Evolutionary Economics

Foundation of Liberal Economic Philosophy

Jason Potts

Evolution is the process of change in an open system, an idea that owes just as much to Smith and Hayek and liberal economics as it does to Darwin and biology.

In 1859, Charles Darwin published *The Origin of Species*, a book that redefined the scientific world's understanding of the origins of life, the structure of nature, and the deep relationship between human existence and nature. It is hard to understate the importance of this book in defining the modern world. Its essence was that the extraordinary variety and seeming design in nature is the outcome of three abstract mechanisms—selection, variation and replication—driving a continuous process of change.

This came to be known as the theory of evolution, and befitting an idea of such elegant simplicity, it has been serially misunderstood. The implications of Darwin's theory—for example, the common ancestry of humans and other forms of life—should not be mistaken for the underlying theory itself.

Evolution is a theory of *endogenous change*, and Darwin's central idea was that three primary mechanisms were sufficient to generate a process of ongoing adaptive change. This idea is at the heart of both evolutionary biology and evolutionary economics.

What is evolutionary economics?

Evolutionary economics is a new scientific approach to economic analysis and one that has come of age in the past decade or so. It is related to evolutionary biology, but it is not just normal economic theory with a Darwinian gloss—for example, in the manner of market competition as 'survival of the fittest' or a metaphorical transfer between genes and technologies.

Contrary to common perception, the concept of evolution was not first invented by Darwin and it was not first observed in the Galapagos Islands. Rather, evolution was first conceived as a process at work in the economic realm, and it was first observed in 18th century European and Scottish society by the likes of Voltaire, Vico, Montesquieu, Adam Smith, and David Hume. It was generalised in the 19th and 20th centuries by Darwin and his followers into the natural realm. Since then it has spread to such contemporary domains as evolutionary psychology, evolutionary politics and evolutionary computation.[1]

Evolutionary economics is a modern recapturing of that primacy. It is not an historical footnote, but an essential insight into the relation between evolutionary theory, economic theory and liberalism. The common ancestry of both evolution and economics stems from the moral philosophers of the 18th century Continental and Scottish Enlightenment, amongst whom were Hume and Smith. They were the first to think clearly about the nature of human knowledge in a world of change, and it was they who furnished us with the idea of evolution. Darwin's *Origin of Species* was a brilliant and far-reaching application of this existing concept.

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Adam Smith: inventor of economic evolution

Economic evolution is about how knowledge grows.[2] Some ideas are tested and found reliable. Others are tested and rejected, and then regenerated by new conjectures that are often variations upon those same rejected ideas. Knowledge grows by this evolutionary process.[3] Evolutionary economics is the study of the mechanisms by which this occurs.

It was Adam Smith who first generalised this in a way that was later to underpin economics. Smith is not widely regarded as a nascent evolutionary theorist, but he should be. In his 1776 volumes *An Enquiry into the Nature and Causes of the Wealth of Nations*, Smith proposed that the mechanism of specialisation (the division of labour) was the key to explaining the wealth of nations. He argued (book I, chapters 1–3) that specialisation facilitated the growth of knowledge.

Smith then established the modern orientation of economics by showing how this mechanism is limited by the extent of the market. Markets were mechanisms that structured the growth of the knowledge process.[4] The wider and more organised are markets, the greater the possibilities for exchange, specialisation and, by implication, the growth of knowledge to drive the wealth of nations. To this day, the heart of economics is the idea that wealth results from the coordination of specialised knowledge and that this works best when organised as a decentralised process of exchange.[5]

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Evolution and the growth of knowledge

Evolution is an algorithmic process of how knowledge grows.[6] It works like this. Begin with a population of candidate solutions to a problem. Define a *selection* mechanism to test these solutions against the original problem and evaluate how well they solve that problem. Eliminate the worst solutions and *replicate* the better solutions. These two mechanisms alone will produce statistical convergence upon a set of good solutions, but because they are limited by the set of starting candidates, they will not necessarily be the best solutions. In nature, as in society, sometimes you need to think differently in order to progress.

By adding a third mechanism, *variation*, we arrive at the minimum necessary conditions for an evolutionary process. A mechanism of variation takes the good solutions and modifies them (randomly or conjecturally) to generate new candidate solutions, beginning the process again. This, in abstract, is an evolutionary process: selection tests solutions against problems; replication carries solutions and updates problems; and variation generates new solutions.

