

## **1. Economics in the policy process**

Over the course of the last half century or so, a great deal of policy making has become dominated by the discipline of economics. This is not to say that other social sciences do not have an input, but the influence of economics is pervasive. Many policies in all Western governments and central banks, as well as in international bodies such as the European Commission and the International Monetary Fund, are filtered through the intellectual perspective of economics. Economists have proved themselves to be extremely successful policy entrepreneurs, selling their way of thinking about the world to policy makers.

In part, this is justified. Economic theory is by no means an empty box. A fundamental building block of economics is the role of incentives. Individuals, companies and even governments themselves, respond and alter their behaviour when the set of incentives which they face changes. This is the great scientific insight of economics, which has wide ranging application to many situations.

The implication of this view of the world is that the key tools of policy are taxes, subsidies, and regulation to alter incentives. A great deal of labour market policy in Europe over the past two or three decades, for example, has been motivated in this way. So, for example, the reforms in the UK under Thatcher in the 1980s and the coalition government since 2010, and the Hartz reforms in Germany in the 2000s were designed to both make benefits less attractive to the recipients, and to increase the willingness of companies to create jobs by weakening the rights of workers. Although there have been side effects in terms of increases in inequality, in their own terms, these sets of reforms have worked.

## **2. How people make decisions in economic theory**

Despite the well publicised disagreements amongst economists about issues such as austerity or quantitative easing, economics is essentially a theory about how humans make decisions, about how they choose between alternatives. Here, there is a very large degree of consensus amongst economists.

All scientific theories make assumptions, which are simplifications of reality. Some, like quantum physics, appear to generate descriptions of the world which are very close to reality. But theory and reality are never absolutely identical. The key question for any theory is how reasonable are the assumptions which it makes, how well do they correspond to reality?

Economic theory is often expressed in highly mathematical forms, but the crucial assumptions can readily be described in words. First, agents – the economic jargon term for decision makers – are assumed to have stable tastes and preferences between alternatives. For example, if, at a given price for Pepsi and a given price for Coke, I prefer Pepsi today, I will always prefer Pepsi in future if the relative price of the two is the same as when I choose

today. I may at some point switch to Coke if Pepsi becomes more expensive, my incentives will have altered, but at the same relative price I will always make the same choice. The second assumption is that tastes and preferences are what is known as transitive. This means that if an agent prefers A to B and B to C, then he or she will prefer A to C. So if I prefer Pepsi to Coke and Coke to lemonade, I prefer Pepsi to lemonade.

These two assumptions might at first sight seem entirely realistic. The third key assumption is less obvious, but it, too, is required to derive mathematically the theoretical results which are the basis of economics. It is that people make choices independently. In other words, their preferences are not altered directly by the behaviour of others. The decisions which other people make may very well influence my choices indirectly, via prices. So if the price of a product rises because it is in heavy demand, I may choose to buy something else instead. But I do not buy something simply because it is popular.

Finally, in this abstract theoretical model, in any given situation, an agent is assumed to be able to both gather and understand all the information which is available about the various alternatives on offer. The agent compares the attributes of the alternatives, and then makes a choice, which is the one which most closely matches his or her preferences – the optimal choice, as economists themselves like to say. The agent has to take account of constraints such as his or her income<sup>1</sup>, but this is essentially how economics describes decisions as being made.

This latter assumption about information has been made less restrictive in recent decades. Joe Stiglitz has become prominent in debates about austerity, but along with George Akerlof, he received his Nobel Prize<sup>2</sup> for work which introduced the idea that agents may lack complete information. Further, different agents may have access to different amounts of information. This is obviously more realistic in many situations than assuming that agents have complete information. But this so-called imperfect information economics still takes all the other postulates of economic decision making as given.

