NEW ERA ECONOMICS

Edited by
Tony Dolphin
and David Nash

August 2012

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COMPLEX NEW WORLD

TRANSLATING NEW ECONOMIC THINKING INTO PUBLIC POLICY

Institute for Public Policy Research

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ABOUT IPPR

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FOREWORD

JOHN KAY

History teaches us that major economic crises usually lead to a period of soul searching followed by a radical rewiring of economic policy. The 1929 stock market crash and subsequent depression saw classical economic thinking gradually give way to Keynesian central planning. The onset of stagflation in the 1970s ushered in neoliberalism and the advent of market deregulation. The 2008 financial crisis and ongoing recessionary fallout in most advanced economies would appear, on the face of it, to represent a similar historical turning point.

Each of these crises called into question the credibility of conventional economics. Economists have never enjoyed a good reputation and 2008 marked a new nadir for the profession. However, we have yet to witness a radical transformation in economics of the sort that accompanied past upheavals. The policy options being debated today are largely an extension of past arguments that occurred in 1929 and 1970. Whether fiscal austerity versus growth or supply-side reforms versus demand stimulus measures, the positions of the leading players are entirely predictable and rest on established political allegiances. The opportunity for radical policy change is gradually fading. A crisis is going to waste.

While public policy debates make little explicit reference to economic theory, Keynes's comment that 'practical men, who believe themselves exempt from any intellectual influence, are generally the slaves of some defunct economist', is as true as ever. The rational choice models and general equilibrium theory that were developed in the 25 years after the second world war fed into the neoliberal policymaking of the quarter century that followed. These approaches remain the dominant academic paradigm, especially in finance theory and macroeconomics.

They describe a world in which economic agents are rational, informed and make optimal decisions, and markets are either in, or geared towards, a state of equilibrium. Governments should, it is suggested, design economic policy on this basis. Differences between left and right turn on the narrow issue of the extent of 'market failure', a narrowly defined categorisation of legitimate reasons for policy intervention. The chief assumptions behind economic policymaking on the left and right are largely the same. The simplifying assumptions of an abstract theory are treated as universal truths about the real world.

But there are many alternative insights into economic phenomena. New economic thinking provides us with a far richer account of the economy, taking into account real-world human behaviour and the complex micro-level interactions that make up economic activity. Complexity, evolutionary and network economics are emerging fields of inquiry that offer a robust critique of neoclassical theory. They reject the latter's deference to static equilibrium and perfect rationality, ignorance of innovation, downplaying of institutions, and assumption of zero-sum market transactions. They depict instead an economy made up of millions of overlapping activities, in which individuals, businesses and other institutions are highly connected and constantly interact, where preferences change and markets shift in unpredictable ways. It is a description that is immediately more recognisable in reality.

While nods in the direction of behavioural economics have become fashionable, these ideas have received scant attention in policy circles. The market failure doctrine remains the required framework of microeconomic debate. Macroeconomic forecasting and analysis in the Treasury, the Bank of England and the Office for Budget Responsibility still draws on dynamic stochastic general equilibrium (DSGE) models and other staples of conventional economics. The majority of government economists and policymakers responsible for providing solutions to the most important economic challenges of the day – how financial instability might be tamed, how regional development can be boosted, and how the carbon emissions and other environmental side effects of economic growth can be reduced – are heavily influenced by the old neoclassical order. This must change.

This book – which is the culmination of a two-year programme of work led by IPPR entitled New Era Economics, on whose advisory panel I have been a member – is the first serious attempt to bring insights from new economic thinking to policymakers. It draws together contributions from a group of respected economists and academics, which discuss what these new heterodox economic theories might mean for policy. In so doing, it is an attempt to kick-start a much-needed debate about how economic policymaking can be improved for the better.

Changing the nature of mainstream economics will be no straightforward task. Yet if we do not take advantage of the current crisis to rethink the way we make economic policy, the opportunity will be missed. We need a far more eclectic approach to economic policy and economic debate. Thankfully, there is a solution and it lies in new economic thinking. This book sketches out the contours of a new approach to economic policymaking centred on this thinking. For that reason, it deserves a wide readership.

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INTRODUCTION

DAVID NASH

We live in uncertain economic times. The financial crash of 2007/08 and the subsequent downturn have shaken the global economic system to its core with severe consequences that are still playing out. Across the developed world, governments are treading uncharted territory in their attempts to shore up their banking sectors, bring sovereign deficits down to sustainable levels and reboot economic activity after the worst recession in living memory. High unemployment, falling living standards and a widespread perception that small groups of elites continue to enjoy unbridled excess have brought the crisis in economics to the fore of our everyday lives. Citizens and politicians of different hues call for a different type of capitalism, but without necessarily being clear what this might entail.

If one thing is certain, it is that the events of recent years have thrown mainstream economic thinking into disrepute. When the Queen asked why economists had not foreseen the collapse of Lehman Brothers and the drying up of global credit markets,[1] she posed a question to which many wanted an answer. The now infamous response came from the Nobel Prize winning economist Robert Lucas, who asserted that, according to contemporary economic theory, 'no one could have predicted it'.[2]

To many mainstream economists Lucas's answer was a perfectly valid, albeit fundamentally unsatisfactory, response. Traditional, or neoclassical, economic theory – pioneered by the likes of Leon Walras and William Stanley Jevons in the late 19th century and later embellished by the Chicago school of neoliberal economists including Milton Friedman and Lucas himself in the mid-20th century – argues that markets are geared to equilibrium, essentially self-regulating and, left to themselves, ought to deliver the best possible economic and social outcomes. A market collapse of the sort that happened in the world of finance in autumn 2008 was essentially impossible according to conventional economics. So, while Lucas's assertion was in keeping with neoclassical economic theory, he inadvertently highlighted that theory's fundamental flaws: its unedifying focus on prediction and, above all, its inability to explain economic developments in the real world.

1 See Pierce 2008

2 See Kay 2011

Despite this rather colossal shortcoming, conventional economic thinking has underpinned the vast majority of economic policymaking in most advanced economies throughout the last century and continues to do so. In the 1980s, Margaret Thatcher and Ronald Reagan embraced aspects of conventional economics to justify minimal state intervention and the use of monetary policy to achieve stable inflation and steady growth. Yet conventional economics has not just been the preserve of neoliberalism. In its belief that fiscal policy could be used to achieve a full employment equilibrium, post-war Keynesianism was also rooted in a neoclassical understanding of how the economy functions. More recently, the notion that the business cycle could be managed and a state of equilibrium eventually reached lay behind the thinking of the architects of the Great Moderation in the US and, implicitly, Gordon Brown's claim that he could abolish boom and bust. The late Hyman Minsky[3] would have told them, in no uncertain terms, that they were mistaken.

In the aftermath of the 2007/08 crash and its highlighting of traditional economics' shortcomings, scholars and commentators are turning to new, heterodox economic theories as a way of better understanding how the economy really works and how governments might manage the economic system more effectively. Although they pre-date the crisis, the schools of complexity and evolutionary economics are the subjects of increasing interest and stand out as important critiques of neoclassical thought and the mathematical models and abstractions that lie at the heart of general equilibrium theory. Meanwhile, and perhaps for different reasons, behavioural economics has already started to draw attention in the UK and is now the focus of a specialised 'Nudge Unit' within the Cabinet Office.

Yet although new economic thinking offers a far better account of how the economic system functions, we have far less of an idea from the existing literature of its implications for policymaking. With the exception of behavioural science,[4] most new economic theories have yet to penetrate policy circles and remain largely confined to small cohorts of academics operating outside the mainstream.[5] Very few proponents

3 Minsky, an American economist whose work was largely ignored when it first appeared in the 1960s, came up with the now revered 'financial instability hypothesis'. This argued that credit cycles are centred on speculative investments, which are borne out of economic fragility. Speculation takes place during a period of calm immediately after the storm and leads to the building up of asset bubbles. Eventually the bubble bursts, causing financial collapse and a fresh opportunity for speculative investment and so on. For Minsky, booms and busts were endogenous to the business cycle.

4 Behavioural economics has been applied to areas such as personal finance and health. More recently, work has been done to explore how 'nudges' might be used to improve tax take and influence low-carbon behaviour.

5 Part of the reason why these theories have yet to emerge from their academic silos is that they have effectively been marginalised in academic debates by the continuing predominance of orthodox economics. As Geoffrey Hodgson (2009) has argued, a group of elite, neoclassically trained academics continue to dominate the peer review journal process and determine what university students are taught, preventing any major changes to curriculums. In complexity theory this process is known as 'lock-in'.

of these theories have set out in any detail what, according to their research, policymakers should actually do differently,[6] let alone how they might achieve particular economic ends.

The upshot is that orthodox economics remains the only game in town for economic policymaking. The vast majority of mainstream economic policy debate continues to oscillate between the arguments of free market economists and neo-Keynesians about how best to restore global growth and prevent future crises. Hence many of the solutions that are being advanced are based on a conventional economics understanding of how markets behave. Although there is a common feeling that the status quo isn't worth returning to, without clear and viable alternatives that is exactly what will happen.

This book starts from the premise that there is a lot wrong with conventional economics and that insights from new economic thinking need to be taken seriously. It seeks to bring new economic thinking to the attention of policymakers and to reappraise the ways in which policy is designed and implemented when real-world economics is taken into account.

What do we mean by 'new economic thinking'?

A number of new economic schools have emerged since the financial crisis, including market monetarists, neo-chartalists and post-Marxists with several making important headways in the blogosphere.[7] While these schools offer some interesting and innovative insights for policymaking in the post-crisis era, they are effectively extensions to, or variants on, mainstream economic thinking and are therefore not considered here.

This book is instead interested in a more radical strand of economics; radical because it approaches the economy from a completely different starting point. It focuses on evolutionary economics (which draws on the work of Joseph Schumpeter) and complexity science (which has its roots in the natural sciences). It touches also on closely related fields, including behavioural science and the study of networks. While each of these schools has its differences and nuances, they share many similarities; so, when referring to them we use 'heterodox economics' and 'new economic thinking' as catch-all terms.

What each of these schools has in common is a shared critique of the core tenets of neoclassical economic theory, in particular the notion of static equilibrium. This suggests that markets are generally

6 A notable exception is the Greater London Authority's Crossrail project, which was given the go-ahead in part due to the results of impact modelling on the likely benefits of the infrastructure. This modelling, which was undertaken by Paul Ormerod and Bridget Rosewell at Volterra Partners, incorporated feedback effects and other complexity dynamics.

7 Market monetarists such as Scott Sumner, for instance, have made an important contribution to the debate over whether the US Federal Reserve should adopt a nominal GDP target. See http://www.economist.com/node/21542174

stable and that, while external shocks to the system can occur, the inherent tendency is for markets to move back into equilibrium. This happens because economic actors are rational and self-interested and possess all the information necessary to make optimal decisions in the marketplace. Following the laws of supply and demand, market transactions are processed at which point the market is said to 'clear'. According to the models used by neoclassical economists, such clearing takes place instantaneously, leaving no time for market lag. Although they incorporate discount rates and scenarios to account for uncertainties, their models are essentially rigid and linear and are based on the notion that economic transactions are a zero sum game.

There are clearly many faults with this analysis. In his seminal book, *The Origin of Wealth,* Eric Beinhocker (2007) describes how the economy is more akin to a 'complex adaptive system'; that is, an entity made up of heterogeneous groupings of agents, networks and institutions, which are influenced by and adapt to one another's behaviour as well as to the surrounding environment. Within this system, activity is driven constantly by a multitude of overlapping and interconnected processes,[8] which tend not to lead to a given fixed point or necessarily follow a specific cycle (Day 1994). Hence, the economy is never in equilibrium or even geared towards achieving equilibrium, but instead is constantly evolving in non-uniform and dynamic ways, driven by so-called 'emergent phenomena'.

Furthermore, decision-making in the real world is not static or optimal, nor does it follow the rational expectations hypothesis of conventional economic theory. The preferences of, and decisions made by, individual actors in the marketplace are shaped by their everyday experiences and interactions. These so-called 'network effects' are difficult to predict and crucially do not necessarily follow preconceived assumptions of rational behaviour. Preferences and courses of action can change at different moments over time as individual agents learn from past failures, adapt and innovate. Modelling, monitoring and tracking complex adaptive systems is therefore highly challenging. It typically depends on sophisticated computer simulation as opposed to conventional mathematical modelling, which tends to be based on reductionist calculations and 'as if' assumptions (Fisher 2009).

Heterodox economics reaches two important conclusions. First, macro level patterns and outcomes can only be fully understood by an appreciation of activity and interactions at the micro level. Importantly, this can not be deduced by analysing individual actors or properties in situ, independent of their networks. Second, because of the non-stop and unpredictable interactions and adaptation that occur, economies are volatile and, at the macro level, very likely to display intermittent periods of chaos and calm.

8 External shocks can also shape the system, but they are more infrequent.

Most non-economists would recognise these conclusions as a reasonable description of the real world and would accept that 'without an adequate understanding of [the inherent dynamics and instability of economic systems], one is likely to miss the major factors that influence the economic sphere of our societies' (Colander et al 2008: 3). They would be surprised, therefore, to discover that the vast majority of economists and, hence, economic policymaking overlook these insights.

Structure of the book

In the first part of this book, we explore in detail the main academic strands associated with 'new economic thinking' and sketch out some initial implications for policymaking. Amna Silim provides a deeper overview of heterodox theory than is provided here, focusing on complexity, evolutionary and behavioural science. She also draws attention to the key features of neoclassical economics that heterodox economics refutes.

An important element in the study of new economic thinking is the role of networks. In chapter 2, Paul Ormerod suggests that network theory not only highlights the deep flaws in laissez-faire economics, but also casts doubt on the efficacy of broad-based state intervention. Ormerod argues that 'mechanistic' policy tools such as taxation and generic incentives often fail to have the desired effect because they tend to treat economic actors in isolation and are unable to anticipate 'network effects' within the economic system. Instead, policy interventions need to be grounded in a holistic understanding of emergent economic activity and should seek to alter the structure of existing networks. To do this, Ormerod suggests, a new intellectual foundation for policy is required, which is embedded in social norms and taps into avenues for collective action.

What might new economic thinking mean for the institutions and the art of government? In chapter 3, Michael Hallsworth argues government institutions, law makers and civil servants could learn a lot from complexity science. While the broad trend in government over the years has been to approach ever more complex challenges by 'a more sophisticated application of traditional, linear thinking, such as more analysis and evidence reviews, more detailed strategies and plans, more rigorous performance monitoring', this has had limited success. An appreciation of complex adaptive systems would, argues Hallsworth, allow politicians to overcome the policy inertia that results from rigid, preformed plans, as well as generating greater feedback and learning. It would also ensure that complex, cross-cutting challenges were dealt with in a system-wide manner, rather than by isolated central government departments. Such 'system stewardship' would, he argues, significantly improve strategies for governing.

The second section of the book explores the implications of heterodox economics for a number of different policy areas. Greg Fisher (chapter 4)

looks at how an understanding of complexity and network thinking might lead us to re-evaluate the tools policymakers should use to better manage the financial system. Drawing on the work of Professor David Tuckett on the psychology of financial markets, Fisher finds that – contrary to orthodox financial theories such as modern portfolio theory and the capital asset pricing model – investors are susceptible to 'groupthink', leading to herd-like behaviour and markets that are inherently volatile. Financial stability and certainty can never, as a result, be assured. However, policymakers can take steps to dampen the impact of market volatility by improving the robustness of the financial system. In particular, Fisher advocates the devolution of the banking sector and a rethinking of mark-to-market accounting principles among other reforms needed in the City.

In chapter 5, Geoffrey Hodgson takes an evolutionary approach to business policy. He argues that there are at least three flaws in the way conventional economics deals with businesses and industries: viewing the firm as a single entity that sits independently within the marketplace and is not influenced by a wider network of institutions; failing to appreciate the diversity of firms; and wrongly assuming that industries have fixed production functions, move up the cost-curve and therefore are in, or close to, equilibrium. For Hodgson, the last simply overlooks 'the core dynamic of modern capitalism', namely that most businesses are in a constant struggle to grow, adapt and survive. Instead he offers a new business policy framework that treats the firm as an evolving social organism and places innovation, experimentation and variation at its heart. Hodgson also argues that the role of the state should be institution building (ensuring the right educational, infrastructure and finance building blocks are in place) and promoting corporate and financial ethics at the expense of shareholder value.

Tony Dolphin asks in chapter 6 what complexity means for macroeconomic policy. In the post-war period, successive UK governments have attempted to pursue macroeconomic stability – most recently through the use of monetary policy primarily. It is a strategy that has met with limited success and one which, he argues, is fundamentally at odds with complexity theory. Since complexity suggests that the economic cycle evolves in unpredictable ways, with short bursts of growth and inflation, punctuated with periods of calm, controlling the cycle will prove difficult and at times impossible. To better appreciate economic reality, Dolphin argues that policymakers in the Bank of England and the Treasury should abandon their overreliance on dynamic stochastic general equilibrium models and develop a better understanding of the impact of policy interventions and their limitations through the use of simulations and impact assessments. He also suggests that monetary policy needs to be set by reference to a broader set of indicators than just consumer price inflation.

Stian Westlake looks at how new economic thinking might inform our approach to innovation policy, which is largely ignored in conventional economic theory. Westlake argues in chapter 7 that orthodox innovation policy is too readily conceived as a response to market failures, especially the 'failure' of businesses to do 'enough' research and development, and has taken the form of top-down measures, such as R&D tax credits and national R&D investment targets. Rather than obsessing about arbitrary measures of innovation, Westlake argues for a much closer focus on technology policy in its own right, tailored policies in support of entrepreneurs who drive innovation, and a new policy framework that appreciates the complexity of the 'innovation system'.

In chapter 8, Jim Watson asks how insights from evolutionary, behavioural and network theories might improve the way policies to reduce greenhouse gas emissions and drive forward the low-carbon economy are designed. According to Watson, conventional economics' treatment of climate change as a market failure has led policymakers to favour broad-based market responses, such as carbon pricing. Since carbon pricing assumes that businesses and consumers respond rationally to price signals it will, he argues, struggle on its own to lead to significant CO_2 reductions, stimulate sufficient green investment or shift the embedded economic networks that have 'locked in' high carbon to our infrastructure and energy systems and personal lifestyles. Thus, governments should supplement carbon pricing with a richer policy framework that recognises the complexity of the low-carbon challenge. This would include far greater emphasis on technological innovation as well as greater efforts to influence consumer behaviour and spur bottom-up, community-level low-carbon initiatives.

The formulation of skills policy has too often focused on supply-side strategies to boost skills, in the hope of achieving a so-called 'high-skill equilibrium'. As Pauline Anderson and Chris Warhurst argue in chapter 9, the concept of 'skills ecosystems' which is rooted in network and institutional theories, offers a better way of approaching skills policy. It seeks to understand the interactions and interconnectedness of different actors and institutions across economic networks and the dynamics at play with regard to the development and supply of skills and training, employer demand for skills and barriers to skills deployment. This framework is already being pioneered in places such as Australia and Scotland but, as the authors argue here, has been lost in translation in attempts to apply it to skills policy in England.

An appreciation of bottom-up, local dynamics should naturally inform strategies to boost regional development. Yet, in her chapter on regional policy, Sue Richards argues that since the 1980s, the conduct of regional policy has – notwithstanding the devolution of power in Scotland, Wales and Northern Ireland – by and large displayed a centralising tendency. This has meant a largely generic approach to

regional development, particularly in England, which fails to appreciate the local idiosyncrasies that determine policy outcomes. Furthermore, she argues that power, authority and accountability are too detached from the local level to respond to emergent phenomena and unexpected change. A real commitment to devolution in higher and further education and labour market policy to the city-region level – coupled with the reallocation of resources from the centre necessary to achieve this – is, according to Richards, long overdue.

The final section of the book explores the political economy of new economic thinking. In chapter 11, Eric Beinhocker argues that not only does complexity science pose challenges for political culture that centre on the need for assuredness and a desire not to change course, it also has implications for the traditional left–right divide. By questioning the merit of black and white ideological standpoints regarding the role of the state, complexity science challenges our conception of politics, as well as the nature of democratic engagement.

In chapter 12, Orit Gal demonstrates how complexity science can shed light on geopolitical trends and in particular how governments might respond to structural fault lines and deeper tensions within the global economy. Gal focuses on one recent emergent global phenomenon: the rise of a dissatisfied global middle class epitomised by the '99%' and Occupy movements in the west, the Arab Spring, and similar protests in China and India. She suggests that complexity economics helps to frame our understanding of the interconnected processes that are fuelling this 'middle crisis', including economic globalisation, structural inconsistencies and loss of political sovereignty. In response to these co-evolving trends, Gal argues that 'anomie' – what she describes as 'the gradual structural breakdown of social bonds, standards, and infrastructure for cooperation' – is the most likely consequence. Tackling this, she argues, will require far greater emphasis on social resilience and developing new avenues and resources for political participation and self-organisation. But it is also crucial that policy responses treat the drivers of anomie as emergent and network-based phenomenon rather than a set of separate, disconnected conditions.

Adam Lent and Greg Fisher close this book by drawing on some of the ideas in the other chapters and their own thinking to sketch out the parameters of a new framework for economic policy in the 21st century based on complexity and network thinking. In reflecting on the insights provided by new economic thinking into the role of collective action, collaboration and institutions in addressing emergent problems, they suggest that policymaking should contain four critical elements: it must be a collaborative endeavour, non-ideological, reflexive and diverse. They make a pitch to policymakers and all political parties to draw on complexity and network thinking in order to inform policy options, which they argue would entail 'an understanding of the real

world from the ground up, providing a more realistic and less ideological picture of reality'. The task for economic policy – and the role of the state in economic policymaking – is, according to Lent and Fisher, to develop 'a collective response that takes account of the ... dynamic and unpredictable economy' that new economic thinking teaches us exists.

Lessons for policy: some important pointers

The purpose of this book is to bring insights from new economic thinking to the attention of policymakers. A number of important implications, lessons and recommendations for policy can be deduced from our understanding of the economy as a 'complex adaptive system' and they are discussed in the following chapters. However, it is worth drawing attention to a few common lessons here.

First, the contributors to this book share the view that **the assumption that free and unfettered markets lead to the best socioeconomic outcomes is at worst fundamentally flawed and at best woefully incomplete**. New economic thinking demonstrates that markets do not operate as neoclassical textbooks suggest: market actors do not have a full access to information, their decision-making is rarely optimal, and markets are not inherently geared towards reaching a point of stability or equilibrium. Any attempt to construct an economic policy built on these assumptions is destined to unravel, with potentially disastrous consequences. But, at the same time, the assumption that the state can simply step in to correct 'market failures' by introducing broad-brush regulations or generic tax measures fails to appreciate the complexity of economic activity. The precise role of the state is far more nuanced and complex[9] and policy tools need to reflect this.

Second, complexity, evolutionary and network economics suggest that a **more integrated and holistic policy approach towards economic systems** is likely to produce better results. One important lesson from the 2007/08 financial crash was that policymakers failed to anticipate the effects of the interconnectedness of financial institutions. Indeed, it was wrongly assumed that distributing risk throughout the banking system through use of various credit derivatives including credit default swaps would ultimately reduce systemic risk – a logic which turned out to be inherently flawed. The stark lesson here is that policymakers and regulators misunderstand network dynamics at their peril. Furthermore, treating economic actors or particular problems in isolation, as separate entities, will increase the likelihood of policy interventions being unsuccessful. Policymakers should instead plan their interventions on the basis of seeking to shape the 'fitness landscape' and altering the behaviour of networks, rather than the current approach which, in crude terms, identifies a problem and aims to solve it through one or two

9 As far as abstractions go, complexity economics provides for a set of less inaccurate ones. Theory will always be abstract but it is important to remember that there are degrees of accuracy in abstraction.

incentive-based policies arising from an empirically defective framework. Much work remains to be done in terms of defining policy methods that incorporate this system-wide approach, yet the principle is clear.

Third, there are **no silver bullets in policymaking**. An appreciation of networks and complex systems suggests that the success of policy interventions depends on a diverse range of factors and will vary according to locality as well as the nature and extent of network interactions and influences. Consequently, policy needs to be suitably tailored to specific problems: blanket interventions are unlikely to be sensitive to the idiosyncrasies of all local communities. Timing is also important; a policy instrument launched today might not always work tomorrow because the economic system is constantly evolving in unpredictable ways. Policy therefore needs to be dynamic, without being haphazard, inconsistent, or made on a whim. Experimentation, innovation, discovery and effective monitoring and evaluation all need to be factored in. Policymaking also needs to be backed up by detailed and robust evidence and careful prior analysis.

Fourth, **greater decentralised economic policymaking is needed**. New economic thinking and its emphasis on networks and emergent phenomena suggests that policymaking is often more likely to be successful if it is locally rooted, aware of local conditions, and locally administered and evaluated. Decentralisation can also help shorten the feedback loops that inform decision-making, so actors can respond more quickly to developments. This does not take away the importance of overarching policy goals, clearly defined strategy or even national policy instruments, but rather points to the need for a richer policy framework that bridges the divide between national strategic priorities and the grassroots realities that policy is attempting to influence. It also points to the severe flaws in micro-management from Whitehall.

Fifth, new economic thinking suggests that **policy outcomes are inherently uncertain**. This is unsurprising given the nature of complex adaptive systems and the emergent and interlocking phenomena that make economic outcomes difficult to predict. This rejection of predictability poses a massive challenge for conventional economic policymaking which has historically relied heavily on forecasting and continues to do so to this day: whether this is the Office for Budget Responsibility projecting economic developments to underpin fiscal policy, the Bank of England forecasting inflation in order to set interest rates, or City economists making predictions about the future level of interest rates, exchange rates, bond yields and stock markets. However, a different type of forecasting, one that is more nuanced, might be possible. Instead of depending on their models and simple cost–benefit and regression analyses, policymakers and forecasters could make greater use of computerised simulations, randomised control trials, trial and error pilot projects, community outreach, and real time data

monitoring and analysis. At the same time, we also need to acknowledge the sometimes messy reality of policymaking: policies are often the result of political bargaining or a politician's pet project, may be designed and implemented without full access to the necessary information, possibly based on preconceived bias, and almost always dependent on the assumptions used by civil servants who design the policy and practitioners who implement it on the ground (Fisher and Gal 2012).

Finally, policymakers – and the general public alike – should **accept that failure happens and learn from it**. There is still a pervasive fear of failure in policymaking circles – in part because of the potential political ramifications that tend to follow. Yet the most successful companies and entrepreneurs, such as Google, Henry Ford and Steve Jobs, are those that at some stage experienced failure. The same is true of policymaking: taking risks is necessary and sometimes failure can be healthy. The critical issue is the propensity and ability of policymakers to learn from failure and to adapt policy responses appropriately. This provides fundamental challenges for the nature of politics.

Drawing lessons and policy ideas from new economic thinking is a task that is still very much in its infancy. There are many important ideas in this book, yet much work remains to be done. In bringing together a number of leading experts and challenging them to explore the policy implications of heterodox economics, we hope this collection will help start a broad debate in policy circles. And ultimately, we hope that it will help bring about change in economic policymaking for the better.

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1.

WHAT IS NEW ECONOMIC THINKING?

AMNA SILIM

The financial collapse of 2007/08 and the subsequent deep recession and sluggish recovery have left huge scars on the global economy. In the UK, the government is grappling with an unprecedented budget deficit and unemployment is over 1 million higher than it was before the recession. This is a crisis for the real economy and for economic policymakers, but it should also be seen as a crisis for the economics profession and for economic theory. Not only did mainstream neoclassical economics – which has been the overwhelmingly dominant strand in economic thinking for over a century – fail to predict the collapse and recession, its models do not even concede that such events could happen. In the future, there is bound to be more interest in economic theories that offer a better explanation of recent events; and this is where heterodox economics comes in.

Neoclassical economics

The failure to predict or explain the financial collapse and recession has put neoclassical economic thinking in the dock, but such an interrogation is long overdue. Sharp fluctuations in economic growth are just one of the real-world phenomena that traditional economics is poor at understanding. From actual human behaviour through to constant innovation, there is much that traditional economic thinking struggles to explain.

Neoclassical economic theories describe a world in which rational agents act as optimal decision-makers. Guided by possession of a full set of information, self-interested agents maximise utility while firms maximise profits. As a result, the economy is said to behave in a static and linear manner and the system tends towards a state of equilibrium: supply equals demand and an optimal price is set. Macroeconomic patterns are simply the sum of microeconomic properties (Blanchard 2010).

In this model, economies are not necessarily always in equilibrium; exogenous shocks, such as the development of a new technology, can disrupt them. But these disruptions will be temporary and market mechanisms will work to push the economy back to equilibrium. From a neoclassical perspective, economic development occurs through cyclical patterns of equilibrium, shocks, destabilisation and restabilisation. In each cycle the content of the economy such as the

goods and services it offers might change, but its very nature essentially remains the same.[1]

This conventional model can be challenged on four fundamental fronts:[2] the tendency to equilibrium, exogenous shocks, individual rationality and systemic consistency. In the real world, economies are not static and geared towards equilibrium; they are dynamic and in constant flux. This dynamism is endogenous; it originates within the system, not from exogenous shocks. Consumer preferences are not formed by individuals acting solely on their own but are the result of a complex process that includes observing and interacting with other consumers. Economic agents do not have a fixed set of preferences based on rational assessment; they are subject to whims and to mimicking the behaviour of other agents. As a result, the nature of the economic system transforms over time.

In reality, the economy is a complex ecology rather than a complicated machine. It does not respond in predictable ways. It is path-dependent, with each phase building on the previous one. A greater appreciation of this reality has led to the emergence of new schools of thought that are challenging the neoclassical world view and attempting to provide a more realistic understanding of the way economies develop and change.

Complexity, evolutionary and behavioural economics

Various schools of economic thought outside the neoclassical mainstream are often placed together under the banner heading of 'heterodox economics'. This term is used to describe any innovative way of thinking about the economy, from those that represent complete breaks from the neoclassical approach to others seeking to undermine only some of its main ideas.

In this chapter, three strands of heterodox economics are discussed in some detail: complexity, evolutionary and behavioural economics. Each offers different insights into economic analysis by seeking a more accurate representation of the economy, and in so doing opens up new possibilities for policymakers. This chapter summarises their basic tenets – and discusses what they might mean for public policy.

Complexity economics challenges fundamental orthodox assumptions and seeks to move beyond market transactions, static equilibrium analysis and *homo economicus* (the perfectly rational, self interested individuals defined in orthodox economic models). Brian Arthur, Steven Durlauf and David Lane (1997) suggest complexity has six defining characteristics.

1 This traditional view of the economy was based not only on economic theories but on our understanding of nature as lying within the Newtonian paradigm.

2 Thanks to Orit Gal for her input to this section. For a full discussion of the shortcomings of neoclassical economics and of complexity economics see Beinhocker 2007.

1. Dispersed interaction: Developments in the economy result from the interaction of heterogeneous agents, whose actions are determined by their environment and by the predicted actions of other agents.
2. The absence of a global controller: The economy is characterised by competition and coordination between decision-makers and no single agent is able to exploit all opportunities in the economy.
3. A cross-cutting hierarchical organisation: The economy is comprised of many levels of organisation and there are many intertwined interactions that span across all levels.
4. Continual adaptation: Decision-makers or agents are continually learning and adapting to their environment, emergent patterns and interactions.
5. Perpetual novelty in the system: New niches continually emerge out of new markets, new technologies, new behaviours and new institutions.
6. Out-of-equilibrium dynamics: The economy is typically operating far from any equilibrium or optimal output and there is constant improvement.

An alternative definition is based on the observed tendency of the economy to produce dynamic outcomes. Richard Day (1994) argues, for example, that '[an] economic system is dynamically complex if its deterministic endogenous processes do not lead it asymptotically to a fixed point, a limit cycle, or an explosion'. In other words, complex systems are non-linear, dynamic and involve continuous adaptation to patterns the economic system itself creates. As a result, these systems are, in contrast to the linear systems described by neoclassical economics, unlikely to rest at a given equilibrium point.

Complexity economics considers the economy to be a 'complex adaptive system' in which constant interaction plays a significant role. A complex adaptive system allows for a wide set of interactions between individuals and recognises that an economic actor's preferences are diverse (Beinhocker 2007). Agents do not just respond to market signals, such as price; they also interact with other agents and this influences their subsequent choices and actions (Arthur 1999). The system is adaptive because agents learn from experience, and from the experience of others, and so gain knowledge they would otherwise have lacked. (In contrast, in traditional economic theory, the economy is populated by 'representative agents' or identical decision-makers operating in isolation.) If we accept the existence of these complex and overlapping interactions, this requires us to rethink the equilibrium outcomes that are at the centre of neoclassical assumptions.

In complexity economics, it is accepted that interactions between different actors at the micro level will lead to particular macroeconomic outcomes. Unlike in traditional economics however, the complexity

view is that micro- and macroeconomics are not separate fields and macro patterns are not the simple aggregation of the micro decisions of uniform decision-makers[3] (Fontanta 2008). Micro level interactions mean macro patterns cannot be reduced to individual level behaviour; these patterns can only be seen as a whole (Durlauf 2011). Thus, economic growth, for example, cannot be reduced to its individual properties or elements; rather it is a result of various interactions at the micro level (Metcalfe et al 2002).

Furthermore, once a macro pattern has been established, there is non-stop adaptation that leads to a generation of new patterns – emergent phenomena – arising from within the system. This process is referred to as endogenous evolution.

In a complex system, these interactions not only influence macro patterns but also create increasingly complex networks. Economic transactions take place across a range of networks, unlike in traditional models, which assume agents interact only through auctions or one-to-one negotiation (Beinhocker 2007). If agents have the ability to learn and adapt their behaviour accordingly, and alter their preferences and decision-making in an unpredictable manner, they can no longer be seen as rational entities operating with perfect information. In this respect, complexity economics has much in common with behavioural economics, while learning and adapting is central to evolutionary economics.

Evolutionary economics is closely related to complexity economics and, as its name suggests, sees the process of evolution as central to economic developments. Evolution involves endogenous change – a process of selection, adaptation and multiplication (Metcalfe et al 2002). As a result of experience and adaptation, some economic strategies and decisions work and some fail. Those that succeed are scaled up or multiplied; those that fail are cast aside. This process of continuous knowledge gathering and adaptation is driven by feedback mechanisms and the interactions between agents and their environment (Nelson and Winter 1982).

Innovation is central to evolutionary economics and is considered a marker of the capitalist economic system (Lent and Lockwood 2010). Indeed, innovation implies experimentation with new forms of physical technology, social technology and business techniques which – as history tells us – are core drivers of increases in efficiency and productivity, economic growth and the generation of wealth (Beinhocker 2007). This process of selection, adaptation and multiplication also takes place at the firm-level, where there is continual generation and

3 Indeed, according to complexity economics, macro outcomes can be very different from what one might expect from a micro analysis of so-called 'representative agents'. So an understanding of the interactions between agents is required to fully explain macro outcomes.

selection of new products and services. The lack of narrative around innovation is one of conventional economic theory's greatest flaws: indeed, by assuming that economies and firms are in or close to equilibrium, neoclassical models simply overlook the role of innovation in modern capitalism.

Like complex systems theory, evolutionary economics emphasises the crucial role of history in shaping the future. Past interactions and decisions have major impacts on the economy – a characteristic known as path dependence – and any initial small changes in an economy can produce drastic downstream effects, partially driven by networks and cross-cutting hierarchical organisation. Economic outcomes are determined not only by current conditions but also by previous decisions and initial conditions (Durlauf 1997).

If adaptation and innovation are central to the evolutionary economics critique of neoclassical economics, then the psychology of human beings is central to that of the behavioural economists. In short, behavioural science is a combination of psychology and economics that has led to a debunking of the traditional economic assumption of rational, self-interested individuals. This approach explores the limits to human rationality in decision-making. It argues that human agents do not possess the flawless ability to maximise utility or profits by weighing all available alternatives presented to them and that there are flaws and imperfections associated with decision-making (Lambert 2006).

Behavioural economists believe decision-makers exhibit what they call bounded rationality, bounded self-interest and bounded willpower (Jolls et al 1998). Bounded rationality recognises the limitations agents face when it comes to decision-making. Despite any prior intentions to be rational, limited information and other constraints prevent agents from making optimal decisions. In addition, agents are not always selfish, or self-interested: their self-interest is usually bounded by a sense of fairness. And bounded willpower acknowledges that agents at times find it difficult to make decisions that will benefit them in the long term.

Agents and firms rely on decision-making methods that differ from those described in neoclassical economics. Heuristics, framing and loss aversion shape their choices (Thaler and Sunstein 2008). When making decisions, economic agents cut corners. They use rules of thumb (heuristics) rather than gather all the relevant available information (an impossible task anyway); they reach different conclusions depending on how a problem is framed to them; and they avoid taking decisions that might lead to losses (Lambert 2006).

These behaviours characterise the actions of consumers. For example in a study commissioned by the Office of Fair Trading in the UK (2010), price framing was found to heavily influence outcomes. Consumers frequently miscalculated and achieved lower value when purchasing

special offers compared to those offered at a simple unit price. They simply assumed that the special offer must be the best deal. Evidence of market inefficiencies like this shows people are not always rational decision-makers in their role as consumers.

Acknowledging the psychology of individuals in decision-making has led to more accurate representations of agents in economic models, thanks in part to behavioural science. These findings are shared by other heterodox economic schools. In models derived from a complexity or an evolutionary economics perspective, therefore, people are not assumed to be rational agents: they factor in the ability of agents to learn and adapt based on past experience and allow for trial and error and flexible behaviour (Nelson and Winter 1982).

To summarise then, complexity, evolutionary and behavioural thinking puts strong emphasis on dynamics, adaptation, psychology, disequilibrium and innovation. Modern economies are complex adaptive systems, rarely tending towards a steady state equilibrium in which supply equals demand and markets clear. Most change occurs endogenously, rather than as a result of exogenous shocks. Economies operate with constant fluctuation and multiple equilibria.

Policy implications

Policymakers operate in a neoclassical framework for the most part. They tend to evaluate various policy interventions by estimating the impact a given policy change might have on the economy and comparing this to what would happen in the absence of that policy being pursued.

Complexity economics on the other hand suggests that since the economy is a complex, adaptive and dynamic system, it is inherently difficult to predict outcomes and responses to particular policy changes (Ormerod 2010a). This presents immediate challenges for policymakers. Predicting future trends is problematic if markets and economies do not return to equilibrium, when agents are not always rational and when uncertainty is in-built into the system.

A deeper understanding of the relationship between macro outcomes and individual decisions is therefore needed for policy formulation. Solutions under complexity tend not to be based on deductive analysis or top-down approaches, but explore interaction and behaviour using a bottom-up approach. This inductive method makes use of empirical analyses such as agent-based modelling (Holt et al 2010) and tends to do away with conventional modelling techniques.

Indeed complexity economists believe emergent phenomena are better understood through computer simulations than through mathematical theorems (Rosser 1999). Computer simulations allow researchers to explore a wide range of possible outcomes (Arthur et al 1997) while

agent-based modelling allows us to capture the key features of complex economic systems, in particular the interactions and networks between agents.

Given the above, Eric Beinhocker (2007) argues that the role of government should start from the premise of seeking to 'shape the fitness environment'. This would allow free markets to assume their natural role of differentiating, selecting and amplifying successful economic behaviour. But by analysing and monitoring evolutionary processes within the market, policymakers can attempt to influence them so as to better respond to society's needs. The aim of policymakers should, therefore, be to shape the environment in which plans or projects are more or less likely to succeed or fail according to their ability to meet society's needs.

