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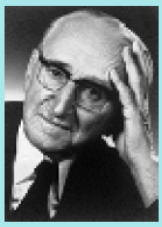



Rossitsa Yalamova

Blockchain Angels or Demons of a Free International Order

Diskurs 2019 - 2

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Abstract

‘Decentralization and Democratization’ is the main promise behind the distributed ledger technology that attracted enthusiasts looking for ways to prop our ailing global socio-economic system. Not surprisingly its best known application ‘Bitcoin’ comes as the ‘panacea’ against the worst offender in the neoliberal order, the Financial Industry. Trends, fads and myths about blockchain technology fuel the imagination allowing for proliferation of hypes and disappointment.

This paper offers a discussion of possible blockchain applications for polycentric governance of socio-economic systems in light of building sustainability and resilience. On the opposite side I will analyze the possibility for misuse (e.g. the Internet of Things) of the technology to build ever stronger centralized control system lacking adaptive capacity and leading to total collapse.

Keywords

Adaptive Systems, Blockchain, Globalization, Collapse of Complex Societies

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Blockchain Angels or Demons of a Free International Order

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Introduction

The process of globalization involves increased corporate power that extends over government and leads to systematic subversion of national sovereignty to transnational corporations. The emergence of this new world order was facilitated by rapid development of telecommunications and computer networks that now form the electronic pathways for the circulation of money, commodities and power. Internet promise to create more equitable access to production and circulation of goods and services became an obvious impossibility with the formation of few resource and power concentrating centers which also abused their access to customer information in inconceivably unethical manner. Cyber security issues are not limited only to the economic sphere but also impact political and social life.

While the role of widely available transparent information for the functioning of a complex dynamic system is undeniable one should not undermine the rights of people's privacy. Blockchain technology may strike the right balance with its cryptographic solution to these seemingly incompatible demands. Therefore, one may find transparent accessible information for the functioning of a complex socio-economic system as an exciting alternative to a central authority of trust. Distributed Ledger Technology offers immutable pseudo-anonymous information shared on a network of participants on a democratic principle of verification and validation by the majority of the participants.

While neoliberalism celebrates market driven conquest across the planet, escalation in the transnational interconnectedness of production, exchange and finance increases system's vulnerability to crisis and instability spreading through the system as evidenced in 2008. In this paper I will describe a resilient complex system that self-organizes to avoid crash moving to a new basin of stable dynamics. I will also analyze the opportunities that the blockchain technology offers for democratization of the economy

(shared economy), new forms of distributed autonomous organizations as well as the prospects for participatory decision making for restoring the progressive independence of society's economic, political and cultural institutions. Rudolf Steiner's sociological theory of threefolding is extended to a global level with the strengthening of a global civil society alongside with the national states and transnational corporations. (Perlas 1999 and Ben-Aharon 2004)

Since the 2008 subprime mortgage collapse the third structural crisis of Capitalism reveals itself from financilization, ever increasing debt and income inequality to international trade/military conflicts. Modern societies had to be prospering under the 'end of history' thesis of Francis Fukuyama or Marx's final victory of the proletarians. Unfortunately, modern societies with all the intellectual achievements seems to remain oblivious to the pattern of collapse of complex societies that concentration of power over resources in a small fraction of the political and economic elite. As a researcher with expertise on complex socioeconomic systems I have been pointing at ways of developing resilience and increase adaptive capacity through policy adjustments and intervention strategies to avoid collapse. The philosophical tenets of this approach will be proposing methodology for renewal of the social structure that will lead to healthy nation societies in a free international economic and cultural relations. The relevance of blockchain technology to achieve optimal self-organization and intervention strategies to avoid destabilizing system dynamics will be discussed. The blockchain is a global system of checks and balances that creates trust among all parties that could allow humanity to attain greater progress with truly global organizations and coordination mechanisms.

