Two Invisible Hands and a Big TOE: Systems Theory and the Problems of Pluralism in Economics.

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Abstract

Open systems theory has been suggested as a possible approach to develop alternative economic analysis free from the shortcomings of the neoclassical orthodoxy. This paper examines the potential of open systems theory in encouraging pluralism in economics as well as the implications of general systems theory, and open systems theory in particular, for the construction of economic theories.

Whilst the recognition that 'closed' systems are restricted in their predictive ability has been helpful in encouraging the development of alternative perspectives in both the natural and the social sciences, the belief that the problems of orthodox economic theory stem from the 'closed' nature of its thinking is questionable. The proposition that classical economics believed in the self-organising nature of the economy and the spontaneous emergence of order suggest that it demonstrates complexity and emergence, whilst its (limited) recognition of the impact of factors outside the 'boundary' of the general theoretical system in fact indicates that it is a form of open system. Adam Smith's invisible hand, hopefully now disposed of in economic thinking, reflects the belief amongst open systems theorists in the physical sciences of the existence of a 'purpose' in all systems. Thus the adoption of open systems thinking does not rid economics of criticisms of teleology. Instead it simply replaces the 'invisible hand' of the market co-ordinating activity with the new 'invisible hand' of 'nature'.

In addition, the purpose of general systems theory, of which open systems theory is a sub-theory, is specifically to encourage the creation of what scientists refer to as the 'Big T.O.E.' (Theory of Everything), and whilst the explicit demand for theories to map interrelationships and interdependencies naturally improves the capacity to create generally effective systems of analysis, it may act to reduce the degree of pluralism, and in particular methodological pluralism, accepted in disciplines attempting to create theories to fit into a meta-theoretical framework with defined patterns of levels and structures. In a sense, systems theory, whether closed or open, encourages pluralism of one form at the expense of pluralism of another.

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I Introduction

The issue of pluralism seems central to the debate in economics over the correct direction of economic enquiry. Two distinct forms of pluralism can, however, be identified. Many of the heterodox schools of economic thought share a common feature in their adoption of pluralist economic theory that has been summarised by Geoff Harcourt as the 'horses for courses' approach (King, 2002). Institutionalist and Post Keynesian theory for instance provide analysis specific to a particular time and/or set of socio-economic institutions. This demonstrates theoretical pluralism, but a more philosophical debate has also been conducted into the nature and necessity of a methodological pluralism. Many academic disciplines aim to encourage good scientific practice by establishing a strong methodological position 'according to one, commonly held, set of critieria' (Dow, 2002, pp.155), or a monist view. Problems relating to the subject matter of economics include the existence of ineradicable uncertainty and epistemological issues leading to 'ineradicable' vagueness (Dow, 2002) whilst the elements related in our theories are volitional, i.e. have choice, which affects theories as processes or behaviours can change by the decision of the individual elements at any time (Durlauf, 2005), and the consequent need for different methods for particular analyses results in inevitable methodological pluralism.

Open systems theory has been suggested as a possible approach to develop alternative economic analysis free from the shortcomings of the neoclassical orthodoxy. This paper examines the potential of open systems theory for encouraging pluralism in economics as well as the implications of general systems theory, and open systems theory in particular, for the construction of economic theories. It first discusses the theory of systems, as it has developed in the physical and social sciences, and examines whether these models appear to be reflected in the work of the neoclassical orthodoxy. It then moves on to examine the development of open systems approaches that appear to overcome the problems of closed systems approaches.

The importance of systems thinking appears to have a wide philosophical and scientific recognition, and yet it has little impact in economics. Aristotle (and later Hegel) believed that for many phenomena the whole was greater than the sum of its parts, whilst Heraclitus emphasised their complexity due to the 'permanence of flux' in natural systems (Russell, 1979, p.63). These capture the essence of systems theory. It approaches theoretical problems from the standpoint that simple relationships between any two phenomena or elements cannot, in aggregation, provide adequate explanations of the behaviour of real world phenomena, due to the complex nature of interrelationships. Consequently, the way in which systems thinking encourages the mapping of processes and interrelationships with their inputs, outputs and side-effects, despite their complexity, improves the standard of analysis in disciplines like economics that suffer at the hands of excessively reductionist theoreticians who pursue the objective of tractability in models at the cost of their adequacy. The problems of this approach are, however, obvious. The relationships between elements of a system with a high number of members can take on a multitude of possible structures.