An example is the use of carbon taxes. One of the main purposes of a carbon tax is to shift the fitness landscape so that projects and technologies with low emissions have a better chance of succeeding. Here the market is still allowed to differentiate, select and amplify successful plans – but the environment in which the market operates is shaped by government. However, while they can be important in influencing behaviour and market outcomes, carbon taxes and other pricing instruments have their limitations. As Jim Watson argues in chapter 8, carbon pricing assumes that consumers and businesses will react rationally to the price signal. Since complexity economics suggests that this will not always be the case, additional measures may be needed to drive forward the low-carbon transition at a sufficient rate – particularly if the carbon price is set too low.

Policy can also draw from evolutionary economics, for example, by focusing on how selection mechanisms create desirable and socially optimal outcomes. Evolutionary economics sheds light on problems of long-term economic growth (Nelson 2005), environmental change (Faber and Frenken 2009) and regional policy (Boschma and Lambooy 1999), as well as new innovations and technologies, and the effects of technological and social change (Lent and Lockwood 2010).

In particular, evolutionary economics argues that the way to thrive in an evolving and changing economy is to innovate. Perhaps because neoclassical models overlook its role, innovation has rarely featured at the centre of economic policymaking in the UK. Historically, innovation has been patchily applied in the UK as part of growth strategies, and businesses and policymakers have been slow to respond to rapid business transformations. The evolutionary approach, however, suggests innovative business activity should be actively encouraged. Indeed, as Adam Lent and Matthew Lockwood (2010) argue, the UK's growth strategy would greatly benefit from placing innovation at its core.

Methods from evolutionary economics have also been used to inform approaches to international development. Richard Nelson (2005) suggests moving away from the overly rigid neoclassical prescriptions of simply increasing investment in human and physical capital in developing countries and towards greater learning and innovation. This would involve learning how other countries have advanced their economy and gaining the knowledge of how modern technology can be used most effectively in achieving desired economic outcomes (Reinert 2006). In an earlier article with Sydney Winter (1982) Nelson argued that 'flexibility, experimentation, and ability to change direction as a result of what is learned are placed high on the list of desiderata for proposed institutional regimes'.

Crucially, policymaking from an evolutionary economics perspective recognises that the state is limited by the same factors facing agents: it is not, and cannot be, in possession of a full set of information. Therefore, the state must be willing to learn from experience and adapt its approaches. Policymaking needs to be more flexible and willing to break with organisational routines.

While complexity and evolutionary economics have struggled to get a foothold in policymaking to date, many governments have begun to reflect on the analysis of behavioural economists when exploring policy interventions. In the UK, for example, the government set up in July 2010 a dedicated Behavioural Insights Team (also known as the 'Nudge Unit'), tasked with assessing potential policy interventions through the lens of behavioural thinking. In particular, it is seeking to use what is referred to as 'choice architecture' to evaluate the impact that framing details in different ways can have on how people make decisions. Choice architecture has already been applied and proved to be effective across a number of areas, including savings for pensions. While most people understand that pensions offer substantial rewards in the future for a relatively modest sacrifice made in the present, enrolment in voluntary schemes tends to be at a low level. Changing the rules so that workers must 'opt out' rather than 'opt in' to pension schemes has been found to significantly increase participation.

As the title of Richard Thaler and Cass Sunstein's influential book (2008) implies, small changes of this sort can 'nudge' people to make better decisions about their health and financial wellbeing. Libertarian paternalism has the potential to create better outcomes, while retaining people's right to choose. What is more, change can often be brought about at little to no cost; simply paying more attention to framing a particular choice may have a greater chance of achieving the desired outcome. As a result, behavioural concepts are being progressively incorporated into policies in many areas including environmental change, finance, international development, healthcare and competition policy. But, as Paul Ormerod has argued elsewhere (2010b), successful

'nudges' must also be grounded in an awareness of the network effects that influence an individual's choices and behaviour and how this can change over time: without this understanding, nudges may fail in the same way as conventional command and control policies.

Conclusion

The neoclassical economic model is based on a series of simplifying assumptions that result in a poor representation of the real world. New schools of economic thought are emerging built on a more accurate analysis of the way economic agents behave and the way decisions are really made. These heterodox schools of economic thought dismiss notions of rational economic agents and profit-maximising firms in favour of a greater focus on psychology, interactions and history.

Complexity economics emphasises the power of networks, feedback mechanisms and the heterogeneity of individuals. Evolutionary economics is centred on the ideas of continuous adaptation and the creation of novelty; it recognises the key roles of innovation, selection and replication in the economy. And behavioural economics seeks to understand how and why individuals behave as they do, rather than assuming that they act like the robotic *homo economicus* of the neoclassical textbook.

Already these approaches are beginning to help us understand some of the economic anomalies that orthodox economics cannot explain. As they develop in the future and the appetite for new economic thought grows, our understanding of the economy – and our economic policymaking – can only be improved.

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2.

NETWORKS AND THE NEED FOR A NEW APPROACH TO POLICYMAKING

PAUL ORMEROD

Modern economic theory was first set out on a formal basis in the late 19th century. While there have been many developments since then, at heart the view in economics of how the world operates remains the same. Mainstream economic theory is essentially concerned with how decisions are made by individuals, what information is gathered and how it is used by decision-makers. The intellectual basis of most social and economic policy in the western world is provided by this conventional economic theory. A whole range of activities in state bureaucracies, such as forecasts, policy evaluation, cost–benefit analysis and the design of regulation, stem directly from mainstream economics.

All scientific theories, even quantum physics, are approximations to reality. Developing theories involves making assumptions and simplifications to enable us to better understand problems. A key feature of a good theory, therefore, is that its assumptions are a reasonable description of the real world.

In the early 21st century, just as in the late 19th, economics in general makes the assumption that individuals operate autonomously, isolated from the direct influences of others. A person has a fixed set of tastes and preferences; when choosing from a set of alternatives, he or she compares the attributes of those alternatives and selects the one which most closely corresponds to his or her preferences. At first sight, this may seem quite reasonable, or even 'rational', as economists describe this theory of behaviour. If I am interested in buying a product which many people want, I may have to pay a high price. So the choices other people make affect me *indirectly* through the workings of the market. My preferences, however, remain unaltered, according to this conventional view of economics.

There is a serious problem with this assumption that individuals operate in isolation from each other, that their preferences are not affected directly by the decisions of others. The social and economic worlds of the 21st century are simply not at all like this. In the real world we are far more aware than ever before of the choices, decisions, behaviours and opinions of other people. In 1900, not much more than 10 per

cent of the world's population lived in cities. Now, for the first time in human history, more than half of us do, in close, everyday proximity to large numbers of other people. In addition, since the end of the 20th century the internet has revolutionised communications in a way not experienced since the invention of the printing press 500 years earlier.

So the assumption that people make choices in isolation, that they do not adopt different tastes or opinions simply because other people have them, is no longer sustainable. Perhaps – and it is a big 'perhaps' – a century or so ago this was a reasonable assumption to make, but no longer.

The choices people make, their attitudes and their opinions are influenced directly by others and the medium across which this influence spreads is social networks. Commonly, social networks are thought of as purely a web-based phenomenon: sites such as Facebook, Twitter and MySpace. These online social networks indeed can influence behaviour, but it is real-life social networks – such as family, friends, colleagues – that are even more important in helping us shape our preferences and beliefs, what we like and what we do not like.

Network effects

The fact that a person can and often does decide to change his or her preferences simply on the basis of what others do is known in economics as network effects. Also called network externalities or demand-side economies of scale, network effects pervade the modern world.

Network effects have in fact been pervasive throughout human history. A crucial feature of human behaviour is our propensity to copy or imitate the behaviours, choices and opinions of others. We can see it, for example, in the fashions in pottery in the Middle Eastern Hittite Empire of three and a half millennia ago. And we can see it today in the behaviour of traders on financial markets, where the propensity to follow the herd can lead all too easily to the booms and crashes experienced by economies around the world.

Networks are especially important in finance. When, in September 2008, Lehman Brothers went bankrupt, it precipitated a crisis that almost led to a total collapse of the world economy and a repeat of the Great Depression of the 1930s. It was precisely because Lehman was connected into a network of other banks that the situation was so serious. Lehman's bankruptcy could easily have led to a cascade of bankruptcies across the global financial network, initially in those institutions to which Lehman owed money, and then spreading wider and wider across the entire network as more and more institutions became exposed. Incredibly, neither the systems of financial regulations which were in place, nor the thinking of mainstream economics that influenced policy so strongly, took any account of the possibility of such a network effect. Ironically, policymakers and the financial establishment

thought that risk could be mitigated by spreading it across the system in the form of securitisation and the slicing up of risky assets. They misunderstood completely the dynamics of financial networks and the possibility that such networks would not reduce risk but instead would trigger uncertainty and upheaval.

A world in which network effects are a driving force of behaviour is completely different from the world of conventional economics, in which isolated individuals carefully weigh up the costs and benefits of any particular course of action. A world in which network effects are important is a much more realistic description of the human social and economic worlds which actually exist in the 21st century. Incentives, of course, have not disappeared as a driver of human behaviour: it is still the case that if, say, Pepsi raises its price compared to Coca-Cola, more Coke and less Pepsi will be sold. This is the world that conventional economic theory describes. It is not wrong, but it is often misleading. It offers only a very partial account of how decisions are made in reality, where network effects can have far greater influence on behaviour than incentives. Network effects, in fact, can completely swamp the impact of incentives, leading to very different outcomes to the ones intended by those who altered the incentives, whether they are companies or public policymakers.

Network effects require policymakers, whether in the public or corporate spheres, to have a markedly different view of how the world operates. They make successful policy much harder to implement and they help explain many of the failures of policies that are based on the view that incentives, rather than network effects, are the key drivers of behaviour. Understanding the influence of network effects and harnessing our knowledge of how they work in practice, however, opens up the possibility of far more effective and successful economic policies.

Why we need a new intellectual foundation of policy

We might reasonably reflect that we are very much better off than we were in, say, the middle of the 20th century. Over this period, we have had a great deal of state activity, of public policy interventions in both social and economic problems based on the model of economically rational agents: that agents respond solely to incentives. Network effects and copying are entirely absent from this model. So why do we need a new perspective on policy at all? Surely we have done well using the old model, especially when boosted by the addition of the late 20th century insights into asymmetric information and the principle of 'market failure'?

A distinguishing feature of the social and economic history of the second half of the 20th century is the enormous rise in the role of the state throughout the western world. Gradually, many of the functions previously within the domain of the third or private sectors have been embraced within the public sector. President Roosevelt's New Deal

in the US in the 1930s was bitterly denounced by critics at the time as being nothing less than socialism. But the percentage share of the whole economy accounted for by the spending of the Federal government then was not much more than half of what it was under Ronald Reagan 50 years later. Likewise, the most avowedly socialist government in the history of the UK was that of Clement Attlee from 1945 to 1951. Yet the share of the public sector in the economy as a whole under Attlee was less than it was during the government of Margaret Thatcher (1979–1990), renowned for her robust approach to the privatisation of state activities.

The intellectual underpinning of the burgeoning activity of the state has been provided by mainstream economics. Paradoxically, a theoretical construct which purports to establish the efficiency of the free market has justified an enormously enhanced role for the state. It is not just the sheer size of the public sector, but the range of private activities which the state now tries to influence or control: either through direct regulation or through exhortations to avoid behaviours deemed inappropriate by civil servants, such as those which lead to obesity or the consumption of anything more than small amounts of alcohol. Generations of policymakers have been raised to have a mechanistic view of the world, and a checklist mentality: to achieve a particular set of aims, draw up a list of policies, and simply tick them off. It is a comforting environment in which to live, being seemingly dependable, predictable and controllable.

The concept of 'market failure', at first sight a critique of free market economics, has provided powerful backing to state intervention. If markets, for whatever reason, are unable to function in practice as the theory suggests they should, then regulation, taxes, incentives of all shapes and forms, are justified. They are justified in order to make the imperfect world conform to the perfect one of economic theory. Economists slip all too easily into the attitude that their core theory does not merely purport to describe how the world actually is, it is a prescription for how the world *ought* to be.

The world view of free market economic theory is precisely one in which rational agents are able to make optimal decisions and achieve the best possible outcome in any particular set of circumstances. And so behaviour can be influenced by the appropriate set of incentives selected by the authorities. Indeed, we see a vast array of taxes, subsidies and benefits, all aimed at achieving precise and detailed outcomes. And where there are obstacles to agents making the best choice, where there is 'market failure', the clever, rational planner can intervene to ensure that the world works as the theory deems it should do.

We have now had over 60 years of this vision. It is fundamentally different from anything seen before in the western world, except during

the two world wars. And yet, the stark fact is that the combination of large-scale state activity and a mechanistic intellectual approach to policymaking has simply not delivered anything like the success that the founding fathers of the post-second world war social settlement imagined would be the case. Deep social and economic problems remain. For example, both the average rate of unemployment and the range within which it varies are scarcely any different in the six decades since the end of the second world war to the same period preceding it. If policy planners were supposed to achieve anything, then surely – in the wake of the massive unemployment that was the scourge of the west in the early 1930s – it was very low levels of unemployment. To be fair, the maximum rates of unemployment in the west have not hit the heights of the Great Depression, but unemployment has consistently remained a serious problem and in 2012 stands at an alarmingly high level in many countries.

Taking a long-term view, averaging over decades, the unemployment rates are very similar in the pre- and post-second world war periods. In the US, the pre-war average was 7 per cent compared to just under 6 per cent post-war; in the UK the two averages are virtually identical at around 5.5 per cent; while in Germany, for example, the average unemployment rate since the second world war, at just over 5 per cent, is even higher than the pre-war average of some 4 per cent.

Other social and economic problems also remain deeply rooted. Comparing crime rates over time is difficult, but despite sharp falls since the mid-1990s in both the US and Britain, for example, crime is everywhere much higher now than it was in 1950. Meanwhile, the distribution of income and wealth has widened dramatically, while rational planning and clever regulation designed to cope with 'market failure' did not prevent the biggest economic recession since the 1930s from taking place in 2008/09.

However, the principal cause of the failure of what we might describe as the post-war western model to achieve its objectives is not the size of the state but the intellectual framework in which it operates. The differences between the centre-right and centre-left within this model have been of merely second-order importance. Both the main parts of the political spectrum have embraced not only a much greater role for the state than obtained before the second world war, but have shared this same intellectual vision. At heart, from this perspective the world is seen as a machine, admittedly a complicated one, but one that can be controlled with the right pressure on this button, just the right amount of pull on that lever. It is a world in which everything can be quantified and targets can not only be set, they can be achieved thanks to the cleverness of experts. But the world is simply not like this. It is a much more complex, much less controllable place than 'rational' planners believe. Policy is very difficult to get right.

What are the implications?

The ability to gauge in advance the reaction of agents to changes in policy is seriously weakened in situations where they base their actions, choices and opinions in part on those of others on the relevant network. So even if, by some miracle, we know for certain how any given agent will react to a policy change now, there is no guarantee that the response will be the same tomorrow, next week, or in six months' time. The response will depend to a greater or lesser extent on how others react. This may seem obvious. But these things are not taken into account either in many ex-ante assessments of the policy terrain, or in the ex-post analysis of the impact of policies. The introduction of these fundamental features of reality into the picture rapidly leads to great uncertainty about the consequences of any given action.

A fundamental feature of any system in which network effects are important is that it is 'robust yet fragile'. The collection of individuals who make up a network will, most of the time, exhibit stability with respect to most of the 'shocks' the network receives when a few agents change their opinion or their behaviour. The system is stable in the sense that most shocks make very little difference, they are absorbed, shrugged off, and few other agents change either their minds or their behaviour as a result. So the network is 'robust'. But, every so often, a particular shock may have a dramatic effect. So the network is also 'fragile'. The behaviour of individuals across the whole, or almost the whole, of any particular network might be altered.

An example from the physical world is power grids. Minor outages occur all the time, but the loss of power is confined to a local area. Very occasionally, however, a small outage triggers a cascade on a large geographical scale. The connectivity of the power grid enables this to happen. A small event has a dramatic consequence, in ways which are extremely difficult to anticipate in advance.

The build-up to the financial crisis after 2007 is an illustration of the same principles. In the normal course of business, there is a large volume of interbank loans, of banks lending and borrowing money to and from each other. By the early summer of 2007, a few commentators had begun to express doubts about the sustainability of the economic boom. Their particular concern was the huge levels of debt which were building up in the private sector. But this was not perceived in general to be a problem. Banks continued to be happy to lend and borrow from each other as usual. Then, suddenly, in August, confidence among banks evaporated. The interbank lending market froze. Nothing had really changed in the economic fundamentals. No drastic event had occurred. The network of confidence across the banking sector simply proved fragile, and pessimism spread like wildfire.

This freezing of the interbank loans market led, of course, to the demise of Northern Rock in the autumn of 2007. As a salutary reminder of the perils of conventional thinking, John McFall, then chairman of the Treasury select committee, proclaimed at the time: 'The banking system in the United Kingdom is strong. We've had 60 quarters of continued growth, the world economy has grown for the past five years. So it's against a strong background ... Northern Rock will be able to carry on its business.' I suppose he can hardly be blamed: the government had, after all, used its formidable intellectual and planning powers to abolish boom and bust!

The belief that clever people, with sufficient thought, really can be social engineers and design the perfect society is very deeply embedded. Just as real engineers can design bridges that work exactly as intended, so the vision of society and the economy as machines encourages policymakers to take the same view of their ability to design human behaviour. But it is no longer relevant, if it ever was, to most aspects of human social and economic behaviour. This is why the network effects view of behaviour is so challenging. I have heard frequent arguments along the lines: this is all very well, these networks seem very clever, but you lack clear guidelines about what we should actually *do* to solve a problem. If we use the economically rational approach, we know what to do.

The latter point is an obvious non sequitur. The economic rational agent model is indeed capable of providing policymakers with an exact answer to a problem: in order to achieve X, do Y. But all too often, doing Y leads to Z, or even to what we might call 'minus X' – in other words, the complete opposite of what was intended. During 2011, for example, there was constant concern about the state of Europe's economies, and the future of both the euro and the eurozone. Periodically, the French president or the German chancellor or the head of the European Commission made a statement intended to calm the markets, or the European Central Bank intervened in the bond market with the same intention in mind. But instead of recovering, the markets often fell further. This way of thinking about policy does not provide control, merely the illusion of control.

These criticisms do not apply simply to the centre-left, where the often uncritical elevation of public bureaucracy into a 'good thing' has become a hallmark. A sharp distinction also needs to be made between the network approach to understanding both society and the economy and, on the other hand, the Chicago, free market approach beloved of the centre-right. Ironically, this latter modus operandi is the mirror image of the 'clever planner' concept of policymaking. So, if the correct set of prices – read incentives – can be put in place, all markets will operate efficiently, and no resources will be left unused; all markets will clear. The role of the state is minimal. But how are these prices ever to

be discovered? Economic theory gives no guidance here at all, and is forced to rely on a mythical creature called the Auctioneer to perform this task. It is merely a short step from this vision of the world to the bureaucrat and his or her belief that the right benefit, the right tax rate, the right regulation can be set in order to achieve any desired aim.

In any event, the network view of the world inherently gives rise to the concept of collective action. If a set of values spreads across a network, the behaviour of the individual component parts is altered by these emergent, collective values. The agents in the network are not isolated individuals, but operate in society and have their behaviour, at least in part, shaped by society.

Take, for example, the issue of drink-driving. In most social circles today, driving after drinking substantial amounts of alcohol is the subject of strong disapproval. But this was not always the case. When Barbara Castle introduced drink-driving legislation in the late 1960s, it met with strong resistance and was widely ignored. Many of the late-night heavy drinkers in my uncle's pub on the moors above Bolton were the police themselves. Gradually, however, a different set of attitudes spread across social networks and drink-driving has become very much less widespread than it was then. Even though the penalties are severe, the chances of being caught remain very low. It is the social norms that have emerged rather than the legislation which keep drink-driving incidents down. A contrast is provided by attitudes to the speed limit, especially on motorways and fast dual carriageways. The 70mph limit has very little social acceptance and is routinely ignored, again despite penalties if caught. On the M40 motorway, for example, more vehicles travel at speeds in excess of the legal speed limit than at 70mph or below.

So, sometimes traditional legislation works – and its impact is boosted by emergent social norms – and sometimes it does not. But the key feature of both the drink-driving and the speed limit examples is that it is the social norm, emerging across networks, which is critical. This collective feature of the network exercises a powerful influence on the behaviour of the individual agents within the network.

As an illustration of a specific policy area, we might usefully think about local unemployment rates across the UK. Over time, these vary according to the overall state of the economy. But there is a remarkable and worrying stability in *relative* unemployment rates across different local areas. If we rank local authority areas by their unemployment rates and see how the rankings change over time, as a broad generalisation they barely change at all – even over a 20-year period. The correlation between the rankings now and 20 years ago is as high as 0.85. In other words, an area with a relatively high or low unemployment rate 20 years ago has a very strong chance of having a high or low one now. These

strong correlations can be observed not merely across the country as a whole, but even within individual counties.

Billions of pounds have been spent trying to change this situation, through bodies such as the regional development agencies, with little effect. Conventional policies have failed.

Instead, the problem can be seen as one of networks, in which the spread of culture and attitudes is just as, and possibly even more, important as standard economic considerations. A key point here is that when network effects are present, the most effective policies are unlikely to be generic, across-the-board changes to incentives. Careful prior analysis and thoughtful targeting become the order of the day. If we can get it right, or even approximately right, less *can* be more. Fewer resources used more intelligently can potentially lead to much more effective strategies.

Altering the structure of the network might itself also become a policy target, and one which could have powerful effects. At a very local level – even in poor towns – different public housing schemes, with residents from essentially identical socioeconomic backgrounds, can exhibit quite different levels of worklessness. A culture can readily evolve in which an income from benefits supplemented by petty crime and casual labour becomes the social norm. In short, it is essential to take into account the fact that people live in a social context, and the particular circumstances of their various social networks can have a decisive influence on their decisions.

The most important way in which people find jobs is through personal contact. A vacancy is heard about through a friend, a family member, a neighbour. In turn, the fact that such individuals are the source of your information may send a signal to the prospective employer, especially from your informant who already works there. In an informal way, you are being recommended.

For professionals, the idea of networking – making personal contact as a key means of advancement – is second nature. But the same effect occurs at all levels of skill and qualification. Social networks are the single most important avenue for the individual to discover that a job vacancy exists. They are much more important than formal channels such as newspapers, the internet, recruitment agencies or public employment services. And from the point of view of the employer, the grapevine is less risky than recruiting from the open market, because they have additional information about the recruit.

Equally, however, the network of connections the residents have to the world of employment may just be too sparse. They simply do not hear about vacancies because not enough of them are in the loop, as it were. So policy in this instance should be directed towards increasing the

social connections of the residents with the world of work, of altering the structure of the network so that it is easier for information about job vacancies to spread among the workless residents. And at the same time, the stronger these connections become, the greater the chance that a different social norm, that of being in work – even if it is low-paid – will spread. Exactly how this is achieved, or attempted, will depend a great deal upon purely local circumstances, of particular knowledge of the area.

Conclusion

The recognition of the fundamental importance of networks for outcomes in the modern social and economic worlds does not mean that governments are powerless. Instead it calls for smarter government rather than no government. It almost certainly means fewer state bureaucrats, working in an outdated intellectual framework, searching for the elusive silver bullet which is guaranteed to solve a problem.

The silver bullet of this approach is that there are no silver bullets. Instead, we need to rely much more on the processes of experimentation and discovery. A key influence on behaviour in many social and economic contexts is the prevailing social norm in the relevant network, which emerges from the interactions of the individuals who comprise the network. But there are no levers, no magic buttons to press, which will guarantee that social norms can be altered in ways which the policymaker desires. We can only discover what works by experiment.

This does not mean that we are operating in the dark, that the success or otherwise of a policy is merely a matter of chance. The more knowledge we have of how people are connected on the relevant network, of who might influence whom and when, the more chance a policy has of succeeding. Much of this knowledge is held at decentralised levels in tacit form, a form which is hard or even impossible to codify. But it is crucial to how most social and economic systems work in practice.

Our current political institutions are to a large extent based on the vision of society and the economy operating like machines, populated by economically rational agents. This view of the world leads to centralised bureaucracies and centralised decision-making. We live in a society where decisions are made through several layers of bureaucracy, in both the public and private sectors. On the whole, this leads to decisions that are insensitive to local (micro) conditions, and which are insensitive to society as it changes.

A lack of both resilience and robustness is a characteristic feature of such approaches to social and economic management. Structures, rules, regulations, incentives are put in place in the belief that a desired

outcome can be achieved, that a potential crisis can be predicted and forestalled by such policies. As the recent financial crisis illustrates only too well, this view of the world is ill-suited to creating systems which are resilient when unexpected shocks occur, and which exhibit robustness in their ability to recover from the shock. The focus of policy needs to shift away from prediction and control. We can never predict the unpredictable. Instead, we need systems which exhibit resilience and robustness together with the ability to adapt and respond well to unpredictable future events.

3.

HOW COMPLEXITY ECONOMICS CAN IMPROVE GOVERNMENT: RETHINKING POLICY ACTORS, INSTITUTIONS AND STRUCTURES

MICHAEL HALLSWORTH

> 'Between the operations of the public and the private sectors there is often no clear boundary. Central and local government stand in a similarly intricate relationship … As the tasks of government have grown and become more complex, so the need to consult and coordinate has grown as well.'

When do you think this statement was made?

If I said it was from last year's *Open Public Services* white paper, few people would think twice: the complexity created by public and private sector relationships, and the corresponding need for a more open, consultative approach, seem unique to our current situation. In fact, they were pressing enough for Lord Fulton to make this claim on page 2 of his report on the structure of the civil service back in 1968.[1]

At the same time, we often talk as if 'complexity' is a challenge that is specific to governments of the past twenty years, brought about by globalisation and the internet (among many other causes). But even 35 years ago, one commentator could label as an 'accepted cliché' the idea that contemporary societies were 'experiencing unprecedented rates of change, and that they have been drawn together by trade and mass communications into a global village'.[2]

Of course, there is plenty of evidence that the task of governing society has become significantly more complex.[3] I mention this past history to stress that simply diagnosing government and society as 'complex' can distract us from what is new and interesting: our improved *understanding* of complexity and the ways it could be applied to enhance government.[4]

And there clearly is a need to think differently about the way policy actors and institutions approach complexity. Broadly speaking, recent

1 HMSO 1968
2 Parker et al 1977
3 See Pierre and Peters 2005
4 See Klijn 2008: 299–317

governments have attempted to deal with complex challenges by a more sophisticated application of traditional, linear thinking: more analysis and evidence reviews, more detailed strategies and plans, more rigorous performance monitoring.[5] In other words, we retain a centralised, directing policy 'brain'; it is just better informed and more responsive.

Unfortunately, there is much evidence that this approach has had limited success when applied to the twin challenges outlined above: the complexity of the public sphere, and the complexity of the problems government faces.[6] As was clear even in 1968, realising policies in practice involves many different actors joined through interlocking relationships.[7] The important point is that often the way these actors respond to each other does not constitute a 'complicated' system, which could theoretically be mapped and understood, given effort. Rather, it is 'complex', and characterised by rapid change, uncertainty and limited predictability.[8]

This means that an apparently self-contained policy may produce wide-ranging and unintended effects in another part of the public policy system. For example, schedule 21 of the 2003 Criminal Justice Act focused on setting sentencing levels for the most serious crimes. However, as former Lord Chief Justice Lord Woolf has commented, 'the [criminal justice] system strives for consistency not only between people who are convicted of the same offence, but between those convicted of offences in the system as a whole'. Therefore, although the policy focused on a particular goal (sentences for serious crimes), it 'affect[ed] sentencing right down the system'.[9]

But complexity theory offers something more than an explanation of the problems encountered by approaches that base success solely on analysing, planning and controlling. The concept of a *complex adaptive system* reveals credible new strategies for governing.[10]

A complex adaptive system is a dynamic network of many agents, who each act according to individual strategies or routines. These agents have many connections with each other, so they are constantly both acting and reacting to what others are doing. At the same time, they are adapting to the environment they find themselves in. Because actors are so interrelated, changes are not linear or straightforward: small changes can cascade into big consequences; equally, major efforts can produce little apparent change.[11]

5 Jones 2011: 5

6 For an extended account, see Chapman 2004

7 See Ostrom et al 1961

8 Teisman et al 2009

9 Lord Woolf, House of Lords Hansard, 27 May 2010, col 147. http://www.publications.parliament.uk/pa/ld201011/ldhansrd/text/100527-0003.htm

10 See Duit and Galaz 2008 , Boviard 2008: 319–340

11 This definition is taken from many different sources, including: Axlerod and Cohen 1999; Klijn 2008: 299–317; and New Synthesis of Public Administration 2009.

The crucial point is that coherent behaviour can emerge from the interactions between these various actors. This 'emergent' behaviour can arise from the aggregation of actions that, in themselves, are simple; the system therefore produces something greater than the sum of its parts. This chimes with recent findings from political science (see for example Poteete et al 2010) that individuals and organisations have a greater capacity to self-organise than traditional policy analyses would indicate. And, since these actors are adapting to their environments, they are more likely to produce effective ways of addressing the challenges they face.

In other words, it may be most effective to allow the systems in the public sphere to tackle complex problems through the power of adaptation and emergence, rather than attempting to direct and control according to a rigid, preformed plan. This notion has been called the 'diversity hypothesis' (Duit and Galaz 2010): that institutional and organisational diversity is the best way of coping with complexity.[12] A complex governance system may be most able to deal with complex problems. Thus, we can now look at complexity for new insights into how to *enhance* government, rather than just seeing it as a challenge governments have to address.

Encouraging system stewardship

The obvious question is: how can we use these ideas to rethink the institutions and structures of government? But perhaps the first thing to ask is what they suggest about *the way we rethink* institutions and structures.

In broad terms, the way we think about central government organisations still owes much to the 1918 Haldane Report, which addressed the question 'Upon what principle are the functions of Departments to be determined and allocated?'[13] Rather than structuring government functions around particular groups in society, the report recommended 'defining the field of activity in the case of each Department according to the particular service which it renders to the community as a whole'.[14] The idea of organising institutions around abstract functions such as 'Health' or 'Education' was born.

As we have seen, there are reasons to be cautious about addressing complex goals through a top-down design that breaks down the issue into separate parts, each tackling a defined problem as part of a comprehensive and cohesive solution.[15] If the goal is simple and the system well understood, this will be fine; but increasingly this is

12 The diversity hypothesis originated in W Ross Ashby's 'Law of Requisite Variety' (Ashby 1956), which states that a regulator or manager with more flexibility of behaviour will have more capacity to control a system, since 'only variety can destroy variety'.

13 Ministry of Reconstruction 1918: 7

14 ibid: 8

15 Kay 2010: chapters 7 and 8

not the case. Designing departments this way can lead to disruptive reorganisations: a new analysis of 'the problem' can seem to demand a new, abstract design to be imposed on messy reality. As White and Dunleavy (2010) note, in the UK thirty departments were affected by reorganisations between 1997 and 2009, at a cost of at least £15 million for each department created.

Thinking about complex adaptive systems suggests a different approach: identify the kind of behaviours that are likely to be most effective in addressing complex challenges, and then consider how institutions may enable them.[16] I am not proposing that every specific behaviour is mapped, along the lines of standard operating procedures. Rather, I propose that general principles of perception and behaviour should be identified, as a first step to developing institutions that guide (but not specify) how individuals act under conditions of complexity.

For central government, we can identify a set of principles that are likely to be particularly suited to current challenges. They can be grouped under the term 'system stewardship'.[17] System stewardship involves two main tasks: choosing the approach, and oversight.[18]

Choosing the approach

As noted above, a policy is not just made and then executed; it is made and constantly *re*-made by many players interacting in a system. Rather than just being undesirable 'drift' from a plan, the way policy is re-made may produce a better outcome, since actors can adapt to their environment to achieve an overall goal. But system stewards need to have the capacity to judge when to rely on the adaptive power of the system, and when to be more directive. Elsewhere, we have proposed detailed criteria for making this judgment (see Hallsworth 2011).

Oversight

The second task is oversight. Until local accountability flourishes, central government still has a role in ensuring that public policy goals are met. System stewardship involves policymakers overseeing the ways in which policies are being adapted, and attempting to steer the system towards certain outcomes, if appropriate.

Again, we can break this task down into four key aspects. The way that these aspects are realised will depend on the approach chosen; they may be performed in a very directive way. However, for reasons of simplicity I have presented each aspect as if the system steward had decided to take a more 'adaptive' approach.

16 This does not mean I believe institutions are simply aggregations of individual actions. Institutions also shape the behaviour of their members. See March and Olson 1984.

17 These ideas are explored in full in Hallsworth 2011.

18 Although my comments are aimed mainly at central government, system stewards vary according to the policy issue, and can exist at any 'level' of government. Nevertheless, central government is likely to retain responsibility for overall system functioning.

The first aspect is setting **goals**. Both ministers and civil servants agree that a clear sense of direction is essential for good government (see Hallsworth et al 2011). But imposing a set of detailed yet continually shifting goals is likely to be ineffective. If the policy issue is complex, then these goals need to be sufficiently strategic or high-level that they provide shared direction for the system, while also being resilient in the face of the adaptation that is likely to occur. System stewards can also act as 'gatekeepers' for the system, ensuring it is not overloaded with too many specific priorities.

There is also a need to develop **rules**. As Holland (1995, 1998) has explained, actors within complex adaptive systems generally guide their actions by a core set of rules or principles, even if the way their behaviours combine is complex. Therefore, rather than prescribing every action, system stewards may be better off setting a few such 'rules' for actors – who will then act and adapt to further their own self-interests.[19] In government, these rules may include incentive structures, minimum standards, boundaries, and principles to guide action.[20]

System stewards need to receive **feedback** to understand how policies are emerging in practice. More flexible, inquiring modes of monitoring and evaluation will be required in order to capture better the informal feedback coming from the system actors, which can indicate how the system is coping. Central government has to be much more comfortable in searching out experience and ideas, networking, facilitating, and understanding complexity. System stewards will also need to recognise that actors do not need rational plans to be effective. They may rely on learnt ability, informal know-how or *metis*, the 'practical skills that underwrite any complex activity' and upon which formal order often depends.[21]

The final role is that of **response** to this feedback. Increasingly, policymakers are likely to be in the situation of trying to steer a system in the absence of direct control. This could be done through advocacy, changing incentives or prices, influencing citizens, catalysing the spread of ideas, building the capacity of system actors, or creating greater transparency.

System stewardship does not preclude the use of directive approaches and plans from central government. If a planned, directive approach is judged to be best, then it should be adopted. The point is that when choosing an intervention (whatever it may be), policymakers should be thinking in terms of overseeing a whole system, rather than discrete initiatives.

19 See Boviard 2008: 324–325, Rhodes and MacKechnie 2003

20 See Lerner and Tetlock 1999 for evidence that basing accountability on principles, rather than outcomes, increases the cognitive effort put into decisions.

21 See Scott 1998: 331. To see how important this know-how is, consider that actually *obeying* all the rules of an organisation is one of the most effective ways of disrupting it – that is why unions sometimes choose to 'work to rule'.

Rethinking policy actors, institutions and structures

If central government is increasingly in the position of stewarding complexity, we need to reconsider four main aspects of the nature and roles of institutions: the relationship between central and local levels; the balance between stability and flexibility; feedback and learning; and politics.

The relationship between central and local levels

We will need to adjust processes that are based on the notion that the centre's role is to provide 'the solution' to complex problems.[22] Instead, this role should increasingly involve creating the conditions for others (foundation trusts, teachers, businesses and citizens) to deal with problems using innovative and adaptive approaches.

Decentralisation is the obvious corollary of this approach. As Swanson and Bhadwal (2009: 92) explain, Greater decentralisation can help shorten the feedback loops that inform decision-making, so actors can respond more quickly to developments. Lower transaction costs may also make it easier to generate 'open source policy' that includes a greater variety of actors in diagnosing problems and creating solutions.[23]

As noted above, issues may need to be dealt with at different levels of governance. This implies, according to Swinney et al (2011) that it may be helpful to have a diverse range of platforms and actors, such as mayors, with effective information flows between these levels. At the extreme of decentralisation, it may be that non-state actors combine and create their own institutions from the bottom up, leading to more 'polycentric governance' (Jones 2011: 21). There is some evidence (Brondizo et al 2009) that these self-organised systems have a range of benefits, including enhanced innovation, learning and trust, and more equitable and sustainable outcomes. However, they may also present problems of coordination and accountability.

A crucial role for system stewards will be to give the system clear goals. For example, since 2007 the Scottish government has developed a single defined purpose and set of national outcomes. In turn, the relationship between central and local tiers has changed. A 2007 Concordat agreed that the former would 'set the direction of policy and the over-arching outcomes', but 'stand back from micro-managing service delivery'.[24] At the same time, Elvidge (2001: 35) argues, Edinburgh would progressively reduce the proportion of its funding

22 In the following sections, I use the term 'the centre' to refer to central concentrations of power that have traditionally undertaken policy development and direction (for example Whitehall, Edinburgh). Therefore, the term does not equate exactly to central government, since it attempts to exclude those parts of central government which are geographically decentralised and which have traditionally taken direction from 'the centre' for example Jobcentre Plus, Highways Agency).

23 This is different from an 'open source policy' model that simply uses the internet to widen policy suggestions for civil servants to consider, along the lines of an enhanced consultation. See also Bason 2010.

24 See http://www.scotland.gov.uk/Resource/Doc/923/0054147.pdf

to local government that was ringfenced. Rather than councils being directed through multiple performance measures, they would have to work towards a Single Outcome Agreement, aligned to the set of national outcomes, with much greater freedom as to the specific approaches taken.

More fundamentally, the power balance between the centre and the rest of the system may change. Pollitt and Bouckaert (2004) have noted that for various reasons, including New Public Management reforms, 'policy development' has been seen as the responsibility of the former; power and prestige have been focused there. 'Policy execution' has been seen as a menial task to be undertaken under direction by agencies or local government.

This separation is misleading, and always has been.[25] In the future this will be increasingly apparent; the 'real' policymaking, the real power and challenge, may be seen to lie in localities or 'delivery' roles. In contrast, as Kickert et al (1997) have pointed out, the centre will act more as a broker, capacity builder, adviser, arbitrator, convenor, connector, motivator and facilitator of others' collaborations. Some of the changes that will be required to fulfil these roles are given below.

The stability–flexibility balance

How can stewards be part of the system yet supervise it? Continuity through stewardship and change through adaptation seem to be in conflict. And so they are: reconciling the demands for flexibility and stability is seen as the 'fundamental tension' in applying complexity thinking to governance.[26] Whitehall in particular needs the capacity to both adapt to new challenges, and also to provide attentive, constant oversight of a system.

Recent years have seen attempts to tackle institutional inertia in central departments. There has been a move to flexible policy 'pools', which can allow resources to be deployed more quickly to emerging priorities, rather than leaving them locked into standing teams (Hallsworth et al 2011). However, so far it seems that governance of these pools is not yet adequate: resource allocation, overall departmental objectives and policy commissioning are not fully aligned. We have proposed (Hallsworth and Rutter 2001) that one solution may be to create a departmental 'policy director', who works closely with the minister to commission policymaking within the department, thus breaking the inertia created by directorates-general.

The problem, of course, is that the logic of flexible policy pools encourages us to see the role of the centre as launching a series of individual projects, not overseeing a system. Therefore, the stability

25 See Hallsworth 2011

26 See Duit and Galaz 2010, Chapman 2004: 61

function also needs to be enhanced. Officials at the centre need to be able to build up expertise, judgment and relationships in a particular area. They also need to ensure their area is resilient to the sudden, unexpected events that complex systems can produce. This can be done through horizon-scanning, scenario-planning, foresight exercises, prototyping, systems mapping, computer-based modelling, and maintaining a sophisticated understanding of how the system is developing.[27] These are not just defensive manoeuvres: as Boyd (2001: 2) suggests, systems that are resilient enough to respond to unexpected events can also use the opportunity to innovate and open up new future paths.

