Why Herbert Simon Matters for Policy Making

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January 2018
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The proof of the pudding is in the eating and when the financial crisis started a decade ago, that meant large helpings of humble pie for many in the economics profession. Queen Elizabeth famously asked Luis Garicano of the London School of Economics “Why did no one see it coming?” In retelling the story, Professor Garicano pointed out that he welcomed the question as it provided an opportunity to cite many that did see it coming, including Messrs, Krugman and Volcker (Garicano, 2008). Unfortunately for us, the OECD was not among them. Our Economic Outlook for June 2007 opened with an editorial entitled “Achieving further rebalancing” giving this view of what was to come: “In its Economic Outlook last Autumn, the OECD took the view that the US slowdown was not heralding a period of worldwide economic weakness, unlike, for instance, in 2001. Rather, a “smooth” rebalancing was to be expected, with Europe taking over the baton from the United States in driving OECD growth. Recent developments have broadly confirmed this prognosis. Indeed, the current economic situation is in many ways better than what we have experienced in years. Against that background, we have stuck to the rebalancing scenario. Our central forecast remains indeed quite benign: a soft landing in the United States, a strong and sustained recovery in Europe, a solid trajectory in Japan and buoyant activity in China and India. In line with recent trends, sustained growth in OECD economies would be underpinned by strong job creation and falling unemployment.” (OECD, 2007a)

We were equally optimistic as regards growing worries about the US mortgage industry. In July 2007, the Update on Financial Market Developments explained that: “...while institutions focusing on sub-prime lending have been facing severe difficulties, larger financial institutions – and the financial sector as a whole - seem to have weathered the sub-prime crisis relatively well, owing to healthy balance sheets and strong earnings in other areas of their business. Securitisation has increasingly enabled a transfer of risk to investors that are more able and willing to bear these risks.” (OECD, 2007b).

That’s not to say that the whole of the OECD was wrong about everything. The OECD Composite Leading Indicators, a forecasting tool that combines individual indicators for a given country to anticipate when economic expansion starts entering a downturn, or
when growth starts to return, were anticipating the crisis some months before GDP reached its pre-crisis high watermark, according to Astolfi et al. (2016). And several years before the crisis, a study on emerging systemic risks was worried that: “In today’s highly interdependent and networked world, even a local event can have substantial repercussions in distant regions of the world through its impact on technological or financial networks…” (OECD, 2003).

Nevertheless, it was clear that we could have done a lot better, and in 2012 the OECD launched its New Approaches to Economic Challenges (NAEC) Initiative to: “Improve the understanding of the complex and interconnected nature of the global economy, identify synergies ... and better ways to cope with policy trade-offs ... identify areas where OECD analytical frameworks need to be adjusted or complemented”. NAEC was also asked to promote and adopt new policy tools...” This article looks at how the thought of Herbert Simon can help us do that, indeed how it already has, in a number of ways. The rest of this article starts by examining the reasons why traditional approaches proved of so little use in understanding and reacting to major events in the economy. It then looks at how Simon’s insights can help us understand governance and policymaking. Finally, it argues that Simon is still our best guide to one of the major issues of the day, the digital economy, and in particular to a central part of that economy that did not even exist in his day, social media.

Complex failures

Speaking at a NAEC seminar in November 2017, Jean-Claude Trichet, President of the European Central Bank at the time of the crisis, reiterated the harsh criticisms he made in 2010 of the information and advice he was getting from economic models as the crisis unfolded. “When the crisis came, the serious limitations of existing economic and financial models immediately became apparent. Arbitrage broke down in many market segments, as markets froze and market participants were gripped by panic. Macro models failed to predict the crisis and seemed incapable of explaining what was happening to the economy in a convincing manner. As a policy-maker during the crisis, I found the available models of limited help. In fact, I would go further: in the face of the crisis, we felt abandoned by conventional tools. In the absence of clear guidance from existing analytical frameworks, policy-makers had to place particular reliance on our experience. Judgement and experience inevitably played a key role.” (Trichet, 2017)

