

New Economic Thinking : “Complexity Polinomics” – an introduction
Regent’s Thought Leadership Series

Analysing and dealing with any strategic challenge begins with our fundamental view of its nature – how we define the challenge and its context, our assumptions regarding causes and effects, and the tools we might use to influence it. Over the last decade, the emulation of theories exploring complex adaptive systems in the natural world provided us with new insights into the dynamics of human environments. Concepts such as self-organization, non-linearity, tipping points and chaos have entered the social discourse, helping us explore a wide range of social phenomena, from wars to business cycles. In the field of economics, such concepts have shed new light on the very nature of economic phenomena, and to a large extent undermined many of our fundamental assumptions regarding the manner in which economic systems develop and behave. Today, this new emerging field of ‘complexity economics’ is fast becoming a leading framework for the development of a new toolbox for sense-making and operational design for the 21st century.

This short article aims to introduce the key principles of complexity economics, their relevancy and added value to all practitioners, whether designing strategies or promoting change, within the business or the public spheres.

From neoclassical to complexity economics

The Neoclassical theories that still dominate our economic policy-making realm assume a system geared towards a state of equilibrium¹. Macro-economic tensions (between supply and demand) are mitigated by rationally-driven micro behaviour that eventually clears the market and brings it to an optimal point of stability. This inherent tendency towards equilibrium is disrupted by exogenous systemic shocks (for example – new innovations or political shifts), stirring the system out of balance only to return over time through market mechanisms. From this perspective, economic development occurs through cyclical patterns of

equilibrium > shocks > de-stabilization > re-stabilization

In each cycle the content of the economy such as the goods and services it offers might change, but its very nature remains the same².

In a nutshell, a complexity approach to economics, challenges the Neoclassical on at least four fundamental principles – equilibrium; exogenous shocks; individual rationality; and systemic consistency. From a complexity perspective, economic systems are not geared towards equilibrium or any state of rest but remain dynamic at all levels. This dynamism generates accumulated shifts from *within* the system, driving change endogenously rather than exogenously. For example, consumer preferences, product innovation and new forms of organization are all driven by gaps and tensions amongst agents and forces, rather than through external processes. Agents’ behaviour within the system are not assumed to be based on what economists normally perceive as

¹ For the full discussion of neo-classic vs. complexity economics see Eric D. Beinhocker, *The Origin of Wealth*, (London, Random House: 2007).

² This traditional view of the economy was based not only on economic theories but on our understanding of nature as lying within the Newtonian paradigm.

“rationality” – i.e. full knowledge and a-priori sets of preferences, but are shaped by cognitive short cuts geared towards partial pattern recognition and network effects, such as swarm behaviour³. Lastly, the nature of the system itself is also perceived as transforming over time. The level of complexity – defined by the levels of connectivity and velocity within the system (the spread of connections amongst the agents in the system and their speed of interactions) – becomes a key differentiating factor between different types of systems across time.

Overall, complexity economics perceives economies as complex ecologies⁴ rather than complicated machines. These ecologies develop over time in consecutive punctuated phases of complexity. At each phase, innovation in what Eric Beinhocker defines as technological and social technologies⁵ emerge out of new solutions by local agents for local challenges (from stock-holding companies, to credit swap derivatives; from water canals to fibre-optic cables). Their introduction into the economic environment creates new sources of potential for increased productivity, pushing the ecology towards certain organizational structures that best harness this potential.

Over time, this potential will be depleted and new systemic challenges are likely to emerge to undermine the system once more. Ultimately, new technological or social innovations are developed, supplying new sources of energy for the system as it moves towards a new state. As the state of the system is path-dependent, each phase builds on the previous ones with the new innovations allowing for much wider reach and better communication between agents – hence the increased levels of complexity with each new systemic state⁶.

From Economics to “Polinomics”

Complexity economics has made significant strides in bettering our understanding of the dynamic processes through which economies transform – i.e. the “How” question. However, a further step is needed if we are to provide answers for the “What and Why”. If economies are to be understood as complex ecologies rather than complicated machine-like systems, then the traditional conceptual boundaries of this system must be reconsidered as well⁷.

Social science disciplines emerged within the same epistemological framework as neo-classical economics, essentially viewing society as a collection of systems – an economic system, a political system, a cultural system, all interconnected through different sets of cogs. But once we start to

³ See Dan Arieli, *The Upside of Irrationality* (NY, Harper: 2010); and Len Fisher, *The Perfect Swarm*, (London, Basic Books: 2009).