But current career structures limit the incentive to carry out these functions, since success is equated to the number of people one manages, not the expertise one possesses.[28] New ways (perhaps alternate career paths) are needed for rewarding those with relationships, expertise and experience in one area, as happens for 'individual contributors' in the private sector.

Feedback and learning

When dealing with complex problems, the most effective setup is likely to be the centre helping local areas to exploit their knowledge and adapt to their experiences, rather than the centre identifying the 'best' solution and training others to adopt it. This is not a new idea; Donald Schön proposed it some 40 years ago in *Beyond the stable state*. Schön (1973: 28) claimed that in response to increasing uncertainty, it is not enough to keep intervening to modify institutions; rather, 'we must invent and develop institutions which are "learning systems"', which are 'capable of bringing about their own continuing transformation.' This task has never been more pressing.

The problem is that one of the main learning mechanisms, policy evaluation, does not function very well.[29] Most politicians and civil servants doubt whether Whitehall learns from evaluations: lessons often do not feed back into policy design or problem formulation. In other words, evaluations are often commissioned but equally often ignored. One principal reason is that evaluations are usually commissioned and managed by the same department that carried out the policy. This can lead to departments setting a narrow question that reduces cross-government learning, and 'toning down' critical yet useful findings.

So, there is a case for departments losing their monopoly on commissioning evaluations. Instead, they would have to negotiate with a central evaluation function. This does not mean that all evaluation would be centralised, since this can impede learning. Rather, this central function would have three sub-functions. First, overseeing or auditing

27 See Mulgan 2009; Sharpe and Van der Heijden 2007; Lempert et al 2003

28 See Hallsworth et al 2011

29 These conclusions and recommendations are presented in Hallsworth and Rutter 2011.

the quality of evaluations commissioned by departments. Second, running a process of open commissioning, which would take bids from evaluators to assess policies; this would open out the task of learning and encourage innovation. Third, commissioning 'lessons learned' exercises in cases of exceptional policy failure. Some of these could be public, like the recent report (IMF 2011) by the International Monetary Fund's Independent Evaluation Office on the IMF's role in the run-up to the financial crisis.

Politics

Perhaps the most fundamental change will need to come from political actors and institutions. Currently, politics in the UK is founded on an adversarial model where each side offers a competing solution that is presented as if it is guaranteed to solve a problem totally. Insights from complexity suggest that this is both implausible and counterproductive. Rather than solutions, 'policies [should] be treated as experiments, with the aim of promoting continual learning and adaptation in response to experience over time', as John Dewey (1927) put it 85 years ago.

If politics were to draw on complexity thinking, there would be recognition that there is inherent uncertainty in how policies turn out – not because the policies are 'bad', but because success often lies in how governments adapt to the unanticipated effects their own actions produce. But currently all the focus is on whether 'the policy' was 'right', and adaptations are pilloried as 'U-turns'. Of course, this does not excuse ineffective planning: governments should plan for anticipated future conditions; the point is, as Swanson and Bhadwal (2009: 15) warn, the *un*anticipated ones are likely to increase in frequency and impact.

In a sense, though, abandoning attempts to say there is a single, coherent and certain plan for success is an innately political stance: it recognises there are a range of incompatible perspectives, values and priorities that are addressed (and missed) by any solution. To govern may be to choose among these partial solutions; but their very partiality should give politicians greater freedom to modify them according to the feedback they generate.

Indeed, it may be that we should abandon the idea that policies need to be entirely coherent in order to be successful. While an adversarial political system encourages us to see policy choices in a binary way, it may be, as Verweij and Thompson (2006) have argued, that we actually need 'clumsy solutions for a complex world'. This concept, drawn from the work of anthropologist Mary Douglas, suggests that successful policies are ones that appeal to four mutually incompatible 'cultural frames' (hierarchical, individualistic, egalitarian and fatalistic), not the ones that coherently adopt just one of these perspectives. The same may be true of our institutions.

Conclusion

Theories of complexity offer new ways of thinking about government and governance. Not all areas of government activity are complex, and for those areas that are not, a more traditional, directive approach is likely to be best. But these areas are often not where the most pressing challenges lie. The insights from complexity can help where other approaches are failing, and here there is a strong case for governments using them.

But not *over*-using them. Adaptability should not be seen as a panacea for complex problems. Organisations can be *over*-sensitive to feedback, and thus fail to recognise that a lack of expected response does not mean failure – it can just be another example of how complex systems do not respond as expected. The action may actually be effective, but, as March (2003) asserts, 'adaptive organisations are likely not to repeat the action, thus failing to accumulate the competence and experience that would reveal the true value of the action'. The process of applying complexity to government should itself be one that proceeds by experimentation, adaptation and learning.

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4.

MANAGING COMPLEXITY IN FINANCIAL MARKETS

GREG FISHER

The dominant approach to economics and finance in the west advises freeing up the financial system to allow 'the invisible hand' to guide the services provided by financial institutions. The important role of allocating society's capital is conducted through the provision of a number of these services so that savings products are directed to investment opportunities. Broadly speaking, market liberation has formed the core of successive governments' approaches to the City since Margaret Thatcher gained power in 1979, including the Labour administrations of 1997 to 2010. In the UK, regulation by the Financial Services Authority was, and remains known as, 'light touch'.

Moreover, since the financial crisis began in August 2007, many exponents of free markets have argued that the crisis was due not to liberated financial markets but to bad public sector policies, including lax monetary policies and the implicit subsidisation of mortgage providers in the US, including by Fannie Mae and Freddie Mac. Is this 'external fault' claim fair or is a largely private financial system *inherently* volatile? Should we expect volatility even without undue government influence?

Financial crises are not new after all. In 2009 Carmen Reinhart and Kenneth Rogoff published an acclaimed book that looked at financial crises over the past 800 years or so. In it, they sought to ascertain whether past instances of financial crisis had been the fault of governments. Were governments responsible for 'Tulipmania', the 'South Sea Bubble' and the 'Dotcom Boom'? According to Reinhart and Rogoff (2009), they were not primarily responsible. So who or what was?

The purpose of this chapter is to draw on new economic thinking and fresh areas of research to ask if we can we learn anything new about how the financial system operates in order to answer these questions, and better inform public policy concerning the financial sector. The three main areas of research highlighted in this chapter are network theory; its 'sibling' field of study, complexity theory; and research conducted by David Tuckett, a psychoanalyst at University College, London. I will draw out some key principles from each, to help us better understand the world of finance.

It is important to state from the outset that any criticism of the application of pure free markets to the financial sector does not necessarily lead us, in the words of a colleague of mine, to the conclusion '… therefore socialism'. Like the financial sector, national governments have a chequered record with respect to resource (including capital) allocation. Indeed, as argued in chapter 13 in this collection written by Adam Lent and myself, the same body of work that allows us to question the application of free markets to finance also warns against centralised state intervention. In a nutshell, it emphasises the need for a much smarter form of government.

Market psychology

An important lesson from the new fields of complexity and network theory is that it is preferable not to start with a hypothesis and then to test that hypothesis against empirical evidence. Rather, we should work from the level of the group upwards in order to understand a whole system. This is best done by starting with an empirical appreciation of what is going on, on the ground, right now, and working from there.

This is the approach taken by Professor David Tuckett of University College London in a recent study (2011) on the behaviour of financial markets. In 2007, Tuckett interviewed 50 investment managers in New York, London and Edinburgh with an eye to getting to grips with exactly how investment managers make sense of their working environments and make decisions.

When, during the pilot interview phase, he started to formulate the questions he would ask in his main interviews, Tuckett quickly came to the realisation that orthodox approaches to finance were not particularly helpful. There seemed to be a wide gap between conventional theory and how investment managers made decisions in uncertain environments. So the questions he asked were on the whole outside the realm of orthodox finance (including behavioural finance) and were instead designed to develop an accurate picture of how investment managers made sense of the world and made decisions under conditions of uncertainty.[1] Tuckett came to the conclusion that 'once uncertainty is properly included [in economics and finance] just about everything changes' (Tuckett 2011: 12).

After conducting his fieldwork, Tuckett developed a framework based on concepts from the field of psychoanalysis, which suggests that investment managers make sense of the present and the potential future through the use of *narratives*. An example of such a narrative would be 'Greece has a history of fiscal mismanagement; it is in the process of

1 The word 'uncertainty' is used here as distinct from the word 'risk'. Uncertainty involves the important idea that in constantly evolving systems, and in systems involving reflexivity (both of which are features of social systems), the future is inherently impossible to predict.

defaulting; and it will take the European financial system with it' (note how the past, present, and future are combined in a coherent 'story').

In today's world of finance, there is too much information for any one individual to process and, within constantly evolving systems, there are many plausible future scenarios at any given moment in time. Yet, this reality sits in stark contrast to conventional economic thinking, which allows for only one future scenario to be expected to transpire, a scenario that ought to be identifiable with enough information. Narratives allow investment managers to organise a mass of information about the present and also potential futures in a coherent way. Importantly, the process of narrative formation involves human emotions and the subconscious: people are often hardly aware this is what they are doing.

The idea that people use narratives to make sense of both the world we live in and the possible future in order to make decisions is not new. There is a deep literature on this subject in the fields of psychology and psychoanalysis. The novelty of Tuckett's study is that it uses this framework to understand financial markets. He also incorporates a number of psychoanalytic 'bells and whistles' into his framework to illustrate how, at times, investment managers can collectively tell themselves stories that are ultimately implausible. Concepts such as 'phantastic objects' and 'groupfeel' are combined in a framework – which he appropriately terms 'emotional finance' – that gets to the psychological heart of asset price bubbles and crashes.

To readers not familiar with orthodox financial theory and to those with experience of real financial markets, this might sound blindingly obvious. But orthodox financial theories, including modern portfolio theory, the capital asset pricing model and the efficient market hypothesis, are a long distance from the reality Tuckett describes in his research. This is not a trivial, theoretical point: financial policies are heavily influenced by these orthodox approaches to finance, meaning that our financial institutional arrangements are built on deeply unreliable models.

The framework outlined in Tuckett's book indicates that financial markets are in large part about a portfolio of competing narratives concerning the present and the future.[2] The dominant narrative in the market at any one time, which we might call 'market sentiment', changes through time. And new narratives emerge, unpredictably, over time. To visualise this process of *emergence* (an important concept in complexity theory), we can think of a large inflatable ball released into a crowd at a concert. The ball will move around unpredictably: over time everybody will influence the direction of the ball but no one individual will have full control over

2 Note that while his work focuses on investment managers, there is strong reason to believe that Tuckett's framework is applicable to the whole financial system. However even if it were not, in this chapter I focus on the financial intermediation role of the financial system; that is, the channelling of savings to investment projects, in which investment managers clearly have the most important role.

its movement. The direction the ball is travelling in is *emergent* and inherently impossible to predict.[3]

By contrast, the building blocks of orthodox economics and finance are deterministic, which means that with enough information, the direction of the ball ought to be fully determinable. Clearly, this is not true. It is a fundamental flaw in conventional thinking in both finance and economics.

So what? This research sounds rather abstract and esoteric. What does it mean for our understanding of the financial system? And what does it mean for public policy concerning the financial system? There are three implications I would like to highlight here.

First, using Tuckett's framework as a building block for our understanding, we can see more clearly that the financial system is a great deal more volatile than orthodox financial theory would have us believe. But it is important to appreciate that this work emphasises that the financial system is *inherently volatile*. By contrast, a lot of the analysis of the financial crisis has looked for causal factors that are *external* to the financial system. For example, as noted above, many people have tried to lay the blame on imperfect (or even too much) government regulation and central bank monetary policy as the 'causes' of the crisis. Tuckett deals with these perspectives in his book: this framing implies that investment managers had no free choice, which of course is simply not true. Many of them chose to participate in the boom through buying collateral debt obligations, credit default swaps, and other exotic instruments, which they could have chosen not to buy. This is not an argument that governments were blameless, it merely emphasises that arguments laying all blame on governments are flawed. Volatility appears to be endogenous in the current financial system, it is not only imposed on it from outside.

The second implication is about the distribution of income and wealth caused in part by market volatility. Currently, the reward structures determining how City employees are paid make the financial system look like a lobster pot, allowing lots of money to seep in during good times (typically drained through profits and bonuses) but returning very little during bad times. Contracts reward investment managers handsomely when the markets move in their direction (hedge funds have typically charged 2 per cent of assets under management plus 20 per cent of all profits made). But with the exception of a minority of contracts which include a 'watermark' that allows investors to recoup losses, these profits are typically not given back when returns are negative or below

3 This metaphor of a ball at a concert is useful for visualising the concept of emergence. To be clear, and stepping back from this metaphor, the key characteristics of emergent phenomena are: (i) they are unpredictable; (ii) they are systemic; and (iii) the sum of the whole is different to the sum of the parts. In addition, system-wide emergence often feeds back on the agents from which the phenomenon emerged, influencing them and their interaction with other agents.

benchmark. Not only are rewards asymmetric, but also, when market oscillations are particularly extreme – as in recent years – the taxpayer has to step in to rescue the whole system.

The combination of this asymmetric reward system and inherent volatility is a dangerous one. Over time, it leads to a cross-subsidisation of City employees by taxpayers. Given the recent boom and bust, future taxpayers will have to pay higher taxes to fund the recent borrowing that was required to rescue the financial system. These future taxes will therefore, in effect, fund the bonuses earned during the recent boom. It is also noteworthy that investment managers are largely not to blame for these asymmetric returns – their clients are. In addition, it is only since the 1980s that financial market participants have been rewarded such substantial sums. Before then investment managers were paid well but not to the degree we see today. The system-wide effect of market volatility combined with asymmetric rewards has been to augment inequality in society.

The third implication of Tuckett's work concerns the allocation of capital and other resources in society. The mixture of human psychology and free markets does not necessarily lead to an optimal allocation of capital over time. Put another way, and oversimplifying for effect, Tuckett's work suggests that capital allocation via the private financial system is at the whim of the market. A lengthy discussion of this important subject is beyond the scope of this chapter but there are three aspects worth highlighting here.

First, if uncertainty in dynamic networks increases the further we look into the future, it is inevitable that the private financial system will focus on 'less uncertain' (that is, shorter) time horizons. This point has been well rehearsed. However, it is worth noting that the new fields of complexity and network theory add further legitimacy to this point because they help us better understand the nature and prevalence of uncertainty in human systems.

Second, booms and busts, which appear to be inherent in financial systems like that of the UK, have historically involved an enormous misallocation of resources. As is well known, when prices rise production increases (subject to the elasticity of supply). When this happens as a result of misallocation, the consequences are to be expected. There is now, for example, a sizeable glut of housing in the US, built during the recent property price bubble. Interestingly, there was no counterpart rise in UK housing because particular supply-side factors make the market sclerotic, which creates its own serious problems.

Finally, recessions typically follow financial crashes, leading to an underutilisation of resources, notably labour. Hence it is usual for unemployment to increase in the immediate aftermath of a financial crisis, as has been demonstrated in the US and UK since 2007. The

financial and emotional cost of recessions to individuals is clearly enormous. That this outcome can occur calls into question the very notion that financial markets and the optimal allocation of capital go hand in hand.

The financial system as a network

There has been a flurry of work in recent years, following the financial crisis, looking at the financial system as an integrated network. This work is very important and it is likely to help us redesign our institutional arrangements to make the financial system safer.

Historically, the approach taken by many academics – and subsequently adopted by policymakers – has been to view financial institutions as relatively disconnected from each other. This is typical of orthodox approaches in both economics and finance, which emphasise individuals at the expense of understanding the interaction of, and adaptation by, constituents of the system. The new fields of complexity and network theory are helping to redress this imbalance but, as often happens in academic and policy circles, these new disciplines are meeting with resistance from established figures, despite their relevance and consistency with empirical evidence.

While the use of network theory, complexity theory and computer simulations in finance is relatively new, the fields themselves are not. There have been several decades of work in these areas, however most of it has been in the natural sciences. During this time these subjects have reached a useful stage of maturity, and a number of social scientists have begun to use the material in their own field of study.[4] New conceptual toolboxes are helping us to make better sense of integrated systems that are constantly evolving, including the financial system.

The key implication of looking at the financial system as a network is that we become more aware of various types of **network effects**,[5] and this awareness can help us to design policies that might eliminate or mitigate the detrimental types of such effects. A useful concept in such approaches is a **global cascade**, which can be thought of as a system-wide domino effect. We saw something like this in the global financial system after the US money markets seized up in August 2007. That seizing up was a key moment in the financial crisis because it led to ripple effects, which became increasingly amplified, ending in what was almost a full-blown financial crisis in September 2008. Examples

4 To help tease out the academic work in these new fields and to bring this new material to bear on policy questions, Paul Ormerod and I recently set up a thinktank, 'Synthesis': see at http://www.synthesisips.net.

5 For a clear articulation of the significance of network effects in social systems, including a contrast with conventional 'incentive' approaches to policy formation, I would recommend a book by my colleague, Paul Ormerod, entitled *Positive Linking: How Networks and Incentives Can Revolutionise the World* (Faber and Faber, 2012).

of network effects in nature are the spread of contagious diseases and forest fires.

The argument goes that by appreciating (and modelling) the financial system as a network, we can begin to build forms of 'fire breakers' to eliminate or mitigate these global cascades because we understand the interconnected, interdependent nature of the system much better. It might also be possible to identify ahead of time which institutions are 'too integrated to fail', allowing us to design policies, including capital requirements, that reflect the risk of particular institutions.

So there is cause to be optimistic because these new fields of study are increasingly being applied to financial regulation. However, these same disciplines also emphasise some general warnings about trying to regulate, or control, highly complex, integrated and fast-moving systems like the world of finance.

First, the financial system is not static, it is a **dynamic network**. The difference between these two is enormous. The constituents of dynamic networks constantly adapt to each other – they **co-evolve**.[6] This includes the regulators and the regulated institutions. The most important implication of viewing the financial system as a dynamic network is that it emphasises how the future of the system is inherently unpredictable. That said, by understanding the system better, for example by treating it as a dynamic network, we can respond more sensitively.

A useful phrase to describe particular types of dynamic networks is that they are **robust yet fragile**: some shocks to the network will be absorbed by the system but other shocks might destabilise it in a way that is detrimental to all. Importantly, it is impossible to know for certain what shocks will be absorbed by the system (robust) and which will create types of detrimental global cascades (fragile).

Clearly, if the future of the financial system is inherently unpredictable, this creates serious problems for any attempt to regulate it. It means that regulators, who design the regulatory rules of the game, will struggle to predict with any degree of accuracy how financial market participants will react to new regulations. We should not overemphasise this point, however. It is not an argument for no regulation, rather it warns against being overconfident that regulations can solve all ills.

A second warning relates to attempts to model the financial system as a network. These approaches have tended to focus on network effects following some shock to a single institution within the system. Given an 'idiosyncratic shock', does the system prove robust or fragile? Here Tuckett's work has an important insight: it points to a form of *systemic* volatility that is inherent in the whole system. Given this inherent volatility,

6 Complexity theorists have defined co-evolution as 'the change of an object triggered by the change of a related object'.

which has been clearly evident in recently years, it is unlikely that fire breakers designed to mitigate global cascades will be sufficient to prevent some full-blown financial crisis. Fire-breaker-type regulation will probably make the system more robust but not completely so. The contemporaneous example is Greece: if Greece defaulted in such a way that a Europe-wide financial crisis was viewed as inevitable, it is unlikely that regulatory fire breakers would prevent a Europe-wide financial crisis. A commonly held narrative, which is not the same as a 'rational expectation', can overpower a financial system.

The recent work attempting to map the financial system as a network is clearly a move in the right direction. However, the fields of study that gave rise to this new work also provide a number of important warnings about the ability of regulators to use policy tools to overcome the financial system's inherent volatility.

Overcentralisation of the financial system

While the two preceding sections are based on new academic research, this section is more speculative. It is largely based on my own interpretation of network and complexity theory, my own experiences of the financial system,[7] and an interesting case study.

In a speech given in March 2010,[8] Andy Haldane, executive director for financial stability at the Bank of England, noted the following:

> 'Economies of scale appear to operate among banks with assets less, perhaps much less, than $100 billion. But above that threshold there is evidence, if anything, of *dis*economies of scale.'

To provide context to this figure of $100 billion, the average asset holdings of the four major UK banks at the end of 2008 was about $3,100 billion, approximately 30 times greater than this apparent threshold.

Why then is the UK (and global) financial system made up of relatively few, and very large, financial institutions? Why is it so centralised? And do the new fields of study discussed in this chapter have anything to say about the concentration of capital allocation in British society?

A core reason why the financial system has gravitated towards centralisation is that our models of how the economy and organisations work lead us to this outcome. Orthodox approaches to economics and management science have been based on a mechanistic view of human systems in which the world is also seen as static. Within such approaches, economies of scale are feasible and the objective of the organisation is that of efficiency. Resilience is underemphasised because

7 I worked at the Bank of England for nine years until 2004 and in a global macro hedge fund for three years until 2008.

8 http://www.bankofengland.co.uk/publications/speeches/2010/speech433.pdf

the world is not expected to change. Moreover, these approaches also lead to 'best practice' and 'one size fits all' outcomes, which make dealing with idiosyncrasies very difficult.

The real world, however, is constantly evolving in ways that are inherently unpredictable, and this means that resilience is important at the individual, organisation, and whole-system levels. And idiosyncrasies matter more than is appreciated by orthodox thinking in economics and management science: systems that rest on centralised control tend to be insensitive to local conditions. What all of these points indicate is that the British financial system is overcentralised and lacking in resilience.

All of this sounds very abstract, so let's focus on an example. During the Swedish financial crisis of the early 1990s, Svenskehandel Bank (SHB), Sweden's largest bank, outperformed its peers. Its loan default rate rose during that crisis but it seemed to fare better than most other Swedish banks. In 2008, the SHB's board asked Volterra, a consultancy run by Paul Ormerod and Bridget Rosewell, to investigate whether this outperformance was due to its operational model, or something else.

SHB ran a relatively devolved banking model, giving its branch managers, and the loan officers in those branches, much more autonomy than is typical in the banking industry. Loan officers use not only quantitative information about a client, they also use tacit information and informal communication networks to build up a better picture of the client and the context in which they are operating. The responsibility for the decision to make a loan resides with loan officers – the decision is not based on a tick-box approach in which head office has the final say.

Volterra's investigation, which made use of computer simulations, concluded that it was probably SHB's devolved operational model that allowed it to be more resilient during Sweden's financial crisis of the early 1990s. This conclusion was soon put to the test in 2008 during the global financial crisis – SHB's operational model once again proved itself resilient relative to its peers.

If it is true that the British financial system is overcentralised, what are the policy implications? Should the government legislate to force a break-up of the banks? Interestingly, here the arguments for such a break-up are subtly different to traditional arguments based on 'too big to fail' and 'too interconnected to fail', which are about the systemic risk posed by single institutions. An important question here is whether banks will, in due course, see that devolved models, like that of SHB, make sense from a commercial point of view: the banks might get there by themselves. Personally, I am not convinced they will in anything but the longest term because the orthodox, machine-based view of organisations is so entrenched in the business and finance world. I therefore lean towards either forcibly breaking up the banks or creating

significant disincentives to scale. However, I would like to see a great deal more research done before we chose this route as a nation.

Conclusion

This chapter has included a whirlwind tour of some of the new thinking coming out of complexity and network theory, as well as the work of David Tuckett. Justice cannot be done here in such a short space to the depth and importance of these new approaches to understanding the financial system, and the implications for government policy.

An underlying theme of this chapter has been to suggest that it is questionable whether, in the presence of psychological effects highlighted by Tuckett, free markets should be the dominant means through which our society allocates capital. The theoretical underpinnings of free market theory involve the exchange of goods and services in one or two periods of time. This is some distance from decision-making about abstract investment products in dynamic systems, under conditions of uncertainty, involving (emotional) human beings and long time horizons. When we combine these issues in a conceptual framework, we can legitimately question the dogma of applying free markets to the financial system.

As a result of this analysis, I propose the following options for policymakers. One relates to the economics research profession, the rest to wider policy considerations.

First, serious thought should be given to creating a UK Sovereign Wealth Fund (UKSWF). If the private financial system is inherently volatile and focuses on 'less uncertain' (that is, short) time horizons, there is an argument that society ought to find additional means to allocate capital. A fund could be set up that allocates savings to longer-horizon investment projects that are in the long-term interests of the UK including infrastructure projects such as a national ultra high speed broadband network, and investment in the sustainable power industries. This fund could also operate counter-cyclically, to add to the tools available for dampening the economic cycle.[9] To stress again, any UKSWF should be sheltered from short-term political interests in the same way that the Bank of England is, while being held accountable to elected politicians.

Second, there is a need to expand and enhance the UK's fledgling social investment market. Research by NESTA published in 2011[10] indicated that there is demand among investors and potential borrowers for financial products that went beyond profit maximisation, which were

9 In early 2011, Lord Skidelsky called for the creation of a National Investment Bank, to act counter-cyclically. The core purpose of a UKSWF would be to ensure society's capital is allocated better over the long term but it could also play a counter-cyclical role, along the lines suggested by Lord Skidelsky.

10 See http://www.nesta.org.uk/home1/assets/features/new_research_maps_supply_and_demand_for_social_finance

pro-social and pro-environmental. This alternative market is unlikely to emerge incrementally; it would require support, notably in the regulatory, legal, and institutional realms. However, such a market is likely to facilitate capital being channelled to smaller projects, where society deems it most necessary, and away from large-scale mistakes.

Third, the government should convert the Royal Bank of Scotland (RBS) into a 'local bank' through a new corporate charter combined with a strong board and the state maintaining a 'golden share'. As stated above, a devolved banking model appears more resilient and more sensitive to local conditions. RBS could be deliberately designed as a local bank along the same lines as SHB in part to demonstrate this model to other retail banks.

Fourth, retail banking institutions should be taxed on the basis of their size by making the current levy progressive (in other words, higher levy rates with greater size) and – given the size of UK banks at present – much bigger (it only raises about £2 billion at present). There are no strong arguments for having large retail banks in the UK. London's comparative advantage is due to wholesale markets, investment banking, and investment management. Our position as a global financial centre will not be affected if the UK's retail banking industry were made up of local and regional banks. Moreover, there are clear competition arguments for creating an industry made up of, say, 100 small and medium-sized banks rather than a handful of large banks. The best and most obvious way to achieve this is through taxation: tax size, progressively.

Another way of looking at this policy idea is through the metaphor of insurance. Following the crisis, it is now blatantly obvious that the government will rescue large banks that get in to trouble (the government in effect plays an underwriting role). So why not force banks to pay a fair insurance premium? Smaller banks, which by their very nature will not be too big to fail, should not pay a premium (but they would still pay corporation tax). Any argument that suggests the UK's retail banking industry would move offshore as a consequence is nonsense. The industry is immobile (which is not true of wholesale activities). Taking calculations from the Bank of England, the Vickers' Commission report, and the Corporation of London, in its current state the banking system's total levy would probably have to rise to around £20 billion. Importantly, this should be a tax on large retail banks, not on the whole City of London, and could reduce to zero if all UK retail banks were below a particular size, in line with the economics of the insurance provided.

Fifth, regulators should rethink the use of mark-to-market (MTM) accounting principles. The use of MTM in valuing assets (financial and real) presupposes that market prices are a 'true and fair' reflection of

their inherent value. The analysis set out above seriously questions that presupposition. It is questionable whether inherent value means anything when it comes to asset prices, which seem to be driven by emergent and volatile processes. We therefore need to soberly reassess whether MTM accounting should be used and, if so, under which circumstances.

Finally, it is time to redirect research funding from orthodox approaches towards finance to work looking at the financial system as a dynamic, integrated network. This is directed at all those funding such research. We have looked at some of this new work in this chapter but there is still a great deal to be done. Most of the research in the financial sphere still uses a naïve form of 'agent rationality', which is some distance from the psychoanalytic work of Tuckett and most of it is based on mathematical models that seek analytical solutions, rather than computer simulations of dynamic networks. Research funders and policymakers ought to support a paradigm change that is struggling to emerge in economics and finance. The value in doing this is to assist the government and the financial system itself to help that system become more resilient and less risky for the economy.

Whatever caused the financial crisis needs to be better understood. We need to allocate more of the country's resources to understanding what went wrong, and it seems reasonable that such research does not all come from the taxpayer. The City should create a pool of funding for new research into the financial system. I propose that the City of London creates an endowment of around £300 million, modelled on NESTA, to support this process.

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5.

BUSINESS REFORM: TOWARDS AN EVOLUTIONARY POLICY FRAMEWORK

GEOFFREY M HODGSON

Evolutionary economics represents a broad stream of thinking. Although it lacks a single theoretical core or policy approach, it involves a large global network of researchers and constitutes one of the most important challenges to mainstream thinking, particularly in microeconomics.

Evolutionary economists emphasise that modern economies are in constant change, and their dynamism is powered by technological and organisational innovation. They stress the complexity of modern economies, the radical uncertainty pervading economic life, and the limited computational and cognitive capacities of the human brain. Human agents are thus obliged to rely on habits or prevailing rules when making decisions. These standpoints are in stark contrast to assumptions in mainstream mathematical models of the economy such as the rational expectations hypothesis, which assumes unrealistically that all agents have a tractable understanding of how the system works, and there is no radical uncertainty concerning the future. There is also a divergence with the equilibrium orientation of mainstream economics: evolutionary economists instead emphasise continuous, complex processes of transformation and diversification.

A seminal text for modern evolutionary economists is Richard Nelson and Sidney Winter's *An Evolutionary Theory of Economic Change* (1982). Earlier inspirations include Alfred Marshall (1890), Thorstein Veblen (see Camic and Hodgson 2011), Joseph Schumpeter (1934, 1942), Edith Penrose (1959), plus Nobel laureates Herbert Simon (1957) and Friedrich Hayek (1967). While there is a common emphasis on continuous change, there is a diversity of policy as well as theoretical perspectives within evolutionary economics.

Evolutionary economics differs from mainstream economics in style as well as theoretical substance. While there is a role for formal theoretical models, evolutionary economists place more stress on discursive (or what Nelson and Winter (1982) call 'appreciative') theory. For reasons outlined below, economic theory overall has to be more sensitive to historical and conjunctural specificities.

Given the diversity of theoretical and policy perspectives within modern evolutionary economics, I shall not attempt to review them all here. Instead I shall lay out some core ideas of the kind of evolutionary approach that I favour and show how they impact on current policy debates. I call my approach 'Veblenian' because – like the American economist of Norwegian descent – it emphasises the importance of:

A. understanding human psychology in terms of ingrained habits rather than a rational brain of unrealistically immense computational and deliberative capacities
B. understanding that habits and business routines act as repositories of knowledge, and that learning and knowledge are drivers of economic development
C. understanding that human motivation is complex and context dependent, and it involves elements of moral motivation as well as self-interest (Hodgson 2012)
D. understanding that legal and other diverse institutions make up the essential fabric of all economic interactions
E. understanding that markets themselves are institutions and depend on contingent and historically specific institutional rules, as well as other social institutions
F. the general suboptimality of economic arrangements, resulting from unavoidable institutional rigidities, imperfections and historical path-dependence (North 1990)
G. the impact of Darwinian thinking on our understanding of human capacities and evolutionary processes (Hodgson and Knudsen 2010).

While the above ideas can be found in the writings of Veblen, they are also shared by other thinkers. Considerable additional inspiration is also taken from them, including the names mentioned above.

Although the above stipulations are rudimentary, they break away from the tired old debate between socialistic central planning and neoliberal unfettered markets. The complexities of real economies alongside the limited deliberative capacities of the human brain greatly limit the scope of rational central planning. Obversely, the fact that modern economies are ingrained with typically suboptimal institutions means that there can be no such thing as a fully free and unfettered market system. Full appreciation of the seven points above, in the light of 20th-century experience, leads to some kind of mixed and internally diverse economy. The tired old debate is transcended: instead we address the institutional detail of feasible mixed economies, where there is demonstrably a wide range of choices and possibilities.

This chapter compares an evolutionary approach to industrial and business policy with standard mainstream views. Using evolutionary ideas it outlines an alternative perspective, challenging the prevailing orthodox theories of the firm that place more emphasis on outside

market conditions than the internal organisation of the firm itself, and their focus on equilibrium outcomes which underestimates the existence and role of diversity in the real world.

Firms and industries in mainstream economics

Mainstream economics typically has three major deficiencies in dealing with business firms and industries. First, with some important exceptions such as Ronald Coase (1937) and Oliver Williamson (1975, 1985), the firm is treated as a 'black box' or 'nexus of contracts', neglecting its internal organisation and often treating it as if it were a single individual or entrepreneur. Although, to their credit, Coase and Williamson opened this 'black box' to look at contracts within the organisation, they ended up blurring the boundaries between the firm and the market. Another problem is applying the same model of 'opportunistic' or self-seeking 'economic man' to the different institutional and cultural contexts of the firm and the market, ignoring the way in which an institutional and cultural context can help mould individual cognitions and aspirations. Processes of structured, interactive and collective learning within organisations are also downplayed.

Second, when analysing collections of firms in the same industry, mainstream economics often resorts to oversimplifications, such as assuming all firms are identical, or treating the industry as a whole through the singular device of the 'representative firm'. Consequently, the importance of internal variety in an industry, and its consequences for competition, innovation and growth, is given insufficient attention (Penrose 1959, Nelson 1991). In reality, firms and their products are hugely diverse, and although many products are substitutes, much of a business' strategy involves the creation of distinctive products and new market niches.

Third, mainstream analysis typically assumes fixed production functions that generate cost curves for firms, and then tries to establish (industry and firm) market equilibria. This overlooks the innovative dynamism and restlessness that is characteristic of much capitalist industry (Schumpeter 1934). By analysing unrealistically each firm as if it were facing slowly changing and non-turbulent market conditions, the constant energetic struggle of each organisation to adapt and survive is given limited importance. By treating each industry as if it were in or close to equilibrium, the core dynamic of modern capitalism is excluded from the script. The equilibrium orientation of mainstream theory implies a static world where relative inefficiencies have been eliminated. But in reality competition is more haphazard: many suboptimal firms can endure and turbulent market conditions can sometimes bankrupt relatively efficient firms. The haphazardness of competition ensures a surviving diversity of firms.

To a large degree this is fortunate, because financial and product market conditions are everchanging, and firms that are fit for one market

environment are not necessarily as fit for another. If all firms were close to optimal for one set of conditions, then a small change of market circumstances might make them all much more vulnerable. By contrast, real-world diversity increases the chances of survival in varying conditions.

These mainstream theoretical deficiencies distort industrial policies in a number of ways. First, there is an overemphasis on prices, costs and markets, which are really only part of the story. Cost-cutting is only one of several possible strategies for a firm. Many successful firms build up market share not by cutting costs but by diversifying or innovating distinctive products that outperform their rivals. Market competition based on prices cannot be relied upon to ensure the competitive selection survival of the more efficient firms.

Second, there is often a primary focus on entrepreneurship and leadership in firms. The modern myth of the invincible entrepreneur has bloated a high-salary culture where new leaders are brought into organisations with expectations of performance as unrealistic as the towering scale of their remuneration. Although entrepreneurship and leadership are very important, managers often overlook the importance of ingrained and routinised knowledge in the organisation, and the dangers of destroying what has been learned through reckless restructuring from the top. The importance of team-building and collective effort can also be downplayed, as well as the way in which the organisation can use and enhance cooperative dispositions among the workforce. All successful firms rely on teams as well as individuals.

Third, the individualist and market-oriented bias of much mainstream-inspired policy underestimates the importance of the growth and adaptation of each firm. Every new firm must go through a complex and difficult process of organisation-building before it is able to compete fully and effectively in the market. It may require access to finance from a banking system with sufficient intimate industrial knowledge to appreciate the uncertainties, and to back suitable ventures. The firm itself requires a team of skilled management personnel that can organise and divide the tasks, while retaining a common and mutually understood purpose, rather than solitary entrepreneurs with plenty of untested vision but a deficit of interpersonal management skills. Furthermore, it is often the case that firms producing similar products cluster together, thus providing opportunities for inter-firm cooperation and knowledge exchanges, as well as competition for market share.

The traditional economic approach often addresses policy questions through its concept of ‘market failure’. Due to externalities or other problems, the market is deemed to be a defective allocator of resources in some circumstances, and a limited role for state intervention is thus identified. Many evolutionary economists accept the reality of externalities but regard the ‘market failures’ approach as flawed and

incomplete. It overlooks the possibility of different kinds of market institution and the role of the state in guiding and buttressing market design. With its concept of equilibrium it concentrates on allocative rather than dynamic efficiency: the focus is on distributive adjustments to actual or possible equilibria, rather than creating the conditions for innovation and growth. And it ignores other possibilities for state intervention, such as shifting the system from one institutional or technological 'locked-in' situation or 'equilibrium' to another. For example, state legislation and guidance were crucial in shifting car production and use from leaded to unleaded petrol in the last part of the 20th century, as they will be in the future development of the electric car. The role of the state is often to supplement and guide markets, and the choice of market and state involvement are not mutually exclusive.

Much modern industrial policy has tried to overcome some of the deficiencies of orthodox economics, particularly by focusing on the importance of technological innovation. This is a welcome step forward. But technological innovation is only part of the story. Organisational and legal innovation are also vital. The firm has to be treated as an evolving social organisation, and not simply as a single entity or entrepreneur in possession of technology.

Darwinian ideas have been used by both mainstream and non-mainstream economists. Contrary to a widespread misperception, Darwinian theory does not support the notion of competition leading to the survival of only the fittest and more efficient firms. Darwin himself recognised that evolutionary selection is a haphazard process, and that organisms find or build niches to protect themselves from competition. Darwin also fully acknowledged that cooperation within groups among social species was as important as competition between groups and with other animals (Hodgson 2012). He did not endorse the caricature of selfish 'economic man'. Furthermore, modern evolutionary theory puts as much emphasis on the development of individual organisms as on competitive selection between them. Evolution is a complex process involving both competitive selection and interactive individual development. Consequently, modern evolutionary theory inspires an approach that contrasts markedly with the mainstream 'Darwinian' caricature of reliably efficient competition and selection leading to an equilibrium, powered by solely self-seeking individuals with access to much relevant information. On the contrary, real-world evolutionary processes are typically much more haphazard and unreliable (Hodgson and Knudsen 2010).

Towards a new industrial policy

Modern economies are highly complex and often unpredictable. Consequently, any approach to industrial policy has to be cautious, varied and experimental. Economies are complex systems in an uncertain and changing world. Systems theory teaches us that to

deal with a complex environment and possible environmental shocks, any micro- or macro-level organisation has to have 'requisite variety' (Ashby 1960). From the point of view of both policy experimentation and survival, some degree of variety within firms and states is essential.

Much can be learned from comparative studies across industries and across countries, and such comparative and empirical approaches are often a better guide than 'one theory fits all' analyses. One lesson that emerges from comparative studies is that instead of reliance on the singular discipline of market competition, successful industrial economies involve a synergetic combination of competition and state intervention (Kenworthy 1995, Evans and Rauch 1999, Reinert 2007). The primary role of the state is not to 'pick winners' in some imaginary market competition. The state is necessary to ensure that financial and industrial institutions mesh together and serve each other, to build up the education system to meet skill requirements, and to ensure the development of a first-rate transport and telecommunications infrastructure, so that information, competitive markets and industrial dynamism can spread from advantaged to less-advantaged regions. The role of the state is as much one of institution-building as of financial expenditure.

