



Creative Destruction

Placing Innovation at the Heart of Progressive Economics

Adam Lent and Matthew Lockwood

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Eric Beinhocker – Senior Fellow at the McKinsey Global Institute

Professor Wendy Carlin – Professor of Economics at University College London

Aditya Chakraborty – Economics leader writer for the *Guardian*

Diane Coyle – Author of *Sex, Drugs and Economics* and *The Soulful Science*

Roland Harwood – Co-founder of 100%Open

Peter Head – Director and Chairman of Global Planning at Arup

Professor John Kay – Fellow of St John’s College, Oxford

Charles Leadbeater – Writer on innovation and creativity

Professor David Marquand – Visiting fellow at the University of Oxford

Robin Murray – Co-founder and Director of Twin and Twin Trading, and founding partner of the environmental consultancy, Ecogika

Kate Oakley – Visiting Professor in Innovation at the University of the Arts in London

Jonty Olliff-Cooper – Director of Policy and Strategy, A4e

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Foreword

The 2008 financial crash demonstrated with devastating effect serious flaws in the UK's economic model. These events alone demand a profound reconsideration of the principles which have guided our economic policymaking. The crisis has also, however, shone a light upon a wider set of problems, questions and changes regarding our economy.

Our economic environment is changing with, for example, the rise of China; our understanding of how capitalist economies work is being challenged by, for example, evolutionary and complexity economics; and progressives have begun to question what economic policy is – or should be – *for*. Is growth with redistribution enough?

ippr's New Era Economics is an ambitious project that seeks to tackle these big questions about our economy – and, by extension, about our society – head on. Aided by our New Era Economics panel, a group of wise men and women working on the cutting edge of economic and progressive thought, we are working towards the construction of a new, progressive economic model for the UK. We will do this by:

1. Provoking new, progressive thinking on the economy
2. Understanding the role policy can play in moving us towards a more successful, progressive economy, and
3. Contributing to the building of a constituency to drive the change we want to see.

We begin the New Era Economics thinking with this pamphlet, which acts as a provocation, opening up the themes of the project. It does so through the lens of innovation, exploring the emphasis that emerging forms of economic thinking such as complexity and evolutionary economics place on innovation, and asking what sorts of innovatory changes are taking place at present and how well-placed the UK is to respond to them. It also outlines a distinctly progressive approach to the economy that is founded on innovation.

The pamphlet's contribution to the wider project is twofold. First, it identifies many specific questions and strands of thought which need further interrogation and development as the work progresses. Second, and quite importantly, it provides support for our initial instinct, that there is a rich well-spring of thought out there waiting to be tapped by those who want to try to build a new, more progressive economic era.

We are grateful to the funders of this pamphlet: the Barrow Cadbury Trust, Esmee Fairbairn Foundation, Joseph Rowntree Charitable Trust and the Joseph Rowntree Foundation. The views expressed here are those of the authors and do not necessarily represent those of the project funders.



Nick Pearce
ippr Director

Executive summary

Economic thinking after the crash

Major economic crises tend to lead to transformations in the way we think about the economy and economic policy. The 1929 crash and resulting depression paved the way for the post-war emphasis on planning inspired by Keynesian economics. The stagflation of the 1970s inspired the shift to neo-liberal thinking and policies designed to free markets. In the present day, the 2008 crash and its consequences represent a fundamental intellectual crisis for the neo-liberal approach.

The notion that the route to economic success is to regulate markets as lightly as possible has become increasingly difficult to sustain in the light of all the problems in the financial sector. In addition, the core economic principle that underpinned the neo-liberal approach – the notion that markets are always, or nearly always, beneficial and stable – has lost much of its credibility. As former Chairman of the Federal Reserve and arch-neo-liberal Alan Greenspan said in 2006 ‘the whole intellectual edifice [has] collapsed’.

Attention has turned, as a result, to approaches that were previously considered to be at the fringes of economic thought. Complexity economics and evolutionary economics have no truck with the notion of benign rational decision-making that has underpinned mainstream economics for so long. Instead, they see systems that are driven by dynamic and unpredictable changes in the way diverse economic agents seek to survive in an uncertain world. As a result, they see capitalism and markets as inherently volatile rather than stable.

