

Hayek and current developments in economic methodology

Hayek as an economic theorist was fifty years ahead of his time. At the frontiers of thought, contemporary economics is gradually embracing the Hayekian vision. As the 21st century unfolds, economic theory will correspond more and more to Hayek's thinking about how the social and economic world works.

This essay is rather different than most of the others in the volume, because it deals in the main with theory rather with practice. But abstract theory can have profound political implications. Empirical evidence that market-oriented systems work better than centrally planned ones is overwhelming. Yet it is always open to the would-be planner to argue that previous designs were flawed, whereas his or her current scheme is bound to work well. Indeed, belief in the inherent efficiency of planning still permeates many parts of economic and social policymaking in the West.

Hayek's achievement was to show that *theoretically*, market based economies are inherently superior to planned ones. Paradoxically, conventional free market economic theory cannot demonstrate this result. Indeed, it is equally relevant to the idealised world of both the central planner and the pure free market. Hayek demonstrated that desirable social and economic outcomes arise not merely from the actions of isolated individuals, which is the postulate of orthodox economics. Rather, they are the *joint* product of both individual actions and the institutional framework in which individuals operate. Individuals and institutions arrive at efficient outcomes by a process of evolution and competition. Rigid, centralised planning operating under a fixed institutional structure is the very antithesis of what is required.

In this short essay, I first of all discuss the key achievement of conventional economic theory in the 20th century. Second, I describe the limitations of this approach, and the intellectual impasse which it reached. I then contrast Hayek's approach with the orthodox one and show why his was so powerful and original. I go on to give examples of how the most exciting developments in economics in the past couple of decades are taking the discipline in the direction of the Hayekian vision.

Over two hundred years ago, Adam Smith gave examples of particular industries, such as XXX, in which the self-interested actions of producers responding to incentives lead to benefits for everyone. Economic theory in the 20th century was able to show that this could lead to a desirable outcome not just in a few, but in *all* markets at the same time. Supply and demand would balance everywhere, and there would be no unused resources. An efficient, overall outcome would prevail. In the jargon of economics, this is the model of ‘general equilibrium’.

General equilibrium theory is often seen as the crowning achievement of economics in demonstrating the superiority of free markets over planning. But, as Hayek realised, the *theoretical* implications of general equilibrium are that a centrally planned economy can be at least as efficient as a free market one, and may even be superior.

An important problem for conventional economic theory, both in this immediate context and more generally, is that in order to demonstrate the efficiency of markets, it requires its actors to be very clever¹. They need to be able to gather and process enormous amounts of information.

According to this theoretical view, efficient outcomes arise for the system as a whole because of the amazing cognitive powers of its component parts, the individuals and firms which comprise the system. Individual agents are able to decide not merely a good strategy to follow, but one which is *the* best, the optimal, a word used a great deal in economic theory. In situations where there is a ‘best’ strategy for an agent, the agent needs to be in possession of *all* relevant information. And to compute the optimal strategy with this information, a great deal of processing power may be needed.

The cognitive demands placed upon agents in the model of general equilibrium are so strong that, in principle, a central planner in a socialist state might well be able to satisfy them more readily than a more decentralised, market based decision-making framework. During the 1940s and 1950s, the concept of planning was very

¹ to be more precise, to act ‘as if’ – a favourite phrase in economics – they are very clever. In other words, they may not actually be very clever, but as long as they act as if they are, everything is fine.

fashionable in the West. It was also during these decades that the first really powerful mathematical results on general equilibrium emerged². A number of academic articles at the time demonstrated that an omniscient socialist planner, by using the price mechanism as a way of deciding how resources should be allocated, could achieve results identical to those of an equally idealised free market economy, but with a more egalitarian distribution of income and wealth.

In other words, in the world of general equilibrium, the great theoretical achievement of conventional economics in the 20th century, socialism could be better than capitalism. Socialist planning in theory could be just as efficient as free enterprise, and at the same time more equitable.