The belief, described above, that securitisation had enabled a transfer of risk to investors who were well-placed to bear the risk had two major consequences. First, it resulted in an increasing interconnectedness across financial institutions, while the globalisation of the financial sector increased the connectedness of financial institutions across countries.
Second, it gave the impression that the risk had diminished. It hadn’t, but the individual shares in the risk, and responsibility for managing it had become diffuse, creating a sense of security that proved illusory. The financial crisis spread rapidly around the globe and reached the real economy, resulting in dramatic drops in stock markets and decreases in business and consumer confidence affecting all economic operators. Financial institutions were unwilling to lend to each other, while households cut back their consumption and started saving more; access to credit became more difficult and more expensive, undermining corporate investment especially among small businesses.

As Trichet pointed out at the OECD, the crisis showed how interconnectedness, one of the very strengths that had allowed the economy to expand, could be just as potent in provoking or aggravating its downfall. The crisis also revealed how the tools economists used were not good enough. Bill White, chair of the OECD’s Economic and Development Review Committee (EDRC) argues that the dominant school of economic thought prior to the crisis essentially modelled the national economy as a totally understandable and changeless machine (DSGE models). Moreover, the machine almost always operated at its optimal speed, churning out outputs in an almost totally predicable (linear) way, under the close control of its (policy) operators. But rather than being a machine, for White the economy should be viewed as a complex adaptive system, with massive interdependencies among its parts and the potential for highly nonlinear outcomes (White, 2017).

Several characteristics of complex systems are particularly relevant for understanding the crisis.

First, all complex systems fail regularly; that is, they fall into crisis. There were 195 stock-market crashes and 84 depressions between 1860 and 2006. Moreover, the distribution of outcomes is commonly determined by a power law. Big crises occur infrequently while smaller ones are more frequent. There were big crises in 1825, 1873 and 1929, as well as smaller ones more recently in the Nordic countries, Japan and South East Asia.

Second, the trigger for a crisis is irrelevant. It could be anything, perhaps even something trivial in itself. It is the system that is unstable. Governor Bernanke of the US Federal Reserve originally estimated that the losses from the subprime crisis would not exceed 50 billion dollars and they would not extend beyond the subprime market. Similarly, how could difficulties in tiny Greece in 2010 have had such far reaching and lasting implications for the whole Eurozone? Its GDP was only around $305 billion compared with over $16 trillion for the EU as a whole.

Third, complex systems can result in very large economic losses much more frequently than a normal distribution would suggest. Moreover, large economic crisis often lead to social and political instability.
And finally, such systems evolve in a path-dependent way and there is no equilibrium to return to.

White is not the only expert on finance to champion a complexity approach. Andy Haldane, Chief Economist at the Bank of England reminds us that although there is no generally-accepted definition of complexity, “that proposed by Herbert Simon in The Architecture of Complexity – ‘one made up of a large number of parts that interact in a non-simple way’ – captures well its everyday essence. The whole behaves very differently than the sum of its parts. The properties of complex systems typically give rise to irregular, and often highly non-normal, statistical distributions for these systems over time. This manifests itself as much fatter tails than a normal distribution would suggest. In other words, system-wide interactions and feedbacks generate a much higher probability of catastrophic events than Gaussian distributions would imply.” (Haldane, 2017).

Haldane discusses Simon’s idea that for evolutionary reasons of survival of the fittest, ‘decomposable’ networks are more resilient and hence more likely to proliferate, although Haldane does not think the idea captures all we need to know to deal with economic and social change: “By decomposable networks, he meant organisational structures which could be partitioned such that the resilience of the system as a whole was not reliant on any one sub-element. This may be a reasonable long-run description of some real-world complex systems, but less suitable as a description of the evolution of socio-economic systems. … if these hyper-connected networks do face systemic threat, they are often able to adapt in ways which avoid extinction. For example, the risk of social, economic or financial disorder will typically lead to an adaptation of policies to prevent systemic collapse. These adaptive policy responses may preserve otherwise-fragile socio-economic topologies. They may even further encourage the growth of connectivity and complexity of these networks. Policies to support “super-spreader” banks in a crisis for instance may encourage them to become larger and more complex. The combination of network economies and policy responses to failure means socio-economic systems may be less Darwinian, and hence decomposable, than natural and biological systems.”