For these schools of thought, the uniqueness of capitalism resides in its ability to turn the vast capacity of humans to innovate into massive wealth. The cost, however, is that successful innovation creates losers as well as winners, often with great suddenness and brutality. Those companies and people left with an outdated approach suffer.

In short, capitalism’s greatest benefit is also its greatest cost. As Joseph Schumpeter noted, capitalist innovation destroys as it creates. For the neo-liberals, such turmoil will be stabilised in the long run by the laws of supply and demand. Keynes famously countered ‘in the long run, we are all dead’. An evolutionary or complexity economist might add ‘in the long run, there will simply be more turmoil’. One way or another, we never achieve the beneficent state promised by neo-liberal thinking.

The power of innovation since 1900

The way in which innovation has driven great advances in wealth, productivity and living standards while also introducing volatility and uncertainty can be seen throughout the 20th and into the 21st centuries.

Incremental innovations happen all the time in different markets but on rare occasions a major shift occurs, driven by new technologies and organisational principles which radically alter producer and consumer behaviour in many different sectors.

Before 1900, there were three such transformative innovations: mechanisation and the industrial revolution in the late 18th century; steam power and the spread of railways and canals in the first half of the 19th century; and electricity and the era of steel in the latter part of that century.

During the last century there were two major transformations. The first was mass production and the rise of mass consumerism, which began in the 1910s and became after 1945 an unprecedented generator of productivity, wealth and higher living standards across the advanced economies. The second emerged just as the mass production revolution was stagnating in the 1960s and 1970s. This was the advent of flexible production, as computer-controlled production and distribution and Japanese workforce techniques allowed for the introduction of a vast range of more diverse product lines, launching an era characterised by an explosion in consumer choice.

Now, the first transformation of the 21st century is underway. The spread of highly interactive web technologies is revolutionising producer behaviour across many sectors, allowing big productivity gains, creating new markets and transforming old ones. Just as it did in previous transformations, consumer behaviour is also changing. It is too early to say exactly how this transformation will play out, but one key development seems to be the rise of ‘prosumption’, wherein consumers play an increasingly central role in the process of production itself. Examples include the open source software movement, the ability to allow customers to design their own products online, and web-based phenomena like the app market, in which consumers generate incomes by actually becoming producers.

These big shifts not only drive new waves of productivity and growth, they also create great

volatility, by making old techniques obsolescent and establishing new markets that newer companies can exploit. Perhaps most significantly, they presage major shifts in economic power globally. Electricity and heavy engineering in the late 19th century helped shift economic power away from Britain and towards the USA and Germany – a process accelerated by the rise of mass production. Flexible production launched Japan as a major global economic force that dented the dominance of the United States and older economies. The possibility now exists that web technologies could accelerate the shift of economic power to the East – but whether and how that happens is as yet unclear.

The reasons for such shifts from the old to the new are clear – newer economies are less constrained by the inertia of established technologies, a suddenly outdated skills base and resistance to change on the part of management and workers. As a result, newer companies – assuming they have sufficient access to capital – can develop and adopt new, more productive innovations more rapidly and more effectively than their older counterparts.

The UK and innovation

The UK is a case in point, having compiled a very patchy record on responding to major innovations over the last 100 years.

Despite a widespread awareness amongst policymakers and business leaders from the 1930s onwards that UK industry was less productive than the United States', no significant efforts were made to shift towards a mass production approach. Certain UK sectors that did 'Americanise' in the 1940s remained competitive, but too many others avoided innovation and, by the 1950s, were being outperformed by American, German and French companies.

During this period, policymakers prioritised welfare policies and planning for economic stability over business innovation, while business leaders mistakenly assumed that the Commonwealth market, where they had dominance, would keep them in profits.