It was Hayek's genius to offer a completely different, and much more realistic, view of how economies operate. In a Hayekian world, decentralised decision making by individual agents is *unequivocally* superior to central planning. Indeed, a central plan may well be the worst possible institutional framework an economy could have.

Hayek anticipated by many years the modern theory of complexity, which is now being applied in both the social and natural sciences. In complex systems, the individual components of the system interact with each other directly to produce order and regularity at the aggregate, system-wide level. Their patterns of behaviour are not be fixed, but may change as they observe the behaviour of their neighbours. Often, the system-wide patterns which emerge are unexpected and cannot be deduced from the rules of behaviour followed by the individual components. The whole is *different* to the simple sum of the parts.

² the research programme on general equilibrium was finalised by the mid-1970s. But the definitive results are not good news for the theory. Radner in 1968 demonstrated that in order to be able to prove the existence of general equilibrium, all agents have to have access to literally an infinite amount of computing power. In the early and mid 1970s, Sonnenschein, Debreu, Mantel and Bliss showed that there is no theoretical presumption in general equilibrium either that market demand curves slope downwards, or that market supply curves slope upwards. For some reason, which is open to speculation, these central results of high economic theory are taught to very few students.

In contrast, in general equilibrium, the individual components interact only *indirectly* via the price mechanism. Their rules of behaviour are fixed. And in principle the behaviour of the system as a whole can be deduced from the individual parts³.

The two visions of the world are fundamentally different. Conventional theory describes a highly structured *mechanical* system. Both the economy and society are in essence gigantic machines, whose behaviour can be controlled and predicted. Hayek's view is much more rooted in biology. Individual behaviour is not fixed, like a screw or cog in a machine is, but evolves in response to the behaviour of others. Control and prediction of the system as a whole is simply not possible.

Interestingly – and how unlike most modern day economists! – Hayek understood and admired the achievements of other intellectual disciplines. Anthropology attracted his particular attention, and of all the social sciences he regarded this as the one which produced people who thought in a sensible way about the development of society. For Hayek ‘an economist who is only an economist cannot be a good economist’.

The complex interactions between individuals give rise to *inherent* limits to knowledge of how systems behave at the aggregate level. No matter how smart the planner, no matter how much information he or she gathers, there are inescapable limits to how much can be known about the system.

An echo of this is found in the public choice literature. Public choice economics⁴ tells us that planners can be as imperfect as the market. They are chosen by imperfect processes that can no more be perfected than the market processes can be perfected to look like the textbook models of ‘perfect’ competition.

Vernon Smith gives a practical illustration of the limits to knowledge in his brilliant Nobel lecture, published in the June 2003 *American Economic Review*⁵. Airline route deregulation in the United States has led to the emergence of the so-called hub

³ the increasingly narrow confines of modern orthodox theory reduce this to absurdity with the postulate that the workings of the economy as a whole can be understood from those of a *single*, ‘representative’ agent

⁴ for example, 2 refs from P Booth please

⁵ VL Smith, ‘Constructivist and Ecological Rationality in Economics’, *American Economic Review*, 93, pp 465-508, 2003

and spoke system. There are few direct flights between cities, and most journeys involve a change at one of the small number of ‘hub’ airports.

Smith describes this as an ‘ecologically rational’ response. Significantly, as he points out, *no-one* predicted in advance that this institutional structure would evolve. This is not because airlines were stupid. It is because customers did not know themselves in advance that this was the system they preferred. They were not cogs in a machine following fixed rules of behaviour. They had to learn which system they actually preferred through a process of market experimentation. Following deregulation, different types of route structure were tried, but the hub and spoke evolved as the most efficient. This institutional structure was discovered through a process of evolution and competition.