Complex Socioeconomic System

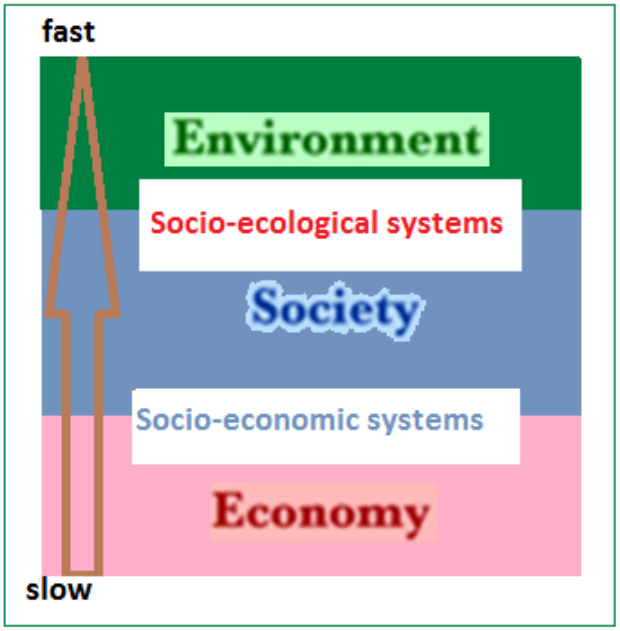
The economic turbulence and multiple financial crises in recent years have shown that our global socio- economic system itself appears not to possess the resilience to fully recover even after unprecedented levels of growth. Moreover, policy makers do not possess the means to avoid or mitigate the outcomes of such critical downturns. Research on the economic system, nested in the larger socioecological system, reveals the properties and characteristic of the whole system at a smaller scale of the hierarchical organization. Thus, research methods in complexity science with the appropriate settings for resilience measures are deemed relevant due to their scalability.

A complex system contains semiautonomous levels of variables with similar speed or spatial attributes, self-organized by small number of controlling processes. Configuration of self-similarity at all levels facilitates the integrity in structure and dynamics. Fast moving/changing small components comprise the lower levels, thus inventions and changes enter the system from below. The level above includes scaled up versions of the lower level structures, clinging to lower speed and averting destabilization. This preserves the integrity of the system. The global socio-economic system embedded in the environment produces an integrated complex dynamical system with three aggregate levels with increasing speed of change – economic, social, environment. Integrity of the system can be preserved if the feedback controlling processes between levels keep the system in dynamic equilibrium/stability domain. Inventions from below create opportunities; experimentation generates and tests innovation through “Adaptive Cycle” (exploitation, conservation, release, reorganization). (Holling 1973)

Elinor Ostrom’s research focused on socio-ecological interface in the system combines methods from economics and environmental science in an attempt to connect property rights to sustainable utilization of natural resources. Resilience group’s research is of ultimate importance for the future of a world of exponentially growing population and industrialization. The problems stemming from diminishing carrying capacity of the earth cannot be tackled separately and independently by corporations, industries, or governmental entities. Making progress toward sustainable development demands that we get international decision-making right. The contentious state of climate change thinking as it strives to gain urgent priority status is an example of how such

processes require more than a massing of facts. Sustainable development requires focusing on the underlying economic, demographic, political and environmental factors that currently limit adaptive capacity and increase vulnerability to climate change. Any investigation of sustainability must be premised on the fact that the human economy is inescapably a subsystem of the earth system, which is a coherent but vastly complex and highly nonlinear biophysical, planetary-scale circuit of energy and materials whose operations we still do not sufficiently understand. The key point is that ecological constraints such as the consequences of carbon dioxide emissions, which are feeding back into the human economy in drastic ways, can hardly be dismissed as economically-irrelevant "externalities." From the ecological point of view "sustainable growth" is an oxymoron; and yet sustainable abundance and prosperity is perfectly feasible if the human and ecological conditions for it are properly understood. If the human economy is to be sustainable in this way it can only be so, at least on this planet, by virtue of the way it interacts with the earth system as a whole. However, there is abundant, indeed alarming, scientific evidence that the human economy is presently not even close to being sustainable in this ecological sense (Homer-Dixon 2007; Barnosky *et al*. 2012). One of the goals will be to encourage human ingenuity to bear on the huge economic challenges confronting our species today. Socio-economic aspects of sustainability pertain to maintaining those levels of the system in a domain of stability (or transforming into another domain of stability) to preserve the integrity of the global economy.

Figure 1. Complex hierarchical structure of socio-economic system nested in the environment.