⁴ By complex ecologies I refer to the metaphor of economies as ecosystems. In the natural world an ecosystem is a complex set of relationships among the living resources, habitats, and residents of an area. In other worlds it is a holistic framework encompassing both the biological and physical network created by individual organisms, the interactions amongst them, and the consequential emerging systemic effects reshaping the network as a whole. As such systems are constructed through the interaction of independent agents continuously affecting and adapting to their dynamic environment it is by definition a complex adaptive system.

⁵ See Beinhocker, *op. cit.*

⁶ The only periods in history during which complexity was not on the increase, are those associated with systemic collapse rather than bifurcation (i.e. moving from one state to another). In which case a completely new system gradually emerges and complexity begins to build up again – for example, fall of civilizations such as the Maya or Rome.

⁷ See also Manuel DeLanda, *New Philosophy of Society: Assemblage Theory and Social Complexity*, (NY, Continuum: 2006).

approach the economy from an evolutionary or ecological perspective, these systemic boundaries become not only irrelevant, but also detrimental to our grasp and efficacy.

For starters, economic activity cannot be understood without its political elements. Politics determine the main rules and structures within which economic activities play out. The simplest form of trade cannot be disassociated from the need for trust and, therefore – formal or informal governing structures. Just as institutional structures cannot be seen as exogenous to the system, they also cannot be perceived as merely another dimension or by-product of economic activity. The politically defined rules by which economic activities are conducted are counterparts to the same ecology. Taking the analysis a step further, we know that economics and politics are action-driven and therefore more tangible to both analyse and affect through public policies, but at a deeper structural level we also find longer-term cultural structures. These also reflect and infuse economic-political patterns.

The trends and structures we find across economies are thus the product of ongoing co-emergence⁸, with different processes interacting at differing temporal frequencies and evolving over time. Exploring and affecting this environment requires a new synthesizing (non-reductionist) approach that can integrate economic and political knowledge into coherent frameworks from which strategies and policies can be derived – i.e. ‘Complexity Polinomics’.

This new synthesizing approach focuses on assessing the multi-dimensional interplaying dynamics emerging within a given system, and provides the starting point for understanding any strategic challenge. This is especially relevant when analysing emerging macro trends.

Take for example the changing nature of ‘booms & busts’ cycles. Consecutive phases of expansion and contraction are a known phenomenon in market economies. However, from an evolutionary perspective it seems certain elements in the nature of the recoveries have changed. For example, a recent report by the McKinsey Global Institute points to a worrying and exponentially growing disparity between recoveries of growth and recoveries of jobs⁹. From the late 1940’s to the 1980’s, job levels in the US economy tended to recover within 6 months after GDP reached pre-recession levels. However, a shift occurred in the early 1990s with jobs recovering only 15 months later. In the 2000/1 recession this time lag leaped to 39 months, while projections for the current recession expect job recovery to last over 60 months¹⁰.

Such a phenomenon exposes the weakness of the traditional equilibrium doctrine which assumes, and therefore strategically supports, a “let’s try to get back to normal” approach. However, from an adaptive evolutionary perspective, this phenomenon should be interpreted as a systemic structural shift. Such a shift holds great ramifications on a multitude of economic, political, technological and cultural fronts. These emerging impacts provide new potential niches for business and political entrepreneurs alike, as they create new incentives and collective patterns of behaviour. These could include new support basis for policy initiatives from domestic welfare to foreign policy; and new sources of market demand, from supportive services for small business start-ups to long-term infrastructure projects.

⁸ Manuel DeLanda, *A Thousand Years of Non-Linear History*, (NY, Zone: 2000).

⁹ McKinsey, *An Economy that Works*, June 2011.

¹⁰ See also Brian Arthur’s analysis of the systemic affects of new technologies http://www.mckinseyquarterly.com/The_second_economy_2853

Detecting the emerging niches will require analysing the interplay amongst these different impacts as they emerge, i.e. dynamically assessing the manner in which political, social and economic trends co-evolve to create them. From the view point of existing businesses, this also means using complexity frameworks for detecting the direct and more importantly indirect effects such a shift will have on their unique business environments.

By adopting a synthesizing adaptive framework able to detect the convergence of micro-trends from a wide array of issue areas rather than narrow market analysis, leaders and entrepreneurs could stay ahead of the game, position themselves upstream, and be ready to take advantage of the coming tides.

Dr Orit Gal is a political economist specialising in the practical applications of complexity theories for policy making and strategic design.