The world of economic forecasting gives another illustration of the inherent limits to knowledge in complex systems. The short-term forecasting record of, say, GDP growth or changes in inflation, is known to be very poor. This is not just in the UK, but across the West. In general, the forecasting record exhibits a certain degree of accuracy in that the average error over time is smaller than the size of the variable being predicted. But the error is still large compared to the actual data, and most of the accurate forecasts are made when economic conditions are relatively stable. Exactly when they are most needed, at turning points in the economy, forecasts are at their least accurate.

Very considerable high-powered resources are devoted, in Treasuries and central banks across the world, to trying to make accurate forecasts. They are essential for successful control of the economy. If we are very unsure about where the economy might be in a year’s time, we are of necessity unclear about what policy changes we should be making now. Yet the forecasting record shows no sign of getting better over time, despite the incentives for policymakers to get it right.

A branch of modern mathematics enables us to show that the poor forecasting record is inherent in the nature of the economy. The precise details need not concern us here, but essentially the technique decomposes data or information into two separate parts. One is the bit which contains true information, and the other can be thought of as

noise, or interference. The latter contains no information at all, as if it arose purely at random. Economic series such as GDP growth or the change in inflation can be shown to contain very little true information⁶. So systematically accurate prediction over time is impossible. The Hayekian interactions of the millions of individuals and firms who make up the economy as a whole lead to unpredictability of the system as a whole.

All the main developments in economics since 1970 can be thought of as moving the subject in the direction of Hayek's view of the world. There are two main ways in which this is being done. First, advances in theory have involved the gradual relaxing of the cognitive powers which are attributed to agents – to the individual firms and people in an economy. In Hayek's world, individuals do not need to have exceptional cognitive powers. Efficient outcomes arise not by design, but by the process of evolution through the complex interactions between individuals. Second, by acknowledging the fact that people's tastes and preferences are not fixed. They are influenced by the behaviour of others.

An important step took place in the 1970s, when economists such as George Akerlof and Joseph Stiglitz (2001 Nobel laureates) introduced the concept of 'bounded' rationality. Some, and possibly all, agents in any given context may lack access to full information. So their ability to gather information is restricted. However, they still follow the rules of maximising behaviour and try to find the optimal strategy given the set of information which they have.

The concept of bounded rationality has undoubtedly extended the power of conventional economics to understand the world. There are many situations in which it is more reasonable to assume that some or all of the relevant agents have access to partial rather than full information.

But bounded rationality can be used as an excuse to let the central planner in by the back door. Agents are still postulated to have the capacity to maximise, to find the

⁶ see, for example, P.Ormerod and C.Mounfield, 'Random Matrix Theory and the Failure of Macro-economic Forecasting', *Physica A*, 280, 497-504, 2000.

best possible solution by processing information efficiently. All they lack is the means to gather all the relevant information. So here is a potential role for the planner, as a uniquely capable gatherer and provider of information, who thereby overcomes the deficiencies of the market.

It is only in the past 10 to 15 years that economics has made the decisive break, and has begun to embrace the Hayekian view of the world. Individuals and firms may not only lack complete information, but it may be impossible for them to work out the 'best' strategy to follow. The game of chess gives a simple example of this latter point. Here, in fact, the rules are transparent and known. But the possible number of permutation of moves is so huge that no-one knows the answer to the simple question: what is the best move for White to play when starting the game?

The problem is compounded when individuals can change their rules of behaviour depending upon what other people do – imagine playing chess if the rules which governed the moves changed unpredictably during the course of the game!

In the 1980s, Brian Arthur provided a realistic model of behaviour in such circumstances⁷, which has many practical illustrations. Like any theoretical model, it is only an approximation to reality, and needs to have customised bits added, as it were, when any particular application is being considered. But the general approach is powerful.

Arthur was interested in new technology markets, where very often one company or brand comes to dominate the market, even though from a purely technical point of view it may not be quite as good as its erstwhile rivals. Obviously, each product needs to satisfy a certain minimum level of quality, but it is not clear that the best product always wins out. Video recorders are a classic example, and many people believe the same to be true of Microsoft and its suite of products.

