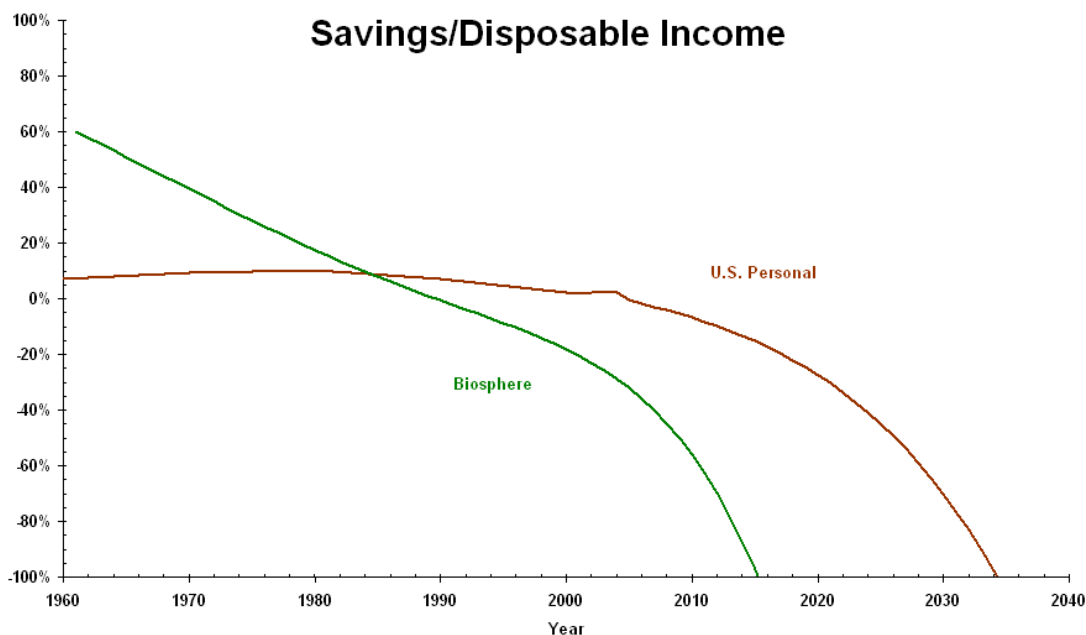


Crisis of Debt

By Bradley Jarvis

In 2000, average American workers, who comprised about half the nation's population (half of the non-workers being children), annually spent half their time (after eating and sleeping) in work-related activities (including commuting). Since 2005, Americans have spent more money than their disposable income. Debt will exceed disposable income in less than 30 years if current trends continue (not counting the growing government debt, which Americans are all responsible for). Economically, American workers would become slaves, because no one would extend them any more credit and they would have to spend all their previously “free” time paying back what they took. Even if every American (children included) started working at that point, debt would once again equal disposable income in another ten years.

Humanity's ecological prospects mirror the American worker's economic prospects, and the time frames are remarkably similar. Nature's economy, the Earth's biosphere, uses the equivalent of human barter: over the course of their lifetimes, members of species trade goods and services rather than money (“goods” are created and then recycled from renewable resources, using energy from the Sun). Because there is no natural equivalent of money, credit – any agreement to trade equivalent goods or services in the future for goods or services received in the present – is on the honor system. Humanity has attempted to bypass this system by extracting non-renewable resources and creating goods that cannot be recycled by the biosphere (from the biosphere's perspective, they are by definition “waste”). We have also denied the biosphere the use of our own matter to recycle and use elsewhere. Our waste began to overwhelm the biosphere around 1989, analogous to the point where American workers began going into debt. By my estimates, within 30 years from that time the biosphere will be trashed (in every sense of the word), and there will be no way humanity can “earn” enough to pay for what we've taken.



Options

To meet our obligations to the biosphere and save it (and us) from extinction, we must decrease our consumption relative to income, providing more goods and services than we use. To do so, we can reduce consumption, increase income, or both. These actions can be done either forcibly or voluntarily.

Forcible reduction of consumption can be done either by other people or by external conditions. Laws, taxes, and military action are ways that people can impose limits. External conditions include having fixed supplies of whatever is being consumed. A composite of the two approaches involves the law of supply and demand in economics, which drives up the price (the amount of work necessary to get more of something) by having too high a demand or too little supply, or both.

Getting people to voluntarily reduce consumption usually involves convincing them through education and experience that they will be better off doing so than continuing their current behavior. They must not only know it, but feel it, and with frequent enough feedback that they believe the transition is more painless than not making the transition.