The same is true about most of behavioural economics, of which Daniel Kahneman is the most prominent exponent<sup>3</sup>. The approach is rooted in the methodology of psychological experiments. Individuals are placed in experimental situations in which a decision has to be made. There is a 'rational' answer to the decision problem, which is the choice which would be made by someone operating according to the postulates of economic theory. The

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<sup>1</sup> More generally, as Vernon Smith expressed it in his Nobel lecture, 'Within economics there is essentially only one model to be adapted to every application: optimization subject to constraints due to resource limitations, institutional rules and /or the behaviour of others, as in Cournot-Nash equilibria'. Smith, V. L. 2003.

"Constructivist and Ecological Rationality in Economics ." *American Economic Review*, 93(3): 465-508

<sup>2</sup> See, for example Akerlof, G.A. 1970. "The Market for Lemons': Quality Uncertainty and the Market Mechanism", *Quarterly Journal of Economics*, 84, 3, 488-500 and Salop, S and Stiglitz J., 1977. "Bargains and Rip-Offs: A Model of Monopolistically Competitive Price Dispersion", *Review of Economic Studies*, 44, 3, 493-510

<sup>3</sup> A classic reference is Kahneman D. and Tversky A. 1979. "Prospect Theory: An Analysis of Decision Under Risk", *Econometrica*, 47, 2, 263-291

actual decisions made by the participants are then observed and compared with the 'rational' choice. In many situations, agents make so-called 'irrational' decisions.

These observed deviations from economic rationality are widespread. But behavioural economics regards them as deviations, rather than forming evidence for a different model of behaviour. There is a partial exception to this in terms of attitudes towards risk, but behavioural economics, despite the weight of evidence it has produced for 'irrational' decisions, has otherwise made very little impact on economic theory<sup>4</sup>. This is precisely because the rational choice model is at the core of the experiments.

Both the economics of imperfect information and behavioural economics have had enormous impacts on policy making and form the basis for a great deal of regulatory intervention in the economy. This is because incomplete information and/or observed deviations from rational behaviour are regarded as 'market failures'. It is the task of the regulator to devise appropriate rules, taxes or subsidies to remove any such failures, so that agents take decisions according to the precepts of rational choice theory.

### **3. Economic theory meets cyber society**

The problem for economic theory is that its key assumptions are becoming increasingly disconnected from reality in the cyber society of the 21<sup>st</sup> century.

In many situations in the world of the 21st century, the key postulates of rational choice theory in economics seem wholly implausible. Preferences are altered directly by the observed behaviour, actions and opinions of others, and evolve over time. Agents are quite incapable of processing more than a small fraction of the amount of information which is available to them

Both twentieth-century technology and now the internet have completely transformed our ability to discover the choices of others. We are faced with a vast explosion of such information compared to the world of a century ago. We also have stupendously more products available to us from which to choose. Eric Beinhocker, in his book *The Origin of Wealth*<sup>5</sup>, considers the number of choices available to someone in New York alone: 'The number of economic choices the average New Yorker has is staggering. The Wal-Mart near JFK Airport has over 100,000 different items in stock, there are over 200 television channels offered on cable TV, Barnes & Noble lists over 8 million titles, the local supermarket has 275 varieties of breakfast cereal, the typical department store offers 150 types of lipstick, and there are over 50,000 restaurants in New York City alone.'

So, compared to the world of 1900, the time when economic theory was first being formalised, the early twenty-first century has seen quantum leaps in both the accessibility of

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<sup>4</sup> See for example the symposium on bounded rationality and behavioural optimisation in the *Journal of Economic Literature*, 51, 2, 2013

<sup>5</sup> Beinhocker E. 2007 *The Origin of Wealth*, Harvard Business School Press

the behaviour, actions and opinions of others, and in the number of choices available. Either of these developments would be sufficient on its own to invalidate the economist's concept of 'rational' behaviour. The assumptions of the theory bear little resemblance to the world they purport to describe. But the discrepancy between theory and reality goes even further. Many of the products available in the twenty-first century are highly sophisticated, and are hard to evaluate even when information on their qualities is provided.

#### 4. The influence of networks<sup>6</sup>

In complex situations, in which there may not only be many alternative courses of action but it may be difficult to work out the differences between them, how can decisions be taken? The rational choice model of economics is a poor guide to policy making, whatever its merits might be in simpler contexts.