Within management thinking, sustainability ranges from financial (solvency and growth aspects) to operational 'greening' within the company. Business organizations are a part of a network of economic and social institutions. Understanding the topology of these networks and the dynamics (flow of resources) between the members of the networks will allow us to detect impending problems (crashes/recessions) and recommend strategies for preventive or remedial intervention. Research investigation into the topology and synchronization dynamics of traders' complex networks (e.g. Yalamova 2011) before crashes is an example of complex network model at a smaller scale that can be scaled up to the overall financial system and ultimately world economy.

The complex network of economic and social institutions should be examined to provide insight of the dynamics of the system in order to formulate intervention strategies for resilience building. A collapse of the socio-economic order (Capitalism?) may not be imminent but the signs of trouble are obvious, e.g. growing income inequality and mounting debt levels should be linked to the frequency of recessionary cycles. Self-organized criticality is characterized by power-law distribution of events around the phase boundary (i.e. critical point and crash in a complex system). Power law (Pareto)

distribution describes income inequality and disappearance of the middle class that supports growth economy. Therefore, the assumptions of classic economic theory with those violations refute equilibrium models and predictability, thus requiring a new approach to macroeconomic research and practice furthering Nobel Prize winning ideas of Elinor Ostrom.

The adaptive capacity of complex hierarchical systems (not to be confused with top-down authoritative control hierarchy) was described in Simon (1974). As communication between levels is maintained, interactions within levels can be transformed without losing the integrity of the system. This in essence describes the relevance of multi-level/polycentric governance in a complex system.

The system approach model should reflect the complex structure of the socio-economic system, transfer of resources to upper levels and transformation within levels that maintain the integrity of the system. Boulding (1981) attests that social structures come into being through activities described as 'social organizers' divided into three groups (1) threat and fear of consequences, (2) exchange and economic award and (3) integrative forces (values, believes, religion, etc.). The power of those social organizers should be used to move the system into more resilient part of the adaptive cycle, i.e. increase the adaptive capacity of the system, and mitigate 'creative destruction' as labeled by Schumpeter (1950).

Classic economic theory paradigm rests on independent (representative) agents, competitive market, equilibrium models, additively aggregated variables, predictability. It is lacking interconnectivity, complexity (not sum of the parts linear thinking) that leads to increasing discrepancy with the reality it tries to model. More accurate approach to modeling economic reality should embark on system thinking in a way of interconnected agents in complex system of semi-autonomous levels from sole proprietorship, partnerships (SME) to small, medium and large corporations. Order is emergent not predetermined with unpredictable, nonlinear, path dependent dynamics. At each level (scale) of the systems' hierarchical structure self-similar units possess similar speed and singularity threshold sustaining dynamic equilibrium. Cross scale interactions (feedback control mechanisms) preserve the integrity of the system.

Methodology

In the context of complex system approach to economic theory equilibrium, i.i.d., integer integration would not provide appropriate tools of representation. Fractal self-similarity and interdependence with feedback control mechanisms require new methods capturing power law distributions and fractal integration of autoregressive processes. This will lead to understanding of complex systems structure and dynamics, which will allow us to prescribe regulatory intervention and polycentric governance for resilience of socioeconomic systems.

There is a growing consensus that the failure of mainstream economics to predict the collapse of 2008, as well as the failure of the policy responses to the crisis has evoked the need for new economic thinking. Such a failure of an area of inquiry to provide understanding and solid theoretical explanations of real world phenomena (natural or social) requires a re-examination of its philosophical tenets. Classical economic theory is focused on equilibrium models. Very little attention is given to instabilities and out-of-equilibrium dynamics. In fact, according to the Chicago School of Economics, an out-of-equilibrium "inefficient" market is theoretically impossible and bubbles are neither predictable nor detectable.

Scientific advance in financial economics is also obstructed by a blinding over-reliance on econometrics models as tools of the dominant methodology. We should be mindful of the Newtonian vs. Einstein gravitational theory transition and the role of philosophical interpretation in that shift. Einstein wrote of the "profound influence" of "Mach's epistemological position." The importance "…of analyzing the long-commonplace concepts and exhibiting those circumstances upon which their justification and usefulness depend" was acknowledged by Einstein concluding that "By this means, their all-too-great authority will be broken." ("Memorial notice for Ernst Mach," *Physikalische Zeitschrift* 17: 101-02.).

A search of the available literature suggests that the reluctance of financial economists to entertain philosophy of science discussions could be attributed to their need to preserve implicit methodological standards. Explicit methodological arguments may attain

support for alternative approach (e.g. behavioral). Arguments against prevailing economics methodology reveal the necessity for substantial modification of the traditional methodological conceptions and motivate the choice of philosophical position (Yalamova, 2014).