People can get higher income by working harder (for one customer, or the same amount for multiple customers); increasing the value of their labor; or finding customers who will pay more for their labor. Where there is a choice of many customers, increasing income is voluntary; where the choice is limited, such as with a single customer, it may be involuntary. In the context of the biosphere, “customers” are other species; and increasing income might include providing services such as the repair of existing damage, increasing genetic diversity, and expanding the biosphere to include other planets (and potentially reduce the load on this one). “Products” that could increase income include clean water and air (less pollution) and habitat useful to other species.

Voluntary Reductions

There are several reasons to doubt that most people will voluntarily decrease their consumption, in spite of the fact that decreasing consumption is typically simpler, if not necessarily easier, than increasing income (unless they are already consuming the bare minimum needed for survival). Perhaps the best of these reasons is the simple fact that consumption continues to rise. No one is forcing people to buy new things (though it could be argued that corporations have become very good at psychological manipulation to that end).

Decreasing consumption tends to go against one of our most basic drives, to mold our environment for maximum comfort and pleasure. People are attracted to artificial environments such as cities and suburbs, which require a high level of consumption (waste) to be maintained, effectively driving up the cost of survival for their residents. As a result, they are more likely to seek ways to increase their income than (voluntarily) cut back on what they use up.

For those who consume a considerable amount of information and crave understanding, the educational prerequisite for voluntary reduction in consumption may be acquired by accident. They may, however, be confident enough in their ability to innovate (increase the ease of consumption) that they will not accept any limitations. On the other hand, people who are more interested in things than ideas are more inclined to learn mostly by experience, and may take too long to become convinced of the need to

reduce consumption.

Then there is research showing that consumption has many of the characteristics of addiction. The more we have, the more we want, and we become progressively less conscious of why. The addiction interferes with our functioning (taking over our lives, not to mention destroying the environment), and each day it is more difficult to stop.

Despite these reasons, there is a growing number of people at least attempting to cut back, embracing the so-called “lifestyles of health and sustainability.” Their motivations range from spiritual to physical, including: love and respect for Nature (held by many environmentalists); a reaction to the stress of “keeping up with the Joneses”; and (in my case) fear of being responsible for mass pain and death, as well as the elimination of a decent future for everyone and everything else.

Energy Constraints

Oil, natural gas, and coal have provided abundant energy for our industrial economy, which has driven unprecedented population growth and set the stage for our expansion into space. Settling other planets has the potential of further increasing not only our population, but the populations of other species, far into the future. As I've mentioned, this is one way we can increase our ecological income and “pay” for what we've taken from the biosphere.

There is strong evidence that we have already found and exploited half of the Earth's supply of accessible oil and natural gas. The rest will be progressively more expensive to get, while demand continues to rise. Thus, involuntary reductions in consumption of energy will occur, resulting in a parallel reduction in consumption of other resources. These reductions will paradoxically, and tragically, decrease our ability to generate the income that space travel promises.

To offset the use of oil, an increased role for coal is often proposed, along with nuclear energy and biofuel. Burning coal is a net loss to the biosphere because it adds more pollution, especially in the form of climate changing greenhouse gases; it is also not very useful to the economy because it is not very portable. Nuclear energy also suffers from the portability problem: it is currently only useful for generating electricity. There are other problems with nuclear energy, including its potential use for weapons, difficulty with the safe disposal of waste, and its dependence on the current fossil fuel economy for materials and support. Indeed, this latter problem plagues all of these options, including coal (for building and maintaining power plants). Even the most promising biofuel technologies, while portable, require fossil fuel and material inputs.

The ideal replacement for oil could be used for fueling transportation, generating electricity, providing heat, and of course serving as feedstock for materials. It would need to be much less polluting and easily adaptable to the technologies that currently use oil. The chances of such a super fuel being discovered before usable oil becomes too scarce to sustain our civilization are pretty small right now.

Breaking the Bank

Even with a super fuel, continued consumption of resources will cause our ecological debt to grow

until we can no longer afford to pay it off. We will then have truly “broken the bank,” and need to be able to process raw material entirely by ourselves to form everything that we need and want. This would require a much more hefty energy source (such as nuclear fusion) along with technologies that could process mass at the atomic level (such as nanotechnology). For our consumption (and civilization) to continue uninterrupted these new sources of energy and means of processing materials would need to be available and operational when the biosphere crashed.

Suppose we were successful at living with a biosphere effectively reduced to microbes (or bioengineered life forms that are able to thrive). The net result of breaking the biological bank would be an expanding sphere of entirely artificial environments. Our growth of consumption would be limited by how fast we could reach and process raw materials, with the speed of expansion ultimately bounded by physics to the speed of light. Even under the most ideal circumstances, the rate of growth of consumption would likely peak no later than about 300 years from now, after which it would drop rapidly. We would be forced by the laws of Nature into a practically zero-growth condition.