This paper examines the closed system approach which predominates in the literature of the neoclassical synthesis by examining systems theory and the development of the methodology of science which combined positivism with systems thinking to produce useful theories capable of contributing to our understanding of the world. It will also examine how economics has followed scientific method and closed systems thinking without sufficient care to avoid its limitations or consideration of whether or not it is appropriate for the subject matter of economics. Finally it concludes that economic pluralism, in both theoretical and methodological forms, is necessary to cope with the nature of economics' subject matter, but incapable of successful incorporation into the open systems approach advocated by some heterodox economic groups due to the nature of systems analysis.

II Closed and Open Systems

The issue of 'system' had been examined long before the development of von Bertalanffy's General Systems Theory (see von Bertalanffy, 1969) and the 'systems approach'. Hegel's philosophy relates elements of theory together into a coherent system, and emphasises the need to analyse problems at the level of the system rather than the individual elements. It also raises a problem of systems theory, the tendency to view coherence as an important criteria when judging elements, or a 'coherence theory of truth' (Harrison-Barbet, 1990). Gestalt (or 'structure') psychology analysed the mind in terms of the overall structure, anticipating issues of emergence in general systems, as well as bad (incomplete – comparable to closed systems below) and good (complete – comparable to open) gestalt (Angyal, 1941/1981, pp.39).

The development of systems theory following the work of von Bertalanffy incorporated influences from a range of disciplines. Although a scientist, von Bertalanffy had developed several views of the interconnectedness of concepts whilst interested in issues of culture, early in his career. He later developed theories of system relating to biology, and integrated principles from the physical sciences, such as thermodynamics which was analysed in relation to open and closed systems by Ilya Prigogine, who later, with Isabelle Stengers, wrote an early and definitive work on chaos theory (Prigogine & Stengers, 1984)

A distinction is drawn, and one fundamental to this discussion, between 'open' and closed' systems, as referred to above. In basic terms, a closed system is one which does not rely on inputs from its external environment or produce outputs into that environment, so that it is self contained and its behaviour is determined by its own internal characteristics. An open system, on the other hand, interacts with its environment. As Koehler (1938/1981) states, ‘no organism is detached from the rest of the world to an extent that would make our [closed-system] principles directly applicable to living systems’ (pp.73) The persistence of these systems therefore depends on their abilities or rules determining their regulation of and adaptation to influences from their external environment. Typically biological and social systems are seen as ‘open’ systems due for instance to their tendency to reactive evolution in the face of a changing environment. Closed systems are capable of establishing equilibria ‘where known forces are balanced‘ (Cannon, 1932, cited in Koehler, 1938/1981, pp.73), whilst any tendency of open systems to survive internal or external changes and re-establish their balance is referred to as ’homeostasis’ (see Cannon, 1929).

Systems views are also ‘holistic’, in that it is assumed that they are ‘composed of interrelated subsystems. The whole is not just the sum of the parts, but the system itself can be explained only as a totality.’ (Kast & Rosenzweig, 1976, pp.17) This view of causation is described as the ‘non-summativity’ of systems phenomena. It is fundamentally incompatible with the scientific method developed by Galileo and Newton that examined phenomena by the isolation of elements (elementarism), as supported by Descartes second principle of analysis, ‘to divide each of the difficulties… examined into as many parts as possible, and as might be necessary.’ (Descartes, *Discourse on Method Part I*, cited in Strathern, 1996, p.34). Systems theory maintains that this approach is incapable of capturing the true nature of causation. John Stuart Mill, in his *System of Logic* (1843) made the distinction between those phenomena whose cause was identifiable by summation of its elemental causes (described as obeying the law of ‘Composition of Causes’) and those whose cause could not be described in this way. A system following behaviour of the latter type, and whose changes cannot be explained by appealing to the nature or behaviour of its sub-systems, is said to demonstrate ‘emergence’. With the serious study of complexity and chaotic systems in recent years, increasing numbers of physical and biological systems are recognised as demonstrating such emergence.