By the 1960s, as it became clear that much of British industry was outdated and that companies were going to have to enter the European market, government turned to more interventionist techniques. But just as the UK was intervening to encourage a shift to mass production, overseas companies were moving to flexible production – the UK companies that 'modernised' late were already out-of-date within a few years. This was an important factor in the troubled economic period of the 1970s, when further efforts at intervention were overwhelmed by regular short-term crises.

This provided the opportunity for the 'New Right' to revolutionise the UK economy. As a result of sectoral privatisation and deregulation, some sectors such as media, retail, finance and telecommunications did become far more innovative. But the notion that the free market was a panacea is wrong. Some sectors – such as ceramics, textiles and engineering – suffered enormously as a result of Thatcher's medicine, even though they continued to flourish in other European countries within very different policy frameworks. Others – such as the auto industry, aerospace and pharmaceuticals – enjoyed significant state support in one form or another and live on as thriving, innovative sectors.

“Contemporary economic policy needs to be centred on three core principles: it must be innovation-centred, pragmatic and aware”

In truth, the period between 1979 and 2008 was an era in which free market rhetoric concealed an odd mix of pragmatism and inconsistency. It was an approach that contributed to the unbalanced state of the UK economy, as investment moved rapidly away from the declining parts of the 'real' economy and concentrated with increasing intensity on property, IT, retail and finance. The result was an economy over-reliant on imports, debt and financial services.

Lessons for economic policy

In light of new economic thinking and the mistakes of the past, contemporary economic policy needs to be centred on three core principles. It must be **innovation-centred, pragmatic and aware**.

Innovation-centred

Given the emphasis that both complexity and evolutionary economics place on innovation as the driver of growth, any policy framework that values growth needs to be explicitly focused on encouraging innovation.

This has a number of consequences. It means looking beyond macroeconomic stability as the primary goal of policy, even though it is undoubtedly important, and towards creation of the conditions for innovation. It means accepting that the state will have a vital role in ensuring that market conditions reach the 'just right' balance which will spur innovation and that adequate investment is available for innovators.

Pragmatic

Policy needs to recognise that, to survive and flourish during periods of transformation, different sectors require a different relationship to the state and market at different times. Ideological, one-size-fits-all

approaches will not deliver high levels of innovation or growth and do not enable consistent policymaking, despite the rhetoric.

Moreover, because of the complex unpredictability of the economy, policymakers need to take a reflexive approach, learning from mistakes and calibrating policy as necessary.

Aware

Policymakers need to develop a high level of awareness of the nature of the innovations occurring in different markets and to ensure that business leaders are equally aware and so able to develop a timely response. This means much more than just knowing what technological advances are underway. Major transformations occur within the context of shifts in producer and consumer behaviour that are informed as much by cultural and social change as by hard-headed economics.

Lessons for progressives

It is vital that progressives engage with innovation for a number of reasons. Understanding the role of innovation in an economy helps to make clear the drivers of – and therefore some of the solutions to – inequality and poverty. If innovation creates wealth, then those who participate in innovation will gain its rewards, and those who don't will be left behind. This reinforces how important it is to go beyond a transfer-based approach to addressing poverty and to focus on broadening out participation in the wealth creation process.

With the rise of web technologies and the opening-up of the entrepreneurial and innovative process, broadening participation in innovation potentially becomes easier, and more pressing. It is easier because innovative structures are flattening and therefore

becoming more accessible, but more pressing because as more people become innovators those who don't are ever more excluded.

Opening up innovation is not just about ensuring its rewards are spread more evenly, however. Participation in innovation can be a good in itself. Being creative and innovative in one's work can be an important part of self-realisation and flourishing – key enlightenment values. Thus even in 'pedestrian' sectors and jobs, where the potential for major increases in productivity may be limited, if workers have the ability to use their own creativity by participating in decision-making and similar activities it can improve their quality of life.

There are two other reasons for progressives to engage with innovation. First, innovation *per se* doesn't necessarily lead to socially beneficial ends. We can see this in the financial sector, for example, which generated very high levels of innovation over the last decade or so, innovation which created the huge risks in our economy that ultimately led to the crisis. In our view, this means that as well as promoting innovation as a key source of wealth upon which rising living standards depend, progressive policymakers should also seek to shape the kind of innovation which takes place, ensuring that it serves socially productive as well as economically productive ends. This means directing innovative energy towards major social challenges, such as addressing climate change.