The present geopolitical situation, relevant to the monetary debt faced by Americans, mirrors this same situation. Like countries at war, the main difference between what we started with in Nature, and what we will end with, is a vast amount of death and waste created in the conflict. In what is shaping up as a battle for influence in the Middle East, where much of the remaining (easily accessed) oil exists, the U.S. is attempting to do the equivalent of breaking the bank instead of reducing our spending, with potentially the same results. We will at best gain a few years of continued consumption, at a human cost already in excess of hundreds of thousands of lives. When the U.S. ceases to be a useful debtor, and the countries who hold our debt decide to either stop extending more or calling in what we owe, leaders like those currently in power may decide it's time to break the banks of those other countries, with even more tragic consequences.

Is getting more stuff really worth the harm so many of us are willing to do for it?

Reducing Carbon Dioxide

Carbon dioxide emissions from human activities have been implicated in global warming, and (according to the WWF) emissions from fossil fuel use account for nearly half of humanity's global ecological footprint (which, I argue, corresponds to our consumption of resources). Since our current footprint is probably over one and a third times what natural systems can handle, and the emissions footprint tracks closely with the total footprint, cutting emissions in half could alone remove our ecological debt. Reducing carbon dioxide emissions has the added benefit of postponing the depletion of cheap oil, which we will need until alternatives can come on line (at least for use in making materials). In his 2004 book *Global Warming: a Very Short Introduction*, Mark Maslin reports that scientists favor a range of between 60 and 80 percent reductions to counter the worst of global warming. This can be done by cutting back on activities that cause the emissions (such as driving and consuming electricity from coal-fired power plants), or finding ways to keep the carbon dioxide from building up in the atmosphere (for example, by being consumed by trees or storing it underground). Recent research indicates that global warming may already be self-sustaining, and we have no more than ten years to keep it from getting much worse.

Ten years is not a lot of time to expect the world to permanently reduce its total consumption by one-

third or substitute that amount with less damaging alternatives; and with a per capita carbon dioxide footprint that is over five times the world average, we in the United States should responsibly make deeper cuts than others. To many people I know, to suggest such a thing is crazy talk. Indeed, roughly a third still do not see the link between global warming and human activity as established, and believe that those proposing even the most modest responses are either delusional or have ulterior motives ranging from the political to the financial. More “practical” acquaintances, whose views are often mirrored by political and industrial leaders, respond that our economic and political structures are simply incapable of handling such drastic change, and propose more gradual approaches. Unfortunately, “gradual” is not an option.

Mandatory Action

Climate scientists and oil experts warn that the time for debate is over. We must act now, and act fast, to avoid the worst effects of global warming and the unavailability of cheap energy. Education of the world’s leaders and citizens is continuing; but like children who could hurt themselves and others out of ignorance, most of us may need stronger guidance.

One of the least painful forms of coercion is the imposition of taxes. Simply put, people pay more for products based on how much waste is generated in their production, use, and disposal. This extra cost both makes wasteful products less likely to be purchased, and provides both an incentive and a source of money for the creation of less wasteful alternatives. Carbon taxes, for example, are taxes on the amount of carbon dioxide emitted in the production of everything from energy to homes.

A more vigorous approach is the enactment of laws prohibiting wasteful behavior and carrying stiff penalties for breaking those laws. Pollution laws, based on the “polluter pays” principle, operate this way. Such laws (or taxes) would need to be enforced worldwide to be effective.

The huge change required in the way people must learn to live will undoubtedly require both involuntary and voluntary responses. An excellent case study of adaptation to sustainable living is the nation of Cuba, which artificially experienced peak oil in the mid-1990s. The government and people worked together to implement energy conservation along with the use of renewable sources, adopted a more natural (and less resource-intensive) diet, and restructured their living and work arrangements to live within their limited means.

Legacy

When someone goes too far into debt, creditors typically refuse to loan more money and enforce payment of the outstanding balance. The biosphere has little left to give humanity, and is in the process of demanding payment because it has no option. Like a cancer, we are killing the source of our growth; and now we are beginning to feel the effects of the illness we caused. But unlike a cancer, we can recognize and stop, slow down, and possibly reverse the damage we are causing. The alternative, continued growth at the rates we have recently achieved is impossible to sustain even if we somehow survive the demise of our planet.

In my opinion, the best of all responses to our present situation would be the development of an economy based on reuse. Daily living would be driven by so-called “clean” energy (from solar collectors and wind for electricity, and a renewable super fuel for transportation and materials). To

improve our chances of surviving into the distant future, we could responsibly (minimizing natural impact) utilize more exotic sources of energy and materials as necessary to settle space and prepare for or mitigate natural disasters.

What will humanity's legacy be: a vibrant living planet possibly spreading the seeds of life to other planets, a terminally ill biosphere, or a grotesque field of artificial waste cluttering a limited sphere of interstellar space? The decisions all of us make today are determining that legacy.