Note that this definition of evolution does not turn on what is actually evolving beyond reference to ongoing solutions to ongoing problems. This is how it is in biology (the concept of an analytic gene), and also in economics (the concept of a rule). Nevertheless, the question of the proper units of selection, replication and variation is a source of much argument and debate in evolutionary theory.[7] In economic evolution, there are many possible units that these three mechanisms might operate upon. Examples include commodities in markets or the characteristics they embody, the preferences of agents, the skills and routines of agents, the competences and capabilities of firms, or indeed of entire firms and industries, or technologies or institutions.[8] These are all examples of structures of knowledge.

Knowledge is what the economic system is made of. In an evolutionary economic process, it is *knowledge* that evolves. Capital is knowledge in an operational form. Labour is knowledge in an active form. Money, as a store of value, is unspecified knowledge potential. Knowledge is subject to selection, variation, and replication. These evolutionary mechanisms operate over systems and populations of rules (that is, institutions) to produce the growth of knowledge process known as economic evolution.[9] It is the growth of knowledge that ultimately underpins the wealth of nations.

Market capitalism is an evolutionary system

Evolutionary economics is concerned with the nature of the market-capitalist system, in particular the set of institutions that define this system, and with the structure and dynamics of its processes of change. Of all the ways of organising human society, and of all the possible arrangements of political-social complexes, the classes of system that seem to embody most closely the mechanisms of an evolutionary process are those associated with market capitalism.

Market capitalism, very broadly defined, embodies certain mechanisms that are either absent or weak in more highly centralised systems of any substantial complexity. Market-capitalist institutions dominate the global economy, and now, more than at any other time in human history, there is a pressing need to understand how these mechanisms work. It is an oversight that borders on negligence how little mainstream economic theory has to say about these underlying dynamic evolutionary processes.

Market-capitalist systems are highly robust in the face of changes in the knowledge-base of the economic system, and for reasons clearly enunciated by Smith, Hayek and Schumpeter alike.

Human minds are, amongst other things, creative and enterprising. When provided with opportunities and incentives, the basic instinct of humans is to develop better ways of doing things by socially coordinating and re-integrating complex specialisations. In an environment of market-capitalist institutions, this is what firms and markets do. And this, not incidentally, is why we are so successful as a species: we work together for our own individual aims, and we solve economic problems as we go. Unparalleled not just in human history, but also in nature, a liberal market society is the best way yet we have developed for harnessing this creative enterprising drive.

Humans are all biologically similar but economically different, and that is what matters.

The most characteristic feature of a market-capitalist system is a driving process of endogenous change. The market-capitalist system is often a highly fecund environment for growing knowledge, yet not all systems have this property. Not all political-economic systems cope well with continual change, and fewer still seem to be predominately characterised by it.

The idea of market capitalism as a process of evolutionary change is not new. In 1942 Joseph Schumpeter, the patron saint of modern evolutionary economics, wrote in *Capitalism, Socialism and Democracy* that[10]

> Capitalism, then, is by nature a form or method of economic change and not only never is but never can be stationary . . . The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates . . . The essential point to grasp is that in dealing with capitalism we are dealing with an evolutionary process.

This is why market capitalism is, on the surface, such a dynamic or restless system.[11] Uncertainty is normal, which is why there is a rational drive to limit exposure to turbulence and to provide safety nets. Growth and turbulence go together, just as Karl Popper recognised in the discontinuities of science, which is a species of knowledge that is instrumental to capitalism. The same is true of technology and other useful knowledge systems. Market capitalism produces growth because it is a set of institutions that foster the growth of knowledge. All discussion of allocation is moot before this point, and it has taken us most of the 20th century, and unfortunately untold lives, to fully appreciate the fundamental significance of this.

What drives market capitalism?

For evolutionary economists, market capitalism—by which we mean a set of institutions relating to the exchange of property rights—is at heart an experimentally organised process of competitive rivalry, driven by the discovery of new ideas and ways of doing things.

For evolutionary economists, the concept of competition does not mean a large number of identical firms in a market for a homogeneous good. Rather, it means that someone is looking at a particular way of doing things and speculating that they could do it better, or, perhaps, that they could do something that would make it unnecessary to do what was being done in the first place.

Competitive or entrepreneurial actions create new knowledge and/or destroy old knowledge, and the market—the democracy of economic agents—decides whether or not it is a good idea. People are motivated by private gain, but if they succeed, then it becomes a public gain: an old problem is better solved, or a new problem is solved. This is what entrepreneurs do, and it is why they are central to the health of an economic society. Entrepreneurs drive economic evolution, and thereby, if harnessed, economic growth.