The complexity of the system, which depends on the number of its elements and therefore interrelationships (Emery, 1976/1981), is often viewed as a cause of emergence of new systemic characteristics. Three different views of emergence and complexity have developed in the systems literature, two in General Systems Theory and one more recently in the critical realist literature in economics:

(i) Emergence leads to disorder (physical sciences, closed systems – van Gigch, 1974)

Physical systems tend to display emergent disorder through the natural process of ‘entropy’. Following the original General Systems Theory relating to closed systems, the progressive movement of physical science (closed) systems from high- to low-levels of useable, ordered energy following the law of thermodynamics suggests that disorder is an emergent quality in closed systems, or that they display progressive *dis*organisation;

(ii) Complexity leads to emergence (biological sciences, open systems – Bar-Yam, 1997)

Through analysing the process of interaction between networks of cells and their organisation into organs, biologists discovered 'a process of "emergence" of new properties at certain "levels of complexity". By this they meant that when a mechanism… becomes complicated enough, it might exhibit a type of behaviour which did not and could not occur at all in the isolated parts.' (Waddington, 1977, p.21) For instance, the organs of the body independently cannot sustain life – they only do so as part of a larger system. Alternatively the interaction between members of a group may fundamentally change when their growth in numbers pushes up against environmental or other constraints, demonstrating organisation;

(iii) Deep structure leads to emergence (critical realist economics – Mearman, 2004)

Recent work in economics has addressed open systems using a critical realist approach (see for instance Mearman, 2004). This approach, reflecting the structuralist tradition of critical theory, invokes the concept of deep structure to explain emergence in systems and may in fact constitute a separate emergence model. In this particular sense, the emergence of new behaviours reflects the epistemological uncertainty of individuals due to their inability to observe causes due to sub-systems in the invisible 'deep structure'. Thus emergent behaviour is not necessarily due to high levels of complexity in open systems but may be inherent and may, for instance, emerge at particular thresholds where environmental or other constraints interact with the developing elements of the system (see Durlauf, 2005).

The 'systems approach' inherently makes a number of ontological assumptions about its subject matter. At the most fundamental, it analyses 'systems' that represent the operation of the real processes and are identifiable over time, showing some persistence of recognisable structure throughout. In each system its constituent elements, and the patterns of processes inside or relationships between those elements may change over time, but the system itself persists in some form. The elements of systems can be physical or socio-economic, or theoretical in their nature. Epistemologically, the nature of the interactions in the system can only be captured at the total systems level, and 'atomistic' analysis incapable of producing scientific 'laws' (or true 'regularities'). The critical realist critique suggests that this is problematic at even the systems level.

Finally, systems theory has at its core a belief in the 'finality' of systems. Teleology (purpose), according to von Bertalanffy (1969, pp.77-8) may show in a number of ways –goal-directedness towards final outcome (e.g. thermodynamics); finality in purposiveness towards a goal (attributed to Aristotle) which is intentionally followed; homeostasis (Cannon, 1932 &

Angyal, 1941/1981). The reintroduction of the issue of teleology in science reflects earlier discussion in philosophy, science and theology over the ‘argument by design’, and the role of creator in pre-Galilean science. These concepts persist in complexity theory as the division between systems displaying self-organisation, as predicted by Hume (1740/1986, see below); or those displaying ‘directedness’ or purpose by design such as shown in the nature of many biological phenomena (Bar-Yam, 1997).

