oil executives told Congress that speculation might be responsible for half the current cost of oil…’ "I think it's a minimum of a dollar a gallon," said Sean Cota, a regional chairman with the Petroleum Marketers Association of America. "That's very significant.’ " (Desjarnids, 2008, retrieved from http://money.cnn.com/2008/04/03/news/economy/senate_oil_prices/)

In short, the economic free market system is not only acting to undermine human survival by pricing the cost of essential commodities out of reach of human consumption, it is also causing a decline in the other subsystems of the biosphere:

> The evolution of the human economy has passed from an era in which human-made capital was the limiting factor in economic development to the current era,

> in which the remaining natural {human and social} capital has become the limiting factor (Costanza and Daly, 1992, Costanza, Cumberland, et al., 1997, as cited in Costanza, 2008, p. 2).

This form of self-imposed systems decline and the active undermining of human survival are "without historical precedent" (Engelhardt, 2008, para. 3) and "place humans in a unique position of being able to alter their ecosystems in ways that jeopardize their own social and economic structures and processes" (Farber and Bradley, 1996, p. 2).

Hope for The System

But if systems can, in fact, adapt and change, then the human-made financial subsystem should be able to adjust to the feedback it is now getting in the form of negative human, social and environmental externalities. If it comes to understand its interdependence on the well-being of all systems, we can still make the changes needed to support sustainable life on earth by managing our social, natural and human capital stocks more wisely. "While any species could exceed its own natural ecosystem's carrying capacity or diminish that capacity to the point of self-extinction, only the human species has both the will and capacity to jeopardize itself, as well as the will and capacity to avoid it" (Farber and Bradly, 1996, p. 2).

In order to succeed, however, we will need to acknowledge the interdependence of all subsystems and manage these resources more wisely"…future sustainability will depend on the system of resource governance that mediates the relationship between the society and the economy and, in contrast, the continuation of ecosystem functional processes" Brunckhorst, 2002, p. 108). We can do that by melding the basic economic theory of supply and demand within the broader concepts of open systems theory as it relates to our relationship with the biosphere and basic human needs.

> Basic economic logic tells us that we should maximize the productivity of the scarcest (i.e., limiting) factor as well as try to increase its supply. This means that economic policy should be designed to increase the productivity of natural {human and social} capital and its total amount rather than to increase the productivity of human-made capital and its accumulation…" (Costanza, 2005, p. 2).

Conclusions

Extractive economies will only succeed as long as the supply of labor, resources and materials are readily available as inputs into the economic system. If these resources become scarce or compromised in some way, they will no longer provide the inputs required of the economic system, and the system will either adapt or die. By investing in the health of the other subsystems upon which the economic system is dependent, it can insure the sustainability of its own survival.

> Significant additional research is still needed, but one conclusion that can be drawn so far is that elements of built capital (income, wealth), human capital (health, education), social capital (family life, social networks), and natural capital (ecological systems and their services) all contribute to sustainable human well-being in complex ways (Costanza, 2006b, p. 2).

As we may be reaching the capacity of all subsystems to support human well-being, it is in our greatest interest to adapt our current economic system in ways that will encourage both their and our survival. Open systems theory stresses the ability of systems to adapt to changes in their environment in an effort to survive. Our own survival is now dependent on our ability to adapt to the changes occurring within the other subsystems of our biosphere. The simple truth is, if we can achieve this balance and adapt, we will survive. If we don't, we won't. The planet and the biosphere will likely still be here in one form or another. But we, not to mention our current economic system, may no longer be part of it.

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