Access to finance is vital for all businesses. Small and medium-sized companies often have little alternative but to use the banks. Yet compared with other leading industrial countries, the UK banking system has a relatively more international than a local and industrial orientation. The state has a role to play in fostering the development of further banking institutions that are oriented towards local industry, throughout the British regions. These would ideally involve a combination of public and private finance.

Another matter on the agenda is corporate reform. The modern corporation involves an implicit bargain between the state and the enterprise, where the state bestows the advantage of limited legal liability in return for the economic stimulus of corporate investment and employment. Yet over the last century the legal and popular discourse on corporate responsibilities has progressively put less stress on the social and public obligations of the corporation and more on its primary duty to maximize shareholder value. This shift has been much associated with the growth of a form of external finance in modern corporations that is focused on relatively short-term financial returns (Froud et al 2000).

Reversing this deleterious corporate trend would require a mixture of legal and other interventions by government. Corporations have responsibilities both to society and to the natural environment. Their sole objective should not be maximising financial returns for institutional and other rich investors. While financial viability is vital, it has to be placed alongside other unavoidable objectives.

Part of the reform initiative of government should be to enhance and widen discussion about corporate and financial ethics in particular and of moral responsibilities in general. Two centuries of individualistic and utilitarian thinking in society, and among economists in particular, have sustained mistaken beliefs that people are entirely self-gratifying and self-interested (at least when it comes to money and business) and that morality is purely a personal and private matter. Against the grain of much of economics today, some prominent economists from Adam Smith through John Maynard Keynes to Nobel laureate Amartya Sen have stressed the vital importance of morality in economic as well as social life. Government not only has an obligation to raise the level of moral discourse and debate but also it is difficult to see how some policies – such as dealing with climate change – can be achieved without an appeal to moral values as well as a good measure of self-interest (Hodgson 2012). Human motivation is complex, and the moral and acquisitive sides to our personalities have to be recognised in matters of policy design. Corporate and industrial policies are no exception.

Conclusion

Evolutionary economists emphasise that policymaking is itself an adaptive and learning process (Metcalfe 1994, Witt 2003). Policymakers are not omniscient. Policy design and implementation are complex processes involving multiple feedbacks and adjustments. One is reminded here of earlier evolutionary approaches to policy by the American philosopher John Dewey (1929) and the political scientist Charles Lindblom (1984).

Dewey sought conditions and habits of public scrutiny and debate that led to both innovation and experiment. He exposed the futility of seeking absolute knowledge and certainty; for Dewey, knowledge is an active capability, rather than a fixed end or goal. In the context of uncertainty and complexity, he favoured an experimental, process-oriented and participative democracy: institutional design had to be cautious and experimental; the primary role of experts is to lay out the feasible policy alternatives and their likely consequences, and feed this information into informed public debate. Lindblom, some 50 years later, fully recognised the complexities and uncertainties in the policy arena and proposed an experimental approach of ‘muddling through’.

This more humble spirit of open-ended and experimental inquiry is lacking in economics today as an academic discipline. Economists have attempted to ape physics and build up complete, explanatory or predictive models of economic phenomena. But while models may often serve as useful heuristics, there are limits to their predictive or explanatory capacities, given the complexities of economies in the real world.

Many of the models that have powered policy developments in both micro- and macroeconomics assume away the complexities and uncertainties. For example, models are constructed of markets where

participating agents have much of the needed information and are assumed to act as if they were capable of immense feats of calculation. Not surprisingly, these models of 'efficient markets' lead to policy recommendations that are disposed to market solutions. Economists have been led astray by their models.

It is here that evolutionary economics offers a change of style and direction, as well as of substance. The foremost task is to understand the real world, rather than an imaginary world contained in a model. While models and simulations can be extremely useful, they are not the whole story. Economics must return to a style and set of wide-ranging approaches that it has seemingly abandoned in recent decades.

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6.

MACROECONOMIC POLICY IN A COMPLEX WORLD

TONY DOLPHIN[1]

The history of economic thought shows economists have seldom agreed on how macroeconomic policy should be framed and conducted. At various times in the post-war period, the consensus has been that policymakers should target full employment, low inflation or economic stability; that the focus should be on the target variable directly or on some intermediate variable, such as monetary growth or the exchange rate; and that the target should be achieved through an active fiscal policy, an active monetary policy, or some combination of the two. And, whatever the consensus, there has always been a substantial and vocal minority arguing for a different approach.

Currently, in some quarters attention is being given to the idea that the aims of economic policy should be broader than simply output growth and inflation: they should encompass environmental sustainability and wider measures of social progress. Three noted economists – Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi – led a commission on how best to measure economic and social progress, which reported in 2009 (Stiglitz et al 2009) and the OECD is currently taking their ideas forward. At the same time, the UK government has asked the Office for National Statistics to develop a measure of national 'well-being'.

This work could, ultimately, lead to significant changes in the way that macroeconomic policy is conducted. However, for the purposes of this chapter, I have assumed that policy will continue – at least for the next few years – to be framed with respect to the more traditional goals of output growth and inflation. I do so for a number of reasons. First, there is no sign that policymakers in any of the major economies are seriously considering an imminent shift to new policy goals. Second, until their economies are growing at a healthy pace and unemployment has fallen to close to its pre-recession levels, I would not expect any such change to occur. Third, introducing a discussion of the aims of economic policy would leave insufficient space to analyse the main topic of this chapter: what lessons might be drawn from the insights of **complexity economics** about the conduct of macroeconomic policies.

1 Thanks are due to Greg Fisher, Adam Lent and David Nash for comments on an earlier version of this paper, though they bear no responsibility for this final version.

And, to be clear, macroeconomic policies in this context are taken primarily to mean the overall stance of fiscal policy and monetary policy, whether framed by reference to monetary aggregates, interest rates or the exchange rate. It is, therefore, about policy manoeuvres designed to control the level of aggregate demand and keep output as high as possible without causing inflation. It is not about so-called 'supply-side' policies – such as skills policy or tax credits for R&D – that aim to increase the economy's long-run growth rate, important though they are.

The current policy consensus

There are important differences of detail in the way that macroeconomic policies are currently conducted across OECD economies, but the broad frameworks are very similar. Except in countries facing a debt crisis, fiscal policy is set according to some medium-term rule for a measure of the budget balance. For the most part, discretionary fiscal policy is independent of the position of the economy in the economic cycle (and this was true even before the recent recession caused large increases in budget deficits in most OECD countries). Monetary policy – usually meaning the level of short-term interest rates – is set to keep inflation low, and often in line with a prescribed target, because it is believed that low inflation is the best guarantee of steady economic growth.

The UK is typical in this respect. Fiscal policy follows two rules:

1. To achieve a cyclically adjusted current balance by the end of a rolling, five-year forecast period.
2. To have public sector net debt (as a percentage of GDP) falling by 2015/16.

Neither rule is varied by reference to the state of the economy. Discretionary fiscal policy is not, in theory, allowed to change even if the economy is in a boom or a slump. In practice, the first rule – because it is framed over a rolling five-year period – does allow quite a lot of leeway. Policy could be eased substantially in years one and two, as long as there were plans to tighten it again in later years. However, the second rule will eventually place a limit on such flexibility because the need to keep debt on a downward path will limit deficits after 2015/16. At that point, fiscal policy will be almost completely insensitive to the economic cycle and even the 'automatic stabilisers'[2] may not be able to work.

These rules were designed to deal with a particular problem: the largest budget deficit seen in the UK in the post-war period (excluding financial interventions, public sector net borrowing amounted to £159 billion, or 11.3 per cent of GDP, in 2009/10). But fiscal policy followed a similar set of rules before the recession (aiming to achieve current balance over the economic cycle and a maximum debt-to-GDP ratio of 40 per cent).

2 Allowing tax receipts to fall and spending in areas such as unemployment benefit to rise when the economy is weak without taking offsetting discretionary fiscal action (and allowing receipts to rise and benefit spending to fall when the economy is strong).

And at present it seems likely that fiscal policy will continue to be run in a way that is largely insensitive to the economic cycle once the deficit is eliminated.

Meanwhile, apart from one small change, the way monetary policy is conducted in the UK has been unaltered for 14 years: the government sets an inflation target[3] and the Monetary Policy Committee (MPC) of the Bank of England adjusts its short-term interest rate (bank rate) in order to meet this target. If inflation strays more than 1 percentage point from the target rate, the Governor of the Bank of England is obliged to write a letter to the chancellor of the exchequer setting out why this has occurred and what steps the MPC is taking to bring inflation back into line with the target.

'Traditional economics' versus 'complexity economics'

This monetary policy approach has its roots in what Eric Beinhocker (2007) calls 'traditional economics'. Traditional economics is based on two key assumptions: individuals are rational (that is, they always take actions that will maximise their own utility) and the behaviour of the aggregate economy reflects the sum of the actions of all these rational individuals operating independently. Starting from these assumptions it is possible to build models that show the economy operates as a linear system; it can be subject to exogenous shocks but after these shocks it returns to equilibrium.

These models are referred to as dynamic stochastic general equilibrium (DSGE) models and they purport to explain fluctuations in the economy and the effects of macroeconomic policy. They are enormously influential in policy circles. Bank of England economists regularly publish papers making use of them (see for example Millard 2011 and Theodoridis 2011) and the Bank's website also contains a 'technical handbook' showing how to set up and run a DSGE model (Zanetti 2010). And yet they appear to be completely useless when it comes to explaining in any satisfactory way developments in the real world (Ormerod 2000). This should come as no surprise, given the underlying assumptions. In particular, individuals do not act in the narrow rational way understood by traditional economics, but are influenced by their peers and prone to herd behaviour. As Barker (2011) notes, DSGE models are 'largely unsupported by formal scientific observation and empirical data', 'dependent on false assumptions about human behaviour and physical systems' and 'based on a rigid and ill-informed interpretation of utilitarian ethic'. They also ignore the fundamental uncertainty that is pervasive in the real world.

3 Currently 2 per cent for the consumer prices measure (the small change was a switch from a target of 2.5 per cent on the retail prices measure at the beginning of 2004).

Recognising the inherent weaknesses in the approach of traditional economics, a new way of thinking about the economy has emerged, seeing it as a complex adaptive evolutionary system (Beinhocker 2007). Such complex systems are characterised by feedbacks, increasing returns to scale and network effects; they display emergent properties and non-linear dynamics; and are seldom, if ever, in equilibrium. In complexity economics, the behaviour of individuals is not always rational in the sense understood in traditional economics. For example, preferences may not be fixed and individuals can be influenced by, and can influence, the behaviour of others. Complexity economics recognises that individuals operate in highly uncertain environments and can be subconsciously guided by narratives and socially emergent values. The economy does not tend to settle in equilibrium. Instead, the economy is dynamically complex: 'it endogenously does not tend asymptotically to a fixed point, a limit cycle, or an explosion' (Rosser 1999). Or, in plain English, even in the absence of external interference the economy will continually display periods of stronger and weaker growth and of higher and lower inflation, possibly punctuated by other periods of relative calm. Boom and bust will never be eliminated and controlling the cycle will prove difficult and at times impossible.

While the language of complexity economics may be new, the same is not always true of its insights. John Maynard Keynes – who is widely regarded as the founding father of modern macroeconomics – referred to 'animal spirits' to describe the swings in confidence that could affect households' and companies' spending habits and was aware that one person's, or company's, level of confidence was not independent of that of others. In 2009, George Akerlof and Robert Shiller developed Keynes's insight in their book *Animal Spirits*, which sets out how human psychology drives the economy. Central to their theory is the argument that confidence is not just about pessimism and optimism, but also about trust and the willingness to make decisions. They also note the role of 'stories' – such as 'it's a new era' or 'we are in an age of austerity' – in determining confidence, and how there can be feedback between confidence and the economy.

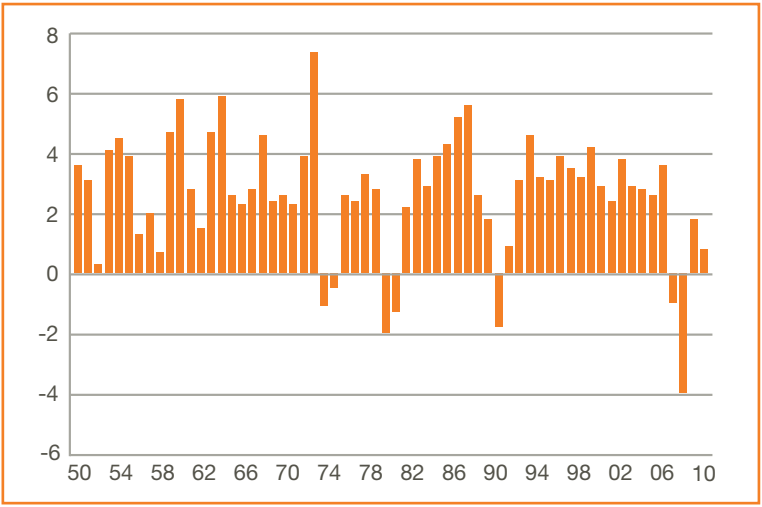
Hyman Minsky (1986) also anticipated some of the complexity economists' critique of traditional economics, when he argued that periods of stability (equilibrium) would inevitably lead to increased risk-taking and so to periods of instability; a conclusion that is completely counter to traditional economic thinking. For Minsky, financial trauma, inflation and unemployment are all to be expected and it is foolish to base macroeconomic policies on traditional economic theories when the very problem you are trying to solve – persistent instability in the economy – is unsolvable in those theories, which allow for external shocks but assume a quick return to equilibrium after them.

A brief post-war history of economic instability in the UK

The period since the second world war provides plenty of evidence to back up Minsky's theory; there is inflation, unemployment and financial trauma in abundance. In the UK, it can be conveniently divided into two periods, with a split in the 1970s.

In the first period, which for convenience is often called the Keynesian period, macroeconomic policy was concentrated on achieving a high rate of growth and a low unemployment rate. During this period, the UK economy experienced frequent short and shallow recessions and, particularly during the 1960s, an inflation rate that trended steadily higher. Eventually, following the quadrupling of oil prices in 1973 and a period of 'stagflation' (recession and high inflation combined), Keynesian remedies were abandoned.

Figure 6.1
UK real GDP growth, 1950–2011 (%)



In their place came macroeconomic policies mainly concerned with achieving low and stable inflation – what is generally referred to as neoliberalism, which has persisted for over 30 years. Within this period, there have been two sub-periods in which inflation behaved very differently. From 1975 to the early 1990s, inflation tended to be high and volatile. Subsequently, it has been lower and relatively stable, though it remains to be seen whether the higher rates of inflation experienced in the last few years are just a 'blip' or the start of a period of renewed inflation volatility.

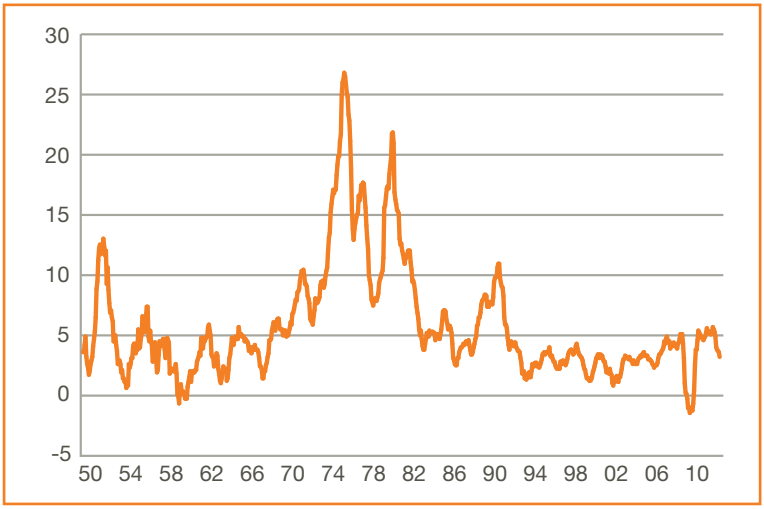


Figure 6.2
UK retail price inflation, 1950–2011 (%)

This neoliberal period has also seen a change in the nature of the economic cycle. There have been just three recessions in this time, but each has been deeper and longer than those experienced in the preceding 30 years. So, although neoliberal policies have, for the most part, delivered low inflation, they have not delivered stable growth.

As a result, just as Minsky predicted, instability has not been eliminated from the UK economy. Even on the very narrow consideration of GDP growth and inflation (that is, excluding asset prices, financial debt and so on), two very different policy regimes – Keynesian and neoliberal, both of which derived from traditional economic thinking – have failed to solve the problem of delivering the desired macroeconomic outcome.

Why have traditional policies failed?

Macroeconomic policymaking in the post-war period, whether Keynesian or neoliberal in nature, has failed to achieve lasting economic stability because it has been based on the traditional idea that the economy can be forecast in the short-term, and that the effects of policy changes on the economy are predictable. Neither is true. As Diggle and Ormerod (2010) argue, the modern economy is made up of a complex array of interconnected actors, which makes it inherently difficult to predict. Furthermore, the response of these actors to stimulus – such as a change in tax levels or in interest rates – can vary over time. So the effects of policy changes are also unpredictable.

In the Keynesian era, fiscal policy was adjusted to try to smooth fluctuations in the economy. So, when economic growth slowed, policy was eased in an attempt to boost growth; and when it increased, policy was tightened in order to slow it down. At least, that was the theory. In

practice, despite the best efforts of policymakers, the economic cycle was not abolished and the economy suffered from periods of 'stop' and 'go'. One problem was that by the time policymakers realised the economy had slowed down, they had secured the necessary support for a change of fiscal policy, had implemented that change and it was beginning to have an effect on the economy, growth had often picked up anyway. So a policy designed to be counter-cyclical, sometimes turned out to be pro-cyclical.

Economists for the most part look back now on these attempts to fine-tune the economy through changes to public spending and taxes with something close to derision, but is the current policy regime any better?

At its heart is a belief that the Bank of England – or more precisely its Monetary Policy Committee (MPC) – can forecast what will happen to inflation over the next two years and can adjust interest rates so that inflation is on course to be in line with the inflation target (2 per cent for consumer price inflation) at the end of this period. To do this, the MPC looks at a range of indicators (which are detailed in its quarterly *Inflation Report*). Central to its analysis is a belief that inflation is dependent on the 'output gap' – the amount of spare capacity in the economy. If there is plenty of spare capacity – a large output gap – then inflation will tend to decline; if output is too strong, relative to its potential level (sometimes described as a negative output gap), inflation will increase. By changing interest rates, the MPC believes it can affect the rate of growth in the economy, thereby closing the output gap (or the negative output gap) and consequently ensuring inflation ends up at its target rate. Broadly speaking, the MPC believes a shift in interest rates will affect inflation roughly two years later, so it sets interest rates with a view to getting inflation in line with its target rate in two years' time.

This approach is heavily reliant on the MPC's ability to forecast inflation – something that is inherently difficult as the last few years have shown. For roughly a decade after the MPC was established in 1997, forecasting inflation in the UK appeared to be relatively easy. Domestic inflation pressures were muted and there were few external shocks, and those that did occur were relatively small. Inflation stayed close to its target rate. Consequently, forecasts, which tended to be conservative, in the sense of assuming things continued much as they were, turned out to be relatively accurate. However, the last five years have seen a series of shocks, particularly as a result of volatile oil and food prices. As these were largely unpredicted, so the accuracy of inflation forecasts declined. Inflation moved far from its target and was 3 per cent or higher throughout 2010 and 2011 (so triggering a series of letters from the governor to the chancellor).

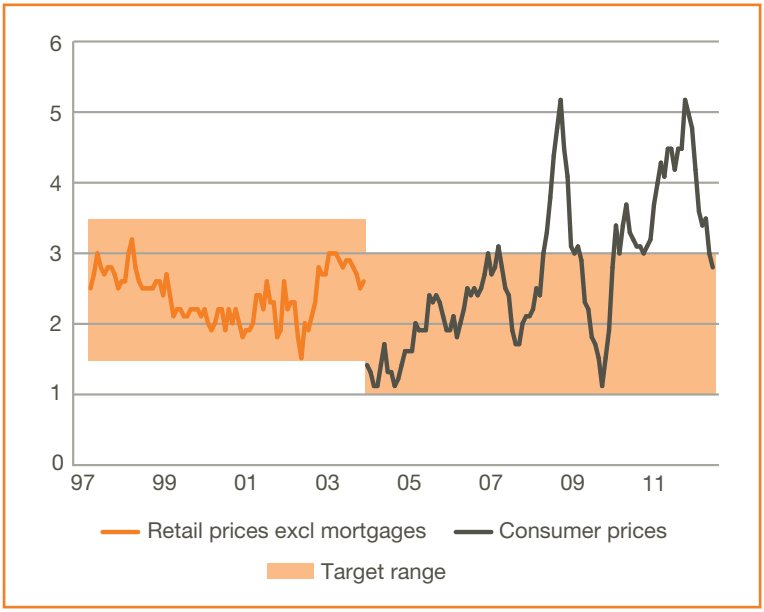


Figure 6.3
UK inflation relative to its target rate, 1997–2012 (%)

Another problem with this approach is its reliance on the output gap: a concept that is much easier to define than it is to measure. At certain times – at the height of an economic boom or in the depths of a recession – we can be reasonably sure about the *sign* of the output gap (whether there is pressure on resources or spare capacity), but it is never possible to be certain about its *size*. In addition, any relationship between estimates of the output gap and inflation in the UK in recent years is hard to discern. The Office for Budget Responsibility (OBR), which needs a measure of the output gap for its calculation of the cyclically adjusted budget deficit, has published an assessment of the output gap since 1972 (Pybus 2011). This shows that the output gap in the UK was negative (that is, output was above its trend level) for most of the period from 1996 to 2007, yet inflation was trending lower from 1996 to 2001 and stable for the next few years. Only towards the very end of this period did it move higher. In a similar vein, Diggle and Ormerod (2010) point out that unemployment (a measure of spare capacity in the labour market) fell in every year from 1993 to 2001, but inflation in 2001 was lower than it was eight years earlier.

Despite the inherent uncertainties over measuring the output gap, forecasting inflation and gauging the effect of policy changes, the MPC was initially prepared to attempt to fine-tune the economy to a greater extent even than the Keynesians in the 1950s and 1960s. In its first five years in existence, the MPC altered interest rates 24 times: that is, at 40 per cent of its monthly meetings. However, by the mid 2000s it had

become less active and in the five years from 2003 to 2007 policy was only changed 14 times (at less than a quarter of its meetings).

It is ironic that while the MPC could have been less active from 1997 to 2002, when developments in the economy were about as close as they are ever likely to get to being ideal – decent growth, falling unemployment and low inflation – it should probably, with the benefit of hindsight, have been more active between 2003 and 2007. Although growth was healthy in this period and inflation remained low (until it began to creep up in the final year), excessive exuberance was breaking out in crucial parts of the economy, particularly in the housing market and the financial sector. Minsky's view that stability inevitably bred future instability was about to be proved very right. The MPC was so focused on its traditional economic models and the relationship between interest rates, growth, the output gap and consumer price inflation that it failed to see the bigger threats to the economy.

Where now for macroeconomic policy?

The financial crisis and consequent double-dip recession have led to profound short-term changes in the way that macroeconomic policy is conducted. There has as yet, however, been no challenge to the broad framework in which macroeconomic policy is made – or even any serious questioning in policymaking circles of this framework.

Consequently, fiscal policy is now focused on eliminating the cyclically adjusted deficit and stabilising the ratio of government debt to GDP. This is to be achieved through a multi-year programme of tax increases and public spending cuts that will be implemented irrespective of developments in the economy. It is not clear at this stage what will happen when the deficit has been eliminated but it is a fair bet that policy will continue to be determined primarily by reference to largely arbitrary fiscal targets involving the level of debt and the size of the cyclically adjusted budget balance.

This is not necessarily the wrong approach. Studies have shown that, historically, a high level of government debt relative to GDP is associated with lower growth (see for example Reinhart and Rogoff 2009) and the debt ratio in the UK is already substantially higher now than it was five years ago, and is set to increase further in the next few years. What constitutes a 'high level' of debt is likely to vary from country to country, and probably over time too, so it is impossible to say what the danger level might be in the UK. But the current level leaves future governments with little room to manoeuvre should the economy fall into recession again. By setting the debt ratio on a downward path, eventually that room for manoeuvre will reappear.

Putting the cyclically adjusted current balance at the heart of fiscal policy is more problematic because there is no wholly satisfactory method for

making the cyclical adjustment. Most economists would probably agree that allowing the deficit to narrow and widen as a result of fluctuations in tax revenues and welfare benefit spending caused by the economic cycle is desirable. Otherwise, fiscal policy would tend to be pro-cyclical: if a recession caused tax revenues to fall and the deficit to widen, tax increases (or spending cuts), which would further weaken the economy, would be needed to rebalance the budget. In practice, though, calculating the cyclically adjusted balance is very difficult. The Office for Budget Responsibility, which is currently tasked with producing the official numbers, changed its estimate for 2011/12 between March and November 2011 from 3.2 per cent of GDP to 4.6 per cent, almost wholly as a result of new information on the economy, rather than changes in government policy (OBR 2011).

The fact that changes of this magnitude can occur within the space of less than a year is problematic for policymakers. They face a choice between two flawed alternatives: setting policy relative to a measure that is insensitive to the cycle, so risking exacerbating booms and busts, or setting it relative to a definition of the deficit that is impossible in practice to measure. One conclusion that might be drawn from this unenviable choice is that fiscal policy should only be used in certain limited circumstances – when monetary policy appears to be proving ineffectual.

Meanwhile, monetary policymakers have abandoned their models in the short-term in order to justify the maximum degree of policy easing. Despite inflation being more than 1 percentage point above its target level for two years, the MPC has held its bank rate at the record low level of 0.5 per cent since March 2009 and has embarked on a programme of quantitative easing that now stands at £375 billion. Avoiding a depression (the depth of the 1930s Great Depression is blamed by many economists on the failure of central banks to relax monetary policy aggressively when economies initially slid into recession) and trying to get the economy growing again has taken priority.

Yet the framework in which the MPC operates has not changed. The Governor is still writing letters to the Chancellor every three months explaining why inflation is so far above its target rate and why the MPC feels no action is needed to bring it down. The presumption is that once the economy has recovered, quantitative easing will be reversed and the MPC will go back to nudging interest rates up and down in response to its best guess about growth and the output gap. The fact that this framework did nothing to prevent the deepest recession for almost 70 years and was thrown out in the crisis appears to count for nothing.

In 2006 and 2007, the MPC's models told it that consumer price inflation was likely to stay close to its target rate if interest rates were nudged slightly higher, so they increased them from 4.5 per cent to a

peak of 5.75 per cent. Meanwhile, policymakers were turning a blind eye to a financial bubble that had been developing for several years – the unintended consequence of a period of low interest rates that was justified by an extended period of low consumer price inflation. At the very least, this suggests monetary policy needs to be set by reference to a broader consideration than just consumer price inflation. David Colander (2011) argues policymakers should consider a range of explanations for developments in the economy and a range of possible outcomes following any policy action. Computers are now powerful enough to allow them to carry out highly sophisticated simulations of policy actions (the use of quantitative easing by the Bank of England is one policy that would be informed by such an approach). Policymakers should also take into account, Colander suggests, a 'solid knowledge of history, history of ideas, and macroeconomic institutions'.

In the UK context, over the next few years this suggests a more relaxed approach to domestic inflation pressures, since they seem to be largely absent, even when the economy is doing well. Instead, greater attention should be focused on asset prices, particularly house prices, and on the oil price. The UK has experienced four major recessions in the last 40 years. Each one was preceded by a large increase in the oil price and a period of rapid gains in house prices. While there is not much that policymakers in the UK can do on their own about oil prices, they should at least be fully aware of when they pose a serious risk to the economy and so give them a more prominent role in their deliberations. Similarly, controlling house price inflation may not always be possible. But if policymakers could find a way to prevent future surges in house prices, for example through the imposition of maximum loan-to-value ratios, it would probably do far more to reduce the risk of a future recession in the UK than minor adjustments to interest rates designed to keep consumer price inflation close to 2 per cent. At the very least, house prices should be given the same weight in policy deliberations as consumer prices, and should be a central focus of the Bank of England's Financial Policy Committee.

Conclusion

Traditional economic thinking has given policymakers a misleading sense of their ability to use macroeconomic policies to guide the economy. The complexity approach accepts that economies are dynamic, subject to endogenous change and contain relationships that shift over time: as a result the nature of the economic cycle will evolve in unpredictable ways. Policymakers cannot accurately forecast economic developments; nor can they be sure of the response of the economy to macroeconomic policy changes. As a general rule, therefore, they should do less.

This does not mean that they should never intervene in the economy, but when they do, their actions should be based less on formal models, particularly DSGE models, and more on their intuition and

common sense. As Geoff Hodgson argues in chapter 5, policymaking is a complex business and policymakers need to adapt and learn as they go along. History suggests narrow, rules-based approaches to macroeconomic policy do not work for long. Policymakers should acknowledge their own limitations, abandon their DSGE models and develop a better understanding of the impact of policy interventions and their limitations through the use of simulations and impact assessments. In addition, they should seek a better understanding of exactly when they should intervene, and when not.

Academic economists need to help policymakers make this transition to a new way of thinking and behaving. There is an urgent need for a better conceptual framework for the 'macroeconomic problem' to be developed: one that mixes complex systems with more accurate descriptions of individual behaviour. Without this framework, policymakers are likely to persist with their existing models, despite their many deficiencies and past failings.

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7.

INNOVATION AND THE NEW ECONOMICS: SOME LESSONS FOR POLICY

STIAN WESTLAKE

New or heterodox economics has a lot to say about innovation. Indeed, some important concepts in heterodox approaches were shaped by the desire to understand innovation better. And yet much innovation policy, and the debates surrounding it, reflects a more traditional understanding.

As a result, debate on innovation policy often rests on narrow economic foundations. In particular, the main aim of innovation policy is too often seen as mitigating market failures, especially the 'failure' of businesses to do 'enough' research and development. This paper reappraises the 'market-failure' approach to innovation policy, and supplements it with three other concepts that have been informed by heterodox economics:

- the idea of **technology** as something interesting and important in its own right
- the idea of the **entrepreneur** as the driver of innovation
- the idea of the **innovation system**.

These ideas suggest we need an innovation policy that does more than mitigate obvious market failures, but also encourages innovative entrepreneurship and the evolution of a supportive innovation system.

This creates a challenge: this kind of public policy is difficult, both politically and in terms of public administration. It offers at best only cautious support for active industrial policy, not least because of the considerable uncertainties about what policies actually work. A more pragmatic option is to adopt an innovation policy based on experimentation, both on the part of businesses and policymakers.

Innovation studies and the 'new' economics: a long relationship

The history of innovation tells us that backwardness has its advantages. The winners of the microcomputer revolution were start-ups like Microsoft and Apple with little to lose and much to gain, rather Digital, Wang or the other leaders of the previous age of computing. Decades earlier, war-ravaged Germany and Japan found their ruined factories and depleted capital stock gave them an opportunity to retool, refocus and surpass the productivity of the victorious UK.

Something similar applies to the study of innovation. Because 'orthodox' economics fails to explain successfully many aspects of technological change, the study of innovation is better informed by the so-called 'new' economics than some other fields.

Innovation was not, for much of the 20th century, a favoured topic for mainstream economists. Nobel Laureates made their names elsewhere. In exogenous growth models, innovation was the great residual, a kind of magic smoke left behind when the measurable inputs of capital and labour had been logged and filed.[1] When endogenous growth theory arrived on the scene in the late 1980s,[2] it incorporated research and development and technological change, but in a way that looks strangely bloodless to those who study technological change itself (Nelson 1998).

In an age when national output is obsessively measured, reported and analysed, the accurate measurement of innovation remains problematic; so much so that in 2012, a serious debate is taking place among economists on whether innovation is slowing down calamitously or speeding up dramatically,[3] and it is suggested that the value of some modern technologies from lighting to consumer electronics are miscounted in national output statistics by a factor of ten or more.[4]

So-called 'heterodox' economics, on the other hand, has long been of interest to scholars researching innovation: indeed, the problem of how innovation happens has been a spur to the development of several heterodox approaches. Joseph Schumpeter, the grandfather of the study of innovation, embraced an evolutionary view of economics, and the search for an effective way of explaining innovation helped encourage the resurgence of interest in evolutionary economics in the 1980s and beyond (Nelson and Winter 1977). A 'systems' perspective on how innovation happens within an economy was well established by the 1990s,[5] as was the idea that path-dependence and emergence were useful concepts in thinking about the economic impact of technology (Arthur 1987).

If it is true that the global financial crisis has created a need for new economic thinking, it is not unreasonable to suspect some of this will be found in the intellectually omnivorous field of innovation research.

1 This is not to say that there is not a rich 20th-century tradition of economics focused on innovation – indeed, before the growth of first the Keynesian and then the neoclassical orthodoxy after the second world war, economists including Joseph Schumpeter and Frank Knight set out many of the core concepts of the study of innovation and entrepreneurship. Endogenous growth theory found a means to incorporate innovation into its analysis of economic growth, typically providing a 'knowledge' or 'research' component that itself boosted productivity.

2 See for example Romer 1990

3 The pessimistic case is expressed in Cowen 2011; an alternative view can be found in Brynjolfsson and McAfee 2011.

4 Nordhaus (1998) argues that even carefully constructed deflators underestimate, perhaps grossly, improvements in the quality of goods as a result of innovation.

5 See Freeman 1988, Lundvall 1988

Orthodox innovation policy: the base case

Although innovation studies have been informed by a range of heterodox approaches, much actual innovation policy is based on more mainstream economic thinking. In particular, it is based on two ideas: the recognition that innovation leads to economic growth, and the belief that businesses do not innovate enough if left to their own devices because of market failures.

Belief 1: innovation matters – especially R&D

Policymakers on the whole have accepted that new knowledge, and in particular scientific and technological knowledge, is a useful thing: it can be exploited to produce new goods and services that make people richer and happier. Politicians may be divided on how the government can help this process along (if at all), but the underlying assumption is almost universally accepted.

This is of course backed up by economics: it has been known for over 50 years that most – between 60 to 80 per cent[6] – of productivity growth comes not from increasing the amount of labour or capital in the economy, but from getting more out of these inputs: that is to say, innovation.

The importance of science and technology to this vision of innovation is also widespread. Even though research and development makes up only around 10 per cent of intangible investments in a country like the UK,[7] it has traditionally been seen by policymakers as the life-blood of innovation. Countries fret about their expenditure on research and development (R&D), and aspire either to catch up with the global big spenders (Finland, Israel, the US) or to reach arbitrary targets (such as the European Union's target of spending 3 per cent of GDP on R&D under the Lisbon Strategy).

Belief 2: innovation is subject to market failures

Most policymakers also accept that government needs to encourage some investments in innovation. The money that businesses and individuals spend on developing new ideas has widespread benefits that are rarely collected in full by the person who lays out the investment.

If I make an investment in physical capital, let's say buy buying a server for my office, I can reasonably expect to enjoy all the benefits of it: for someone else to do so is both illegal and difficult. But if I spend money to develop a new idea, it may well be rather easy for someone else to copy it, and, except under very specific circumstances, it will probably be legal.

Microsoft made billions from the graphical user interface. But Windows depended on earlier products and investments made by Apple, by

6 *The Innovation Index* (Nesta 2009–12) provided the 60 per cent figure for the UK in the late 20th and early 21st century; the 80 per cent figure is for the US earlier in the 20th century and comes from one of the first growth accounting exercises, see Abramovitz 1956.

7 Nesta 2009–2012

Xerox's Palo Alto Research Center and by the US government (in the form of the DARPA-funded oN-Line System), none of whom had any right to be paid for their troubles. As Microsoft's Bill Gates justified himself to Steve Jobs of Apple, 'it's ... like we both had this rich neighbour named Xerox and I broke into his house to steal the TV set and found out that you had already stolen it' (Isaacson 2011).

Again, this intuitive insight has sound economic roots: investments in some types of innovation, especially R&D have positive spillovers. The idea that the public returns to investment in R&D exceed the private returns was observed by economists at much the same time that they realised the extent to which growth depended on innovation (Grilliches 1958). Because investors in R&D do not receive all the benefits of their investment, economists immediately recognised a potential market failure: left to their self-interest, people and businesses would do too little research, since the chances are someone else would reap most of the benefit.

These two insights give rise to two of the core orthodoxies of modern innovation policy: the idea that innovation is an important driver of growth, and the idea that the government should seek to increase the benefits of researching and innovating to offset market failures.

The policies this leads to are old standards: public funding of research, to encourage more of it to happen (especially basic research, whose benefits are least likely to accrue to the person who pays for it, along with funding for university technology transfer); intellectual property laws, so that (some) innovators are more likely to reap the benefits of their ideas; and R&D tax credits, to hand back to investors in innovation through the tax system some of the economy-wide benefits they create.

As well as being well-grounded in generally accepted economic principles, these policies are also convenient both politically and from the point of view of public administration. R&D tax credits and intellectual property laws do not ostensibly favour one sector over another, and so protect governments from the accusation that they are 'picking winners', a practice with a bad track record at least in the UK. Neither do they require great technological or commercial insight on the part of government officials. What's more, funding basic research is popular with academics and scientists, who constitute a vocal constituency that is experienced at lobbying.

Like many orthodoxies, policymakers' basic beliefs on innovation are accompanied by a variety of talismans and superstitions. It is often thought that entrepreneurship, or the existence of start-up businesses, is good for innovation,[8] with the result that innovation

8 As for example in this blog post by the Kauffman Foundation: http://www.kauffman.org/newsroom/kauffman-foundation-unveils-startup-act-proposal-to-boost-growth-of-new-businesses-and-add-jobs-to-u-s-economy.aspx

policy and entrepreneurship policy are often connected. Sometimes small businesses of all types are thought to be especially innovative.[9] Institutions and phenomena associated with innovation hotspots, such as Silicon Valley, are often thought to be a good thing: venture capital funds, incubators and university technology transfer operations (Hughes 2007).

But beyond this, it is generally held that the way to promote innovation is to follow the standard rules of economics: keep taxes and regulation as low as possible, encourage competition and liberal markets for both capital and labour, and innovation will flourish along with the rest of the economy.[10]

Beyond this, innovation policy has tended to be subsumed into the wider economic debates that play out along well-established ideological lines: the right asserts that economic 'freedom' is conducive to innovation,[11] while the left argues for a larger role for the state in encouraging investment in innovation and in setting rules that encourage 'productive' innovation.[12]

Three new 'characters' in the innovation story: technologies, entrepreneurs, systems

It may be convenient for policymakers to see market failure as the central fact in the story of innovation, and to shape policy accordingly. But this leaves three important characters out of the story. These three concepts have each been informed by the 'new' economics, and raise important questions for policymakers. They are:

1. technology and technological change as distinct concepts worthy of study rather than incidental or epiphenomenal aspects of economic activity
2. the entrepreneur, as an agent of change and innovation
3. the innovation system, as something more than a market in which one of the inputs happens to be R&D.

1. The nature of technology and technological change

Few policymakers or economists would disagree that technological change is an important part of economic growth. But the specifics of technology rarely take centre stage in mainstream economics – indeed, one of the virtues of economic analysis is that it takes the bewildering

9 The website of the Small and Medium Business Innovation Alliance contains the following quote from the Department of Trade and Industry that is difficult to trace ultimately to any actual research: 'Since the second world war 95% of all the radical new inventions have come from businesses employing less than 5 people. The formation of those businesses is critical to our economic success.'

10 The idea that innovation policy follows the contours of the wider economic debate tends to be true even for those who believe the government should play a far greater role in encouraging innovation. Keynesian critics of current government policy occasionally argue the need for a state-sponsored 'innovation bank' alongside calls for infrastructure banks and small business banks, as in Hutton 2010. Active state involvement in innovation tends to be advocated as part of a package deal, rather than as a specific response to the peculiarities of innovation.

