Some thoughts about the vulnerability of the financial system

Economists have blind eye for the role of complex systems. This appendix gives you three cases of why this matters. The first according to George Monbiot, the second to (the late) Bernard Lietar (et al), and the third to Nate Hagens.

Monbiot

‘One of the great deficiencies of our education is that few of us are taught systems theory. The behaviour of these systems repeatedly takes us by surprise.’

Thus starts George Monbiot his 9th March 2023 article ‘The Hunger Gap’ with a fine example of the role of complex systems in relation to the world food market. See https://www.monbiot.com/2023/03/09/the-hunger-gap/ According to Monbiot the problem is thus:

All complex systems possess emergent properties. This means that their components, however simple they each might be, behave in non-linear ways when they combine. Through the networks unintentionally created by billions of randomly-distributed decisions, they organise themselves, spontaneously creating order without central control.

Complex systems have thresholds. A system might be secure under some conditions, as its self-organising properties stabilise it. But when conditions change, and it is pushed towards a threshold, these self-organising properties have the opposite effect. Negative feedback loops are replaced by positive feedback loops, which compound the shocks afflicting the network, amplifying chaos. These thresholds can be hard to identify until they have been passed. They are often described as tipping points. Once a system has lost its resilience, a small disturbance can tip it over its critical threshold, at which point it collapses, suddenly and unstoppably.

Once it has collapsed, a system is often subject to hysteresis. This means (in this context) that the system enters a new equilibrium state. Because this new state has its own self-reinforcing properties that stabilise it, a collapsed system can be difficult or impossible to return to its former state. In general, far more energy is needed to reverse a tipping than was needed to cause it. Tipping a system into a new stable state is like falling off a cliff. Reversing hysteresis is like climbing back up again.

Had the global financial system been allowed to cross its critical threshold in 2008, its collapse would have triggered cascading failure across human society. Only a global bailout amounting to trillions of dollars, at the 11th hour, pushed it back into a safer state. In other words, even before hysteresis occurred, far more energy (or money) was needed to stop the collapse than was needed (via the butterfly’s wing of the US subprime crisis) to cause it.

Scientists represent complex systems as a mesh of nodes and links. The nodes are like the knots in an old-fashioned fishing net, while the links are the strands of twine that connect them. If the nodes behave in a variety of ways, and their links to each other are weak, the system is likely to be resilient. If the nodes behave in similar ways and are strongly connected, it is likely to be fragile. This is because the behaviour of similar nodes is likely to synchronise, as they are shaken by the same disruption, while strong links ensure the disruption resonates through the network.

For example, in the approach to the 2008 crisis, the big banks developed similar strategies and similar ways of managing risk, as they pursued the same sources of profit. They became strongly linked to each other (partly through securitisation and derivatives trading) in ways that regulators scarcely understood. When Lehman Brothers failed, it threatened to pull everyone down.

Another important issue is “modularity”: to what extent is the system divided into compartments. If different parts of a system have a degree of isolation from each other, the network as a whole is more likely to be resilient, as shocks are less likely to spread.

Ideally, the network will contain circuit breakers, like fuses in an electrical system, that prevent the spread of contagious collapse. There should be a backup system, working within or alongside the main network, that operates on entirely different principles. There should be plenty of redundancy (spare capacity) in the system: this acts as a kind of shock absorber. In other words, [there are] six elements of systemic resilience: Diversity; Asynchronicity; Redundancy; Modularity; Circuit Breakers; Back-Up Systems.

Lietaer

As Monbiot writes on about the vulnerabilities of the global food system, we now turn to the financial system, with the explanation Bernard Lietaer, Christian Arnsperger, Sally Goerner and Stefan Brunnhuber give in their book ‘Money and Sustainability – the Missing Link (Triarchy Press 2012).

Because the Traditional Economics paradigm misclassifies the economy as a closed system in general equilibrium (where linear cause-and-effect mechanisms are at play) and as well negates the effect of the Second Law of thermodynamics (that states that entropy, a measure of disorder or randomness in a system, is always increasing, which makes entropy time’s arrow), it misses the tension that exists between resilience (which measures the above mentioned redundacy) and efficiency. Both are necessary; it is all about their balance.

Efficiency, also called throughput efficiency, measures the ability of a system to process volumes of the relevant flows of matter, energy and/or information.