Another Andy, Andy Lo, is particularly interested in the adaptive, evolutionary aspects. His latest book, Adaptive Markets: Financial Evolution at the Speed of Thought (Lo, 2017) points out that while economic and financial crises throughout history exhibit many similarities, they also have many differences. In part this is due to adaptive human behaviour, both in markets and on the part of regulators, in response to previous crises. Lo theorises this in his “adaptive markets hypothesis”, according to which financial market dynamics are driven by our interactions as we behave, learn, and adapt to each other, and to the social, cultural, political, economic, and natural environments in which we live; and survival is the ultimate force driving competition, innovation, and
adaptation. This builds on earlier work in which he argues that “by extending Herbert Simon's notion of satisficing with evolutionary dynamics, much of what behavioralists cite as counterexamples to economic rationality - loss aversion, overconfidence, overreaction, mental accounting, and other behavioral biases - are, in fact, consistent with an evolutionary model of individuals adapting to a changing environment via simple heuristics.” (Lo, 2004)

Simon is also referred to in Rick Bookstaber’s fundamental critique of traditional economic modelling (Bookstaber, 2017), where he comes back to Trichet’s problem of connectedness. Again, this builds on earlier work, where he reminds us that: “Connectedness measures how one action can affect other elements of a system. A simple example of connectedness is the effect of a failure of one critical node on the hub-and-spoke network of airlines. Dynamic systems also emerge from the actions and feedback of interacting components. Herbert Simon posed a fractal-like measure of system complexity by looking at the layering of hierarchy. That is, the depth to which a system is composed of subsystems, which in turn are composed of yet deeper subsystems.” (Bookstaber, 2011). He sees four problems with conventional economic models.

The first of these is computational irreducibility. You may be able to reduce the behaviour of a simple system to a mathematical description that provides a shortcut to predicting its future behaviour, the way a map shows that following a road gets you to a town without having to physically travel the road first. Unfortunately, for many systems, you only know what is going to happen by faithfully reproducing the path the system takes to its end point, through simulation and observation, with no chance of getting to the final state before the system itself. It’s a bit like the map Borges describes in On Rigor in Science, where “the Map of the Empire had the size of the Empire itself and coincided with it point by point”. Not being able to reduce the economy to a computation means you can’t predict it using analytical methods, but economics requires that you can.

The second characteristic property is emergence. Emergent phenomena occur when the overall effect of individuals’ actions is qualitatively different from what each of the individuals is doing. You cannot anticipate the outcome for the whole system on the basis of the actions of its individual members because the large system will show properties its individual members do not have. For example, some people pushing others in a crowd may lead to nothing or it may lead to a stampede with people getting crushed, despite nobody wanting this or acting intentionally to produce it. Likewise no one decides to precipitate a financial crisis, and indeed at the level of the individual firms, decisions generally are made to take prudent action to avoid the costly effects of a crisis. But what is locally stable can become globally unstable. (And as the physicists have found, when you try to optimise a complex system, it becomes unstable.)
The name for the third characteristic, non-ergodicity, comes from the German physicist Ludwig Boltzmann who defined as “ergodic” a concept in statistical mechanics whereby a single trajectory, continued long enough at constant energy, would be representative of an isolated system as a whole, from the Greek *ergon* energy, and *odos* path. The mechanical processes that drive of our physical world are ergodic, as are many biological processes. We can predict how a ball will move when struck without knowing how it got into its present position – past doesn’t matter. But the past matters in social processes and you cannot simply extrapolate it to know the future. The dynamics of a financial crisis are not reflected in the pre-crisis period for instance because financial markets are constantly innovating, so the future may look nothing like the past.