The role of nature or some creator in directing the behaviour of physical systems appear farfetched in the light of modern science, but Darwin considered this argument; and Hawking (1989) specifically makes references to the idea in his famous quotation from *A Brief History of Time*, that ‘However, if we do discover a complete theory… then we would know the mind of God’ (pp.175). This is, appropriately, a very systems-theory sympathetic view, involving directedness (or design) and the importance of unified theory. The idea that there is an ‘Invisible Hand’ that directs the physical world has persisted through all the trials of the post-Galilean scientific world.

The popularity of overt ‘systems approaches’ has varied over time and across disciplines. Their use in engineering is standard, whilst in the physical sciences and biological or environmental sciences they are commonplace. The use of systems thinking in economics has gone from being overt to being assumed, however, and this has submerged important issues relating to the nature of economic theory. Systems theories are logical in their structure and not merely patchwork theories that are somehow combined. The ability to create ‘continuous’ explanations depends on an inherent structuring of explanations. The theories which are combined must ‘speak the same language’ in that the inputs and outputs of each element, sub-process, or sub-theory must be consistent, requiring that a common methodological approach be used, with elements often organised on the basis of scale or aggregation of analysis. The methodological coherence of the physical sciences, as well as the relatively uncomplicated ontology when compared with the social sciences, creates a greater opportunity for the appropriate use of systems theories to provide adequate, or even comprehensive systems theories.

III Science, Complexity and Methodology

Simplicity appears to appeal to those who seek to explain all economic phenomena, despite the obvious contradictions in this. The ultimate objective is the pursuit of the Holy Grail of the sciences – a big Theory of Everything (T.O.E.) or unifying theory. The ability of the physical sciences to explain and predict phenomena with some degree of accuracy underpins their prestige, and yet a fundamental conflict exists between the conclusions of the theories of gravity and relativity, and those of quantum mechanics (equivalent to macro- and micro-analysis respectively – see Greene, 1999). Despite this, a common methodological approach amongst physical sciences holds out the possibility that these inconsistencies may be ironed out.

The justification for deterministic modelling is frequently stated in scientific writing with reference to the method of Galileo. Galileo's approach developed in the attempt to observe acceleration of objects under gravity. This he addressed in a novel way, firstly by observing the acceleration of a ball down an incline rather than in free flight, thereby slowing the acceleration to within observable limits. Secondly, as he noticed that friction was slowing the acceleration so that it was not perfectly uniform, 'he took the dramatic and influential leap, astonishing for his time, of extrapolating from his observations to work out how his balls would move *without* the effect of friction, on some idealized, perfectly slippery slope' (Gribbin, 2004, pp.7). Scientists in the following centuries formulated mathematical laws relating the behaviour of 'mystical' objects with idealised properties that made them susceptible to study. These theories differed from the deductive scientific discovery of classical times, however, as 'unlike the Greek philosophers, they knew that their image of perfection did not represent the real world… they could try to put in extra terms, correction factors, to take account of imperfections of the real world' (Gribbin, 2004, pp.8). Abstraction into an idealised form was essential in order to overcome difficulties of observing and recording experiments, and to produce 'laws' with a general applicability. Isaac Newton applied Galileo's methods, involving observation from experiments, and 'also took on board and refined Galileo's insight into the value of deliberately simplified models… as descriptions of particular aspects of the real world.' (Gribbin, 2004, pp.9)

The extent to which abstraction is justified in modelling of physical, socio-economic, or other systems is an inherently subjective judgement, but one that all theories are forced to address. The process of abstraction is inherently reductionist, and yet theories, in that they relate the patterns of interaction between abstracted categories of elements as well as their significance, require that this abstraction take place. The level of such abstraction that is possible whilst still permitting a theory to be 'meaningful' is always questionable. The pursuit of realist theories will require lesser degrees of abstraction, but produce more specific outcomes. Those pursuing general laws may therefore resort to a greater degree of abstraction in the attempt. The physical sciences, in their early analysis of phenomena such as gravity, fortuitously had a subject matter susceptible to such simplification without causing excessive 'damage': cosmologists can analyse the relationship between the planets in orbit quite accurately using measurements from the centre of each planet, which lies on its orbit, rather than the surface without causing appreciable errors (and those can anyway be ironed out by consequent observation). Gravitational force may not change massively over relatively large distances: customs or culture do.

