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Economic emergence: An evolutionary economic perspective☆

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ABSTRACT

The standard neoclassical approach to economic theorising excludes, by definition, economic emergence and the related phenomenon of entrepreneurship. We explore how the most economic of human behaviours, entrepreneurship, came to be largely excluded from mainstream economic theory. In contrast, we report that evolutionary economists have acknowledged the importance of understanding emergence and we explore the advances that have been made in this regard. We go on to argue that evolutionary economics can make further progress by taking a more 'naturalistic' approach to economic evolution. This requires that economic analysis be fully embedded in complex economic system theory and that associated understandings as to how humans react to states of uncertainty be explicitly dealt with. We argue that 'knowledge,' because of the existence of uncertainty is, to a large degree 'conjectural' and, thus, is closely linked to our emotional states. Our economic behaviour is also influenced by the reality that we, and the systems that we create, are dissipative structures. Thus, we introduce the notions of 'energy gradients' and 'knowledge gradients' as essential concepts in understanding economic emergence and resultant economic growth.

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1. Introduction

> "Every resultant is either a sum or a difference of the co-operant forces; their sum, when their directions are the same – their difference, when their directions are contrary. Further, every resultant is clearly traceable in its components, because these are homogeneous and commensurable. It is otherwise with emergents, when, instead of adding measurable motion to measurable motion, or things of one kind to other individuals of their kind, there is a co-operation of things of unlike kinds. The emergent is unlike its components insofar as these are incommensurable, and it cannot be reduced to their sum or their difference." (Lewes, 1875, p. 412)

Conventional neoclassical economics has at its core the presumption that economic decision making is a matter of cold logic, namely, the application of a constrained optimization rule. Over the past three decades, this rule has become set, increasingly, in the context of strategic interactions although much of macroeconomics continues to apply it in the context of a single 'representative agent.' Despite the analytical precision that such a rule provides, it can only approximate actual behaviour in historical time when there is either certainty or quantifiable risk, i.e., in 'simplistic' contexts (Foster, 2005). It can only be used to calculate from calculable information. It cannot approximate economic decision-making when there is uncertainty, i.e., the absence of knowledge of the full set of events faced and the probabilities associated with them. This is the typical state in which technological, organizational and institutional changes occur and these changes, in turn, can create new uncertainties in an economic system. The presence of uncertainty does not prevent economic behaviour from occurring. On the contrary, we observe much creative, cooperative and competitive behaviour in states of uncertainty and the result is 'economic evolution' which is characterised by increases in organised complexity in economic systems and accompanying rises in wealth and per capita income.

If we choose to restrict economic analysis to logical applications of the constrained optimisation rule, then we must always be dealing with a closed system in which economic evolution cannot take place. For example, although much has been written in the mainstream about the consequences of shifts in preferences and technological change, the behavioural origins of these changes tend to be omitted from economic analysis, despite the core roles that both play in the determination of economic growth. Instead, the origins of such changes have become the focus of disciplines outside of mainstream economics such as marketing and business strategy. Although this separation has become less clear cut over the past two decades, as behavioural economics, has risen in popularity, it remains the case that the constrained optimization rule is kept at the analytical core. Evidence drawn from other disciplines or economic experiments is used to modify the assumptions made in applying constrained optimization. Such qualifications help to align theory better with reality, but do not provide an understanding of evolutionary economic change (Witt, 2010; Santos, 2011).

What is missing in conventional economic analysis is a treatment of 'economic emergence' whereby economic structures arise that cannot be explained simply by examining their components. Thus, the 'whole can be greater than the sum of its parts.' In neoclassical economic theory, the whole is already considered to be a fully optimised configuration of its components, subject to whatever constraints are imposed. So there is no distinction between wholes and parts and, thus, no treatment of emergence. In the natural sciences, recognition of such a distinction has had a long history (see Corning, 2002; Hooker, 2011). As Harper and Endres (in press) stress, ignoring the process of emergence in economic systems seriously handicaps economic science. Starting with a clear definition of what is meant by 'emergence' in any scientific context, they identify three additional properties that must be present in economic emergence: "genuine novelty," "unpredictability in principle" and "irreducibility."

Harper and Endres (in press) associate these properties as operative in "evolutionary economic systems" and, indeed, when we examine the principles of evolutionary economics (see, for example, Dopfer, 2005) we find that all three of these features lie at the analytical core. So evolutionary economists have always been concerned with economic emergence and how this enables economic systems to transform themselves from within. It has been well-understood that it is not possible to capture economic emergence using one rule, namely constrained optimization. Transformation occurs because not one, but a range of behavioural rules are adopted and applied by economic decision-makers when faced by uncertainty. For example, Nelson and Winter (1982) stressed the centrality of behavioural routines once it is accepted that decision-makers have to operate in the reality of historical time, with all its attendant uncertainties. In evolutionary economics, economic agents are viewed as reducing the uncertainty that they face and achieving economic goals by adhering to bundles of rules. The formation of radically new bundles of rules is "genuine novelty" and can take the form of: capital goods (technological rules), productive networks (organizational rules), contracting systems (institutional rules) and human skills (procedural rules). Enacting new bundles of rules involves a process of 'self-organization' which is "unpredictable" with regard to the patterns of structure that ultimately form. Over time, such unpredictability is diminished by a process of 'competitive selection' whereby particular combinations of technologies, organizational structures, institutions and procedures come to dominate. Such dominant structures are, necessarily, "irreducible," because of the irreversible character of dissipative economic systems operating in historical time.

Thus, evolutionary economists view economic evolution as driven by 'strong emergence' while, at the same time, accepting that many of the complex processes involved, such as 'incremental innovation' and 'learning by doing,' approximate 'weak emergence' since they can, to a significant extent, be reducible to the creative actions of individuals in the productive process. Following the lead of Joseph Schumpeter, evolutionary economists have been interested in identifying and studying the behaviour that gives rise to 'strong' economic emergence, i.e., those who are engaged in 'entrepreneurship' which