Radical (or Knightian) uncertainty completes Bookstaber’s quartet. As Keynes put it, “There is no scientific basis to form any calculable probability whatever. We simply do not know.” For Bookstaber, Knightian uncertainty, where we can’t know everything that would be needed to calculate the odds is in fact is the human condition. He puts it this way in his 2017 book: “As the example of my daily life suggests, it is absurd to think that we optimize. So economists tone down this critical assumption to say that we act as if we are optimizing. Or we optimize subject to our constraints on cognitive ability and available information ...The ‘subject to our constraints’ argument suggests Herbert Simon’s (1947) satisficing approach.” For Bookstaber, the reality of humanity means that a mechanistic approach to economics will fail.

**Behavioural economics**

Behavioural economics is one attempt to overcome the limits of the mechanistic approach. Richard Thaler’s Nobel Prize has brought it back into the public gaze, especially so-called “nudging”. But as David Tuckett, one of the participants at a recent NAEC workshop on neuroeconomics put it (personal communication): “Nudge is mainly based on using the concept of the default option. So design of tax forms, public lavatories, pension arrangements have all been improved after testing which methods produce desired behaviour. It works well if there is a behaviour generally agreed to be right- be honest on your tax form, chose to save etc. Great savings have been achieved. Nudge is invalid if *ex ante* the correct decision is contestable or unknown. The idea is totally unhelpful if there is conflict or radical uncertainty.” Another participant, Aldo Rustichini, was even more radical. He said, “In summary, the theory of nudging is, as any other theory based on the assumption that government is a rational social welfare maximiser, hopelessly useless at best and typically dangerous. If we do not have a theory of what the prince does, how do we evaluate a technique that facilitates the work of the prince?” (Personal communication).
Vela Velupillai delves into the theoretical underpinnings of this strand of behavioural economics to compare what is being proposed with Simon’s far more radical tools (Velupillai, 2014). He argues that Classical behavioural economics (CBE), pioneered by Simon in 1953, presents a more radical break with the tradition than Modern behavioural economics (MBE) originating in work by Ward Edwards (1954) for three reasons.

His first objection to MBE concerns how the economic agents are assumed to act: maximising utility with respect to an underlying preference order – to which “an increasingly realistic psychological underpinning” is attributed. Zaman and Karacuka (2012) draw on Simon in an extensive review of the empirical evidence against utility maximisation, concluding that: “All conventional economic textbooks use the axiomatic method to derive theoretical results which are never cross checked against observations of the real world”. MBE does not go beyond the doctrine of utility maximisation, and even if the behavioural models do consider more realistic psychological or social effects, economic agents are still assumed to be optimising agents, whatever the objective functions may be. In other words, MBE is “in some sense only an extension of traditional theory, replacing and repairing the aspects which proved to be contradictory”. In CBE on the other hand, an economic agent’s decision-making behaviour is subject to bounded rationality and exhibits satisficing behaviour. This leads Velupillai to state that “MBE remains within the orthodox neoclassical framework of optimisation under constraints; CBE is best understood in terms of decision.”

Velupillai’s second objection to MBE is that it concerns the behaviour of agents and institutions in or near equilibrium. For Bookstaber, Haldane and many others who have to understand financial markets, this does not correspond to reality. Adrian Blundell-Wignall insists that: “Global finance is the perfect example of a complex system, consisting as it does of a highly interconnected system of sub-systems featuring tipping points, emergence, asymmetries, unintended consequences, a ‘parts-within-parts’ structure (to quote Herbert Simon), and all the other defining characteristics of complexity. It is shaped by numerous internal and external trends and shocks that it also influences and generates in turn. And as the system (in most parts) also reacts to predictions about it, it can be called a ‘level two’ chaotic system...”. CBE investigates the far more normal disequilibrium or non-equilibrium phenomena.

Finally, “MBE accepts mathematical analysis of (uncountably) infinite events or iterations, infinite horizon optimisation problems and probabilities defined over S-algebras and arbitrary measure spaces; CBE only exemplifies cases which contain finitely large search spaces and constrained by finite-time horizons.”