Newton, influentially, formulated a set of equations representing the behaviour of the real world that were susceptible to solution by integration using the methods of calculus. In this sense he produced a model that constituted a determinate, rather than indeterminate, system of equations. In this sense the equation system is a closed system 'for which no outside [effects] are to be considered.' (van Gigch, 1974, pp.40) In doing so in a work that was to become widely-known, and in fact fundamental to the physical sciences, he promoted the approach to the extent that it came to dominate scientific investigation. As van Gigch states, 'We can only optimize closed systems such as models in which all assumptions and boundary conditions are known. Real-life situations are open systems, the portions of which can, at best, be partially optimized.' (pp.34) Newton can be seen, in many respects, as the father of the closed system. Scientists would defend his abstraction and simplification by referring to their awareness that corrections would always be necessary for the circumstances of any particular example. This typifies the attitude that it is better to be 'never entirely right' than to be 'sometimes entirely wrong'. The radically different approach of the biological and social sciences to the analysis of real-life situations reflects the complex nature of many aspects of 'reality' which the scientific method is supposed to address.

The formalism of the scientific method, which has been central to the creation of solvable, deterministic models in the physical sciences, has been adopted widely in the orthodox economics. This formalism is questionable for many reasons, in particular relating to the nature of the subject matter of economics. Until the development of quantum mechanics, no parallel existed in the physical sciences for the existence in economics of stochastic reasoning, or heterogeneous, complexly inter-related units of analysis that can change their mind, or act irrationally. Arguably, neither did it exist in the orthodox economic analysis (Markose, 2005). The reliance on probabilistic methods to create 'closure' of such systems of analysis appears inadequate to create convincing accounts of phenomena out of unconvincing fundamental assumptions.

Closed-system approaches are typical of the physical sciences, where relationships between variables can be approximately isolated in experiments in order to reveal causal 'regularities' in their connections. The reliance of solution of models by calculus on the 'closure' of the model, in terms of the elimination of both external influences and also the possibility of change in its internal relationships (see Dow, 2002 or Mearman, 2004, on closure conditions), has encouraged the persistence of closed-model thinking, as well as its adoption by others such as economists. The ability to produce 'definite answers' provides a subject with a respectability that many of the social sciences have clearly sought after. Relationships analysed in economics and the social sciences are, however, more difficult to isolate in such a way (Pratten, 2004), but are also inherently more complex and shifting. The problem that is created by 'realist' economic analysis, which retains the non-tractable models that show the true details of interactions of economics agents, is that it increases the complexity of the theoretical model.

The revelation of an apparent causal link by an experiment does not guarantee that it will still hold when the experiment is repeated, so that demi-regularities may exist, if any. The application of mathematical methods, as used in the physical sciences, to data from experimentation is therefore of questionable value. This, however, is how the subject of economics has 'progressed'. As Mark Blaug states, 'Economics has increasingly become an intellectual game played for its own sake… Economists have converted the subject into a sort of social mathematics in which analytical rigour is everything and practical relevance nothing.' (Blaug, 1997, p.3)

IV Why Is Orthodox Economics a Closed System?

Systems approaches attempt to address a range of problems that have troubled both philosophers and scientists by providing a framework within which theories or systems at various levels of aggregations can be interrelated. The changing properties of real-world systems and the mechanisms that operate within them are often relevant to systems thinking. Heraclitus examined the issue of the 'permanence of flux', and stated that 'we never step twice into the same river' (cited in Russell, 1979, pp.63). Whilst the river still exists, and many of its identifiable characteristics appear unchanged in the short run, its elements and structure have changed radically. In the long run, greater changes become visible due to the interaction between the river and its environment changing its size, shape, position, etc.. The river persists as a system, but does so by maintaining itself, or being maintained, despite these changes using mechanisms of adaptation and regulation. The existence and relevance of such 'complex adaptive systems' for markets and other phenomena has only gradually been recognised by economics, and their full implications have still not been realised although existing attempts to incorporate such ideas and the methods required for their analysis already spell 'a paradigm shift for many mainstream economists who have [previously] operated under the assumption of closure and completeness.' (Markose, 2005, p.F188)