If consumers – or the central planner! - have perfect knowledge, such an outcome is impossible. The best will always win. But the key to Arthur's model, as with Smith's

⁷ his original article is highly mathematical WB Arthur, Yu Ermoliev and Yu Kaniovski, 'A Generalised Urn Problem and its Applications', *Kibernetika*, Jan-Feb 1983

airport route example, is that consumers do not know themselves in advance what their preferences are. They have to learn them when the products become available. Lacking information, it makes sense to observe what others do and follow their example. If a friend or neighbour buys a VHS video recorder, say, and is satisfied, you are more likely to do the same. Once this process gets underway, the lead in market share which VHS obtains encourages retailers, for example, to stock tapes for these machines rather than for its rival Betamax, which in turn gives an incentive for new purchasers to choose a VHS machine, so that a virtuous circle comes into existence for VHS, which becomes a vicious one for Betamax. This is the key to Arthur's theoretical model, though the actual mathematics are pretty hair-raising.

The implications are very Hayekian. There is structure and order at the overall level, in the sense that we know that one product is likely to secure a dominant market position. The qualitative structure of the market which will emerge is known. But it is impossible to predict in advance which product will be the dominant one.

There is a growing number of models such as this. Their precise subtleties vary from context to context, but they each provide a better account of reality than does conventional economics. Examples include explaining the volatility of financial markets, accounting why the successes and failures of Hollywood films are inexplicable, understanding why dramatic changes in crime can take place, and the distribution of honesty ratings amongst sellers on websites such as e-Bay⁸.

Even financial markets, the domain par excellence of free market theory, are not immune to this approach. For example, a recent model⁹ analyses the mechanics of price formation and the accumulation of stored supply and demand under the simple assumption that people place orders to trade at random. The model makes excellent

⁸ A.Kirman, 'The Behaviour of the Foreign Exchange Market', *Bank of England Quarterly Bulletin*, August 1995; A De Vany and R. Wallis, 'Bose-Einstein Dynamics and Adaptive Contracting in the Motion Picture Industry', *Economic Journal*, 106, 1493- 1514 1996; E.L.Glaeser, B.Sacerdote, and J.A.Scheinkman, 1996, 'Crime and social interactions', *Quarterly Journal of Economics*, vol.CXI, no.2, pp.507-48; P Ormerod, C Mounfield and L Smith 'Non-linear modelling of burglary and violent crime in the UK', in *Modelling Crime and Offending*, Home Office Occasional Paper no. 80, Home Office, London, 2003; P Laureti, F Salnina, Y-K Yu and Y-C Zhang, 'Buyer feedback as a filtering mechanism for reputable sellers', *Physica A*, 316, 413-429, 2002

⁹ J.D.Farmer, P.Patelli and I.I.Zovko, 'The predictive power of zero intelligence in financial markets', Los Alamos National Laboratory Condensed Matter archive 0309233, 2003

predictions for transaction costs, price diffusion rates, and a quantity closely related to supply and demand, using actual data from the London Stock Exchange. In other words, it appears that the price formation mechanism strongly constrains the market, playing a more important role than the strategic behavior of agents¹⁰.

The brilliant work of Vernon Smith has been at the forefront of this development, and is taking it in even more exciting directions.. His Nobel lecture, referred to above, is an intellectual tour de force, and helps define the Hayekian research agenda for the 21st century. The challenge is not only to understand better how individuals behave, but to show how, through their interactions, institutions themselves evolve. Economic efficiency, we have finally realised, does not arise solely through the behaviour of individuals. It is a joint product of their behaviours *and* the rules of the institutional structure under which they operate. Hayek knew this all along. His giant figure looms at the threshold of 21st century economics.

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¹⁰ for a general discussion of the importance of low cognition amongst agents see P.Ormerod, 'What can agents learn?', opening plenary address to the Australian Economic Society conference, September 2003, at www.paulormerod.com