CBE is best understood in terms of computable economics – computational complexity theory, nonlinear dynamics and algorithmic probability theory. It exploits Simon’s notion
of “bounded rationality”, whereby it is not evident and admissible to assume that human beings are able to exhaust all the information and make the “best” choice out of it. This probably seems more obvious to most non-economists than it does to traditional economists. It brings to mind Margolis’ (1982) argument that it’s time for a paradigm shift when a naïve observer sees things that are obvious and obviously important more easily than the specialists.

**Populism, wicked problems and social media**

This does not mean that the man or woman in the street knows better than the experts, but the experts often fail to spot important changes because the tools they use do not allow them to do so. This was one of the reasons the OECD launched the NAEC Initiative. Our models did not see the crisis coming, nor did they see how the financial crisis would evolve into a recession, or that this would engender a political crisis and the rise of populists and extreme views. Perhaps surprisingly, populists refer to Simon as well. In his defence of the new US president in *Trump’s Populist America*, Steven Rosefielde (Rosefielde, 2017) cites Simon’s “Models of Man”, “Mechanism for Social Selection and Successful Altruism”, and “Bounded Rationality and Organizational Learning” in the chapter on education. After pointing out that scarcity is ubiquitous, he goes on to say that: “We do not know everything, and there are not enough resources to provide individuals with the education they need to fully actualize their human potential. Likewise, if the ideal is beyond the reach of individuals, it is also unattainable for the more demanding requirement that individuals modify their learning in the interest of the national good. Educators have to lower their sights. They must fall back on the principle of “good enough”. Although here is no attainable best (“bounded rationality”), there are a large number of “satisfactory” options.”

In considering how Simon could help policymakers understand populism, it is interesting to recall briefly another thinker he can be associated usefully with in tackling this issue, Ernesto Laclau. Laclau was born in Argentina and initially started by studying Peronism. He argues that populism emerges as a response to inequality, when what he calls a “logic of difference” is replaced by a “logic of equivalence”, mediated by “an empty signifier” (Laclau, 1996). By this he means that in normal times, different socioeconomic groups have differentiated demands – workers want higher wages, businesses want lower taxes, ecologists want to ban pesticides, etc. When the system, incarnated by the government, cannot or will not satisfy these demands, different groups began to forget their differences and see similarities with others, finding equivalences in their grievances (blue collar workers identify with an “anti-system” property billionaire, for instance). The ideological glue that binds them has to be recognisable but so broad that each group can invest it with the significance it likes, hence terms like “making America great gain”, “taking back control of our country”, “fraternité”...
This allows the populist movement to impose a hegemony far beyond what its “true” size and influence would suggest, especially, you could argue, in periods of what Gramsci in *The Prison Notebooks* termed an “interregnum”: “The crisis consists precisely in the fact that the old is dying and the new cannot be born; in this interregnum a great variety of morbid symptoms appear.” (Gramsci, 1971). One of these symptoms, morbid or not, is a rejection of “the establishment”, embodied in the political elite and the institutions of the state. Simon was prescient in identifying that: “Democratic institutions find their principal justification as a procedure for the validation of value judgements, hence expertise of whatever kind is no qualification for the performance of this function” (Simon, 1997). The rejection of expertise in favour of “somebody like us” as a guide to hard choices facing society makes it all the more difficult to solve so-called wicked problems.

“Wicked” here is not a moral judgement. It refers to questions like climate change, immigration, international trade and so on. The opposite is “tame” problems, where the clear definition of the problem also unveils the solution, and the outcome is true of false, successful or unsuccessful (Batie, 2008). In a wicked problem however, no agreement exists about what the problem is. Each attempt to create a solution changes the problem. The solution is not true or false - the end is assessed as “better” or “worse” or “good enough”. The problem changes over time. Many stakeholders are likely to have differing ideas about what the “real” problem is and what its causes are. The end is accompanied by stakeholders, political forces, and resource availability. There is no definitive solution. Solution(s) to the problem is (are) based on “judgments” of multiple stakeholders. The problem is associated with high uncertainty as to system components and outcomes. There are no shared values with respect to societal goals. This is similar to Simon’s “ill structured” problems (Simon et al., 1986): “The current research target is to gain an understanding of problem-solving tasks when the goals themselves are complex and sometimes ill defined, and when the very nature of the problem is successively transformed in the course of exploration. To the extent that a problem has these characteristics, it is usually called ill structured.”