As classic theory does not involve out-of-equilibrium economics, it does not provide tools for detection of instabilities. In particular, the equilibrium concept - through the technique of independent variables aggregation - eliminates important aspects of interdependence and feedback control, thus obscuring particularly interesting parts of the theory itself. The goal of overcoming existing methodological problems should be balancing observability/testability with importance/depth trade-offs. This “dynamic evaluation” allow us to consider theories with “growth potential” as intermediate steps to future theories.

One of the objectives in quantifying complex systems is to explain emergent structures, self-organization. The hierarchical structure and self-similarity of the system creates the potential for synchronization of its dynamics leading to the famous “butterfly effect” that may lead to a collapse. Monitoring the coupling levels among the subsystems and the process of synchronization provides indications about the stability of the system. Statistical complexity measures (e.g. Rosso et al. 2010), characterize the system with its level of disorder and its distance from equilibrium. Those different measures of entropy will allow us to develop quantitative methods for empirical testing for instability indicators.

Next step will be to produce quantitative measure for stability and resilience of systems. Complexity statistical measures allow us to calculate the level of entropy in a system and monitor its dynamics. Fluctuations of entropy are signs of instability, which also impedes the ability of the system to recover after a shock, i.e. resilience (Holling 1973). Resilience of a system is measured by its ability to preserve its identity, defined by property of key components and networks (relationships). Alternative research design contains a framework for empirical measurement of resilience presented in Cumming et al. (2005) with the hypothesis that resilience is predictably related to connectivity.

Such framework will produce better policy recommendations for prevention of devastating recessionary impact on the socioeconomic system, developing metrics for long term economic health and sustainability (Goerner et al. 2009).

Blockchain technology and resilience

Blockchain technology promises better cyber security offering solution to an important aspect of organizational structure vulnerability. Technology experts assure us that DLTs safely run programs on a public infrastructure that is arguably more secure than some traditional computing environments. Blockchain infrastructures have multiple built-in redundancies that improve resiliency. Information systems organizational frameworks have been continuously re-inventing themselves with the fast pace of technology innovations. Enterprise architecture should support our understanding of complex adaptive systems resilience as described in the previous section. In this regard, blockchain technology holds a promise in decentralization of control as well as transparency of information both are proven characteristics of resilience in natural occurring self-organizing systems.

Multilevel polycentric governance of complex organizations will be made possible in the presence of transparent widely available information, which is the bedrock of blockchain technology. Moreover, DLT time stamping and immutability allows for proper crediting applicable contributions to the network as well as efficient allocation of resources solving 'the free rider' problem. Fair economic benefits allocation motivates co-operation leading to collective utility maximization and higher value creation than in an individual competitive framework.

Participatory decision making in absence of central control introduces innovation and change to the system while feedback controls from a level above preserves integrity weeding out destabilizing processes. Decentralized applications may introduce emergent and complex behavior in the organizations. One possible path is bringing existing non-blockchain rule-based systems onto the blockchain to further automate and empower operations. Smart contracts can be decentralized, autonomous, and pseudonymously running on the blockchain.

From smart contracts to Decentralized Autonomous Societies one can easily track the logic of the hierarchy of semiautonomous levels of complex systems. Functioning in an environment with transparent shared information and lack of central control delivers the essential components for innovation and adaptation. This lays the foundations for imagined future where ‘engineered’ complexity may evolve where economic, political and social systems may co-exist in perfect harmony and co-operation. Whether one subscribes to Steiner’s threefolding social order ideal, or agrees that complex systems patterns of collapse follow concentration of power and resources in one dominant center, the decentralization model of blockchain technology offers some possible restructuring model of more equitable socio-economic system that may delay (if not avoid) its collapse.

Unfortunately, democratization and decentralization are based not only on active, massive participation and technology literacy but may also be lost to first mover/higher resource owner advantage. This will lead to concentration of resources/control in few centers and ‘the promise (and loss) of democratization on the web’ may re-play itself. If we lose this chance of restructuring, few centers of power will successfully built their Internet of Things and may gain control of most of the planet resources. What will follow next is the self-organization pattern preceding a collapse, a topic discussed in most of my research papers.

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