The previous development of economics as a 'closed system' discipline is difficult to rationalise on the basis of its subject matter, and yet it has clearly developed into a strongly formalistic subject in its orthodox form. The growth of this approach might be due to reasons of respectability, or tractability of mathematical models when compared to discursive analysis, rather than being intended to achieve closed models, but the formalists' desire to create solvable mathematical models will create an inherent tendency to models with inappropriate closure. The perpetrators, however, see themselves as taking a logical approach that is superior, or capable of superiority, in all respects. The views of the 'mathematical' economists are clarified by Klein (1954) who states that:

> 'Non-mathematical contributions to economic analysis often tend to be fat, sloppy, and vague… Clarity of thought characterizes mathematical economics… One of the best ways of comparing alternative systems of thought appears, in fact, to be to consider skeleton mathematical models of each system and to look at differences in the structure of the relevant equations.' (p.360)

A range of critical explanations have been provided for this mathematical tendency. Rosser (1993) invokes Mirowski's (1989) rather direct critique: that economics suffers from "physics envy". More mathematical criticisms can, however, be levelled at the approach. It has been noted that Monetarist and Keynesian models, in their 'reduced form' for calculation, for instance, display 'observational equivalence', i.e. they look just the same. The process of reductionism necessary to fit the concepts with mathematical notation and the available data produces an apparent congruence that, in fact, does not exist between the original theories. In practice, all mathematical models are 'reduced forms' trimmed of much of the negotiable meaning that in fact helps economic debate and the progress of the subject (Dow, 2002). The deterministic models produced, in that they do create 'solutions' where non-deterministic analysis is unable to do so clearly, have an advantage in policy situations where answers are demanded from analysts and nuances are largely lost. The impact of this on the long-term development of the subject appears regrettable. The growth of formalistic modelling has, however, been taken as a proof of its superior value. Solow (1954) states that, for the translation of mathematical economics into the mainstream:

> 'Actually there is an Invisible Hand which tends to make such communications problems solve themselves. Over the years there has been a slow but discernible groundswell in [mainstream mathematical] economic theory… As a good Darwinian I believe that this is no accident… Survival in the literature is a test of fitness, if an imperfect one.' (p.373)

Unfortunately this 'Invisible Hand' appears to have directed the subject away from its most advantageous approach, as the subject has appeared increasingly abstract and academic to consumers of policy advice in this period of formalisation. Economics' academic respectability seems to improve as its relevance declines, in some form of inverse-square rule.

Just as the earliest scientists to use the Galilean method were aware of the exceptions to and variations from their 'laws', it is arguable that the classical economics was originally a relatively open system, as conceptualised by writers such as David Hume (1740/1986) and Adam Smith (in the *Wealth of Nations*, and particularly in the *Theory of Moral Sentiments*). Hume (1740/1986) suggested that legal institutions demonstrated emergent development by 'spontaneous order', through the independent actions of individuals. This concept has been repeated in both Austrian (Hayek, 1982; Sugden, 1989) and Institutional (Olson, 2000) economists in attempts to explain the emergence of markets and other economic institutions. In addition Smith (1759/1984) dealt with the heterogeneity of individual motivations, as well as the effects of trade and other ‘external’ factors explicitly. The Scottish enlightenment, unlike it French and English equivalents, did not appear to follow Comte’s ‘positivist’ programme (Rosser, 1993) which lead ultimately to the formalisation of the subject, but instead envisaged an economic system open to both change and external influences (Dow et al., 1997). The explicit recognition that the economic system has complexity and emergent characteristics and an open system ontology contrasts starkly to the restrictive perception of the economics of the neoclassical synthesis.