In contemporary politics, the debate and the value judgements on ill structured/wicked problems exist within the sphere of social media. Here, once again Simon was prescient. Years before the founders of Facebook and twitter were even born, he understood that: “In an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes. What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it.” (Simon, 1971) That overabundance is now such that we’re already well past the zettabyte mark for annual internet traffic. To translate that back into numbers most of us are more familiar with, we need to look at what happens each minute: more than 455,000 Tweets; 400
hours of new video on YouTube; over 3 million new posts on Facebook; over 3.5 million
Google searches; and over 15 million text messages (Schultz, 2017).

Poverty of attention is at the basis of the business model described by Davenport and
Beck (2001) in their The Attention Economy: Understanding the New Currency of
Business and applied by Facebook and the others. These companies are no longer selling
the product they are identified with – it is given away. The money-making product of
their “general purpose engines” is in fact the attention of the users. This raises a number
of questions for policymakers, and economists, not least what “productivity” means in
such a context. In a traditional industry, the time taken to carry out a task is important to
the management. In many online operations it doesn’t matter since it is the client and not
the employee who is doing the work when selecting and paying for goods and services
online. The decline in the rate of productivity growth seen over the past decades may or
may not be a cause for concern if it is simply a reflection of this change, we do not know
yet. (Likewise, the relatively limited needs of “fourth industrial revolution” companies to
invest in physical resources may be influencing capital investment figures). Perhaps
Simon’s pioneering work with Ridley in the 1930s on measuring
the performance of
administrations could be of use here. There idea that efficiency should be measured by
“the ratio of the effects actually obtained with the available resources to the maximum
effects possible with the available resources (Ridley and Simon, 1937) could be useful in
this respect.

A goal of very high priority

Much of the economic science that informs public policy is still rooted in the physics of
the 19th century. Even the vocabulary is resonant of that time, with its forces, flows and
masses, its linearities and predictabilities, and its foundations anchored in axioms. But
physics has moved on since then, while economics finds itself lagging behind. In its
desire to prove itself a “real” science, it risks falling into a trap highlighted by Husserl in
1936: “But now we must note something of the highest importance that occurred even as
early as Galileo: the surreptitious substitution of the mathematically substructed world of
idealties for the only real world, the one that is actually given through perception, that is
ever experienced and experienceable – our everyday life-world” (Husserl, 1970). Alan
Kirman (2017) sounds a similar warning when he says that although fields such as
statistical physics, ecology and social psychology accept that systems
may not have the
sort of behaviour that corresponds to that of one average or typical particle or individual,
this has not had much effect on economics. Kirman also reminds us that Hayek once
argued that there are no economic “laws” just “patterns” and suggests that big data
techniques may provide us with the tools to recognise such patterns and to react to them.

But these patterns arise from the interaction of individuals who are in many ways simpler
than homo economicus, and it is the interaction between these relatively simple
individuals who react to what is going on, rather than optimise in isolation that produces
the major upheavals that characterise our systems. We still have a long way to go in carrying out the programme proposed by Simon et al. in 1986: “Extending empirical knowledge of actual human cognitive processes and of techniques for dealing with complexity continues to be a research goal of very high priority. Such empirical knowledge is needed both to build valid theories of how the U.S. society and economy operate and to build prescriptive tools for decision making that are compatible with existing computational capabilities.” The OECD owes it to Herb Simon to try. He was after all part of the Economic Cooperation Administration in 1948 that managed the Marshall Plan, which gave birth to the Organisation for Co-operation and Development in 1961 when the plan was wound up.

References