Keynes considered this problem as long ago as the 1930s. In his magnum opus<sup>7</sup>, the *General Theory of Employment, Interest and Money*, he wrote extensively about the inherent limits to rational decision making both for companies and for governments. In chapter 12, he states that “the outstanding fact is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield [of a new investment] have to be made ... If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London amounts to little and sometimes to nothing; or even five years hence”.

For Keynes, major investment decisions were made not through rational calculation, but as a result of “waves of irrational psychology”. This was the basis of his famous phrase “animal spirits”. A major problem during recessions was how to revive the mass psychology of the business world so that optimism rather than pessimism once more prevailed. We can see this in the very hesitant nature of the recovery across the developed world since the crisis of the late 2000s, and particularly in many EU economies. Large companies are sitting on piles of cash, for they have rebuilt their balance sheets. But they are not carrying out major capital investment projects because of a lack of confidence about the future.

In modern terminology, Keynes was writing about a network across which the agents – in this case large companies – are connected. The views of each individual agent are potentially influenced by what the agents directly connected to it are thinking. Understanding how views and decisions either spread or are contained, across networks is the key to a great deal of modern policy making. So, for example, in July 2012 the Governor of the European Central Bank, Mario Draghi, pledged to do ‘whatever it takes’ to save the

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<sup>6</sup> This topic is discussed in much more detail in Ormerod, P. 2012. *Positive Linking: How Networks and Incentives can Revolutionise the World*, Faber and Faber, London

<sup>7</sup> JM Keynes, 1936. *The General Theory of Employment, Interest and Money*, Macmillan, London

Euro. He then did precisely nothing. Yet his statement was a great success. Across the network of financial markets, it was believed. In network jargon, it achieved a ‘global cascade’ – ‘global’ in the sense that it spread more or less everywhere across the relevant network. Of course, in this particular example, the word ‘global’ also has its usual meaning, because financial markets operate on a global scale.

But in a network context, a ‘global’ cascade simply means an idea or an action gets traction across most of the relevant network. Consider, for example, a campaign designed to persuade people to stop smoking, or to get tested for prostate cancer, or whatever. A really successful campaign would eventually persuade most of the people on the network. A few would be convinced initially, then the message would be reinforced as they discussed how they had decided to act, and others would gradually become convinced.

The network might be the power grid of the United States, how power is transmitted across the country. For purposes of description, we call state A of the world as meaning that each generator is working well, and state B means that it has failed. A small number of outlets chosen at random experience a failure, the sort of thing which happens all the time. How far will this spread? Again, sentiment about the future, the degree of optimism or pessimism which firms feel at any point in time – Keynes’ animal spirits – is an important determinant of the boom and bust of the business cycle. We can think of a firm in state A as being optimistic. The economy receives a small shock, a bit of bad news, and a few firms switch to state B, pessimistic. How many others will abandon their optimism? If enough do so the economy will move from boom to bust. But by assumption, the economy in this case has only received a small adverse shock. Can this really be sufficient to precipitate a full blown recession?

The answer is both yes and no! The same small initial disturbance can have dramatically different outcomes. Most of the time, the initial disturbance, the initial switch by a small number of agents from A to B, does not spread very far. But occasionally, there will be a cascade across the entire system, most agents will end up with B instead of A.

Systems of interconnected agents whose behaviour influences each other are both *robust* and *fragile*<sup>8</sup>. These are key words. Most of the time, the system is robust to small disturbances, they do not spread very far. But occasionally, the system is fragile, vulnerable to exactly the same size of shock which it is usually able to contain. These properties present both difficulties and opportunities to policy makers.

If the world operates like this, anticipating the impact of a change in policy becomes extremely difficult. The common sense causal link between the size of an event and its eventual impact is broken. Of course, if a large shock were administered to the system so that say one half of all agents switched from A to B, by definition the eventual outcome

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<sup>8</sup> See, for example, Watts, D.J. 2002. “A Simple Model of Global Cascades on Random Networks”, *Proc. Nat. Acad. Sci.*, 5766–5771

would be large. But, equally, a small disturbance can have dramatic consequences.