Humans are all biologically similar, but economically different, and that is what matters. We

do not all carry the same knowledge, and this is why our economies can grow. Indeed, if we were all the same there would be no need to interact, to access the web of knowledge, because there would be no gains from specialisation and trade. Each economic agent is a specialised component of knowledge, and the central economic problem is how to coordinate this specialised knowledge. Provided interaction is preserved and remains open, both production and growth are possible. The upshot is a society of knowledge into which agents fit (in both the biological sense of 'fitness') and within which agents can move around by acquiring new specialisations and making new connections.

This is market capitalism. Entrepreneurs propose, institutions facilitate, markets decide, and knowledge grows. And when knowledge grows, societies progress. As new knowledge is discovered and used to solve problems, invariably generating further problems, the economy evolves as an ever-changing structure of opportunities and constraints in an ever-present cloud of uncertainty and rival conjecture.

Evolutionary economics and liberalism

When we observe market-capitalist systems, the predominant thing we observe is change. There are many ways an economic system can change, including systematic market fluctuations (that is, business cycles) or growth convergence. But the sort of change that is of interest to evolutionary economists is qualitative change in the content and structure of the system as an ongoing process of transformation. This sort of non-cyclical, non-stationary, and significantly, non-predictable change is what is meant by economic evolution. Although this sort of change is an aberration in an equilibrium system, it is actually quite typical of market-capitalist economic systems. Indeed, it is what makes them tick.

But the mainstream approach to economic theory—that is, neoclassical economics—is not, and never really has been, concerned with processes of change. Neoclassical economic analysis is based on the concept of equilibrium and the attendant definitions of the economic problem as one of optimal substitution (best allocation) under conditions of *known* resource scarcity. This is certainly *an* economic problem, but it is not the main economic problem faced by modern globally connected economies in which competition is mostly about introducing new options for consumers in the face of ongoing uncertainty, and not simply about beating down existing suppliers facing a known opportunity set. If risk is quantifiable, and salaried managers are the most highly rewarded agents, then this is not market capitalism. And its problems are certainly not the economic problems that Smith and the other early liberal philosophers—Voltaire, Vico, Hume and Montesquieu—wrote about.

Market capitalism is, as Schumpeter argued, an evolutionary process that is by nature dynamic, and that means that static representations (that is, neoclassical economics) are like photographs of the wind; they somewhat capture it as it was, but never essentially as it is.

Liberal market-based societies are adapted to being surprised and to taking and managing risks because this is how they grow.

Evolutionary economics is about how complex open systems self-organise around ongoing processes of change.[12] Economic evolution is the process of changing knowledge, and the methods by which it changes are the markers of market capitalism—namely, profit, entrepreneurship, enterprise, turbulence, venture-capital, creative-destruction, uncertainty, freedom and prosperity. The point that has been curiously misunderstood in much otherwise good liberal thought, and only first corrected by Hayek,[13] is that the economics of the growth of knowledge are the economics of evolution in a complex open system, and that, despite appearances to the contrary, this is not what mainstream neoclassical microeconomics is about. Evolutionary economic theory is a much better foundation for liberal concern with economic problems than neoclassical economic theory.

Conclusion

Evolution is an endogenous process of change that, if it is genuine change, will be surprising. Liberal market-based societies are adapted to being surprised and to taking and managing risks because this is how they grow. Market economies and liberal societies are essentially adult environments in which people take responsibility for their own actions and react to the perceived incentives and opportunities around them. It is, in this sense, ultimately child-like to believe that

there must exist one person or group of people who knows what is best for everyone else; dictators, great leaders or bureaucratic planners, irrespective of how benighted, enlightened or highly trained they might be, are never smarter or more capable than the systems they try to control. Hayek called this 'the fatal conceit', and predicted the imminent failure of any complex economic society organised along these lines. Subsequent events have proven him correct, and evolutionary theory explains why.

The ongoing success of liberal societies and market economies is not because they are generally successful in most efficiently allocating scarce resources. Often, in fact, they are not very effective at this; free-market societies tend to produce sometimes highly skewed distributions of income and are prone to turbulence and instability. If the goal is static efficiency in allocation, then a centrally planned society is best, and this is where neoclassical economics is most appropriate as a guiding analytical tool.

Wealth is ultimately are product of specialised and integrated knowledge.