V Economics and Open Systems

VI Conclusion

Is there a chance that economics integration of concepts from systems theory could result in a unifying theory? It is highly unlikely given the problems of the economics subject matter and the range of methodological and hermeneutic (in its original, theological sense) differences that remain within economics. Systems theory is designed to aid the integration of elements of theory, or to help consideration of the complex ‘whole’ rather than its parts. Its most successful attempts have been in the physical and biological sciences, however, which may be revealing about its benefits and limitations. Whilst it is true that the pursuit of the ‘Big TOE’ may have almost reached its goal, this unites a range of different theoretical analyses which fulfil the criteria of ‘theoretical pluralism’, but not that of ‘methodological pluralism’. The method handed down from Galileo and Newton is universal across all of the physical sciences, just as Darwin’s work underpins the biological sciences. Their progress at integrated or unified theories has been possible because this aspect of unification is not under debate – the debate simply revolves around the puzzling question of why the theories seem to disagree with each other *despite* the identical nature of the methodological approach of their investigation. Economics, as has been recognised in the methodological literature, has fundamental differences of approach that would preclude this. It appears that, whilst systems theory may permit the ‘validation’ of theoretical pluralism, it would do so only at the cost of methodological standardisation, and it is at this level that many of the fiercest debates remain (see Dow, 2002).

In addition, the persistence of teleological reasoning in the systems theory approach would cause problems for a number of the traditions in heterodox thought. This concentration on ‘direction’ may be addressed in the use of biological analogies, so that complex-systems methods could be used (Bar-Yam, 1997), but this teleological nature has been a fundamental point of criticism since the criticisms of commentators such as Veblen (1899). It appears unlikely that it would suddenly become acceptable. In particular, the unfortunate resemblance to the ‘argument by design’ opens such analysis to uncomfortable (or at least embarrassing) questions over whose design is being implemented. An invisible hand appears to be a persistent feature of such problematic analyses.

Overall, whilst the recognition that ‘closed’ systems are restricted in their predictive ability has been helpful in encouraging the development of alternative perspectives in both the natural and the social sciences, the belief that the problems of orthodox economic theory stem from the ‘closed’ nature of its thinking is questionable. The proposition that classical economics believed in the self-organising nature of the economy and the spontaneous emergence of order suggest that it demonstrates complexity and emergence, whilst its (limited) recognition of the impact of factors outside the ‘boundary’ of the general theoretical system in fact indicates that it is a form of open system. Instead it simply replaces the ‘invisible hand’ of the market co-ordinating activity with the new ‘invisible hand’ of ‘nature’. In its neoclassical form, however, economics restricts its analysis and simplifies its categories in imitation of the physical sciences, but fails to produce a *good* closed system from this. It fails to adequately define the boundaries of its analysis, such as that between the economy and its environment, and to recognise the potential for emergence of process-change within apparently deterministic and closed systems. The issue for heterodox economics is not just that neoclassical economics is a closed system, but that it is a poor closed system. Open system theories may find it impossible to reconcile the needs for simultaneous theoretical and methodological pluralism, but the resultant attempts are likely to be far superior to the shoddy closed system theory that is still prevalent in the deterministic modelling of the mainstream economics

It must, however, be recognised that economics must progress beyond the open system, just as it is progressing beyond the closed system. The purpose of general systems theory, of which open systems theory is a sub-theory, is specifically to encourage the creation of what scientists refer to as the ‘Big T.O.E.’ (Theory of Everything), and whilst the explicit demand for theories to map interrelationships and interdependencies naturally improves the capacity to create generally effective systems of analysis, it may act to reduce the degree of pluralism, and in particular methodological pluralism, accepted in disciplines attempting to create theories to fit into a meta-theoretical framework with defined patterns of levels and structures. In a sense, systems theory, whether closed or open, encourages pluralism of one form at the expense of pluralism of another.

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