In some ways, this is good news for policy makers. A desirable policy aim is selected, such as reducing the number of people who smoke or who are obese. A policy instrument is chosen, which could be good old-fashioned tax increases on cigarettes<sup>9</sup> to less direct methods such as health education, restricting advertising, or whatever. Now, to achieve a big reduction in smoking, such a conventional policy by itself requires that the policy has a big effect, that it alters the behaviour of large numbers of people. But the policy plus networks means that if you are lucky, only a small number of people need to be persuaded initially, yet the number who eventually change their minds could be enormous.

This represents a potentially huge increase in the ability of policy to affect outcomes. But networks also make life more complicated for policy makers. On the one hand, their potential power is enhanced. On the other, both evaluating what has worked in the past and anticipating what might work in the future becomes much more difficult. Networks on which social learning takes place, the copying or imitation of the actions/beliefs of others, are not some esoteric ivory tower concept of little or no practical use. On the contrary, they are a pervading and inherent feature of our social and economic worlds.

The life of the policy maker is made even more complicated due to the fact that the robustness and fragility of a network may vary substantially depending upon its particular structure. Who is connected to whom? How many connections does an agent have? More subtly, what is the overall structure? For example, do a few people have lots of connections and most people few, or is it more like an overlapping friends-of-friends structure, in which no single individual stands out by virtue of the number of his or her connections?

The scientific understanding of these issues has advanced enormously in the last 10 to 15 years. And the empirical ways of identifying the structures of networks have improved even more recently. Now, for example, central banks are devoting effort and resources to build up a picture of the net asset and liability network which connects banks. In principle, this enables smarter policies with less need for regulatory measures which can, and do, run to thousands of pages of detail. So, for example, if a bank gets into trouble and is mainly connected to financially sound banks, it can be left to go under with very little risk of creating a cascade of failure. If its connecting banks are themselves weak, the central bank should step in and support it. So we no longer need the cudgel of a one-size-fits-all policy. Less can be more.

## **5. Conclusion**

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<sup>9</sup> A cautionary tale illustrating the potentially adverse outcomes of such a policy in the face of non-rational behaviour by individuals is given in J Adda and F Cornaglia, 'Taxes, cigarette consumption and smoking intensity', *American Economic Review*, 96, 1013-1028, 2006

The concept of behavioural economics has gained traction in the policy world, in both the public and private sectors. The more realistic view of behavior which it offers, compared to that of the classical economics assumptions of how people make decisions, certainly provides a potential basis for more effective policy making. But it is not without its problems.

More importantly, network effects can either magnify dramatically the impact of such policies, make them harder to understand, give the impression that a policy has failed, or even set up a powerful movement which is contrary to the intentions of the policy. In short, network effects can dwarf the impacts of policy based on the standard economic model of decision making, even in its modern behavioural guise. Behavioural economics provides a potentially valuable insight for the initial task of trying to steer a network in a particular direction, but then the network takes over.

There is *inherent* uncertainty about the impact of policy in a world in which network effects are important, which no amount of cleverness can overcome. This is not at all a comfortable world for the policy maker. But it is how large sections of the social and economic world really are. Ignoring network effects simply means that we carry on with the same model, spending vast amounts of money, with at best a rather hit-or-miss success rate.

Consider briefly the environment. Governments desire to reduce energy consumption. A standard way of doing this, which would undoubtedly move things in the right direction, would be to impose massive taxes on energy. But it is equally undoubted that the levels of taxation involved would hardly be sustainable in Western democracies. The problem could be re-framed. How do we induce not a simple incentive-based reaction, based either on price or on a more sophisticated form of nudge, but a genuine change in behavior by harnessing the potential power of networks?

One possible implication to be drawn from the networked view of the world is that that little or nothing should be done, on the grounds that we have little or no idea of the eventual consequences of introducing any particular policy. Far from it. The potential gains from more effective policies built on a better scientific understanding of how the world operates are enormous.

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