11 See for example Phelps 2009

12 See for example Hutton 2010

jumble of technologies that make up the modern economy and expresses them in the radically simple quantitative language of output and productivity.

However, technology does not seem to be quite as smooth or predictable as this would imply. The economist Arthur Harberger (1998) once asked whether economic growth was more like mushrooms or more like yeast:

> 'Yeast causes bread to expand very evenly, like a balloon being filled with air, while mushrooms have the habit of popping up, almost overnight, in a fashion that is not easy to predict.'

A variety of research from outside the economic mainstream – from economic history to complexity theory – suggests that, on the whole, innovation is more mushroomy than yeasty.

At the heart of this are two related concepts. The first concept is based on Brian Arthur's related observations that some technologies exhibit increasing returns to scale, and that all technologies are built from other technologies. The first part of this explains why some technologies, such as telephones, become increasingly useful as they are more widely adopted; the second part observes that some technologies are complementary to one another, and that bringing them together in new ways occasionally creates unexpected breakthroughs. (One consequence of this is that, unlike other sorts of investment, backing innovation may not exhibit decreasing returns to scale.)

The second concept is Timothy Bresnahan's (1995) idea of the 'general purpose technology', a technology with the potential to change large parts of the economy in transformative ways. Steam power and electricity are often cited as examples of general purpose technologies, since they changed fields as diverse as transportation, manufacturing, communication and heating. One of the characteristics of these technologies is that they often take a long time to achieve an impact. Factories ran on electrical power for many years before it was widely realised (David 1990) that an electrified factory could be laid out in a completely different way (with power sources for each machine, rather than a single large engine driving all the factory's machines through belts and chains). Opinions differ as to which technologies count as general purpose, but there is widespread agreement that information and communication technology (ICT) is an example (Field 2011). Some of those who have studied this question most closely argue that the impact of ICT on the economy is far from being fully realised and is, in fact, less than halfway through (Arthur 2011, Brynjolfsson and McAfee 2011).

Building on Schumpeter's work on 'long waves' of technological deployment, some authors have speculated that technological trends dictate economic activity. For instance, Carlota Perez (2003) has

argued that the current economic climate and its financial crises are a consequence of the build-out of ICT in the economy. Even if we do not accept such a strong form of technological determinism, it seems plausible that the specifics of technological progress will have an effect on the economy.

This means that one way or another, governments need to create the conditions for their economies to exploit these new technologies, and that doing so can unleash unusually high growth. Of course, the question is how.

One possibility is that government should play a role in identifying and promoting general purpose technologies (Hutton and Schneider 2008), and should direct its policy interventions accordingly. It seems plausible that government should take account of technological trends to the extent that they are knowable; although it is less clear that government is likely to be able to predict them.[13]

What we do know is that technological developments require non-technological investments to make them pay off. In the UK, for every pound invested in R&D, businesses invest eight pounds in other intangible assets, from training to product design to branding (Nesta 2009–2012). The process of combining these technologies and assets with one another, and then trying to see how they can be turned into things that customers find useful, is a central part of innovation. And it also seems to be the mechanism that helps general purpose technologies transform the wider economy (Brynjolfsson 2011).

The real question for policy, then, is how it can go with the grain of technological change to support new ideas – especially major technological breakthroughs like ICT – and old ideas coming together to change the economy. This is where the next two characters in the innovation story come in.

2. Entrepreneurs as drivers of innovation

Entrepreneurs have a curious position in innovation policy. Politicians like to talk about entrepreneurs and to be seen to promote them, but they often do this at one remove from innovation policy, which tends to focus on the more research-centred market failures discussed above.

Some heterodox economists, most notably the Austrians, have put innovation more squarely at the centre of their theory of entrepreneurship. Israel Kirzner, for example, argued that the ability of the entrepreneur to see and exploit new, innovative business opportunities sits outside the optimising calculus of classical economics. Whether or not this is theoretically true (Cowen 2003), entrepreneurs

13 There are a number of heroic failures in this area. Consider for example the 1998 UK Productivity Report, commissioned by the UK government from McKinsey & Company, which, alongside much insightful analysis, looks at trends transforming the UK economy, but makes no mention of the internet, except for a small box describing in passing an innovative retailer called Amazon.co.uk.

play an important role in the process of turning new technologies and knowledge into practically useful offerings – that is, the process of innovation (Baumol 2003).

Paying lip-service to the role of entrepreneurs in innovation, however, is not the same as designing effective public policy to promote it. If we define an entrepreneur as anyone who starts a business, then as Scott Shane (2008) has observed, most entrepreneurs are neither innovative nor particularly likely to succeed. There is nothing inherently innovative about new businesses per se: for every new Google or Facebook, there are thousands of me-too businesses that are less productive and no more inventive than existing firms. Only a small minority of firms are truly innovative and they are disproportionately likely to achieve high growth (Nesta 2009). However, because there are many small businesses in the UK and their owners and workers all vote, the political appeal of confounding innovative entrepreneurs with the much larger number of small businesses is clear.

The result of this is the mislabelling of small business or start-up policy as innovation policy. One example is the government's ill-fated national insurance break for the first 10 employees of small businesses, a policy geared to helping all start-ups indiscriminately, and by limiting support to the first 10 employees, targeting money away from the high-growth businesses most likely to be innovative.

The role of innovation policy with respect to entrepreneurs should, instead, be as much as possible to encourage those entrepreneurs likely to be innovating. To the extent their businesses are likely to grow, this will include policies to encourage business growth such as improving access to finance for highly innovative firms or improving their access to skilled workers through the education and immigration systems. To the extent that their innovations are likely to disrupt business as usual, this means not putting in place policies to protect incumbents (Nesta 2010).[14] Other, more micro-scale policies can encourage the experimental entrepreneurship that leads to innovation: encouraging entrepreneurship among high-potential groups such as university students, co-sponsoring accelerators and incubators, or stimulating radical innovation through prizes can increase the feedstock of innovative entrepreneurs.And finally, the government should think of itself as a facilitator of innovative experiment. Encouraging innovative businesses to share knowledge through knowledge transfer networks is a cheap but valuable undertaking; providing funding for new business model development on the condition that lessons are widely shared (as, for example, in the Technology Strategy Board's 'digital testbeds' programme for high-speed broadband) are a more ambitious version of this.

14 Nesta's research suggests that a 0.5 percentage point fall in the number of rapidly shrinking firms (that is, less creative destruction) reduced productivity in European countries by 0.2 percentage points in the last decade.

Entrepreneurs do not operate in a vacuum, however. The technologies on which they rely arise from a much more complex broth, the nature of which matters greatly for innovation. This is the innovation system.

3. The innovation system – business, government, research and more

For the past three decades, innovation scholars have pointed out that innovation happens in complex systems. Interest in innovation systems was sparked by the dramatic success of the Japanese economy in the 1970s and 1980s: observers noticed that something was going on in the interaction between the Japanese state, its businesses and its research base, and tried to understand more, extending the analysis not just to other Asian nations with explicitly interventionist states, but to a wide range of rich countries.

This line of inquiry highlighted how the amount of innovation that businesses invest in is affected not just by straightforward commercial considerations, but also by institutions (the nature of the education system, or technological standards), culture (Japanese long-termism in investment decisions, for example, or American tolerance of business failure) and social ties (such as those between engineers of competing businesses) (Lundvall et al 2002: 213–232). An important aspect of this is the so-called 'chain-link' model of the supply of and demand for innovation (Kline and Rosenberg 1986), which argues that innovation depends on a subtle and frequently changing mix of demand pull (for example, customers demanding better products) and supply push (for example, research identifying ways to make products better).

If the amount of innovation that occurs in an economy is a function of many interconnected factors, it is plausible that the system linking all these factors – the innovation system – might have multiple equilibria. One implication of this is that the existence of the 'wrong' kinds of institutions (from regulation to schooling, culture to procurement) could lead to a country being stuck in an unfavourable equilibrium. This raises the question of whether government should play a role in helping set up the 'right' institutions.

Another implication is that policy choices might have effects that manifest themselves unevenly, like the proverbial ketchup bottle. Consider R&D tax credits, a standard tool of innovation policy. If the main problem they are meant to address is that businesses invest less than they otherwise would in R&D because they cannot capture all the benefits, then a tax credit needs to be permanent (if a government stops its tax credit programme, the old market failures will kick in and investment in R&D will fall again). What's more, a small tax credit is better than no tax credit at all.

If, however, the aim of the credit is more generally to shift businesses, and the organisations with whom they work, from a way of working in which they do little R&D to one in which they do more, a shorter-

lived but more generous credit may make more sense.[15] A permanent but small tax credit may even have no effect at all, if it does not help overcome the institutional barriers to innovation. The idea of the 'behavioural additionality' of policies like tax credits – the extent to which they change behaviour – has become an area of policy interest in recent years (OECD 2006).

Some commentators have argued that the systems perspective on innovation supports left-wing arguments for a much more active developmental state (Mazzucato 2011, Nesta 2009). After all, the idea of innovation systems has as its ancestor the work of Friedrich List, the architect of German and American protectionism in the 19th century (Lundvall et al 2002). This interpretation of innovation systems is true insofar as it casts doubt on a very extreme version of its right-wing counterargument: the idea that government policy is always inevitably hostile to innovation; that the government 'should just get out of the way'. This is not borne out by the evidence of successful national innovation systems from Finland to Israel, or even the US, which as some scholars have noted has a large developmental state supplying everything from generous research funding to soft finance for start-ups (Block 2008).

One recent article (Aighion et al 2009) argues that remedying system failures requires sector-specific policies (for example, harnessing government procurement to increase demand for new solutions, or funding research in particular areas of technology). However, the importance of innovation systems throws up almost as many questions as it answers. On the one hand, the deep involvement of the state in quite specific ways in many examples of successful innovation suggests that encouraging innovation, especially innovation that requires big investments in time and research, requires supportive public policy that goes beyond broad research funding or tax credits.

Knowing that some policies worked to encourage some innovations in the past does not, however, mean that we know what policies will encourage other innovations in the future. Even in relatively well-studied and limited areas of innovation system-building, the policy pharmacopoeia is patchy and unreliable. Take, for example, the promotion of effective markets for venture capital investment.[16] Despite the successful and widely discussed example of Israel's public–private Yozma fund in the 1990s, a range of similar policies have worked less well, and debate continues on the effectiveness of policies in the UK.[17] The question of which policies work is complicated by the fact that innovation systems are complex, and therefore that it is hard to isolate the effectiveness of individual policies.

15 Ongoing work by Philippe Laredo is investigating this idea.

16 Reviewed in Lerner 2010

17 See for example Nesta/BVCA 2009

Political implementation is also tricky. Active innovation policy costs money, which must often be found at the expense of popular causes. In its recovery from crisis in the early 1990s, Finland cut expenditure drastically in most areas of public spending, but not research.[18] This was made easier by Finland's relatively small and cohesive population and coherent political culture. It is harder to imagine such a response being politically acceptable in the UK, and it is interesting to note that most countries with strong, explicit, well-respected innovation policies – Israel, Singapore, Finland, Sweden – are relatively small and relatively cohesive. Active innovation policy also tends to be technocratic, requiring willingness to appoint technically competent (and therefore often highly paid) officials and to give them control over large budgets with little political interference. Neither of these things tend to be politically popular.

So the innovation systems literature allows us to eliminate one rather uninteresting question from political debate: 'is an active innovation policy an unalloyed good or an unmitigated disaster?' It makes it clear that in some instances in the past such activism has worked and has been valuable. Instead, it raises two important priorities for policy: first, developing a better understanding of what policies work to achieve specific goals in the context of the innovation system, and second, building the political case for implementing these policies.

Conclusion: an experimental innovation policy

This chapter has identified three themes, inspired by the 'new' economics, that take us beyond a market-failure-dominated view of innovation policy. Taking into account the importance of exploiting new technologies, the role of innovative entrepreneurship and the complexity of the innovation system should form the basis for a richer and more effective innovation policy.

However, such a policy is likely to be tougher to design than a hands-off, market-failure-based approach. Promoting entrepreneurship is a tricky task for government. And shaping the innovation system requires more than sector-blind policies: it requires intervention that may vary from industry to industry and that therefore requires detailed knowledge to get right. Indeed, it is possible that in some, even in many, areas reliably making good sector-specific innovation policy may be beyond the ability of most governments, both in terms of political will and public administrative capability.

The solution to this is an experimental approach. On the one hand, policy with regard to entrepreneurship should seek to encourage an experimental approach with regard to new business models and ideas. The role of government as a broker of new ideas, encouraging

18 See for example the interview with Finland's then prime minister, Esko Aho, conducted by the OECD: http://www.oecd.org/document/27/0,3746,en_2649_33703_43098513_1_1_1_1,00.html

partnerships to share knowledge and funding new ways of doing things should sit alongside a broader policy framework that encourages innovative entrepreneurs to set up and grow their businesses.

On the other hand, when it comes to the innovation system, policymaking itself should be explicitly experimental. We need to recognise that, although we do not know what works in many aspects of sectoral innovation policy, we know that in the past the right government policy has paid off, whether in the form of the US's hidden developmental state or the more explicit innovation policies of Finland or Singapore. Trying new policies, gathering data and rigorously assessing what works is the most likely way to identify the right innovation policy – or conversely to identify the areas in which policy is likely to have limited impact.

All this will require political will to promote innovation on a scale not previously seen in the UK. Politicians should think not just about how to identify the best innovation policy, but also how to develop and describe it in ways that resonate with voters, otherwise innovation will lose out in the inevitable political battles with other spending priorities.

This is a timely approach. It is timely from the point of view of the business of innovation in that it mirrors the approach to technological change increasingly seen at giants like Google, Facebook and Amazon, who encourage entrepreneurship both among their staff and among constellations of related start-ups, and combine this with a resolutely experimental approach enabled by the richness of the data at their fingertips about their customers, what works and what doesn't for their business.

More importantly, it is timely for the UK. If we care about our country's economic performance over the next decade, and into the decade after, the biggest challenge we face is innovation.

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8.

CLIMATE CHANGE POLICY AND THE TRANSITION TO A LOW-CARBON ECONOMY

JIM WATSON

Energy is of fundamental importance for modern industrialised economies. Access to affordable energy is vital for the services we enjoy – from keeping warm to cooking our food, the ability to travel to providing entertainment. In recent years, policy concerns about the availability, security and affordability of energy have once again risen up the agenda. Energy prices have risen dramatically, and the UK has returned to the club of net energy importers after twenty years in which production exceeded consumption.

Since the early 2000s, climate change has been at the heart of energy policy debates. Unlike some industrialised countries (notably Australia and the United States), the UK's energy and climate change policies have been underpinned by a strong degree of cross-party consensus, with all the main political parties in agreement that something must be done to reduce greenhouse gas emissions. This consensus has been reinforced by the increasing strength of climate science and evidence to suggest that action on emissions is in the UK's economic interest (Stern 2006). Armed with a comprehensive case for emissions cuts, the UK's political parties have often competed with each other to propose tougher policies and laws. For this reason, the UK has some of the most ambitious targets for emissions reduction in the world, with legal backing through the Climate Change Act 2009.

While this background has given the UK's drive to reduce emissions considerable momentum, climate and energy policies have started recently to encounter significant difficulties. The financial crisis and economic downturn have put huge pressure on government and household budgets and have led to cracks in the political consensus. Climate change has fallen down the agenda, though energy concerns remain strong due to persistently high prices and the need to replace ageing infrastructure. Pointed questions are being asked about the cost of cutting emissions, and whether the measures the government is pursuing are affordable, most notably by the chancellor, George Osborne.

In the face of these challenges, what should be done? This chapter explores how new economic thinking can inform climate change and

energy policies. I argue that even before the crisis there were important shortcomings in the economic approaches used to underpin climate and energy policies; but now that the economic and political context has changed so fundamentally, these shortcomings need greater attention, not less. Evolutionary and complexity economics offer some important insights and lessons and, as I put forward here, could help make climate and energy policies more effective.

Beyond carbon pricing

It is no surprise that the neoclassical economic frameworks that dominate policy thinking in the UK have also formed the basis of responses to our climate change and energy policy challenges. One of the main modifications to the traditional neoclassical approach has been to impose a price on environmental 'externalities', namely emissions of carbon dioxide and other greenhouse gas emissions. The rationale for this is that while emissions impose costs on current and future generations, for example through increases in average temperatures, changes in weather patterns and rising sea levels, these costs are not typically captured in market transactions.

Provided these costs can be quantified, carbon pricing allows for them to be 'internalised' by putting an appropriate price on each tonne of greenhouse gas emitted. By making buyers pay more for goods and services in proportion to their climate change impact, there is an incentive for them to switch to lower-carbon alternatives – and for sellers or producers to reduce the carbon footprint of the goods and services they provide.

Carbon prices have been introduced in the UK through emissions trading – in essence, an artificially created market in which participating firms are allocated a fixed number of permits to emit greenhouse gases. These permits can be traded. In theory, firms will trade permits until the market reaches equilibrium: the point at which the desired emissions limit has been met at the lowest overall cost. An initial UK pilot trading scheme was quickly succeeded by an EU-wide emissions trading scheme (the EU ETS) in 2005. Emissions trading was described in the 2003 white paper as being 'central to the future market and policy framework' (Department of Trade and Industry 2003: 13). In a subsequent white paper published in 2007, it was estimated that trading would deliver the biggest share of additional emissions reductions by 2020 (Department of Trade and Industry 2007).

While pricing carbon is important to internalise the external costs of greenhouse gas emissions, a number of criticisms can be made of an overreliance on this as a policy strategy. Some (but not all) of these criticisms stem from differences between real-world implementation of emissions trading and textbook theories. First, the price in the EU ETS has been too low to make much difference to investment (as

opposed to operational) decision-making by firms. At the time of writing EU ETS prices are below 10 euros per tonne of CO_2. This reflects the fact that the cap on emissions was set too high, itself a reflection of political compromises that were made with lobbies that feared negative competitiveness impacts of high carbon prices. But just as important, the time horizon of the carbon price is short and prices have been very volatile. The UK government has acknowledged both of these problems, and have used them as a rationale to propose a Carbon Floor Price which will be implemented in April 2013 (DECC 2011b).

But even if it were stable and high, a universal carbon price would not be a sufficient condition for decarbonisation. This leads to the second criticism. An important assumption behind policies such as emissions trading is that decision-makers – whether they be individuals or large firms – operate in a rational way. However, it has been clear for a long time that assumptions about rationality are oversimplified and inaccurate. It is many decades since Nobel prize winner Herbert Simon wrote about the 'bounded rationality' that is often at work, in which decisions are made using short cuts and 'rules of thumb' (Simon 1957). More recently, behavioural economists have shown in detail why such rationality is a nice ideal, but is rarely an accurate reflection of the real world (Ariely 2009).

Concepts such as bounded rationality start to explain why context is important in economic decision-making. For example, large power companies contemplating investment in offshore wind go through rather different decision-making processes to individual consumers wondering whether to insulate their lofts. These firms and individuals will respond differently to a given price signal or incentive. Furthermore, as Paul Ormerod explains in chapter 2, they will be influenced by others through 'social networks'. This contradicts the assumption in neoclassical economics that decisions are made by individuals whose preferences are fixed and independent from those of others.

A good illustration of this complexity is road transport. An average UK car driver faces fuel taxes and VAT that are collectively equivalent to £300 per tonne of CO_2. This extremely high implicit price of carbon has undoubtedly influenced behaviour, and has helped to reduce fuel consumption and emissions. However, it has not led consumers to switch to the most efficient models of vehicle or to buy alternatives to petrol and diesel.

There are many good reasons for this. Alternative fuel vehicles are more expensive to buy and are hampered by a lack of infrastructure, such as electric charging points. But the fact that consumers are prepared to pay so much to drive their cars – including inefficient models – also reflects how much they value attributes such as status, style, safety, brand, performance, privacy and convenience. Only some of these

attributes can be captured by traditional frameworks that assume decisions are made by 'rational' individuals.

Limitations to rationality also apply to the analysis of firms, where simple cost–benefit calculations about the 'best' investment are just one consideration among many – other issues such as financial and policy risks are important too (UKERC 2007). A good illustration is nuclear power. It has been claimed that nuclear power is the cheapest low-carbon option available and even has lower costs than unabated gas power plants (Committee on Climate Change 2010). This is disputable given the major cost overruns that are affecting plants that are being built in France and Finland. But it is also striking that no investors are prepared to build new nuclear plants in the UK without significant additional government intervention – for example on sharing waste liabilities, long-term contracts for selling power and planning. In the meantime, gas-fired generation remains the technology of choice for new investments because it is seen as much less risky than most of the alternatives. This is because the principal risk associated with gas-fired plants is the level of gas prices. By correlating these prices with electricity prices, investors are able to hedge against this risk. By contrast, the current market arrangements do not provide a sufficient hedge against the main risks for nuclear investors, which are associated with capital costs.

A third critical point to draw attention to is innovation. As evolutionary economists since Joseph Schumpeter have emphasised, innovation is a centrally important driver of economic growth and has been at the heart of many of the pervasive changes in our economy during the past two centuries (Freeman and Louca 2001). Examples include the role of the steam engine in the industrial revolution, and the pervasive impact of information and communication technologies more recently.

Innovation is likely to play a central role in the transition to a more sustainable economy. Policies to support innovation are important to develop new technologies through R&D, and to support emerging low-carbon technologies through demonstration and early adoption towards commercial deployment. A carbon price (or any other pricing mechanism) will be designed to incentivise the cheapest courses of action first. This is for a good reason: it minimises the costs to society of meeting a given environmental target. But on its own, it does little to encourage the development of the next generation of low-carbon technologies. It is a very weak signal to firms to take the risk of funding new technologies across the 'valley of death' from early prototype to full-scale deployment. As the Carbon Trust has shown, this is often the most capital intensive stage of the innovation process. Neoclassical approaches to climate and energy policy simply overlook these limitations (Carbon Trust 2006).

Both the previous Labour administration and the current Coalition government have paid some attention to innovation. More nuanced and specific policies have been implemented to take into account the different stages of development of low-carbon technologies – for example through reforming renewable energy incentives so that further-from-market technologies receive more support. There has also been an explicit attempt, initially by former business secretary Peter Mandelson, to couple support for low-carbon technology deployment with industrial policy. While this re-emergence of industrial policy has not been problem free, it has brought the UK closer to many of the most successful countries – such as Germany – in terms of the stated approach to low-carbon innovation.

A fourth issue is more pervasive, and is very difficult for standard economic models to deal with. The concepts of path-dependence and lock-in from evolutionary economics are very important, but little attention has been paid to them within UK policymaking. The term lock-in was originally coined by Brian Arthur to explain how some technologies become widely adopted due to increasing returns to scale, even though they may not, objectively speaking, be the best technologies for a particular application (Arthur 1989). Examples include the QWERTY computer keyboard and the VHS video format. This lock-in concept was subsequently scaled up to describe the pervasiveness of fossil fuels, and hence high-carbon emissions, within modern industrialised economies (Unruh 2000, Unruh 2002). This means that if markets are left to themselves, energy systems tend to change slowly. Transitions such as the historical shifts in the UK from wood fuel to coal, and from coal to other fossil fuels, have taken many decades (Pearson and Fouquet 2006).

The key insight from the concept of lock-in is that it is not simply a case of making low-carbon technologies more attractive and cost effective. This is because many parts of our high-carbon energy system consist of long-lived capital assets including electricity grids, gas pipelines and buildings. Furthermore, these are supported by interacting systems of rules, regulations and institutions that coordinate energy flows, market relationships and investment decisions. Technologies and institutions co-evolve and are closely integrated (Geels 2004, Weber and Hemmelskamp 2005). As Paul Ormerod argues in chapter 2, the rigidities of these systems are reinforced by pervasive social networks between the actors and institutions involved. This can mean that when changes happen within such systems, they can ‘cascade’ through such systems in unpredictable ways (as was the case in the banking crisis). Therefore, in many cases, low-carbon technologies cannot simply be substituted for high-carbon technologies without some changes to these rules, regulations and institutions. While policymaking has made some reference to these more pervasive sources of high-carbon inertia – such as the lack of infrastructure to support electric vehicle charging – it has paid too little attention to this phenomenon.

Infrastructures, innovation and government entrepreneurship

Given these critiques of the dominant approach to climate policy, and the deterioration in both public and private finances, what should be done now? In the face of these challenges, some organisations have advocated a pared-down version of climate change and energy policy (Less et al 2010). While retreating to the 'simpler' policies of the late 1990s and early 2000s is superficially attractive, this chapter has already set out a number of reasons why carbon pricing alone will not be sufficient to do the job. Complementary policies are also required to reduce emissions effectively, and to break out of our lock-in to a high-carbon energy system. To address this, we need smarter government intervention, including highly targeted policies to support innovation, low-carbon investment and make our use of energy more efficient.

Contemporary debates about 'rebalancing' the economy present an opportunity to influence policymaking so that it supports growth that is cleaner and 'greener'. There is significant support for this concept, but with large divergences of view. Some argue that growth itself is the main sustainability problem (Jackson 2009), whereas others do not have a problem with growth but want it to be much less carbon and resource intensive (Aldersgate Group 2011). It is not the intention to go into these arguments in detail here. The radical critics of conventional economic growth make some very important points about limits to resources, the unsustainability of current patterns of consumption, and the problems of using GDP as a measure of progress. They are less convincing when it comes to politically and economically feasible alternatives.[1]

One further thing they fail to explain is where the innovation required to 'green' our economy will come from if we move away from growth. As innovation has been a key driver of the growth we have experienced and benefited from in the past, so, in the absence of growth, we might expect innovation to be less likely.

It is important to be clear about what a low-carbon society means for the UK. It means radical cuts in our emissions, and meeting the legally binding targets in the Climate Change Act.[2] It also means an equally important shift in the goods and services the UK economy produces in favour of cleaner technologies, and more economically and environmentally sustainable business models. Radical innovation and large-scale investments will be crucial to achieving this.

1 See for example critiques by Matthew Lockwood, http://politicalclimate.net/2011/03/25/the-limits-to-environmentalism-4/

2 Of course, there are limitations to the 'legally binding' nature of the 2009 act. There was considerable debate when it was introduced about the extent to which it is legally enforceable in the courts, or whether the main impact of missing targets would simply be damage to ministerial reputations.

Yet a recent report claims that the UK's low-carbon investment is going in the wrong direction. Low-carbon energy investment in the UK fell from £7.1 billion in 2009 to £2.1 billion in 2010, rising only slightly in 2011 to £2.5 billion (Harvey 2011). While overall business investment has been hit by the economic crisis,[3] the fall in low-carbon energy investment has been disproportionately large. This is not for lack of funds. Indeed, the private sector in the UK and some other countries has built up a substantial financial surplus. They are not spending this surplus out of concern over the sluggish state of the economy and because there is a lack of confidence that investment would generate a return.

As Mattia Romani and colleagues at the LSE argue, there would be significant investment in low-carbon infrastructure if policy incentives were stronger and clearer (Romani et al 2011). Policies to kick-start growth need to provide clear incentives for investment to be low carbon. Waiting until the economic climate is brighter would not only mean higher greenhouse gas emissions in the short term, but could also strengthen our economy's lock-in to high-carbon infrastructures. As the International Energy Agency argued recently (IEA 2011), the world could be locked in to an emissions pathway that is too carbon intensive for climate safety if current emissions trends continue beyond 2017.

What policies should be put in place to support growth that is more sustainable and leads to an economy that has lower carbon emissions? Overall, the government's growth strategies place some emphasis on sustainability (HM Treasury and Department of Business, Innovation and Skills 2010). However, the policy prescriptions that flow from this do not make sustainability a central concern.

The government recognises that it can help to stimulate growth by supporting infrastructure investment. The benefits of public co-funding of infrastructures – and the positive impacts on private sector investment – are well documented in the literature (Infrastructure Transitions Research Consortium 2012). The revised National Infrastructure Plan (HM Treasury and Infrastructure UK 2011) that accompanied the autumn statement offers some legitimacy for such investment.

Some of the infrastructure projects that are being prioritised under the plan are designed to reduce carbon emissions. In the power sector, investment is being supported by far reaching reforms of the electricity market (DECC 2011b). While many criticisms can be made of the electricity market reform (EMR) process, such reforms are required if this particular sector is to be decarbonised on the timescales that are required. But they need to be complemented by support for other energy investments – to make energy use more efficient, to upgrade

3 See Office of National Statistics for data on UK business investment, http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=National+Income%2C+Expenditure+and+Output

electricity grids so that they are smarter and can integrate low-carbon sources effectively, and to facilitate heat networks in densely populated areas.

This focus on the electricity sector can be contrasted with some other parts of the National Infrastructure Plan. Although the proposals it includes for investment in roads and increasing the capacity of UK airports can arguably make a positive contribution to growth, they make little sense if such plans perpetuate and strengthen our high-carbon lock-in. To overcome this lock-in, new or modified infrastructures will be needed that are lower carbon and more resource efficient, with changes in institutions and incentives to match. It may also mean rethinking the received wisdom that growth inevitably requires continual increase in the capacity of such transport infrastructures.

To help support this low-carbon infrastructure investment, an appropriate framework of targeted incentives will be required, alongside processes to learn from successes and failures. Green tax reform is potentially one element of this framework. As the Green Fiscal Commission argued in 2009, the UK could go much further in shifting taxation – so that, for example, polluting activities are taxed more, while labour is taxed less (Green Fiscal Commission 2009). However, as was argued earlier in this chapter with respect to emissions trading, the adjustment of prices through increased environmental taxes is unlikely to be sufficient to drive a low-carbon transition. Such taxes would also be subject to political trade-offs which may weaken their impact.

New institutions with a remit to focus specifically on low-carbon investments could also make a significant difference. The Green Investment Bank is a good example of the kind of institutional innovation that can help to overcome the UK's high-carbon lock-in. It will focus on a number of priority areas, which is sensible given that resources are limited. However, the decision to delay full borrowing powers for the Bank until at least 2015 is a mistake. Without such powers, it will operate more like a green fund, which has a much lower potential impact on investment.

In addition to supporting low-carbon investment, a suite of policies is also required to support low-carbon innovation. Most of the technologies required to deliver the dramatic reductions in emissions that are necessary already exist. The main innovation challenge, therefore, is to further develop, demonstrate and deploy existing technologies. A good example is the need to retrofit many of our public and private buildings to make them more energy efficient. Technologies to make substantial improvements have already been developed, but there is a need for stronger regulations and incentives, and the development of a skilled workforce of installers, to diffuse these technologies.

Over the past decade, the government has paid more attention to low-carbon innovation – for example, by supporting more R&D, setting up new institutions such as the Carbon Trust, and by funding demonstration programmes (Watson 2008). However, significant weaknesses remain in the government's approach to innovation. These weaknesses are not just caused by constraints on public budgets, but also by a philosophical approach that dates back at least thirty years, in which the government is seen as having little competence in supporting specific areas of technology. This is a philosophy that is shared by governments in some other countries (for example Sweden), but not by many others – including those such as Germany, Japan (and perhaps even China) who are seen as successful in supporting the growth of greener industries. In the current UK debate, many still support the UK's more 'hands off' approach (Owen 2012) and argue instead that 'horizontal' policies such as generic tax credits for R&D should be implemented.

A key issue is that innovation requires experimentation and what evolutionary economists might call 'learning by doing'. It is therefore necessary for those who support innovation to take risks – and to accept that some technologies may fail. This is problematic for public policy, where failures are seen in a very negative light. Furthermore, providing more specific support for particular technologies risks 'capture' of government by vested interests.

While acknowledging these difficulties, my colleague Mariana Mazzucato has argued the case for an 'entrepreneurial state' that is more suited to the realities of innovation (Mazzucato 2011). This entrepreneurial state works in partnership with the private and third sectors to foster innovation, and to underwrite the specific risks of developing and commercialising new technologies. She argues that there is a need for experimentation and learning. This means that the UK government needs to found new arms-length institutions with the necessary competencies and independence to be effective in this role.

There are already some good examples of genuine low-carbon experimentation that have been supported by public agencies in the UK. The Low Carbon Communities Challenge initiated by the previous government was a small funding scheme that supported 20 communities to implement projects and programmes. The Low Carbon Networks Fund initiated by energy regulator Ofgem is supporting a range of smart network trials across the UK. To reap the benefits of these experiments, it will be important to evaluate their effectiveness – and crucially, to use these evaluations to develop more effective policies and programmes.

There are also some less successful examples. The programme by the Department of Energy and Climate Change (DECC) to demonstrate carbon capture and storage (CCS) technologies has made slow and painful progress so far. While the competition to support the first full-

scale CCS demonstration in the UK was announced in autumn 2007, this has not yet led to a firm commitment to a specific project. The collapse of negotiations with Scottish Power and other companies intending to build a demonstration at Longannet is just the latest in a series of delays. In retrospect, the decision to specify which CCS technology should be demonstrated was a mistake. Given the large uncertainties about which CCS technologies might be the most efficient and cost effective, this decision left too little room for manoeuvre by private developers. Whie the government tried to micromanage this particular innovation process, a truly entrepreneurial state would have taken a more open approach – and would have invited interested companies to bid for public support using a range of technologies.

Ironically, this is precisely how DECC's revised strategy following the collapse of Longannet is structured. This example is a very good illustration of an appropriate role for government. Although there is plenty of evidence that government support for particular 'technology families' like CCS is necessary to commercialise them (Sandén and Azar 2005, Jacobsson and Bergek 2011), this does not mean that governments should micromanage the process by backing particular technology variants or developers. This is where the last Labour government got it wrong, through their specific support for nuclear component supplier Sheffield Forgemasters and other firms.

To help strike this balance, a government agency is required that can maintain the appropriate distance from industries that are being supported, and has the capacity to foster experimentation and innovation. Existing UK institutions such as the Carbon Trust are a good place to start and lessons can also be learned from other countries (Mazzucato 2011). In recent years, the Trust has been joined by a plethora of other institutions supporting low-carbon innovation, including the public–private Energy Technologies Institute and the Technology Strategy Board within the Department of Business. Each has a rationale that makes sense, but taken together they form an overly complex and crowded institutional landscape. It therefore makes sense for one or more of these institutions to be given a specific remit to fulfil this role – with the financial resources to match.

Engaging consumers and communities

An important aspect of the economics of the shift to low carbon has not yet been covered in this chapter. So far, the discussion has focused on relatively centralised and 'top down' policies and institutions. But this will not be enough. The shift to a low-carbon economy needs to engage with the concerns of consumers, citizens and communities. Prices, not carbon reduction, dominate contemporary energy discussions. Average household energy bills rose from £605 to £1,060 between 2004 and 2010, or by 75 per cent in nominal terms (Committee on Climate Change 2011).

Some of the costs of investment in low-carbon technologies and infrastructures have started to appear on consumer bills. This has generated significant debate and inaccurate claims that the costs of the low-carbon agenda are largely responsible for energy bill increases. Recent reports by both DECC and the Committee on Climate Change show that this is not the case (Committee on Climate Change 2011, DECC 2011a).[4]

What is often missing from the highly charged political debates is the counterfactual scenario – that is, what might happen to energy costs if low-carbon investments were not supported through bills. While the consequences of this counterfactual world are very difficult to pin down, the risk is that consumers would be much more exposed to high and volatile fossil fuel prices. There is also a wider question of principle here: to what extent should the costs of the low-carbon transition be passed on to energy consumers in this way? In the current economic climate, it is hard to argue that more of these costs should be funded via general taxation. However, this is a more progressive way to meet the costs of a transition to low carbon while mitigating some of the negative impacts on poorer consumers.

This battle over costs reinforces the need to focus on the demand side as well as the supply side of the energy picture. A key weakness of the EMR process is that it neglects the demand side. For example, it would have been possible to include contracts for energy saving in the reforms alongside contracts for low-carbon generation (Benton 2011). There is some recognition by government that a 'step change' is needed to progress on energy efficiency. But to put this aspiration into practice, there is a need to rethink standard economic conceptions of consumer behaviour.

In analysing the possible impact of energy saving policies such as the Green Deal, the government needs to take full account of insights from psychology and sociology as well as economics (Willis and Eyre 2011). This means taking seriously the full range of factors that influence people's purchasing decisions and patterns of behaviour. As noted earlier, neoclassical frameworks assume that people will respond rationally to prices, drawing on all of the information available about costs and benefits. But in practice, they do not usually have such knowledge, and their decisions are influenced by routines, habits and rules of thumb. They are also constrained by what Tim Jackson has called 'forces outside their control' which place practical limits on the choices that can be taken (Jackson 2005: x).

There are signs that limitations to the rational model are acknowledged within government. Broader analyses of behaviour and some innovative

4 The Committee on Climate Change concludes that 80 per cent of the rise in bills between 2004 and 2010 was due to factors unrelated to low-carbon policies.

experiments have been carried out by teams in DECC, Defra and the Cabinet Office. It is unclear yet whether their work will have a significant effect. Traditional economic analysis still dominates evaluations of the potential impacts of energy and climate policies.

A final important issue to consider is that we don't simply operate as individual consumers. We also engage with each other in networks and communities. Much emphasis has been placed recently by all political parties on variants of the localism agenda. Devolving power and decision-making to the local level has been emphasised most by David Cameron in his vision of the Big Society. To translate such rhetoric into action requires resources, which is where the Big Society ideal often runs into trouble. This is as true of the low carbon agenda as it is in other areas like health and social care. Community energy has become very popular in the UK – with large numbers of groups and projects springing up. As noted earlier, this route for low-carbon investment has received some funding from government which has helped to foster local innovation and learning. But more recently, the government has been less helpful to communities. The recent changes to solar feed-in tariffs have reduced a source of finance that community projects can use – and has led to the cancellation of many plans.[5]

This risks choking off a genuine source of innovation and experimentation that has the potential to make a significant contribution to the low-carbon economy of the future. Furthermore, it also risks undermining public support by taking away one of the ways in which individuals and communities can participate directly in the low-carbon transition. It is initiatives like community energy that could, if done correctly, epitomise a complexity-friendly approach to this transition. But simply decentralising planning (for example through the Localism Act) while failing to decentralise other aspects of governance (such as resources and funding) may backfire and could make it harder for low-carbon infrastructures to develop.

Conclusion

This chapter has argued that significant changes to the UK's climate and energy policies are required if insights from evolutionary and complexity economics are to be taken seriously. In particular, there is a need for a greater emphasis on public policy experimentation and learning. This lesson applies at all levels of governance (local, national and international) and does not apply only to government itself.

This emphasis does not mean that national and international targets for emissions reductions are unwarranted or unnecessary. Such targets,

5 In autumn 2011, the government announced that the rate of feed-in tariff payable for each unit of electricity generated by small-scale solar installations would be reduced earlier than planned. Following court challenges, this decision was partly reversed. Tariff rates have been reduced substantially from early March 2012.

and the discussions they generate about our future energy pathways, play a crucial role in ensuring that energy policies are on the right track. The government is right to be reticent about exactly what a low-carbon economy will look like, particularly in the medium to long term (2020–2050). Although the language of planning has made a comeback – for example in the government's annual *Carbon Plan* – it is important that this does not lead to monolithic, inflexible plans which are bound to come unstuck.

To reinforce targets, broad-based economic instruments such as emissions trading also have an important role in influencing decisions by individuals, firms and communities. However, this chapter has suggested that such instruments are not enough. They need to be complemented by more specific, tailored policies for particular sectors and groups of investors to speed up technical, social and institutional innovation. Furthermore, such policies need to rely less on neoclassical textbook models, and to recognise that investor and consumer responses are more complex than these models assume.