If the goal is to grow the wealth of nations and societies, then this will invariably involve growing knowledge, and the best way to do this is to unleash evolutionary forces. A liberal market-based economic order works because it harnesses the creative energies of all the agents in the system, and the more diversity and rivalry there is, the greater are the possibilities that better solutions will be found.

The wealth of nations is widely, but mistakenly, thought to be a product of the exploitation of natural resources. Wealth is ultimately a product of specialised and integrated knowledge, which is to say as an ongoing product of all people, and not just elites. This is the essential difference between a society of bees or ants, and a society of humans. This was the original liberal idea of the Continental and Scottish Enlightenment, and the original message of Adam Smith—the idea of evolution and its direct connection to the improvement of the welfare and capabilities of society.

Endnotes

1 For example, J. Barkow, L. Cosmides, and J. Tooby, *The Adapted Mind* (New York: Oxford University Press, 1992); P. Rubin, *Darwinian Politics: The Evolutionary Origin of Freedom* (New Brunswick, Rutgers University Press, 2002); M. Mitchell, *An Introduction to Genetic Algorithms* (Cambridge, MA: MIT Press, 1995).

2 J. Schumpeter, *The Theory of Economic Development* (New Jersey: Transaction Publishers, [1912]/1934); F. Hayek, 'The Use of Knowledge in Society', *American Economic Review* 35 (1945), pp. 519–30.

3 See D. Dennett, *Darwin's Dangerous Idea: Evolution and the Meaning of Life* (New York: Simon & Schuster, 1995); B. Loasby, *Knowledge, Institutions and Evolution in Economics* (London: Routledge, 1999); K. Popper, *A World of Propensities* (Bristol: Thoemmes, 1985); and G. Shackle, *Epistemics and Economics* (Cambridge: Cambridge University Press, 1972) for discussion of this as a general principle of evolutionary epistemology.

4 J. Potts, 'Knowledge and Markets', *Journal of Evolutionary Economics* 11 (2001), pp. 413–31; J. Buchanan and V. Vanberg, 'The Market as a Creative Process.' *Economics and Philosophy* 7, pp. 167–86.

5 F. Hayek, 'The Use of Knowledge'.

6 J. Potts, *The New Evolutionary Microeconomics: Complexity, Competence and Adaptive Behaviour* (Cheltenham: Edward Elgar, 2000).

7 There is a sizable body of popular literature that presents and discusses these issues. For example, see R. Dawkins, *The Selfish Gene* (New York: Oxford University Press, 1976) and *The Extended Phenotype* (Oxford: Oxford University Press, 1984); G. Hodgson, *Economics and Evolution: Bringing Life Back Into Economics* (Cambridge: Policy Press, 1993).

8 For example, R. Nelson and S. Winter, *An Evolutionary Theory of Economic Change* (Cambridge, MA: Harvard University Press, 1982); N. Foss, and C. Knudsen (eds), *Towards a Competence Theory of the Firm* (London: Routledge, 1996); P.E. Earl and J. Potts, 'The Market for Preferences', *Cambridge Journal of Economics* (forthcoming).

9 K. Dopfer, J. Foster, and J. Potts, 'A Micro-Meso-Macro Framework for Evolutionary Economic Analysis' *Journal of Evolutionary Economics* (forthcoming).

10 J. Schumpeter, *Capitalism, Socialism and Democracy* (London: George Allen & Unwin, 1942), pp. 81–2.

11 S. Metcalfe, *Evolutionary Economics and Creative Destruction* (London: Routledge, 1997); F. Louca, *Turbulence in Economics: An Evolutionary Appraisal of Cycles and Complexity in Historical Processes* (Cheltenham: Edward Elgar, 1997).

12 S. Kauffman, *The Origins of Order: Self-organization and Selection in Evolution* (Oxford: Oxford University Press, 1993; J. Potts, *The New Evolutionary Microeconomics* (see n.6); J. Foster and J.S. Metcalfe (eds) *Frontiers of Evolutionary Economics: Competition, Self-organization and Innovation policy*. (Cheltenham: Edward Elgar, 2001).

13 F. Hayek, 'The Trend of Economic Thinking', *Economica* 13 (1933), pp. 121–37; F. Hayek, 'The Use of Knowledge in Society', *American Economic Review* 35 (1945), pp. 519–30. See also L. Lachmann, *The Market as an Economic Process* (Oxford: Basil Blackwell, 1986).