Resilience measures the ability of a system to recover from a disturbance, an attack or a change in the environment.

The four authors state: 'With these definitions in mind, we can now define and precisely quantify a complex flow system's sustainability using a single metric.' Which is the balance between resilience and efficiency.

In general, a system's resilience is enhanced by higher diversity and by more pathways (or connections) because there are numerous channels of interaction to fall back on in times of trouble or change. Researchers have therefore been able to use the amount of diversity and connectivity to quantify a system's resilience.

Diversity and connectivity also play an important role in throughput efficiency, but in the opposite direction: efficiency increases as diversity and connectivity decreases. Furthermore, as a flow system becomes more efficient, it tends to build up a kind of self-fuelling momentum (technically called 'autocatalysis') that eliminates diversity as it gradually streamlines the process. In general, increasingly efficient systems tend to become more directed, less diverse and, consequently, more brittle.

The point being made here is profound and has wide-reaching implications for all complex flow systems, including our worldwide economy. Since resilience and efficiency are both necessary but pull in opposite directions, nature tends to select those systems which have an optimal balance of the two. In most human-designed systems, and certainly in the monetary domain, we have been concerned only with efficiency, and have therefore tended to unduly sacrifice resilience. The financial system must stay within a window of viability around the optimum or it will crash.

There is hardly an economist that shares this view. It strikes that Lietaer et al refer to the work of Andrew Haldane and Robert May, authors of the article 'Systemic Risk in Banking Ecosystems' (Nature, Vol. 469 (20 January, 2011), pp.351-355) where Haldane was the Bank of England's Executive Director for Financial Stability at the time, and Professor Robert May was the former President of the Royal Society in England. George Monbiot cites in his above mentioned article another article by Haldane 'Rethinking the Financial Network' (https://www.bankofengland.co.uk/speech/2009/rethinking-the-financial-network (of 28 April 2009). But this kind of work is very much an exception. In the network of monopolistic national currencies of our global monetary system no-one questions the throughput efficiency of these markets or their capacity to process huge volumes of money. However, the system's lack of resilience shows up, not in the information technologies where back-up systems are universally in place, but in the financial realm where no back-up systems exist.

This leads the four authors to the conclusion that monetary sustainability requires a diversity of currency systems, so that multiple and more diverse channels of monetary linkage and exchange can emerge. And this is precisely what the Booster does.

Hagens

There is another blind spot in economics from the systems point of view. Post Carbon Institute advisor Nate Hagens makes some very relevant remarks on our 'blindness' about the relation between money and (available) energy, in his article 'Economics for the future – Beyond the superorganism' published in Ecological Economics (https://www.sciencedirect.com/science/article/pii/S0921800919310067).

Hagens states first that 'Energy is so fundamental, that its availability sets the physical limits to our social scale. All life, commerce, work, or creation of order is enabled and limited by available net energy. As GDP increases globally, energy needs to increase in lockstep.' It is a fact that: a) energy is needed to create and transform all material inputs and b) energy can only be substituted by other energy.

Then he states that there is a clear relation to money. As money is not lent out from existing wealth, but created, this new money eventually gets spent on a good or service which will contain embodied energy. This means that '*money is a claim on energy, yet its creation is not tethered to energy availability or cost'.* And since money is a claim on energy, then debt is a claim on *future* energy. This means that debt is a social construct with physical consequences. Debt pulls resources forward in time.

Debt has been referred to as 'fake energy'. More accurately, debt moves real energy and consumption from the future, to the present, unsustainably. But it is fake in the sense that to pay back the debt, we have to also pay back the energy. One could say this amount (and related consumption) is 'borrowed' energy.

Although we currently witness emotional signals that injustice, wealth inequality, and climate change, are real and urgent issues, there appears to be little awareness of constraints concerning energy and finance. The modern system has used finance to obfuscate the fact that we have consumed beyond our means for at least the past 50 years. *The energy/credit/growth dynamic is the least understood but most important phenomenon driving the current global economic and ecological situation*.

Think of credit as a magic wand, that allows us to spend more than our income with a promise to pay it back in the future. This only works well when our economy is growing and there are enough untapped resources (e.g. 1950) to allow future growth to repay those debts. If we are ever to honor our current debts, the amount of energy required will be immense. If the energy is not available, at cheap prices, those debts will never be repaid, something that has happened historically with debt again and again.