Examples of such tailored instruments already exist. Others, such as the Green Deal and Electricity Market Reform, are at an advanced stage of development. Their effectiveness will partly depend on whether learning is embedded within their implementation. This means a conscious effort by government to resist the temptation to micromanage outcomes. It also means signalling from the outset that regular reviews and adjustments will take place. At a time when climate change action is less politically salient and public budgets are tight, arbitrary interventions that damage confidence in low-carbon investment need to be avoided.

Above all, it is crucial that UK policy develops a much better understanding of the UK's lock-in to high-carbon infrastructures and the associated institutions and practices. To break this lock-in will require risks to be taken by both the public and private sectors. There will be policy failures along the way, and vested interests wedded to the status quo will need to be challenged. Government will need to develop better ways of accepting and learning from these failures as well as the success stories that the low-carbon transition will bring.

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9.

LOST IN TRANSLATION? SKILLS POLICY AND THE SHIFT TO SKILL ECOSYSTEMS

PAULINE ANDERSON AND CHRIS WARHURST

In his lament for the decline of craft skills, Richard Sennett (2009) notes the irony of what he calls the emergent 'skills economy' in which the UK government has boosted the supply of skills in an attempt to address an underperforming economy. Just as thinking on the economy has begun to change in recent years, so too must policy thinking about skills. In this chapter we outline how skills policy is evolving to take account of the more complex reality of skills development and deployment, but argue that greater clarity is still needed if that policy is to be made more effective.

With government aware that the UK economy has relatively low skill levels compared to other OECD countries, boosting the supply of skills has long dominated UK economic policy. This approach to skills is part of a long-term assumed trend about how, through technology, work and products are becoming more complex and therefore require more educated, more highly skilled workers. It is an approach that underpins the different versions of the 'knowledge-based' or 'creative' economy around which policy is now focused in the UK. Both these economies are projected as 'high skill' economies in which intangible, ideas-derived new products are created by highly educated workers who have acquired 'analytical' and 'thinking' skills through higher education – which, of course, has expanded massively over recent decades in the UK.

This policy thinking is underpinned and legitimised by reference to economist Howard Becker's (1964) human capital theory. This theory posits that human capital is similar to 'physical capital' such as land and machinery in that it can be enhanced through investment. In the case of human capital that investment comes most obviously through education and training. Becker, awarded the Nobel prize in economic services in 1992, argued that more sophisticated technology increases the value of human capital and that to a large extent economic growth now depends more on human than physical capital: 'increases in education and training have accompanied major advances in technological knowledge in all countries that have achieved significant economic growth', he states (Becker 2008: 250).

According to this theory, government investment to boost human capital, for example through expanding higher education, offers a win-win-win opportunity: workers with more and better human capital earn more; firms with more human capital are more productive; and the boost of skills makes the economy more competitive by driving firms up the value chain. Following this orthodoxy, economic policy in the UK has come to rest on supply-side interventions in the labour market to boost skills: as illustrated by the 1998 white paper *Our Competitive Future* (DTI 1998), which was followed six years later by the pre-budget document *Skills in the Global Economy* (HM Treasury 2004) and more recently by the Coalition government's *Skills for Sustainable Growth* (BIS 2010).

Yet, as with other economic orthodoxy, policy based on human capital theory has failed to deliver. It is now clear that supply-side intervention, particularly in higher education, has not had the desired effect. Productivity and competiveness have not markedly improved (Leitch 2006, UKCES 2009) and there are even concerns about having an overeducated workforce (Felstead et al 2007). The problem is that this one-stop, quick-fix approach resting on static, rationalist assumptions about human capital acquisition and its utility maximisation by workers and employers is not borne out in practice.

The failure of skills policy to deliver reflects broader concerns about the efficacy of orthodox economic thinking more generally. Four years after the banking collapse and with an economy that limps along it is clear that the old economic orthodoxies are discredited and are not, and perhaps never were, fit for purpose. New economic thinking is required. A more heterodox economics is emerging, encompassing evolutionary and complexity theories, which recognises the need for more holistic approaches to the economy in which there is a dynamic interaction between various actors and institutions, and which conceives of the economy as constantly changing.

If the old skills policy was indicative of the problem with orthodox economics, more recent thinking about skills could be part of the solution, and might even be said to be indicative of the new economic thinking. What is required are broader 'system' changes to help the UK break out of its low-skill trap. Although it has long been advocated by some academics (for example Keep and Mayhew 1999) it is a message that is beginning to penetrate policy thinking in the UK (UKCES 2009). This new thinking rejects static notions of equilibria and centres on the concept of 'skill ecosystems' – which are akin to dynamic living organisms with interconnected parts, actions and needs.

Unfortunately, while policymakers have started to embrace skill ecosystem thinking, the concept has been lost in its translation to policy. In this chapter we clarify the concept and argue that policy based on it resonates well with new economic thinking and can help push along

its implementation in the UK. We start by outlining the shift in thinking from skill equilibria to skill ecosystems and indicate how the concept has been lost in its translation into policy initiatives. We then re-present the concept so that understanding of it and its relevance to the new economic thinking is clearer. The final section of the chapter uses skills to raise some broader issues about the implementation of the new economic thinking into policy.

The shift from skill equilibria to skill ecosystems

Orthodox economics treats the economy as either in equilibrium or heading to equilibrium (Dennis 2012). However, non-equilibrium in the economy seems more usual and is what the new economic thinking tries to capture. As Richard Nelson (2008: 10) says of evolutionary theory for example, it 'sees the economy as always in the process of change, with economic activity almost always proceeding in a context that is not completely familiar to the actors, or perfectly understood by them'. Likewise, complexity economics assumes that the economy is a complex adaptive system featuring dynamic networks of relationships and interactions that are mutually reactive to changing needs, inputs and outputs. The shift in academic and policymaking thinking from skill equilibria to skill ecosystems mirrors this attempt to shift away from the equilibrium-based assumptions underpinning orthodox economics to one that accepts change as interactive and normal.

The shift in thinking about skills and economic competitiveness was first stimulated by David Finegold's (1999) seminal paper on high-skill ecosystems. The key arguments in this paper directly link to and address some of the arguments he and David Soskice set out in a highly influential paper 10 years earlier (Finegold and Soskice 1988). Both papers appeared in special editions of the *Oxford Review of Economic Policy*: the first was a collection of articles by leading academics on the UK's failure to invest in skills; the second reflected on education and training policy in the decade since the first publication. If the 1988 paper kick-started thinking about skills in terms of skill equilibria, the second paper marked a sharp shift to embrace the more dynamic concept of skill ecosystems.

The starting point was an awareness that the stocks of high, intermediate and lower-level skills in the UK lagged behind other OECD countries – all compounded by the general absence of retraining and upskilling opportunities for all of the UK workforce, including managers. By failing to invest in skills, Finegold and Soskice's original paper claimed that the UK was trapped in a low-skill equilibrium in which low-skilled workers were producing low-quality, cost driven goods and services. They argued that the fear of free-riding (Stevens 1996) – where firms do not invest in skills because they know that other companies can use the money they save by not training to 'poach' skilled workers with higher

salaries, which in turn leads to universal underinvestment in skills – could not on its own explain why the UK's skill record was so poor.

This poor record of investment in skills was a problem. Finegold and Soskice argued it seriously hindered UK competiveness. Underinvestment in skills, they suggested, was both the product and cause of this lack of competitiveness:

> 'A product, because the ET [Education and Training] system evolved to meet the needs of the world's first industrialized economy, whose large, mass-production manufacturing sector required only a small number of skilled workers and university graduates; and a cause, because the absence of a well educated and trained workforce has made it difficult for industry to respond to new economic conditions.'
>
> Finegold and Soskice 1988: 22

This low skills equilibrium was self-reinforcing, they said: sticking to the 'low road' meant that there was no requirement for well-trained workers, meaning that the UK could not respond to new economic opportunities. As Rob Wilson and Terrence Hogarth (2003: viii) later pointed out, there is nothing wrong with *some* companies choosing the low road. However long-term difficulties arise for the *country as a whole* when significant numbers choose this option.

The solution, argued Finegold and Soskice, was to shift to the production of higher value goods and services. The result would be a 'high skill equilibrium', with firms having workforces with higher skills. However, companies choosing to produce higher-value-added goods and services and invest in skills was not enough; they pointed out that getting the best out of the workforce required significant changes in work organisation and management to support flexibility and innovation. They also argued that the UK's education and training system would be best thought of as an integral part of a larger system (a 'set of political-economic institutions') which includes the organisation of industry; firms and the work process; the state and political structure; industrial relations systems; and financial markets. What they were essentially saying was that education and training systems needed to be firmly embedded within a much larger configuration of institutions and that all institutions in this configuration were to be interdependent.

It was the way in which this system uniquely evolved in the UK, they suggested, that meant there were few incentives to encourage individuals and employers to invest in skills and, under these circumstances, opting for the low road was a rational choice on the part of employers and individuals. As a result, the UK was said to be stuck in a low-skill equilibrium – defined as 'a self-reinforcing network of societal and state institutions which interact to stifle the demand for improvements in skill levels' (1988: 22). Other countries with different

institutional configurations have different, typically better, skill outcomes, as Germany illustrates (Hall and Soskice 2001).

This explanation for the UK's poor economic performance and related failure to invest in skills challenged prevailing class-based ('us vs them', 'management vs workers') explanations for the country's economic problems. It suggested an institutional, system-based, explanation of failure – what Ewart Keep and Ken Mayhew (1999: 4) call a 'systems failure'. It threw down a serious challenge to policymakers about what needed doing to improve the UK's economy.

As might have been expected when faced with a bit of complexity, they failed to rise to the challenge. Instead they opted to continue to tinker with the one part of the system that was easiest to influence – supply. Finegold later noted in his 1999 paper that although he and Soskice suggested that increasing skills supply might act as leverage for movement, in the absence of broader system changes, such interventions would not work. He even pointed out that the mass expansion of higher education had actually hampered the UK's capacity to produce cutting-edge research and development.

Finegold also noted that it had become apparent that skill equilibria thinking did not do justice to the continual evolution and relative unpredictability of the system. The sheer pace of developments in technology and the global economy meant that 'static frameworks' were clearly inadequate. Understanding skill ecosystems was a much better way to make sense of what was now happening and to highlight that it was not always possible to predict how systems would evolve.

Elements of the old approach were kept, principally the need to conceive of the system as a configuration of institutions, but it was felt that these needed to be concerned not just with skills supply but also its development, demand and use. Above all, while both ways of thinking focus on the interconnectedness and interactions within the system, skill ecosystems thinking emphasises the system's dynamism and continual evolution (Finegold 1999).

Finegold's 1999 paper was an attempt to develop a framework for understanding the conditions that help grow and sustain high-skill ecosystems. His framework was based on world-leading, fast-moving, knowledge-intensive hi-tech and biomedical industries in California. Companies tended to be clustered tightly together geographically and Finegold realised that these areas had turned into 'self-sustaining *high-skill ecosystems* (HSEs), that once started, generate a positive, mutually reinforcing dynamic that fuels ongoing knowledge creation and growth and adaptation to changing competitive conditions' (1999: 61).

Although he never explicitly used the term, Finegold's concept of skill ecosystems resonates with 'new economic thinking', ticking all

of its essential criteria boxes (see Dosi and Nelson 1994). Using the analogy of biological ecosystems, Finegold demonstrated that industrial ecosystems mirror natural ecosystems in the following ways:

- they need something to act as a **catalyst** to create and grow them
- they need **fuel or nourishment** to sustain them
- they need **a supportive host environment** to help them thrive
- they cultivate **a high degree of interdependence** between organisms
- they need the **adaptive capacity** to respond to changing conditions.

By maintaining the idea of systems as institutional configurations, Finegold's concept of skill ecosystems not only resonates with new economic thinking, but arguably has the capacity to add to it. For example, as Richard Nelson suggests with evolutionary economics:

> 'As a result of bringing institutions under the umbrella of evolutionary theory, evolutionary economics now has the capability to provide a broad, coherent and useful theory of economic growth as experienced in the advanced industrial economies.'
>
> Nelson 2008: 38

The industries on which the concept was based were often breaking new ground, spearheading developments in science and technology and constantly innovating and evolving. For instance, Finegold pointed out that skills development in high-skill ecosystems tended to be through a mix of informal learning on-the-job, mentoring, being given 'special assignments' and visiting suppliers and other companies. Formal education and training systems, he suggested, could not keep up. When workers did take part in formal learning, it was mainly through part-time evening or distance learning. To emphasise how skills can be developed in many different ways and contexts, he and other academics increasingly favoured the term 'systems of skill formation' rather than 'education and training systems' (see for example Brown et al 2001, Crouch 2005, Thelen 2004).

More recently, in Australia, the concept has been extended beyond discussion of purely 'high-skill' ecosystems. Here, skill ecosystems are defined as 'clusters of ... competencies in a particular region or industry shaped by interlocking networks of firms, markets and institutions' (Buchanan et al 2001: 21). While high-skill ecosystems can be an important source of job and wealth creation, the number of high-skill jobs in any economy may be relatively small and likely to remain so (Crouch et al 1999). However, there are spin-off jobs. On the one hand, intermediate-level skilled jobs are created through high-skill ecosystems. Engineers, for example, are needed to maintain the production

equipment of the new hi-tech and biomedical industries, while sales staff are needed to market and retail the goods produced by these industries. On the other hand, cash rich and time poor 'knowledge workers' need the support of a large number of lower-level service jobs, what Richard Florida (2002) has called the 'service class' (see also Warhurst 2008). For this reason John Buchanan and his colleagues extend the use of the concept to the two other main skill categories – intermediate and routine skills – and show how it can be used to identify problems in different skill 'bundles' across high, intermediate or low skill-level jobs (Buchanan et al 2001).

Skill ecosystems policy initiatives in Australia and Scotland

The work of John Buchanan and his colleagues set a new direction in skills policy in Australia that promotes skill ecosystems as part of a broader workforce development agenda (NSW DET 2008). One example was the skill ecosystem programme in New South Wales which funded research and partnership projects between trainers and industry to improve workforce capacity and the use of skills at work. As well as education and training development, the projects addressed aspects of the workplace and industry environment that influence the continual development and use of skills. The key requirements for funding partnership projects were that they addressed skill supply/development and use, and set out to improve business performance and achieve 'positive outcomes' for individuals (ibid: 9). Projects involved multi-stranded interventions that have led to changes to work organisation, employment contracts and business strategy, as well as training design and delivery.

In other words, the projects sought to improve the whole 'skills ecosystem' – not just the provision of training. John Buchanan and Richard Hall (2005: 2) argue employer calls of skills shortages or even skills crises tends to focus policymakers' attention on the skill supply 'problem'. In contrast, skill ecosystems thinking compels them to address the problem of skill demand and skill use – and might lead them to reach different conclusions, for instance that it is poor work design or low pay that often results in recruitment problems, not a lack of workers with the right skills.

Examples of funded projects include redesigning the role of, and employment contracts for, trackwork riders in the racing industry to deal with skill shortages and make these jobs more attractive; brokering relationships in the water industry between researchers, small enterprises and training providers; and improving inter-health cooperation and joint-working in mental health services. The Australian case shows just how policy can shift from a narrow focus on skill supply and look at things more holistically.

As with the rest of the UK during most of the 1990s and 2000s, Scotland overdosed on skill supply initiatives, ignoring the level of demand for skills by employers and use of skills by workers in the workplace (Felstead 2007). Changing policy tack, the new Scottish government began to embrace skill ecosystems thinking – drawn to reports of the Australian successes. The Scottish government's (2007) skills strategy emphasised the importance of skill deployment – or to use the new policy vernacular, 'skill utilisation'. The Scottish Funding Council has invested £3m over a five-year period to fund 12 skills utilisation projects. Examples of funded projects include management and leadership training in the social care sector; developing a vocational route from an apprenticeship to a master's degree; and delivering training, workshops and online learning to identify and develop unused workplace skills in the life science sector.

Leading the policy shift in the UK, the Scottish government is to be commended on its efforts on policy innovation – certainly, the UK Commission for Employment and Skills has praised these efforts and it too is now advocating skill ecosystems thinking (UKCES 2010a).

However, one glance at the examples of projects in Australia and Scotland immediately reveals that, in practice, Scottish policy initiatives do not really adopt the holistic approach advocated by skill ecosystem thinking. In Australia there were problems in getting all the key actors on board with projects. Similarly, Jonathan Payne's (2011) interim evaluation of the Scottish skills utilisation projects points out that colleges and universities tend to lead projects as education and training suppliers. He re-emphasises the need for the involvement of a broader range of actors, with employer involvement a priority. Unfortunately UKCES seem to have swung too far in this direction by suggesting that the next step should be employer-only networks (UKCES 2010b). It is fair to say, therefore, that in the UK skill ecosystems thinking has become lost in translation (Payne 2008). Even in Australia, where policy acceptance of the skills ecosystem approach is advanced, it is acknowledged that it can be a 'messy' concept (NSW DET 2008: 30).

Making sense of a messy concept

Evidence from Australia and Scotland, and the UK more generally, suggests that the skills ecosystem concept has been lost in translation, with its policy application partial and, in the UK, being dragged back to supply-side actions. It is better, however, to recognise that making skills work for the economy requires more than just having a supply of skills, these skills have to be developed – and as Finegold has noted, higher education is only one and may not be the best site of skill development. Furthermore, there needs to be a demand for these skills by employers. But, as one of us has already pointed out in an article with Patricia Findlay (Warhust and Findlay 2012) there are two types of employer demand – Type 1 at the point of hire, and Type 2 at the point

of use. At present, employers seem to be hiring workers with more skills than these workers then use at work (Felstead et al 2007). It is better therefore to disentangle 'demand' at the point of hire and 'deployment' at the point of use. Stripped back, skill ecosystems are made up of, and are concerned with, four main areas of skill:

- the development of skills
- the supply of skills
- the demand for skills
- the deployment of skills.

These areas are embedded in a configuration of institutions – some of which are proximate, some background, for example the firm and financial markets respectively. Within this configuration, actors with different roles, interests, needs and resources are interconnected and interact, and, by so doing, interdependently affect the nature and dynamics of the system. All of the skill areas, institutions and actors form part of the whole skill ecosystem and all are interrelated. What is important to remember too, is that skill ecosystems overlap with other skill ecosystems (see Anderson 2010). For example in Scotland, the skill ecosystems of the oil and gas industries, and those of new green industries centred on wave and wind technologies, overlap with pressures and developments in one affecting the other.

To summarise then, a skills ecosystem (as depicted in figure 9.1 over) is:

> **'a dynamic network of interdependent institutions and actors which through their various interactions, roles, interests, needs and resources is in a constant process of change – evolving in ways that cannot always be predicted – but which shape the development, supply, demand and deployment of skills in any given industry or region.'**

We argue that by placing skill development, supply, demand and deployment centre stage, we can begin to overcome a policy preference for boosting skill supply through the formal institutions of education and training. This framework lends itself to posing clear and important policy questions, such as: what is happening with skill supply, skill demand, skill development and skill deployment and how are changes in one area affecting others; who are the main actors and institutions in each of these skill areas and how are they shaping what is happening; and in what ways does this whole skill ecosystem seem to be evolving?

It also leads us to inquire about what skills are developed, where are they developed and how are they developed; what skills are employers recruiting and selecting from the labour market, why and how; and what skills are needed to be deployed in the workplace and what are the conditions by which they are best deployed?

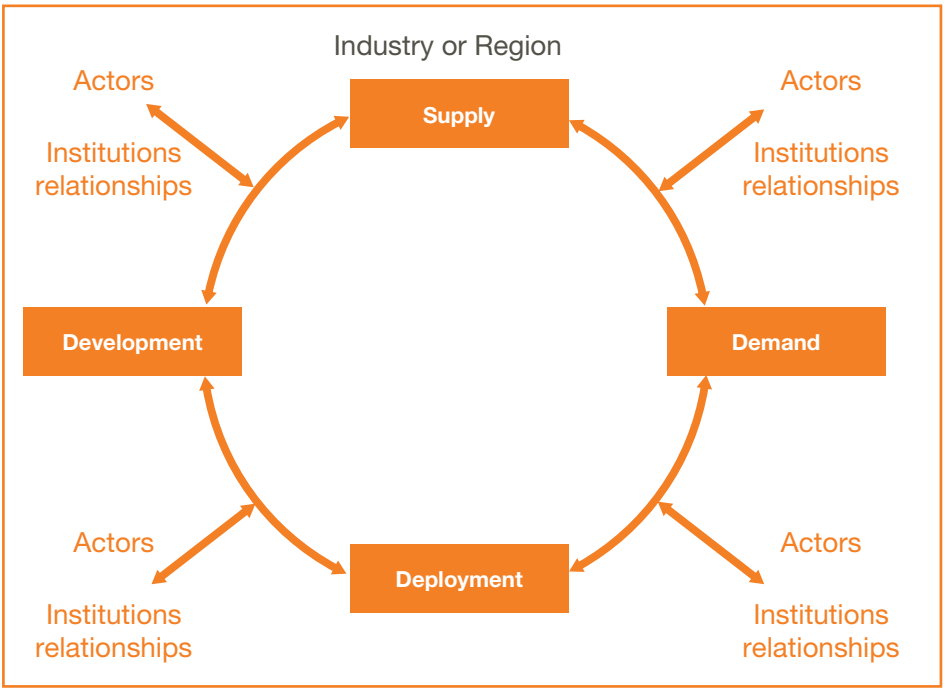

Figure 9.1 Simplified framework for a skills ecosystem

Perhaps most importantly, it allows us to ask what policy and other measures or interventions best nourish this skills ecosystem and how we ensure that these policies and interventions can adapt as the ecosystem evolves.

Conclusion

The current Coalition and previous Labour governments stressed the importance of skills for creating and maintaining economic competitiveness in the UK. While it is true that too much weight has been placed on the shoulders of skills over recent years – they are misguidedly offered as a cure for a range of disparate economic and social ills (see Keep and Mayhew 2010) – they rightfully remain a key part of any economic strategy. The issue is how best to frame skills policy and practice so that skills work best for the economy.

Old thinking about skills as with orthodox economic thinking generally has run into the sand. This chapter has outlined the concept of skill ecosystems and its relevance to new economic thinking. Adoption of this concept requires a broader shift in economic policy thinking that jettisons assumptions of equilibria and one-stop, quick fixes. The shift from skill equilibrium thinking to skills ecosystem thinking has not been an easy one. However, there is plenty of evidence from Australia and

Scotland to suggest a willingness to innovate with skill policy, even if the adoption of skill ecosystems has become lost in translation. To overcome this problem a clearer understanding of the concept is needed and we have sought to provide that clarity.

We recognise that for this better understanding to be implemented effectively requires governments to not only change their thinking but that the interface between government and the other key institutions and actors needs to be improved. Colin Crouch (1998) has already noted the current weaknesses in the relationships and understandings among government, practitioners and researchers around the issue of skills. This poor nexus needs to be addressed: indeed, it is fundamental for the effective operation of any skills ecosystem. It might also help if government becomes more open to alternative policy thinking – one based on empirical evidence and what works in practice rather than what might work in econometric models (Dennis 2012).

There should be no doubt that policy built on skill ecosystems thinking will be more complex and dynamic than one-stop, quick-fix, supply-side focused policy. However the real economy is more complex and more dynamic than single intervention strategies assume. Real economies are rarely at or heading for equilibrium as orthodox economics assumes. So too it is with skills: the development, supply, demand and deployment of skill constantly changes.

The concept of skill ecosystems enables policymakers to understand why and how these changes occur. Our belief is that it can go some way to improving skills policy thinking and inform wider economic development strategies in the UK. It is a choice between simple economic thinking that is often wrong or a new type of economic thinking that is admittedly more difficult to implement, but more likely to deliver what works.

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10.

REGIONAL POLICY AND COMPLEXITY: TOWARDS EFFECTIVE DECENTRALISATION

SUE RICHARDS

This chapter reflects on how regions, sub-regions and cities fare in the public policy system as it currently operates. It asks questions about whether these sub-national parts of the economy would fare better in a world which was better able to deal with the complexity of the interlocking nature of social, economic and political factors which impact on regional development.

I examine the shifting balance between localism and centralism in how the public policy system operates, and argue that many social and economic policy aspirations, especially those concerned with prosperity at the regional and sub-regional level, cannot be met where power and authority are located in a highly centralised set of governance institutions. Under such conditions and because of scale factors, the centre is compelled to employ mechanistic approaches to achieve results. However, the returns generated by this approach tend to be limited to mere compliance, and do not lead to the potentially innovative achievements that could be realised if an approach was adopted which took account of the inevitable complexity of local systems. It is one thing, for example, to set targets for getting long-term unemployed people back into work; it is another thing altogether to create the conditions whereby a galvanised local economy takes on the responsibility for ensuring that all citizens can make a work contribution.

An examination of the recent history of the British state demonstrates that over time different points of balance between centralism and localism have been struck, but that for most of the last 30 years the push towards centralisation has been the stronger, whether this has been under the avowedly neoliberal governments of the 1980s or under the third way approach of New Labour. Despite their rhetoric about the small state, the governments of Margaret Thatcher centralised power in order to change the paradigm of public policy. Similarly, New Labour's pathway to power was through establishing centralised dominance of the Labour party, and it was easy to regard the core competences that consequently developed as skills transferrable into government.

The institutions of governance are not neutral mechanisms but living systems with embedded ideologies and vested interests. They are not static. While institutional theory suggests that such deeply embedded entities have the capacity to reshape and deflect attempts to change them, they are not immutable either. New forces and factors may emerge that undermine the old certainties and establish new ways of doing things which carry their own legitimacy.

New thinking about complexity offers ideas and arguments to help us understand these issues. Older theories based on reductionism emphasise the similarities of change in different places. Complex systems emphasise the idiosyncrasies of particular circumstances. Adopting this approach, any policy ideas need to be tailored more than we thought pre-complexity. This suggests devolving decision-making to ensure it is tailored. Additionally, complex systems evolve unpredictably, requiring a more resilient system than we currently have. Authority and responsibility ought to be closer to the action, so policy can be more nimble.

If we look in more detail at how the public policy system has operated we will find evidence of some moves towards a decentralised approach, which is better able to recognise complexity, but these steps have remained subordinate to centralising tendencies**.** The overall picture is, therefore, complicated but worth disentangling for the light it throws on where we are now and where we might need to go to create the right conditions for regional and sub-regional development.

In order to develop this analysis, the chapter will focus on:

- the increased centralisation within the British state – particularly (and contrary to popular assumption) during the neoliberal moment of the 1980s and 1990s
- the continuation of the dominant theme of centralisation under New Labour, particularly after the first term
- the periodic emergence of different responses, such as steps towards a coherent urban programme and the development of institutional responses such as devolution to Scotland, Wales and Northern Ireland, and regional government offices
- the rapid development of ideas towards the end of the Labour government about reconfiguring the relationship between central government and locality.

Regional policy dilemmas

In the first industrial revolution, mass migration from the countryside to new urban industrial centres took place, and public policy decisions about the infrastructure which made urban living tolerable – for example, better housing, water and drainage, public health – all followed on from what were essentially economic drivers. Institutions of city governance took the initiative in creating these new social policies.

While landless and voteless farm labourers had little choice but to up sticks and move, once there was political representation it was easier to contemplate using the power of the state to ameliorate the work of the markets, and to seek to find ways of bringing work to the people rather than people to the work.

The policy dilemma will be apparent from the above potted history. How far should government intervene in the process of economic change to sustain the areas which were once highly productive but which have become less so and therefore provide fewer jobs, and how far should it allow market forces to operate without constraint? Recent disclosure of cabinet papers under the 30-year rule reveals exactly that discussion, when the then chancellor of the exchequer, Sir Geoffrey Howe, argued that Merseyside should be allowed to wither away rather than receive public funding to arrest its decline. This stark suggestion highlights the dilemma in question – while some might argue that 'going with the flow' of the market is the best way of assuring economic success even if that means resources and development move elsewhere, the sunk investment in major cities and the local public backlash that will invariably follow at the ballot box (at least, by those members of the local population who choose not to vote with their feet by leaving) require a different solution.

Until the 1980s, public policy in the post-war era involved a commitment to full employment, with nationalisation a key instrument for ensuring that this happened. While there was still a drift towards the south east, these policies led to the retention of relatively buoyant regional economies. But comparative national economic decline made it less and less possible to cushion 'uncompetitive' production, and contributed in the 1970s to the emerging public view that 'we could not go on like this', a sentiment which led to the Conservative victory in 1979.

It is the wave of change which followed the 1979 election which sets the context for this discussion of how we can best support regional development. Floating the pound, by now an oil-backed currency, together with freeing up capital markets, privatisation and the subsequent restructuring of industrial enterprises: all of these led to a rapid collapse of the core industries in the regions of the UK. The further liberalisation of capital markets following the 1986 'Big Bang' reforms of the UK financial services industry accelerated the split which Will Hutton has drawn attention to between the global finance elements of the economy, predominantly based in London and the south east and the de-industrialised regional centres (Hutton 1995).

Hutton argued that the neoliberal ideology swept over not only those working in global financial markets, but also public policymakers, both elected and permanent, who went with the flow rather than focusing on how the UK economy as a whole could increase its competitiveness and achieve more prosperity.

The next section of this chapter examines a shift in the way that the public policy system operated and went in tandem with neoliberal economic policies. The shift was towards a much more centralised distribution of power, reducing the power and influence of regional interests and focusing on the untrammelled operation of market forces.

The balance between centralism and localism within the British state

This section will give an account of how the power of the central state was increased, how this was related to a particular set of economic policies, and how it was intended to de-privilege the voices of those with opposing views. As we shall see, the legacy of state centralisation remains, even though the support for many of the policies with which it was linked has melted away.

Pre-1980s

Social policy in the UK has its roots deep in localism, through the emergence of charitable bodies as a response to the urban problems of the 19th century and the development of municipalist leadership, which used the institutions of local government to deal with the pressing issues of populations living in close proximity and without traditional support mechanisms. The new factors posed by the 20th century, including the need to mobilise for a major war, triggered national involvement in social policy, with the post-second world war welfare state establishing a new paradigm of central state involvement.

The Attlee government's approach was underpinned by the intellectual and ideological framework of Fabian socialism, focusing on the directive use of state power to achieve change. Nevertheless, this approach was rooted in local institutions and processes. Three measures in the 1940s – the establishment of national assistance, the 1944 Education Act and the creation of the NHS in 1948 – form model cases of a new relationship between centre and locality.

For all the rhetoric surrounding minister of health Aneurin Bevan's claim that he would hear about the details of service failures in his ministerial office (see the famous bedpan in Tonypandy), while a National Health Service was created and funded through the exchequer, governance was shared through local and regional board structures, involving both local elected representatives and the leaders of clinical professions.

The Education Act 1944 created a service which was, in its own words, 'centrally determined and locally administered' – a form of words which beautifully expressed the power sharing that characterised the relationship between centre and locality. Local education authorities in effect shared power with the teaching profession and with central government.

National Assistance was far more centralised, with benefit systems and finances decided in the centre and the notion of nationally based

entitlements related to the contribution of national insurance by individuals. This centralised position was consistent with the view that unemployment would be a short-term problem for individuals and not an endemic feature of local economies, requiring complex local solutions.

In effect, we had, in Karl Weick's phrase, a 'loosely coupled system', with centre and locality, each able to operate within the logics appropriate to their sphere, the former creating a national narrative surrounding the services in question and the latter getting to grips with the messy reality of crafting change and making things happen on the ground (Weick 1976). This is a power-sharing accommodation, rooted in social solidarity.

On the economic policy side – or rather its key component, industrial policy – here, too, power sharing was the order of the day. Defunct infrastructure companies had been nationalised as part of the mobilisation for war, and the question of how the relationship with government should be structured post-war was resolved by the establishment of the public corporation as the dominant form. Power was shared with the professional, managerial and technical elite, who negotiated high-level strategy and finance with ministers and their civil servants but otherwise ran the show.

On both the social policy and industrial policy aspects of this paradigm there was a respect for knowledge rooted in experience, tacit knowledge that was conveyed through craft apprenticeship and learned through doing the job. Shared goals and values were the glue that kept this relationship between centre, region and locality and other interests in place. No one used the term complexity, but actually this was complexity theory in action.

This history has been set out at some length because there is now a generation of policymakers who have no direct experience of it, and who may believe that the centralised state which accompanied the last 30 years of neoliberalism, was an eternal verity rather than a dysfunctional aberration.

Post-1980s

It became common in the 1980s to talk about the 'hollowing out' of the state, a phrase that became synonymous with the period of privatisation which divested government of enterprise (Rhodes 1997). However, a process of centralising state power within the UK national state was proceeding at the same time. The Thatcher government may have been centralising in order to decentralise, as they claimed, but it was the centralisation which is the lasting memorial (Metcalfe and Richards 1987).

In education, Thatcher oversaw a gradual weakening of influence of locally elected education authorities through 'Local Management in

Schools'; devolving school budgets to head teachers; and the creation of Ofsted, which would judge school performance based on national criteria and league tables. Further education colleges were removed from local authority control and given corporate status, while the representatives of local further education boards were appointed by ministers and directed through national funding arrangements.

In health, local authority members were removed from local and regional health bodies and replaced by ministerial appointees. The creation of a purchaser/provider split served to de-privilege local professionals, while strategic commissioning bodies became accountable to the secretary of state and were granted the power to oust local managers and chairs for non-achievement of central targets, something which occurred with great frequency.

Income support is a more complicated example. The National Assistance Board was established as a highly centralised insurance-based system providing financial support for unemployed people in the immediate post-war period. Unemployment was viewed originally as a short-term phenomenon where people needed funds to tide them over until they got their next job. The system had been devised to suit post-war industrial policy. The de-industrialisation of the early 1980s created endemic long-term unemployment where a more holistic approach, which involved not only benefits but also work and life skills development, was needed to make inroads into the problem. The income support system, however, remained resolutely centralised.

These developments remained in various guises during the tenure of successive Conservative and Labour governments; although under Labour, centralisation was often cushioned by the provision of more resources for service improvement, for example through investment in the development of head teacher leadership capability, more funding for further education, and schemes to ease the passage for people formerly dependent on benefits back into work.

Furthermore, it is possible to view the first term of the New Labour government as an attempt to row back from centralisation – examples could be cited to support this, particularly in health. But after the 2001 election the policies pursued by the Labour government were nearly as centralist as those of its predecessor. It is interesting that Tony Blair in his biography refers to the first term as a wasted opportunity.

If instead of policy and service instruments we look at the way in which the state itself was organised, once again we see a set of changes which resulted in centralisation. This included:

A. the abolition of elected bodies at regional and sub-regional level (GLC and the metropolitan counties) which were alternative centres of strategic state power

B. capping of local authorities' capacity to spend independently
C. creation of the Audit Commission to reduce local variance and enforce compliance with national targets
D. atrophy of cabinet government, with the tacit knowledge and judgment of individual departments and their secretaries of state less influential than the positivist research-based knowledge possessed by the Number 10 policy unit
E. a relative weakening of the independence of and the capacity to 'speak truth unto power' by the permanent civil service, where over a working lifetime civil servants could acquire a rich appreciation of the policy issues they dealt with; civil servants were often seen as a brake on change by governments of both parties and therefore marginalised
F. decentralisation was offered to those who were able to press their case politically, in what became the devolved administrations. The devolved administrations may ultimately constitute a natural experiment which demonstrates the importance of smaller scale in dealing with the complex issues of development, but in the short term it removed important voices from the discourse about regional devolution.

The picture is clear: what was once a state system which was based on a partnership between centre, region and locality increasingly became tightly centralised in Downing Street, tightly coupled through a system of performance targets, measurement and monitoring that reduced the overall level of intelligence available to policymakers, which arguably impoverished the way that decisions were made. The system was justified by castigating local players and professionals as the enemies of change, the 'forces of conservatism' who must be defeated, but the overall impact of centralisation was to make policy more mechanistic, less able to deal with experiential and tacit knowledge, more alienating for those outside the charmed circles, and those within having a thinner appreciation of the diverse fabric of the regions that make up the UK.

What was beginning to happen towards the end of this period is that the model of tight centralised control was beginning to collapse under its own weight. The transaction costs of targeting, inspection and monitoring were reaching unsustainable proportions. Rethinking began under the Labour government, but actually the political capital of the critique accrued to the then opposition and fed into their narratives about localism and the Big Society.

Post-2010

It is still too early to tell how the Coalition government will ultimately fare on the centralisation question, but the phrase 'lipstick localism'[1] neatly sums up the scepticism felt by some observers. David Cameron has

1 See http://www.ippr.org/articles/56/9031/going-metro

certainly looked to learn from the mistakes of the previous administration and the widespread perception that it had been overly prescriptive, but it has become apparent since the election that there is a great deal of hesitation about handing power back to the local state. Instead of seeing local government as the natural convenor of the Big Society, which is how many local authorities see themselves, the view has prevailed that this is just one more arm of the state and therefore it needs to be rolled back (Richards 2011). Localism for the government is predominantly defined as seeking to strengthen the hand of citizen groups vis-á-vis local government.

Perhaps the most promising lines of development lie in proposals for decentralisation to city sub-regions through the City Deal initiative. Cities have been promised more autonomy, provided they first jump through the hoop of holding a referendum for an elected mayor. What will happen to this policy now that the idea of the elected mayor has been resoundingly rejected remains to be seen. The referendum results reveal that the public has little patience with tinkering with political management arrangements, possibly influenced by the views of local political leaders who were on the whole profoundly irritated by Whitehall's perennial promise to devolve more, if only... An acknowledgement that the problem lies at the centre rather than in the locality would be a big step forwards.

Emergent responses

You can treat a complex adaptive system as though it is a tightly coupled machine, but you cannot turn it into one. During the whole period since the start of the 1980s there is evidence of groups coming together and creating networks to try to influence a system that was seen to be unhelpful to the development of the regions. De-industrialisation and consequent unemployment formed the spur in many areas to create relationships, across political lines and across sectors, which aimed to find a better way for their locality.

The Toxteth and Brixton riots sent alarm bells ringing in government and led some to question the public's willingness to bear the social costs of the great neoliberal experiment. Toxteth marked the start of the career of Michael Heseltine as an urban and regional development actor. Throughout the 1980s and 1990s, as a minister he was involved in one scheme or another aimed at using marginal funding to ameliorate conditions in the worst affected urban and regional areas. Local players channelled their energies into bidding competitively against each other for central funding to do worthwhile things, through such schemes as City Challenge and the Single Regeneration Budget. This had the further advantage for central government in that some of the cost could be recouped from European Union grants.

A key finding from evaluations of these early interventions was that building new factories or offices was not enough in itself to trigger development. What worked best was a combination of appropriate economic and social initiatives building the social capital of interlocking networks through partnership working.

In recognition and pursuit of this holistic approach, Heseltine sponsored the notion of the single government office for the region, which would be a one-stop shop providing an integrated service across the whole of government. This grew into the government offices for the regions (GOR) system in the mid-1990s, which was said to be the eyes and ears of Whitehall in the regions and the voice of the regions in Whitehall. Over time, this system snowballed, with more and more departments posting staff into the system to create a coherent regional presence. Government offices organised themselves on a sub-regional basis and saw their role as facilitating network creation and development between sub-regional actors and others who had something to offer the sub-regional economy.

Unfortunately one of the first acts of the 1997 Labour government was to pull the economic development function out of the GOR and instead set up the regional development agencies (RDAs), a plan developed in opposition and not well grounded in an understanding of what had been learned in the 1990s. There was thus a GOR and an RDA in each region, with not-so-creative tension between them – tension that was nevertheless reduced over the years by careful relationship building. Both organisations were then abolished by the Coalition government in the name of 'localism'.

Meanwhile, the Treasury sought to reform the expenditure planning process. The intention behind Public Service Agreements, begun in 1998, was to focus on the achievement of outcomes and reduce the burden of 'targetry' and monitoring. Institutionalist theory focuses on how the established norms of a given institution may shape the way that purposive action actually transpires, and there could not have been a clearer example of this than Public Service Agreements (March and Olsen 1989). Instead of reducing burdens, it actually led to an increase and at one time in the early 2000s local authorities were subject to 600 separate performance targets.

However, the sheer absurdity of this situation did trigger more radical change, which accelerated after the change of prime minister, with a real shift towards greater decentralisation through the establishment of Local Area Agreements jointly negotiated between central and local government. This development in turn paved the way for Total Place, an experiment conducted right at the end of the Labour administration which operated at the sub-regional and local level, allowing local government and local public service bodies to pool budgets to achieve

better value for money in achieving common goals. This idea was continued, albeit on the narrower field of children's services, by the current government's Community Budgets initiative. What we are seeing demonstrated here is a partial loosening of the tightly coupled system.

Localism is becoming a concept in good currency. The Lyons review of local government in 2008 articulated the significance of the concept of 'place', re-evaluating the spatial dimension of wellbeing. The incoming coalition government also pitched a strong narrative around localism, although their interpretation of this idea in government has been more to do with marketisation and cost-cutting than decentralisation of decision-making.

What lessons can be drawn for the future?

It is not possible here to set out a working template for a public policy system which will be better able to handle regional and local complexities and provide an approach to regional development which has some chance of making a contribution to the rebalancing of the economy away from London and the south east. However the above account of key design features over the last 30 years and beyond does allow us to set out certain parameters.

First, strategic leadership is needed from central government, not micromanagement. This phrase comes from a far-sighted white paper entitled *Excellence and Fairness* produced in 2008 by the Cabinet Office. In it can be found the thinking of people in the previous Labour administration who realised that the old centralised control approach had gone too far and needed to be counterbalanced by an approach based on dialogue and persuasion. The central maxim of the paper can be summarised as 'you are only a leader if people choose to follow you', a reverse on the old 'Number 10 knows best' mentality. The term 'strategic' implies that there is a need for overview and oversight at the level of the nation state, not micromanagement.

Second, scale factors are important. Many of the countries which have the most effective public policy systems have smaller populations than the UK. Finland and Singapore both come to mind as delivering public services of the highest standard, achieving results well in advance of the UK. In neither case can this success be ascribed to beneficial natural endowments, but I would argue that their size enables a connectivity and the growth of a sense of common purpose which underpins their development. UK city sub-regions are around the same population size. Other larger more successful public policy systems – such as Canada and Germany – illustrate the importance of federal systems where sub-national policy systems have the scope to make a difference.

The low level of esteem in which government is held by the British public means that it would be unproductive to go down the route of a formal constitutional convention to work out how to organise things differently, as happened in Scotland before devolution. The rejection of the proposal for a north east assembly in a referendum three years ago illustrates a general unwillingness to contemplate new layers of government. However, continuing the process of re-creating the metropolitan counties does make sense – it has already been done in London, and in Greater Manchester and the Leeds City Region new arrangements under the Coalition government's City Deal initiative are being made to all these groupings of authorities to function as one. This is clearly a process which could be extended to other conurbations, which like Greater Manchester could overcome local rivalries to reach out for the bigger prize.

Third, join up government at the sub-national level. The Total Place programme, introduced in 2008, has demonstrated clearly that giving local bodies the power to pool budgets, or at least part of their budget, to work for purposes, or for service users, that they share, gives benefits both in cost-savings and in capacity for innovation in complex policy and service areas. This programme of work put local bodies in the lead, with a group of high-level officials in Whitehall whose job it was to knock over central government obstacles to joint working. One example is Croydon, where the local authority and the health service joined together to achieve more with less for local children and young people by successfully improving early intervention, creating multi-professional teams able to view issues holistically, and by building social partnerships with community networks, thereby engaging them in solving the problems (Hughes and Richards 2011).

Regrettably, despite its localism narrative, the current government's lack of a coherent public service strategy leaves it vulnerable to the service silo mentality which is the standard operating procedure in Whitehall. It is pretty clear that neither the current health reforms nor the proposed direction of school policy are much influenced by the need for holistic working at the local level.

Fourth, devolve budgets for higher and further education and skills to city sub-regions. Many areas of public service which are highly relevant to regional economic policy lie outside the traditions of regional funding. Universities exist within a national (and now consumer) funding framework, where more funding has gone to universities with high scores on a research assessment framework and more international academic publications. This probably has a pay-off in terms of attracting foreign students and in the development of fundamental science-based enterprises, but there are wider areas where the application to practice is not helped by this framework. City sub-regions which are working towards improving their knowledge economies, which must mean most

of them, will be missing a vital ingredient if universities are driven away from them, rather than towards them.

The same argument applies, without the countervailing factors, to further education and skills. The Skills Funding Agency is seeking to reorientate itself so that it gives colleges more space to be local innovators, but the legacy of the past means that there is a long way to go.

Fifth, by the same token, the budget for the Work Programme should be devolved to city sub-regions. It will be clear from the sections earlier in this chapter that the system of benefits started life as, and has continued to be, highly centralised. In the case of benefits available as of right to all citizens, this remains an appropriate structural choice but in the area of work-related benefits, where there is some administrative discretion, it does not make sense for that discretion to be exercised within a Whitehall silo, divorced from the mainstream of economic and social development activity. The recent award by the Department for Work and Pensions (DWP) of prime contracts for the Work Programme on a sub-regional basis is recognition of the need to work at the appropriate scale. Unfortunately, the fact that these contracts were won by private companies rather than a local public development body means that the integration of this work within the wider context is not likely to happen. Transferring work-related benefits to a city sub-region would be a big step but the development challenge which faces regions of the UK is of similar magnitude.

Finally, regional policy practitioners should note the hidden wiring of public accountability. It is sometimes said that the UK does not have a constitution, but it does have constitution-like practices which are deeply embedded and carry strong legitimacy. One such practice is the notion that public money must ultimately be under the control of a properly constituted public body run by elected representatives and that those who are charged with spending public money may be held accountable for what they do with it. Accountability and therefore political risk cannot be shuffled off to third parties. The recent problems faced by the secretary of state for work and pensions over practices in the company A4E (Action for Employment) illustrate the point.

The history of public administration in the last 30 years is littered with examples of central government politicians seeking to 'decentralise' to non-elected bodies which they themselves appoint rather than to local elected bodies. The health service boards from the early 1990s onwards are one example of ministers trying in vain to avoid accountability for local action, but failing to do so. Both proponents and opponents of the recent health bill were aware how crucial was the retention of the secretary of state's responsibility for ensuring the provision of a *National* Health Service, with some notion of common entitlements rather than

non-elected local bodies (even if run by GPs) having full discretion to spend public money as they see fit.

To sit discretion and the accountability which goes with it at the level of the local economic development footprint, likely to be a city sub-region, there is little alternative but to use elected local government to anchor it in public accountability. If central government is going to adopt a strategic leadership role it needs a locally grounded partner who will ensure that the buck stops at the right level rather than returning to the centre.

This will involve discarding the outdated myths about local government purveyed by the metropolitan elite. Among both political and officer elites, local government is clearly at least as well able to provide effective leadership as those who operate in central government. The fact that the new head of the civil service is a former local authority chief executive should say it all.

Conclusion

This chapter has drawn attention to the linkage between issues of regional policy and the way the public policy system operates. In particular, the degree of power centralisation is seen as a significant factor in enabling the full flowering of neoliberal economic policies in the 1980s and 1990s. The legacy of centralised power was adopted by New Labour and only belatedly seen as problematic when the system of targetry reached epic proportions. The reputation thus gained for top-down bossiness was one reason for the espousal of the principle of localism by the current government, but this commitment is being derailed by the greater commitment to marketisation.

If we wish to rebalance the economy by building regional prosperity we need to recognise that this cannot be done through a mechanistic approach from Whitehall. Instead, there needs to be a focus on regional development as a complex adaptive system, facilitated and empowered to adapt according to circumstances.

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11.

NEW ECONOMICS, POLICY AND POLITICS

ERIC BEINHOCKER

Economic ideas matter. The writings of Adam Smith over two centuries ago still influence how people in positions of power – in government, business, and the media – think about markets, regulation, the role of the state, and other economic issues today. The words written by Karl Marx in the middle of the 19th century inspired revolutions around the world and provided the ideological foundations for the cold war. The Chicago economists, led by Milton Friedman, set the stage for the Reagan/Thatcher era and now fill Tea Partiers with zeal. The debates of Keynes and Hayek in the 1930s are repeated daily in the op-ed pages and blogosphere today.

The thesis of this book is that economic thinking is changing. If that thesis is correct – and there are many reasons to believe it is – then historical experience suggests policy and politics will change as well. How significant that change will be remains to be seen. It is still early days and the impact thus far has been limited. Few politicians or policymakers are even dimly aware of the changes underway in economics; but these changes are deep and profound, and the implications for policy and politics are potentially transformative.

For almost 200 years the politics of the west, and more recently of much of the world, have been conducted in a framework of right versus left – of markets versus states, and of individual rights versus collective responsibilities. New economic thinking scrambles, breaks up and re-forms these old dividing lines and debates. It is not just a matter of pragmatic centrism, of compromise, or even a 'third way'. Rather, new economic thinking provides something altogether different: a new way of seeing and understanding the economic world. When viewed through the eyeglasses of new economics, the old right–left debates don't just look wrong, they look irrelevant. New economic thinking will not end economic or political debates; there will always be issues to argue over. But it has the promise to reframe those debates in new and hopefully more productive directions.

An economics for the real world

The term 'new economics' is both vague and broad. It is easiest to define by what it is not. New economics does not accept the orthodox

theory that has dominated economics for the past several decades that humans are perfectly rational, markets are perfectly efficient, institutions are optimally designed and economies are self-correcting equilibrium systems that invariably find a state that maximises social welfare. Social scientists working in the new economics tradition argue that this theory has failed empirically on many points and that the 2008 financial crisis is only the latest and most obvious example.

Defining what new economics *is* provides a greater challenge. As of yet there is no neatly synthesised theory to replace neoclassical orthodoxy (and some argue there never will be as the economy is too complex a system to be fully captured in a single theory). Rather new economics is best characterised as a research programme that encompasses a broad range of theories, empirical work, and methods. It is also highly interdisciplinary, involving not only economists, but psychologists, anthropologists, sociologists, historians, physicists, biologists, mathematicians, computer scientists, and others across the social and physical sciences.

It should also be emphasised that new economics is not necessarily new. Rather it builds on well-established heterodox traditions in economics such as behavioural economics, institutional economics, evolutionary economics, and studies of economic history, as well as newer streams such as complex systems studies, network theory, and experimental economics. Over the past several decades a number of Nobel prizes have been given to researchers working in what today might be called the new economics tradition, including Friedrich von Hayek, Herbert Simon, Douglass North, James Heckman, Amartya Sen, Daniel Kahneman, Thomas Schelling and Elinor Ostrom.

The common thread running through this broad research programme is a strong desire to make economic theory better reflect the empirical reality of the economy. New economics seeks explanations of how the economy works that have empirical validity. Thus behavioural economists run painstakingly crafted experiments to explain actual human economic behaviour. Institutional economists conduct detailed field investigations into the functions and dysfunctions of real institutions. Complexity theorists seek to understand the dynamic behaviour of the economy with computer models validated against data.

In my book *The Origin of Wealth* (2007: 97) I offered a table to summarise the contrast between traditional economics and the new economics perspective. I provide here an updated version.

	Traditional economics	New economics
Individuals	Perfectly rational, use deductive reasoning, have access to perfect information	Use both inductive and deductive reasoning, rely on rules of thumb, subject to errors, capable of learning, access to local, imperfect information
Networks and institutions	Network relationships don't matter, all interactions that matter are through price system	Network structures matter, non-price interactions matter (eg social relationships, trust, reciprocity)
Institutions	Institutions are rational optimisers and thus efficient – details of institutional design can be ignored (eg no banks in most macro models)	Institutions are imperfect, often inefficient, and constantly evolving – details of institutional design can matter (eg fragility of banking system)
Dynamics	Economy automatically goes to equilibrium where social welfare is maximised	Economy is a highly dynamic system that can go far from equilibrium and become trapped in suboptimal states
Innovation	Innovation is a mysterious, unpredictable, external force	Technological and social innovation are evolutionary processes that are central to economic growth and change
Emergence	Macro phenomena (inflation, unemployment, bubbles) result from the linear addition of individual decisions – heterogeneity doesn't matter	Macro patterns emerge non-linearly from dynamic interactions of heterogeneous agents, small changes can have big effects and big changes can have small effects

Table 11.1 Traditional economics and new economics

Traditional economists often respond that the limitations of orthodox theory are well recognised and there is much work being done to relax restrictive assumptions, introduce more realistic behaviour, heterogeneity, institutional effects, dynamics, endogenous innovation and so on. They are correct and this work is a very positive development for the field. However, much of this work introduces just one element of realism to an otherwise standard model – a bit of behaviour here, a bit of institutional realism there, and so on. It is very hard or even impossible to relax all of the assumptions at once without throwing out the whole structure of the model – in particular without abandoning the core idea that the economy is an equilibrium system.

The radical challenge the new economists have accepted is to relax all of the unrealistic assumptions at once, move to the right column of the above table, and create an economics that has much greater fidelity to the real world. It is an enormous challenge and it requires a new toolkit and methodologies. But there is growing evidence that it is possible. That evidence comes from work in economics itself, but also from other fields that successfully model highly complex distributed systems that have many similarities to the economy – for example climate and weather, biological ecosystems, the brain, the internet and epidemiology.

Thus what has come to be referred to as new economics is not a single theory, or even a coherent body of work. It is a broad research programme best characterised by its unifying desire to embrace the messy reality of the economy. To accept human behaviour, imperfect institutions, and the complex interactions and dynamics of the economy as they really are rather than what an idealised model says they should be.

As policymakers and politicians often rely on the advice of economists and use their theories and ideas to frame their views and debates, this move towards realism in economics should be a good thing. If one thinks of economists as like biologists and policymakers as like doctors, then just as better biology has led to more effective medicine, so too should a more realistic economics lead to more effective policy.

In the rest of this chapter I will outline three ways in which new economics may impact policy and politics. First, new economics may offer better tools for policy development and analysis – I will discuss an example from the financial crisis. Second, new economics has the potential to change the way we think of the role of government and policy itself, yielding new ways of designing policies in general. Third, new economics offers the intriguing possibility of developing new political narratives – this is the least developed aspect of new economics, but perhaps the one with potential for greatest long-term impact.

New tools for policy – examples from the crisis

> '…Uncertainty has increased, but generally inconsistent with the perception of a "bubble," the implied risks do not seem particularly tilted to the downside…'
>
> US Federal Reserve 2006

In 2006, economists at the US Federal Reserve conducted an analysis of what would happen to the US economy if house prices suddenly dropped by 20 per cent. Officials at the central bank had noted the unprecedented run-up in house prices and become concerned. They ran the analysis on their state of the art macroeconomic model and the answer that came back was 'not much'. Growth might soften, or there might even be a mild recession, but nothing that a few small interest rate cuts couldn't handle. The model had done exactly what such traditional models are designed to do. It assumed everyone would behave rationally, markets would function efficiently, and the system would smoothly self-correct back to full-employment equilibrium.

At around the same time, Fed chairman Alan Greenspan was repeatedly asked by the media, congressmen, and others whether there was a housing bubble.[1] Greenspan, a devotee of efficient market theory and

1 For examples see US Fed International Finance Discussion Paper no 841, September 2005 and Finance and Economics Discussion Paper no 2006-32, October 2006; and Paul Krugman, 'Greenspan and the Bubble', New York Times, 29 August 2005.

fan of Ayn Rand's libertarian philosophy, consistently replied that the run-up in prices must have good rational reasons, there was little evidence of a bubble, and even if there was, the Fed should not intervene to burst it as the markets would eventually self-correct and government intervention would likely do more harm than good.

We all know what happened. The bubble burst and it triggered a catastrophic financial collapse, almost instantly wiped out $10.8 trillion in wealth in the US alone, nearly led to a second great depression, and we are still dealing with the consequences, most notably the ongoing euro crisis. In late 2008, Greenspan gave his famous mea culpa saying, 'I have found a flaw' in orthodox free-market theory, 'I don't know how significant or permanent it is. But I have been very distressed by that fact.'[2]

Might new economic techniques and models have given a different view? Might they have helped policymakers avoid such a disastrous outcome? A team of researchers led by John Geanakoplos at Yale, Robert Axtell at George Mason, my colleague Doyne Farmer at Oxford and Peter Howitt at Brown think so. They have constructed (Geanakoplos et al 2012) an agent-based model of the housing market that gives new insights into what caused the bubble and the model could eventually become a tool to assist policymakers in designing strategies for preventing or managing future bubbles.[3]

Their model is radically different from the kind of models the Fed used in its 2006 analysis. Rather than look at the economy top-down and in aggregate, they model the system bottom-up. Their model has individual households in it, and for those owning houses rather than renting, individual mortgages backed by houses of a certain value. This population of households is heterogeneous – some have mortgages they can easily afford, some don't, and the terms of their mortgages may differ. The households are assumed to behave in ways consistent with how behavioural economists tell us real people behave. Rather than doing elaborate calculations the agents in the model use rules of thumb (for example one shouldn't take on a mortgage more than three times one's annual income) but individuals vary in their use of such rules (some might be more conservative, others more risk taking). They also introduce institutional realism, for example if interest rates drop you might consider refinancing, but you might not automatically do it if the hassle factor is too high.

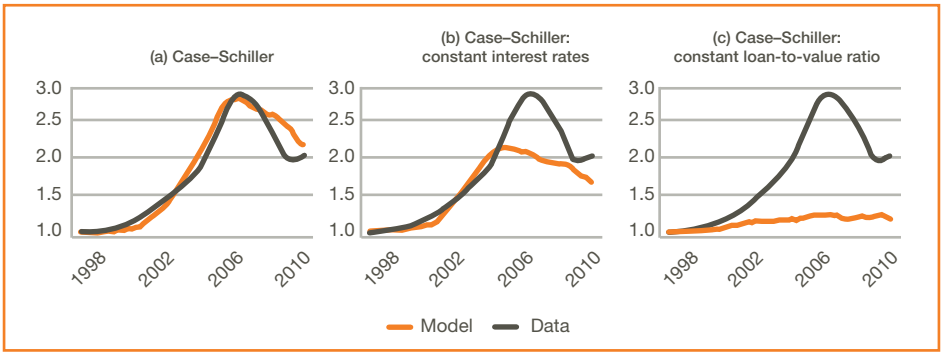
The initial version of the model uses detailed mortgage and household data from a single metropolitan area – Washington, DC. The team eventually plan to calibrate it with data from other major cities, and possibly the whole of the US and other countries such as the UK as

2 Alan Greenspan testimony to the Government Oversight Committee, US House of Representatives, 23 October 2008.

3 This work is supported by the Institute for New Economic Thinking (INET) with which the author is affiliated.

well. Their preliminary findings reproduce the dynamics of the bubble building up and then bursting. Unlike traditional analyses, the model doesn't gently self-correct, it crashes (see figure 11.1a). They then run policy experiments on the model, asking what policymakers might have done to prevent the bubble forming, or at least stopped it building once it was clear there was one. Analyses using traditional models have tended to blame the bubble on overly loose monetary policy from the Fed. So the team tested scenarios where policymakers raise interest rates. The bubble is indeed moderated, but not eliminated (figure 11.1b). But interest rates are a blunt instrument and such tightening would also have slowed growth in the rest of the economy. So the team also tried a regulatory intervention – preventing banks from loosening their loan-to-value ratios. During the heat of the bubble, banks competed with each other to give loans, loosening their standards. The team's model shows that by intervening to prevent these standards from slipping, policymakers might have eliminated a key dynamic in the bubble's formation, prevented the subsequent bust, and done so more effectively and without the collateral damage caused by a big interest rate hike (figure 11.1c).

Figure 11.1 Agent-based model of the US housing market, 1998–2010 (index 1 = first period)



Source: Geanakoplos et al 2012

There are also efforts to use similar approaches to go beyond the housing market and look more broadly at the relationship between the financial sector and the macroeconomy. When the crisis hit in 2008 many senior policymakers were shocked by how little help they received from the formal theories and models of traditional economics. Reflecting on this later, European Central Bank (ECB) president Jean-Claude Trichet said: 'As a policymaker 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.'[4]

Central banks, finance ministries, and economic regulators all have large staffs of well-trained economists, fancy models and vast quantities of

4 Speech to ECB Annual Central Banking Conference, November 2010.

data. But when the crunch came, their theories and models could not describe what they were experiencing. The *Economist* reported that the Bank of England's large macro model wasn't much help because it didn't have banks in it. It is hard to make policy in the middle of a banking crisis if one's economic model doesn't have banks in it.

The reason these models and formal theories were of limited use is they were built on assumptions that people are rational, markets always clear, bubbles can't form, and that banks are just boring bits of plumbing that shuffle money from one part of the system to another and can be safely ignored. It is therefore not surprising that when people started panicking, markets were not clearing, a massive bubble had just burst, and the banking system was on the verge of collapse, that models with such assumptions were not that helpful. It is a bit like building a flight simulator where it is impossible for the airplane to crash.

Yet a crisis is exactly when a model should be at its most helpful. The crisis was something beyond the experience of most of the participants; it was highly complex and moving very fast. Intuition and 'mental simulation' can be unreliable in such circumstances. Models can be very helpful in augmenting and informing judgment. They can keep track of lots of variables, enforce logical relationships, and search spaces of possibility more rigorously and quickly than the human mind can alone. If policymakers had had better models, they might have been able to run more and different policy scenarios and gained different insights into the crisis. Politics and judgment will always play a key role in major policy decisions – but better models might have given the policymakers better options to choose from.

Andrew Haldane (2011), executive director for financial stability at the Bank of England, has teamed up with Lord Robert May, one of the world's pre-eminent mathematical ecologists and applied ideas from network theory, epidemiology, and food webs in ecology to look at the problem of financial contagion in the banking system. Their work has potentially significant implications for structural reform of the banking system. Doyne Farmer, Domenico Delli Gatti and I are leading an effort supported by the European Commission called Project CRISIS, which is a consortium of researchers building an agent-based model of the interlinked banking system and macroeconomy to provide a simulation platform for policymakers to develop and test policy ideas.[5] While the work is at an early stage and there are many challenges to building a tool policymakers can rely on, there has been significant interest from central banks, finance ministries, regulators, and other economic policymakers.

While the examples cited draw from behavioural economics, network theory, experimental economics, complex systems thinking and use computer simulation, there is also new economic work with direct public

5 See http://www.crisis-economics.eu

policy relevance going on in economic history, institutional economics, evolutionary economics, and a variety of other traditions and toolkits. And there is work going on not only on the financial crisis, but also on topics such as climate change, inequality, poverty, economic development, innovation and growth, and other policy-relevant topics.[6] The challenge is bringing this promising, but still early-stage work, into the policy environment.

Policymaking in an uncertain world

In addition to providing new models and tools for specific issues like the financial crisis, new economics offers a potentially different way of thinking about policy more broadly.

Traditional economics views the economy in a fairly mechanistic way. If people are rational and we want to change their behaviour then we just need to change their incentives. Thus, a lot of policy is conducted through tinkering with the tax code or subsidies, for example if one wants more innovation, give an R&D tax credit; if one wants less smoking, tax it heavily. Of course people aren't immune to such incentives, but often the response is far less than policymakers would like.

Likewise, traditional economics views the economy as naturally being in a state of efficiency, and so by definition any interventions move it away from that state, making it less efficient. Thus, interventions are justified by market failures, the need to create some public good, or the need to avoid some negative spillover effects or externalities. For example, state support of R&D might be justified if there are market failures, or taxing smoking might be justified to reduce the externalities smokers create for non-smokers.

Finally, policies are evaluated through the lens of cost–benefit analysis, where future benefits and costs are projected and compared. For example, much of the debate on climate change policy has been over competing forecasts of future costs from climate damage and their likelihood of occurring, versus the potential benefits of action to avoid those costs.

These mechanistic approaches to policy and regulation are still what are taught in most undergraduate and graduate university programmes, and they pervade the civil service and the pool of advisers and experts that governments rely on for policy development and assessment.

Both economists and policymakers have also ignored what George Soros calls the 'reflexivity' of the economy. Actors in an economy take actions which change the economy, those changes then change the actors' perceptions of the economy, which then changes their actions, and so on. But as humans are fallible and our perceptions and interpretations may not always match reality, the two-way interplay between perceptions and actions can send the economy off on a course

6 See for example Geyer and Rihani 2010 and Room 2011

far from the optimal path predicted by orthodox economic models. Bubbles are a prime example. Soros has also pointed out that these reflexive interactions can create 'predator–prey' dynamics between regulators and those being regulated. Regulators take an action to address a perceived problem, that changes the perceptions and actions of market participants, which in turn creates a new set of problems triggering further regulator actions, and so on. Over time this infinite chase between fallible regulators and equally fallible market participants leaves a trail of rules, structures, and institutions that has a major effect on shaping the evolution of the economy.

So how might new economics move us beyond the mechanistic view of policy and regulation, and towards a view that takes into account the complexity, unpredictability, and reflexivity of the economy?

My view is that we must take a more deliberately evolutionary view of policy development. Rather than thinking of policy as a fixed set of rules or institutions engineered to address a particular set of issues, we should think of policy as an adapting portfolio of experiments that helps shape the evolution of the economy and society over time. There are three principles to this approach:

First, **rather than predict we should experiment**. Policymaking often starts with an engineering perspective – there is a problem and government should fix it. For example, we need to get student mathematics test scores up, we need to reduce traffic congestion, or we need to prevent financial fraud. Policy wonks design some rational solution, it goes through the political meat grinder, whatever emerges is implemented (often poorly), unintended consequences occur, and then – whether it works or not – it gets locked in for a long time. An alternative approach is to create a portfolio of small-scale experiments trying a variety of solutions, see which ones work, scale-up the ones that are working, and eliminate the ones that are not. Such an evolutionary approach recognises the complexity of social-economic systems, the difficulty of predicting what solutions will work in advance and difficulties in real-world implementation. Failures then happen on a small scale and become opportunities to learn rather than hard to reverse policy disasters. It won't eliminate the distortions of politics. But the current process forces politicians to choose from competing forecasts about what will and won't work put forward by competing interest groups – since it is hard to judge which forecast is right it is not surprising they simply choose the more powerful interest group. An evolutionary approach at least gives them an option of choosing what has been shown to actually work.

One area where evolutionary experimentation on policies has been tried explicitly is in development economics, where different interventions are tried across a portfolio of villages or regions, the results measured,

and successful interventions scaled up. Michael Kremer at Harvard has conducted field experiments on issues ranging from policies to improve teacher performance, to getting farmers to use fertiliser.[7] David Sloan Wilson (2011), a leading evolutionary theorist, has tried an evolutionary approach in a fascinating case study of improvement efforts in his city of Binghamton, NY. The individual states in the US also provide such a natural evolutionary laboratory on issues ranging from healthcare to education. Other initiatives where there is a diversity of approaches, such as charter schools, end up creating an evolutionary portfolio of experiments, though more could be done to harvest those experiences and scale-up the successful experiments.

Second, **policies and institutions should be made as adaptable as possible**. The predator–prey dynamics between regulators and participants mean there is a never-ending battle between regulators trying to draw rules as tightly and specifically as possible, taking into account all possible contingencies, and armies of lawyers and accountants trying to find ways around them. This often leads to very rigid regulatory structures overlaid on highly dynamic markets. A better approach is to create rules that provide general frameworks, but then adapt to specific circumstances. One example is how California's building codes have succeeded in reducing energy consumption. Rather than try to predict the state of energy efficiency technologies in future years, the regulators created a set of general performance standards that automatically ratchet-up as the state of technology improves – the standards are set by whatever the best developers are doing at the time. And rather than specify how those standards are to be achieved, developers are offered a choice of pre-approved practices, or experimenting with new ways of meeting the standards. Some developers are happy to go with the pre-approved practices, but others who are competing to meet the standards in less costly or more aesthetic ways have incentives to experiment and innovate. Thus the regulations and state-of-the-art building practices co-evolve with each other.

One could imagine similar approaches being applied in areas such as health, transport and education where general performance standards could be set, incentives created for experimentation and innovation, and then have the standards automatically adjust as the system evolves.

Third and finally, **policymakers need to think of themselves less as social engineers and more as 'system stewards'**. As Michael Hallsworth from the Institute for Government (IFG) explains in chapter 3, rather than engineering specific outcomes, government's role as system stewards is to create the conditions in which interacting agents in the system will adapt towards socially desirable outcomes. Policy design and implementation are thought of as integral rather than

7 See http://www.economics.harvard.edu/faculty/kremer/papers_kremer

separately, and mechanisms for feedback and continuous learning and improvement are built-in from the beginning. The IFG recognises, however, that such an evolutionary approach may not be suitable for all circumstances. In some situations, for example emergency disaster relief or national security situations, a traditional top-down approach may be required when speed is of the essence, where clarity and consistency is critical, or when the capacity of actors further down the chain is limited (Hallsworth 2011).

A major challenge for these more adaptive approaches to policy is the political difficulty of failure. Learning from a portfolio of experiments necessitates that some experiments will fail. Evolution is a highly innovative, but inherently wasteful process – many options are often tried before the right one is discovered. Yet politicians are held to an impossibly high standard, where any failure, large or small, can be used to call into question their entire record.

Likewise, politicians are always expected to have clear plans, and simple, easy to understand answers in which they have unshakeable confidence. You would never hear a politician give a speech where she or he says 'It is a complex problem, we're not sure what to do. But we have several good ideas that we'll try on a small scale. We'll then ramp up the ones that work and close down the ones that don't, and then have a good shot at solving it.' For some reason we don't mind such an approach when it is used by doctors looking for new drugs, energy companies looking for oil, or venture capitalists looking for the next big idea. But we seem to prefer politicians who tell us the world is simple and predictable, even though we know it to be complex and unpredictable.

So an explicit, widespread use of new economic approaches to policymaking may require some education of citizens, the media and politicians themselves on the risks of overconfident top-down solutions, and the importance of small-scale failure as a way to learn and prevent large-scale disasters.

Politics – neither left, right nor centre

Perhaps the most intriguing, but least developed, potential impact of new economic thinking could be on politics itself. The tradition of splitting politics into left and right camps dates back to the layout of the French National Assembly in the Revolution of 1789. Over the two and a quarter centuries since, both left and right have seen their political narratives evolve. The left has travelled an arc from Marx and Rousseau, through Victorian social reformers, to Keynes, the New Deal and to modern European notions of social democracy. Meanwhile, the right has travelled from Smith and Hume, through the Austrians, the Chicago revolution, Thatcher-Reagan, and to today's European centre-right parties and America's radicalised Tea Partiers. At the heart of both narratives have

been differing views on the nature of the economy, the roles of the individual and the state, and notions of freedom and social justice.

New economics has the potential to significantly reframe these debates. It isn't merely a matter of centrist compromise, of just splitting the difference. Rather it is a different frame that agrees with the right on some things, with the left on others, and neither on still other areas. For example, new economic work shows that Hayek was ahead of his time in his insights into the power of markets to self-organise, efficiently process information from millions of producers and consumers, and innovate. But new economic work also shows that Keynes was ahead of his time in his concerns about inherent instabilities in markets, the possibility that markets can fail to self-correct, and the need for the state to intervene when markets malfunction. Likewise, new economics research shows that humans are neither the selfish individualists of Hume nor the noble altruists of Rousseau, rather they are complex social creatures who engage in a never ending dance of cooperation and competition. Humans are what researchers such as Herb Gintis and Sam Bowles (2005) call 'conditional co-operators and altruistic punishers' – our cooperative instincts are strong and provide the basis for all organisation in the economy, but we also harshly punish cheaters and free-riders, and compete intensely for wealth and status.

Traditional economics tends to frame things in terms of market efficiency versus market failure, and those on the right emphasise the efficiency part and those on the left the failure part. This leads to differing views on the justice of market outcomes. The right generally believes that if markets allocate resources in the most societally efficient way then any interference in that process is morally suspect. Market outcomes may be unequal, but that is because the distribution of talent and hard work in the economy is also unequal – in general people get what they deserve. The left on the other hand tends to see unequal outcomes as an injustice in and of itself, and emphasises how powerful interests use markets to their benefit and can abuse or leave behind the less powerful. People often don't get what they deserve and the state must intervene to protect the vulnerable, and correct both unfair processes and unfair outcomes.

To date there has been very limited work on questions of inequality, social welfare, and social justice from a complex systems or evolutionary economics perspective. But there are hints of a different view. Even models that start with perfectly equal or random distributions of income or wealth can produce unequal outcomes statistically similar to what is observed in the real world.[8] These outcomes emerge because small, random differences can lead to self-reinforcing feedbacks that pull apart the tails of the distributions. For example, two people might start off

8 See for example Epstein and Axtell 1996

with equal ability and starting circumstances, but by chance one gets an early lucky break and the other doesn't leading to compounding differences in income over the rest of their lives. Thus even with equal initial endowments and a fair process, inequality may emerge. The right might be wrong in that inequality might not be merely the result of unequal distributions of talent and hard work and therefore justified. But the left might also be wrong in that inequality might not necessarily be the result of unfair processes. At the same time, the right might be correct that unequal outcomes are a natural and difficult to avoid outcome of market interactions, while the left might also be correct that a growing body of evidence shows that unequal outcomes are strongly associated with a number of social pathologies justifying state intervention to ameliorate those outcomes. In other words, a new economics perspective might not just split the difference on debates such as inequality, it might rescramble the terms of such debates.

Finally, new economic thinking may also provide the foundation for new political narratives. Eric Liu and Nick Hanauer, in their 2011 book *The Gardens of Democracy*, explore the possible shape of such a narrative. They liken the narratives of traditional economics to 'machine-thinking' and advocate a shift to 'garden-thinking' that emphasises the dynamic, constantly evolving nature of the economy and the interconnectedness of society. The state then plays the role of gardener helping create the conditions in which the garden of society can flourish.

It took traditional economics decades to move from academic theory to providing a foundation for policymaking and a basis for our political narratives. New economic thinking still has some distance to go to mature as a body of economic theory, and no doubt it will take time to fully develop the policy and political implications of these ideas. This journey might not end our political debates, but it has the potential to make them far more productive for society.

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12.

UNDERSTANDING GLOBAL RUPTURES: A COMPLEXITY PERSPECTIVE ON THE EMERGING 'MIDDLE CRISIS'

ORIT GAL

The continuously evolving economic crisis that hit the UK in 2008 and has occupied our public discourse ever since, has not only exposed structural fault lines within the financial system, but also the hidden ruptures and unsustainable tensions in the wider global economy. With attention focused on rebuilding the financial infrastructure, paying down deficits and tackling inflation, many of the deeper shifts in our economic environment have yet to be fully grasped. Yet, as suggested by new theories explaining the nature of economic transformation – such as those explored in this book – it is these deeper shifts that potentially harbour the seeds of the next crisis. Unless they are dealt with, such a crisis is likely to spread beyond the economic system and jeopardise our political and social ecology as a whole.

One of the key sources of risk lies in the unsustainable pressures that have been building up against what we might describe as the backbone of the market ecology – the middle classes.[1] Since the industrial revolution, it has been the middle classes that have provided the anchor for emerging economic and political orders; by supplying social deposits of labour, entrepreneurship, and political checks and balances.[2] While the expansion of western markets and growing globalisation since the 1970s have significantly improved the lives of most ordinary citizens in western and emerging economies alike,[3] it is these same forces that are now converging to undermine the very fabric of the middle classes and with it our current political-economic order.

1 There are various ways to define the middle classes. In economic terms, some prefer absolute income indications, while others use the threshold of one-third disposable income after shelter and food expenses. In social terms, meanwhile, the middle classes have been defined by aspirations rather than income. The 2008 Pew report, for example, suggested such aspirations as home ownership, college education for children, health and retirement security, and family vacations. See http://www.pewsocialtrends.org/2008/04/09/inside-the-middle-class-bad-times-hit-the-good-life/

2 Even non-democratic regimes tend to cater to this moderate core.

3 While growing voices in the west have recently echoed the question of 'what has globalisation ever done for us?' we must not forget its contribution to our modern wellbeing. Individual self-realisation through more flexible job opportunities, technological breakthroughs, the proliferation of higher education, human rights, and women's role in the marketplace – to name but a few – all can be attributed to the forces of globalisation.

Whereas the specific combination of undermining forces varies across different societies, the initial tangible manifestations in response to them have been strikingly similar.[4] Across the developed world, we find anxious demonstrators in Athens, Madrid and Rome protesting against government austerity plans. In New York, Washington and London, people have taken to the street under the banners of 'occupying Wall Street', 'occupying London' and 'the 99%'. Even in developed countries with relatively stronger economic climates such as Israel, unprecedented waves of demonstrations against rising costs of living have shown this crisis is a global one with far-reaching ramifications.

Similar manifestations can be found across emerging markets as well. In India hundreds of thousands have joined Anna Hazara's campaign against public corruption, while in China the authorities are anxiously aware of the continuing rise in the number and scale of 'mass incidents'. The most dramatic upheavals have occurred in countries where tensions have been at their most extreme, such as Tunisia and Egypt, where persistent demonstrations fuelled by socioeconomic malaise brought down governments and spread like wildfire to neighbouring countries in the region during the 'Arab spring'.

Notwithstanding the wide differences in context, the connecting theme in all these cases is their leading players: it is not the impoverished masses, nor budding ideological movements that have taken to the streets, but the educated middle classes, frustrated by their governments' inability to ensure their future. The question is should such events be seen within the context of cyclical economic patterns and the inevitable frustration with which economic downturns are met? In other words, are they an uncomfortable but passing phenomenon that will wane once our economic system recovers?

This chapter suggests otherwise. It argues that such events imply deeper structural transformations in our economic system which requires equivalent conceptual and operational shifts in our public policies if we are to comprehend these transformations fully and respond adequately. In what follows, we begin with a brief discussion of how new approaches to economic development based on insights from complexity science shed a different light on our understanding of economic environments. We then proceed to discuss the main forces and trends fuelling the emerging 'middle crisis' before finally introducing some ideas that will be required to develop crisis-averting policies.

New economic thinking: towards 'complexity polinomics'

Analysing and dealing with any challenge begins with our fundamental view of its nature: namely, how we define the challenge and its context;

4 See also the recent article by Joseph Stiglitz, 'From Tunisia to Wall Street: the globalization of protest', *Daily Star*, 10 November 2011.

our assumptions regarding the causes and effects of the challenge; and the tools we use to influence it. Over the past three decades, we have witnessed a gradual emulation of new theories, which centre on the concept of 'complex adaptive systems'.

As Amna Silim makes clear in chapter 1, the neoclassical theories that still dominate our economic policymaking assume a system geared towards a state of equilibrium. From a complexity perspective, economic systems are not geared towards equilibrium or any state of rest but remain dynamic at all levels. This dynamism generates accumulated shifts from *within* the system, driving change endogenously rather than exogenously. For example, consumer preferences, product innovation and new forms of organisation are all driven by interactions, tensions and gaps between agents and forces, rather than by external processes. The behaviour of agents within the system is not assumed to be 'rational' – that is, full knowledge and *a priori* sets of preferences – but is shaped by cognitive short cuts, partial pattern recognition and network effects such as swarm behaviour (see Ariely 2010, Fisher 2009). Furthermore, the nature of the system itself is also perceived as transforming over time. The level of complexity – the connectivity and velocity of interactions within the system – becomes a key differentiating factor between different types of systemic change that occur.

Systemic change results from innovation in what Eric Beinhocker (2007) defines as 'technological and social technologies'. This occurs as new solutions are deployed by local agents for local challenges (from stock-holding companies to credit swap derivatives; from water canals to fibre-optic cables). Their introduction into the economic environment creates new potential for increased productivity, as well as new organisational structures that best harness this potential. These productivity opportunities will be exploited and new systemic challenges will emerge to undermine the system once more, leading to the development and deployment of new technological and social innovations and the emergence of a new state. As the state of the system is path-dependent, each phase builds on previous ones, with new innovations allowing for much wider reach and better communication between agents – and so we see increased levels of complexity with each new systemic state.[5]

Complexity economics has made significant strides in bettering our understanding of the dynamic processes through which economies transform – that is, the 'how' question. However, a further step is needed if we are to provide answers for the 'what' and 'why' questions. If economies are to be understood as complex ecologies rather than complicated machine-like systems, then the traditional conceptual boundaries of these systems must be reconsidered as well (see DeLanda 2006).

5 The only periods in history during which complexity was not on the increase are those associated with systemic collapse rather than bifurcation (that is, moving from one state to another). In which case a completely new system gradually emerges and complexity begins to build up again.

Most social science disciplines share the same epistemological framework of neoclassical economics, essentially viewing society as a collection of systems (an economic system, a political system and a cultural system) which are connected though separate nonetheless. Yet once we start to view the economy from an evolutionary or complex systems perspective, these systemic boundaries not only become irrelevant, but also detrimental to our understanding.

Economic activity cannot be understood without consideration of its political elements. Politics determine the main rules and structures within which economic activities play out: even the simplest form of trade is predicated on the need for trust and therefore some form of governing structure. Just as institutional structures cannot be seen as exogenous to the system, they also cannot be perceived as merely another dimension or by-product of economic activity. Indeed, the politically defined rules by which economic activities are conducted are counterparts to the same ecology. From a complexity perspective, analysing economic systems without their politics would be like analysing the food chain in a pond without any consideration of its vegetation or water. Taking this analysis a step further, we also know that economics and politics are action-driven and, therefore, can be assessed and affected in tangible ways, but at a deeper structural level we also find longer-term cultural structures. These reflect and infuse economic-political patterns.

The trends and structures we find across societies are thus the product of ongoing co-emergence (DeLanda 2000), with different processes interacting at differing temporal frequencies and evolving over time. Exploring and affecting the multidimensional and interplaying dynamics that emerge within a given system requires a new synthesising (but non-reductionist) approach that can integrate economic and political knowledge into coherent frameworks from which strategies and policies can then be derived. This new synthesising approach, what we might call 'complexity polinomics', provides the starting point for understanding both the sources and potential ramifications of the 'middle crisis'.

What is fuelling the 'middle crisis'?

Like every social emergence, the 'middle crisis' has been long in the making, and while this chapter cannot hope to explore it in full depth, it can lay out its main systemic drivers. Overall, the forces fuelling this fault line can be clustered into three interdependent groups: economic pressures emanating from the structural fractures of globalisation; social pressures driven by a false sense of social levelling which inflated throughout the first decade of the 21st century (what can be referred to as a 'levelling bubble'); and political pressures generated by the growing inconsistencies between international interdependency and sovereign authority.

While these key driving trends are presented separately, it is important to stress their co-evolving nature, none could have emerged the way they did without the permissive environment provided by the others. Their overall impact and policy implications, therefore, need to be assessed within a comprehensive polinomic framework.

Economic pressures – the structural fractures of globalisation
Globalisation, while responsible for the extensive expansion of the middle classes,[6] has also helped to generate the very forces that are now undermining them.[7] Over time the evolving patterns of global trade, integrated production chains and currency manipulation have created deep structural attributes that constrain the economic basis of the middle classes and alter social expectations to an extent that might make the current model of globalisation unsustainable.

From the perspective of the western middle classes, three key structural shifts have gradually built up economic pressures.

The changing nature of 'boom and bust' cycles: Recurring phases of expansion and contraction are a known phenomenon in market economies. However, over the past two decades, the nature of the recoveries has changed. A recent report by McKinsey Global Institute (Manyika et al 2011) points to a worrying and exponentially growing disparity between recoveries of growth and recoveries of jobs. From the late 1940s to the 1980s, job levels in the US economy tended to recover within six months of GDP reaching pre-recession levels. However, a shift occurred in the early 1990s with jobs recovering only 15 months later. In the 2000/01 recession this time lag leapt to 39 months, while projections for the current recession expect job recovery to last over 60 months. The report suggests structural changes in global competition have led to growth recoveries which are efficiency-driven (using fewer resources to achieve the same outputs) rather than innovation-driven (advancements that allow new niches to emerge across the market) as firms take advantage of new technologies, global out-sourcing and off-shoring to recover production levels with fewer resources.[8] This trend has had major ramifications for public policy making in general, and the political use of economic tools such as setting interest rates in particular.

The mismatch of skills in the labour market: Generally speaking, as emerging markets progressed, developed economies were also able to

6 According to some indicators making them a majority among the global population since 2005 (see Parker 2009).

7 A complexity perspective helps better explain how economic-political systems can reach a tipping point in which some of the same forces that have previously converged to stabilise the system become its own disrupters. This is an important distinction from more traditional policy approaches, which when faced with new dynamics tend to reconsider past assumptions. For example, take the current debate regarding the advantages of global liberalisation during the 1990s. From a complexity perspective its usefulness continues to hold merit; however, it is also confined within a certain set of systemic conditions. Once those conditions shifted, policies should have adapted as well.

8 See also Brian Arthur's analysis of the systemic effects of new technologies (Arthur 2011).

develop new niches for jobs and services by moving up the value chain from labour-intensive to skill-intensive products. However, patterns of job creation reveal that as the demand for skills evolved, national skills bases did not adapt quickly enough. This means that many of the job losses can be attributed to a structural mismatch of skills rather than the recent downturn.[9] In the UK, recent research suggests seven out of 10 firms blame lack of skills for lack of hire.[10] Continuing the shift towards a higher skills base requires both employers and employees to have better knowledge of what the market needs in the mid- and long-term. Unfortunately, the market itself is unable to develop adequate mechanisms for providing this knowledge while effective institutional solutions have yet to be developed.

Restricted access to emerging markets: The success of emerging economies has been mostly attributed to their export-led strategies – a development approach in which governments play an intervening role in supporting certain industries and firms which are deemed highly competitive in the global market. Over the 1980s and 1990s, the structural implications of these export-led strategies for western citizens were inconsequential, due to the relatively small size of emerging economies as well as their continued reliance on western technology and finance. However, over the last decade emerging economies have become significant players in the global economy and less reliant on western technology.[11] At the same time, the underdevelopment of and lack of competitiveness in their own domestic markets has left western economies holding the short end of the stick as far as access to markets is concerned, contributing to their balance of payment and current account deficits. Chinese reliance on restricting exchange rates has only further intensified this structural asymmetry.[12]

From an emerging world perspective, the structural patterns of economic development have also created increasing pressures on their countries' new middle classes. Specifically these relate to two growing concerns: first, mounting levels of local corruption; and second, limited public services.

Institutional deficits: The same export-led strategies that have successfully lifted millions of people out of poverty become a domestic constraining factor once the emerging middle classes are the dominant

9 Between 2000 and 2007 the US showed its weakest employment growth period since the 1930s, see Manyika et al 2011.

10 Research by Alexander Mann Solutions, http://www.telegraph.co.uk/finance/jobs/hr-news/8286397/jobs-vacancies-Firms-struggling-to-recruit-as-war-for-talent-returns.html

11 However, it has not been all positive for emerging economies. As a result of focusing their developmental strategy on foreign instead of domestic demand, these countries are still characterised by underdeveloped local economies with domestic inefficiencies, limited internal competition and weak institutional frameworks. This has created a structural asymmetry described by Raghuram Rajan (2011) as a major fault line in the current global economy.

12 Export-led strategies correspond to the 'mercantilist model', viewed by many as a parasitic strategy that is, by definition, not scalable to the whole system.

civilian force. As these emerging new classes begin to develop compatible tastes and social expectations they, too, experience the downside of underdeveloped domestic markets and institutions. Across China and India, corruption affects the middle classes across a wide array of economic and social interactions: from housing to policing, education to job opportunities. Domestic institutional underdevelopment is not only the by-product of an export-led growth strategy, but also of the speed of economic development where the latter outpaces the former. Institutional maturation is a much more complex and lengthier process than market expansion. Between the two lies an underlying political tension that could prove hard to contain.

Climbing without safety nets: Institutional weakness and lack of public services implies much higher levels of personal risk and uncertainty. In practice, this requires people in the emerging world to save much more of their available income. Paradoxically, with growing expectations for reaching more comfortable standards of living, the pressures and anxieties to maintain them only increase. In China for example, the absence of social safety nets means even high earners must save up for all contingencies – from job loss to blood transfusion.[13] At the structural level, this necessity to save not only limits personal consumption, but also creates a major distorting financial pattern for the global economy as a whole.[14] Without a real change in the personal risks experienced by the emerging middle classes, the global asymmetry in saving/spending patterns will remain.

Social pressures – the bursting of the 'levelling bubble'

While the structural fractures discussed above reveal some deep shifts that are occurring across the economic landscape, it is the manner in which people personally experience these shifts that mostly influences their attitudes and political choices. This especially resonates among western middle classes, who over the past decade have experienced a growing chasm between individual expectations and their day to day realisation. From a complexity perspective, it is these inconsistencies between micro patterns of behaviour and emerging macro patterns of structure that gradually build up unsustainable tensions within the system.

From upward mobility to stagnation: Two key principles that are culturally embedded within the middle classes are first, forward progression – children expect to be better off than their parents; and second, individually driven social mobility – with some talent and lots

13 Out of pocket spending on healthcare in China is said to have increased by more than 100-fold. For an in-depth account of internal Chinese ruptures see Dodson 2011.

14 It is important to note that China has started addressing this challenge; the 12th five-year plan announced in 2011 includes measures to support internal rebalancing towards domestic consumption and inward investment. However, the scope of the organisational, financial and political challenges involved suggest a lengthy process at best.

of hard work individuals can achieve wealth and success.[15] Over the last decade this perception has strengthened thanks to popular culture depicting routes in which instant access to fame and fortune can be achieved, access to cheap credit enticing spending beyond our means, as well as a sense of consumer levelling thanks to shrewd high street retailing and 'bagonomics'.[16] In other words, a false perception of material levelling has emerged among western consumers. Unfortunately, such shared perceptions have continuously masked much harsher individual realities.

Research in the UK has shown that real social mobility has been falling persistently, with levels of income becoming more highly dependent on those of parents (Blanden et al 2005). In the US, meanwhile, median family income has stagnated since the 1980s and, more importantly, has become disconnected from the rise in productivity (White House 2010). In the UK, while median income has seen moderate rises it also lagged behind productivity (IFS 2011, Lansley 2009). During the boom years, this dissonance was personally and collectively mitigated through access to cheap credit and even cheaper goods that created a perception of prosperity. But as the credit crunch hit, together with the rise in food and energy prices, this unsustainable tension was brought to the forefront for what has been dubbed the 'squeezed middle'.

Growing inequality and the re-emergence of 'fairness': In 1976, the top 1 per cent of American households accounted for 9 per cent of income; by 2007 their share had climbed to 24 per cent – that is, almost 60 per cent of three decades of growth went into the pockets of the top 1 per cent. The last time America experienced such levels of inequality was on the eve of the Great Depression (Rajan 2011, Sachs 2011). While the US and the UK hold the lead in wage differentials among western countries (National Equality Panel 2010), increasing income inequality within countries is a global trend. With the bursting of the levelling bubble described above, social tolerance for such inequality has eroded; a trend that is further exacerbated by distorted tax systems under which Warren Buffet, for example, finds himself paying a lower percentage of his income in tax than his secretary (Buffett 2011). The personal anxieties of job insecurity and rising costs of living, together with the onset of government austerity measures and the use of public funds to prop up the financial system, have served to reignite the public discourse on fairness, responsibility and accountability. Amongst the middle classes, this frustration has been channelled with equal vigour towards the richest and poorest echelons of society, with accusations of inherent unfairness within the tax system on the one hand and the benefit system on the other.

15 Rather than the institutionally restricted social mobility within traditional societies.

16 The term 'Bagonomics' refers to the strategy of luxury brands, previously catering only to the super rich, to promote labelled accessories as fashion essentials, thereby successfully entering into the mass market.

Political pressures – between interdependency and accountability
The role of political leadership is to mitigate economic and social pressures, while harnessing their potential in order to create a better future: in other words, to operationally manage the social contract. Alas, the challenge of state leadership has never been harder, as globalisation has brought to a head the inherent tension between economic interdependence and democratic accountability. Global market forces have created new pressures which are weighing down citizens, leaving decision-makers with ever diminishing policy levers and faced with ever increasing demands. Their policy choices have created a number of underlying tensions whose systemic effect culminated and became visible when the financial crisis erupted.

Consumption as the path of least resistance: Throughout the 2000s, the economic and social pressures described above created a permissive environment within which politicians could too easily opt for low interest rates.[17] Initially these were aimed at re-energising corporate investment still traumatised by the bursting of the dot.com bubble, but most corporates remained risk-averse. Instead, the cheap credit on offer was quickly swept up by consumers (who were experiencing stagnant incomes) and used for extensive shopping sprees from shoes to houses. From a political perspective, this diversion was rationalised by both economic and political arguments – it provided an alternative demand-driven economic stimulus, while promoting the wider political vision of the affluent 'property owning democracy' (Ferguson 2009).

The pre-emptive narrative: One pillar of the implicit social contract between government and the middle classes has been the idea of sacrifice and shared burden today in order to deliver *collective gain* tomorrow. While this remains an inherent part of the social-political DNA, an equally central and repeating theme over the last decade reflects a fundamentally different discourse: sacrifice and shared burden today so as to *avoid calamity* tomorrow. This pre-emptive narrative is a polinomics convergence and manifests itself in a number of ways: from launching pre-emptive wars to prevent terrorism; to reducing carbon emissions to avoid climate change; and to implementing austerity measures to avoid financial meltdown. This overarching transformation in discourse between governments and the middle classes has become an additional undermining force weakening social resilience. The lack of a positive and collective political vision prevents cooperation and unravels elements in the embedded 'social contract', inevitably concentrating populist debates on 'who's to blame' and 'who should pay the most' (the greedy bankers? the inflated public sector? the idle people on benefits? the immigrants?) rather than on how to restructure the social economy towards a shared vision for a national future.

17 For the full discussion see chapter 'Let them Eat Credit', in Rajan 2011.

The conceptual void: Since the 1990s and the ushering in of the 'post-ideological' world, highly charged debates between left and right have gradually wound down into cordial discussions on the tactics of economic management. Similarly, globalisation has challenged mainstream economic paradigms, having introduced new economic patterns and generated political distortions, while the recent recession was greeted with surprise by the majority of supposedly 'oracle' economists, denting their standing in the process. We face, therefore, a conceptual void. This void also contributes to the pre-emptive narrative and lack of political vision described above. Despite its increasing influence, new economic thinking, such as complexity economics, has yet to produce an alternative policy doctrine. The ramifications of these trends are highly significant as leaders require conceptual frameworks both for decision-making and for justifying these decisions to their voters. In the absence of new conceptual frameworks, political pressures and public insecurity may continue to spiral.

Overall, it is the interdependency between all the key driving trends outlined above that have created the problems underpinning the emerging middle crisis. The added value of a complexity approach rests in the manner in which we are able to follow a wide multitude of dynamic trends and synthesise them, thereby detecting potential shifts in the system as well as the meeting points for policy intervention. As figure 12.1 suggests, while each of these forces has been shaped by the others, they have also enabled them. From a policy perspective, we would therefore argue that one should treat the crisis as a complex adaptive system rather than a collection of policy challenges.

Implications for policymaking: averting systemic risks

Complexity theory teaches us that major events are the manifestation of maturing and converging underlying trends: they reflect *change that has already occurred within the system*. In that sense, it would be futile for policymakers to try to undo the co-evolving political-economic trends described above. Rather, they should focus their efforts on assessing and mitigating the main risks and challenges emanating from them.

The objective of policymakers in general, and in the UK in particular, should therefore be two-fold: negotiating new international governing mechanisms that could proactively transform certain structural weaknesses in the current globalisation model; and developing new tools for recession management.

At the international level, it is fair to assume that under current circumstances, the ability of world leaders to formally reconfigure international economic governance is quite limited. However, whatever international forum is engaged, one strategic theme that should cut across all efforts is the need to broaden the economic discourse to

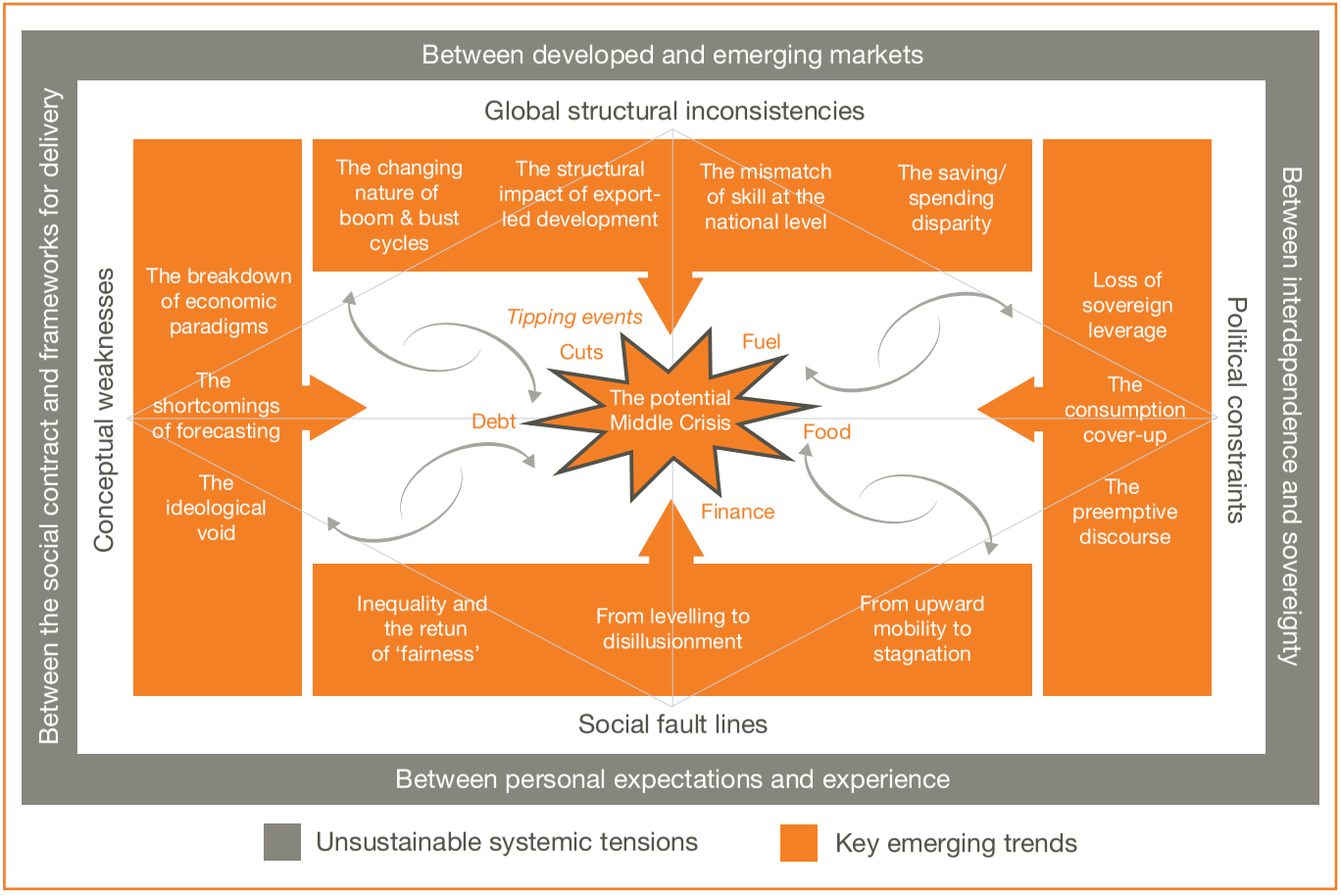

Figure 12.1 The middle crisis: a polinomic emergent view

include institutional arrangements and the provision of public goods, the lack of which has been responsible for some of the structural weaknesses fuelling the crisis. Issues such as transparency, corruption, and welfare, which have previously dominated international aid doctrines, should now be fully integrated into international trading frameworks. At the moment, any discussion about these interrelated subjects are conducted largely in isolation of each other. This needs to change.

From a domestic perspective, it would appear that the changes and growing pressures on the middle classes reflect a structural shift rather than a cyclical phase. According to most analysts, the current economic crisis in the western world will continue to dominate in the coming years, with political and social implications lingering long after growth resumes and economic restructuring begins to take hold. History teaches us that such convergence of social, economic and political tensions implies a high risk of turbulence and upheaval. The question is, given the current cultural, political and technological context, what would such instabilities look like? The first and hardest-hit societies so far, Greece, Spain and even to some extent the US, provide us with initial clues and data. Based on current trajectories, it seems the phenomenon of 'anomie' rather than regime collapse might be our biggest systemic risk.

Anomie is a manifestation of network decay. In essence, it is the gradual structural breakdown of social bonds, standards and infrastructure for cooperation. As it progresses, the middle classes increasingly remove themselves from the political landscape, ultimately surrendering it to radical minorities. Similar in its systemic nature to low-intensity conflict, the real danger is that no events are big enough to cause transformative reaction. The systemic damage is only fully understood once fully manifested, by which point reconstruction becomes a long and painful process. The main objective of policymakers is thus to approach anomie as a gradual and network-based phenomenon rather than as a set of separate conditions and to develop strategies that will intervene to counteract it.

Strategically, national governments should focus on four main objectives.

First, they should seek to **transform existing frameworks for managing social risk**. Current institutional arrangements are based on the concept of safety nets; that is, providing support of last resort for the weakest individuals in society while assuming the rest will always be able to sort themselves out. This is a static and individual-based approach that should be replaced by a dynamic and networked-based one. A new operational rationale for managing social risk in a globalised world should be based on enhancing social resilience. This includes supporting seemingly stronger groups and communities at their most fragile tipping points.

Second, there is a need to **define new indicators of social network decline and early warning systems**. Further research is now needed to assess how anomie could manifest itself across the social network and what kind of intervening actions will have the greatest impact. Our analysis leads us to suggest that a set of new indicators should be developed so as to allow the continuous assessment of shifts within the system (for instance, quantifying graffiti on the streets, mapping fragile communities, mining social networks to detect local decay and running surveys to monitor political disengagement).

Third, governments should **develop new avenues and resources for political participation and self-organisation at the local level**. If a key risk of anomie is the gradual disengagement of the middle classes from the public space, policymakers should provide as many platforms and avenues as possible to keep them proactively involved. This might require certain deregulation in the use of public spaces and resources so as to allow further local initiatives outside the management of local authorities.

Finally, we need to **re-evaluate the traditional discourse between government and citizens and its implied social contract**. Local, community, and business leaderships have to redefine social expectations, resource allocations, and government deliverables towards national resilience in our sovereignty-based, yet highly interdependent world. Our existing perceptions regarding roles, rights and commitments emerged within the old Newtonian-based framework. They would now also benefit from a complexity-driven reconsideration adapted to 21st-century realities; that is, forward looking towards the emerging rather than the existing global context.

For example, Thomas Friedman (2005) argues that 'Globalisation 2.0' has been driven by individuals, but this trend might have exhausted itself, with future competition relying more and more on the recollectivisation of efforts. Overall, the driving rationale for a renewed social contract must be based on the need to create a self-reinforcing national social system within an open global one. Traditional perceptions assumed a relatively closed system in which domestic power relations needed to be negotiated, resulting in the traditional focus on defining rights, separate roles, and boundaries (citizens, employers, businesses, government). Within our emerging new world more emphasis will need to be given to commitments, fuzzy boundaries and multiple roles, be it the role of businesses in skills creation and education, or the role of citizens in promotion and innovation.

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13.

A COMPLEX APPROACH TO ECONOMIC POLICY

ADAM LENT AND GREG FISHER

Most neoclassical economists emphasise the importance of allowing free markets to allocate resources in society. Austrian economics seems to have a more mature perspective on institutions than the neoclassical school but, nonetheless, they both advise adopting a broadly economic liberal view. Both these schools of thought have also heavily influenced the political right's views of economics; the neoclassical strand having been particularly influential in mainstream economic policy and analysis.[1]

At the same time, the most successful economies, at least if measured by GDP, have found success largely through developing a broadly free market economy. Most notably, China has lifted hundreds of millions of people out of poverty since the 1970s, in part because it chose to chart a free market course.

But free markets are far from perfect; the economic and financial crises of recent years are testimony to that. In chapter 4 on the financial system, Greg Fisher notes that financial crises to some extent originated in the nature of human psychology when free markets were applied to the process of capital allocation. Something akin to 'groupthink' can lead private financial markets down a path that ends at a cliff and, very often, a recession follows.

According to the increasingly influential school of complexity economics, the misallocation of resources during asset price booms and the underutilisation of resources in recessions that follow are examples of 'emergent phenomena' – in other words, characteristics that arise from the multiple interactions of the constituents of the economic system. These emergent characteristics are problematic when the combined, seemingly rational, 'micro' decisions or attributes of agents can create 'macro' outcomes that are detrimental for many or all those agents. This is a critical lesson from complexity economics.

For example, in answer to the question: what causes the unequal distributions that seem to automatically emerge in computer programmes that simulate the multiple interactions of virtual agents

1 Most standard economic textbooks are structured around the approach of neoclassical economics, see for example Lipsey and Chrystal 2007. For an accessible, if heavily preconceived, account of Austrian economics see Butler 2010.

with diverse attributes and decisions?, the complexity economist Eric Beinhocker (2007) writes:

> '[I]n essence, 'everything'. The skewed (wealth) distribution is an emergent property of the system. It is a macro behaviour that emerges out of the collective micro behaviour of the population of agents. The combination of the shape of the physical landscape, the genetic endowments of the agents, where they were born, the rules that they follow, the dynamics of their interactions with each other and with their environment, and, above all, luck all conspire to give the emergent result of a skewed wealth distribution.'

Or as Paul Ormerod (2001) states:

> 'The behaviour of the (economic) system as a whole can never be understood by mechanistically adding together its component parts: just as a living creature is more than the sum of the individual cells which make up its body, so the economy and society are more than the sum of the individuals who inhabit it.'

Neoclassical economics finds it difficult to account for such emergent problems because it is based on a framework of simple, bilateral exchange; that is, individual agents that choose whether or not to exchange their resources with other agents. In such a framing, emergent problems cannot arise because agents can opt out of any exchange they deem not in their interests. Individual optimisation can only lead to social optimisation in this framework. This is not to say that neoclassical economics does not recognise the existence of economy-wide problems, it does. But either it finds it difficult to make a clear causal connection between its individually focused framework and wider phenomena or it is forced to regard the wider phenomena as the result of some external disruption to the normal running of free bilateral exchange.

The underlying theme of this chapter is that the new fields of complexity theory and network theory help us to consider the economy as a **dynamic network**, rather than the static model of two-way exchanges that underlies orthodox economics. We now have much better conceptual technology, thanks to the processing power of computers, to make sense of – and model – dynamic networks. This new toolbox helps us to understand that emergent problems, to which orthodox economics is largely blind, can and do emerge in economic systems. And, given this new understanding, we can start to consider policy options that might respond more effectively to such problems.

Emergent problems and the state

Although the school of complexity economics and the idea of emergent phenomena are relatively new, the recognition of the existence of system-wide economic problems is obviously not. It has long been a staple of the great majority of economic thinking that there are at least some fundamental challenges for an economy which can only be solved through some form of collective action. For example, rightly or wrongly most economists accept the need for a central bank to control the flow of money so that systemic problems such as extreme price volatility do not prevent an economy operating effectively.

However, the most common collective solution to system-wide economic problems has been to use the power of the state in a great diversity of ways. Ever since powerful central authorities emerged in the first city states, governments have used a wide variety of tools including taxes, regulation, licensing, law, ownership, welfare payments and simple exhortation to address all sorts of economic problems that seem to outstrip the effort of any single individual. Examples include currency volatility, business cycles, inflation, deflation, mass unemployment and inequality.

However, the notion that the state as it currently operates can indeed offer effective and sustainable solutions to emergent problems is problematic for complexity theory. As Paul Ormerod explains in chapter 2 of this collection, a key problem with policymaking focused on state solutions is that it incorporates the notion that society acts like machines. This is to a large degree because mainstream economics has taken a very narrow view of human nature and interaction, in which human beings are generally motivated by relatively straightforward material goals and can be trusted to act rationally to measures which affect those material goals and their capacity to achieve them. This has tended to lead to a 'buttons and levers' view of policy options, which as he states is about adjusting individuals' incentives.

Complexity theory, however, is based on the core observation that social systems are dynamic, evolving networks in which individual and collective behaviour can shift and change rapidly and unexpectedly. Rather than general outcomes being the aggregate result of a mass of rational, individual actions, those individual actions are deeply influenced by both the perception and the reality of other individual actions *and* the general outcomes themselves. This introduces a degree of fluidity and unpredictability into a system which means attempts to control an economy by gathering data, making forecasts and developing policy will always be subject to a high risk of failure, particularly over longer timescales. In this context, mechanistic approaches to policy can be extremely problematic.

The new fields of complexity and network theory indicate that there are at least four broad reasons for this.

First, idiosyncrasies matter. Despite attempts to escape a 'one size fits all' approach in many areas of policy, it is extremely difficult for centrally determined economic policy to remain sensitive to the very wide diversity of circumstances that affect different parts of the economy.

Second, targets set remotely can be inaccurate proxies for real aims, often resulting in distorted incentives. The most obvious example of this is the broad use of prescriptive targets for the NHS, notably under the last government, which a number of studies noted led to hospitals neglecting fundamental aspects of patient care.[2]

Third, network effects can drown the very incentives that are at the heart of so many policy responses. For example, research indicates that people who are obese are often in social networks of obese people – in such circumstances, there is often little a government can do to reduce the prevalence of obesity.

One piece of research emphasised this point particularly well in the economic sphere,[3] in which the authors conducted two experiments concerning consumer preferences. In one experiment, consumers were isolated from each other and asked to rank their preferences of 48 songs. The second experiment was identical to the first except that consumers were given the ranked preferences of other consumers. The preferences of the second group were dramatically different to the first, demonstrating that the preferences of other people were highly influential on individuals' choices. These are network effects par excellence.

And, fourth, incentives are often set as if people were selfish maximisers of their own utility. However, research indicates this is an inaccurate assumption. For example, a study by Simon Burgess and Marisa Ratto (2006), noted that the *intrinsic motivation* of public sector workers, such as those in care services, can differ significantly from those in the private sector. If true, this would make the economics of the public sector substantially different to the private sector.

Seeking new techniques to resolve emergent problems

Some might argue, notably from the neoclassical school, that the above comments point to a state that is ineffective and often damaging, which means that keeping its influence to a minimum is the right response to the recognition of complexity. Unfortunately, the corollary of this response is the willingness to accept that the often deep and widespread human misery that results from emergent economic

2 See Booth 2010

3 See Salganik et al 2006

problems is simply an irresolvable fact of life. We do not believe that it is necessary to accept such a pessimistic conclusion because such pessimism fails to acknowledge that there can be more to a collective response to emergent problems than a mechanistic, centralised state. The question is not whether it is worth developing a collective response but whether we can develop a collective response that takes account of the more dynamic and unpredictable economy posited by complexity theory.

The following examples build up a sense of what the characteristics of such a response might be. Although we identify four key features, they are by no means exhaustive.

1. Non-ideological

It seems that attraction to ideology is an exceptionally powerful feature of human behaviour. That attraction can present itself in unmistakable form such as at the extremes of the left and right wing; or it can appear in the more subtle but unquestioned, or even unnoticed, assumptions, values and principles that can inform mainstream policymaking. We would argue that neoclassical economics, for example, is an ideological outlook based on particular assumptions and moral values (often presented as science) which has come to shape economic policymaking for many decades.

However, one of the implications of complexity theory is that any attempt to explain and predict economic phenomena based on *universal* and *absolute* assertions will ultimately fail. Economic activity is too diverse and interacts in too many complex ways to allow for generalisation, and the patterns of economic activity and relationships are continuously evolving. Policy based on intellectual foundations that assume otherwise will fail outright, succeed only partially or succeed only for limited periods of time.

If we define ideology as a body of ideas then, of course, escaping ideology altogether is impossible. Policy will always require some foundation in values and assumptions about the nature of the problem to which one is responding. Indeed, this may be one reason why policy always does seem to fail at least to some extent.

However, there are degrees of ideological commitment. We would argue that the most forthright ideological views will result in bad policy development over a long enough time horizon. Such approaches will oversimplify the causes of economic behaviour and phenomena and the problems that arise from them.

2. Reflexive

We would argue, however, not just for the mitigation of ideology but also for an approach which continuously challenges and rethinks ideological outlooks, including those subtler forms that afflict the mainstream.

To ensure that our economic policy remains meaningful in a system characterised by inherent unpredictability and dynamism we need to develop a governing culture and institutional processes built upon a perpetual reassessment of 'solutions'. Curiously, this leads us to a more Hayekian view of the economy (his actual views, not the popular myths) in which institutional emergence is an essential part of society.

Tendencies towards groupthink, inertia, consensus and orthodoxy must be identified early and subject to challenge and disruption. There are potentially many ways this can be done, including the introduction of **sunset clauses** into all new legislation with significant economic implications, the creation of **challenge units** in all spending government departments, and more rigorous and continuous monitoring and evaluation of the impact of economic policy.

3. Diversity and devolution

The emphasis complexity economics places on idiosyncrasies and change in the progress of economic phenomena militates against any notion that a single policy 'solution' will necessarily be an effective and permanent response to emergent problems. In short, in many policy domains there is too much variability between regions and sectors for a single policy to have consistent or predictable outcomes across a nation; and change, which is inevitable in a complex economic system, will render policy solutions obsolete over a long enough time period.

For this reason, we would argue that economic policy needs to become more diverse in its development and application. One obvious way to do this is to devolve economic power to a more local level to allow the creation of policy frameworks more suited to the specific characteristics of a particular area. Hence, many complexity theorists emphasise the notion of subsidiarity in human governance and organisation.

However, it should also be possible to create a more experimental approach to economic policymaking with different initiatives and ideas being attempted in different regions and in different sectors. Some of these initiatives may prove appropriate only to specific sectors but, with an appropriately non-ideological and reflexive approach, some may prove to be genuine breakthrough policies, which could be transferred, tailored and scaled. Needless to say such an open and innovative approach would require a significant culture change within the many central government departments.

4. Collaborative

Although we have referred to the importance of finding collective solutions to emergent problems in this chapter, we believe the term 'collaborative' to be more appropriate. We emphasise this because the idea of a collective response has historically indicated a degree of shared perspectives and common values and identity which would undermine some of the principles outlined above.

Complexity discourages any notion that collective endeavour is – in and of itself – an adequate solution to economic problems. There is no inherent benefit to be found in the collectivism of the strong state, the class movement or identity grouping. Instead we would argue for efforts to meet emergent economic phenomena based upon the collaborative endeavour of many different perspectives and values. The ties that may bind such diverse outlooks are not enduring and deep but are instead created by a shared desire to solve a problem.

We would point, for example, to the spirit of collaboration that infuses so much of the internet where large-scale collaborative efforts (for example, in the creation of open source software or major knowledge resources such as Wikipedia) thrive on the very fact that the many individuals involved bring different perspectives, experience and understandings.[4] We believe that a similar spirit of practical problem-solving collaboration between diverse attempts to resolve economic problems is the best way to find sustainable solutions to emergent problems that accord with the imperatives of complex economic systems.

Conclusion

We live in a time of serious economic volatility. The financial crisis of 2008 and the associated global recession are still reverberating around the world. The European financial system remains susceptible to a crisis emanating from Greece; the stockpiles of foreign exchange reserves accumulated over the past 15 years, notably by China and oil exporting nations, remain vulnerable to a dollar collapse; and, perhaps most importantly, the political and economics communities do not seem able to grasp why the financial crisis arose in the first place. This lack of understanding can only hamper attempts to bring about meaningful change in our global economic system.

At the same time, the basis of the economics profession, neoclassical economics, has been shown to be seriously deficient in light of these crises and the challenges that remain. Most – not all – of economics today is highly mathematical, bearing little resemblance to the real world, and it seems to be of little relevance to contemporaneous economic questions. Given the resources devoted to the economics profession, this is a shameful state of affairs.

The main thrust of this chapter has been to emphasise there is hope in the form of complexity and network theory. These new fields of study, which have revolutionised many parts of the natural sciences, have found their way into the social sciences, including economics. While abstract and new, these fields also paint a picture that is much more recognisable than the inaccurate abstractions of neoclassical economics. So we are not advocating the replacement of one set of inaccurate abstractions with another: these new fields emphasise

4 See Shirky 2009, Tapscott and Williams 2008

building up an understanding of the real world from the ground up, providing a more realistic and less ideological picture of reality. They also offer a new way of thinking about the role of collective action, collaboration and institutions, including the state, in the economic system. Moreover, these new fields are inherently apolitical – they ought to be useful to all political parties. We should make greater use of them.

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‘Practical men, who believe themselves exempt from any intellectual influence, are generally the slaves of some defunct economist’

John Maynard Keynes, 1936

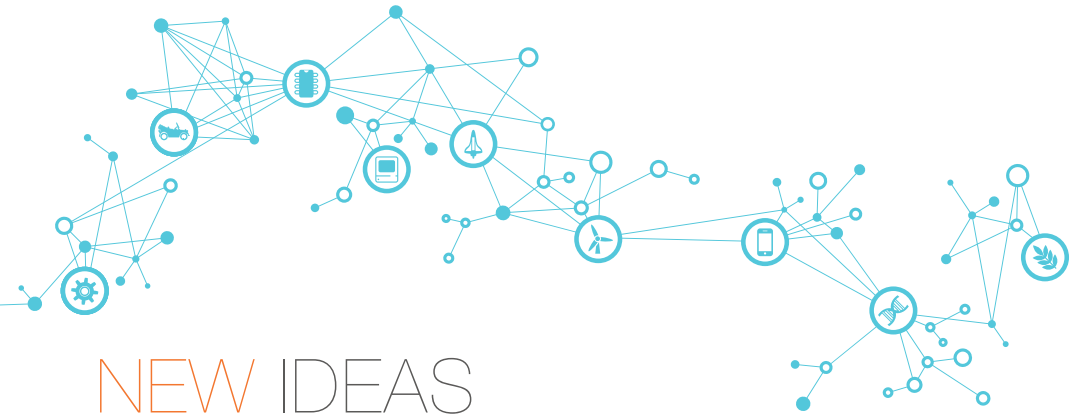
We live in uncertain economic times. The financial crash and subsequent downturn have shaken the global economic system to its core.

If one thing is certain, it is that the events of recent years have thrown mainstream economic thinking into disrepute.

In the aftermath of the crash, scholars and commentators are turning to new, heterodox economic theories as a way of better understanding how the economy really works and how the economic system might be managed more effectively.

Yet although new economic thinking offers a far better account of how the economic system functions, we don’t yet have a clear idea of its implications for policymaking. In economic policymaking, orthodox economics remains the only game in town.

This book starts from the premise that insights from new economic thinking need to be taken seriously. It seeks to bring new economic thinking to the attention of policymakers and to reappraise the ways in which policy is designed and implemented when real-world economics is taken into account.



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