Finally, progressives are in a good position to recognise that capitalist innovation is a double-edged sword that offers the opportunity to address inequality and poverty by raising productivity and living standards but will also bring about obsolescence and so incur great human costs. The challenge facing progressives is to reduce the human impact of the 'creative destruction' process, without losing its benefits.

Introduction

We are in the midst of a long economic crisis. What began in 2008 as the most dramatic financial crisis since 1929 evolved into a sharp global recession. Following a series of bank bailouts and a coordinated effort at stimulus in the major economies, many countries now face a fiscal crisis as well, raising the possibility of a Japanese-style ‘lost decade’ as governments, banks and households recover from their huge debt overhang.

There is also widespread recognition that this is more than another bubble bursting – it is not simply a repeat of the Lawson boom of the late 1980s or the dot.com bubble. This is partly because of the scale and globally interconnected nature of the crisis. Large banks in all the major Western economies were caught up in the initial crisis, all the Western economies went into recession simultaneously (while even in Asian markets growth slowed), and most are now attempting to cut their deficits at the same time. The crisis has also made more visible the structural changes that the entry of China into the world economy has wrought over the last decade.

But there is also a widely expressed feeling that this is a crisis in a deeper sense – that the whole intellectual framework that was being used to understand the economy was flawed. Our current economic predicament powerfully suggests that neo-liberal economic thinking has run its course.

At the same time, underlying trends which have been made more apparent by the crisis also pose pointed questions for British economic policy. One such trend is the eastward shift of the centre of gravity within the world economy;¹ another is the rise of dangerous climate change. Increased inequality, reduced security in work and an ever-louder demand for work-life balance have all led to profound questions being asked about our economic model.

So, there are many reasons for thinking that we are now at a turning point, both for the global economy and for economic thinking, similar to those of 1929–45 and the 1970s. Those turning points were also prompted in large part by crises, and both led to new intellectual and economic policy regimes, in the first case to Keynesian demand management and the mixed economy after the Second World War, and in the second to the neo-liberalism of the 1980s.

We believe that this crisis also demands fundamental new thinking, not only about the nature of economic

growth but also about economics and the intellectual framework for policy. Inspired by the fresh perspectives being put forward by analysts such as Eric Beinhocker and Carlota Perez, ippr’s New Era Economics project seeks to generate debate by providing new evidence and perspectives. This pamphlet plays an important role as our first provocation.

The first chapter looks at the rise and fall of the dominant paradigm of the last 30 years: neo-liberalism. We argue that the crisis has shown the limits not only of neo-liberalism itself but also of its long debate with Keynesian demand management. Our view is that the economics of the next phase should be dynamic and focus primarily on the process of innovation as the driver of wealth creation and distribution, rather than on static market or government failures *per se*.

Chapter 2 looks more closely at the nature of innovation in capitalist economies. It examines in particular the major shifts that have taken place within the capitalist structure, which have come with the development of the automobile and electricity at the start of the 20th century, and then personal computers and the internet at the end of the century. We also examine the UK’s record on innovation in this context, with an assessment of past successes and failures, and lessons for the future.

Understanding how capitalist economies evolve is a vital precursor to understanding how policy can intervene in them for progressive ends. Detailed policy prescriptions are beyond the scope of this paper, but in chapter 3 we lay out some basic principles for placing innovation at the heart of economic policy. The fact that innovation is central to modern capitalism, however, poses some major challenges for progressives, and in chapter 4 we explore some ways through the dilemmas. We argue for the need for a strategy which encourages not only *more* innovation and wealth creation but also innovation *of a particular kind*. Progressive innovation should involve – and reward – the many rather than the few, and be dedicated increasingly towards ends – such as tackling climate change and meeting the needs of an ageing population – that are socially beneficial.

In this pamphlet we are laying out an ambitious agenda. But if we are entering a new era for the economy then we need ambition and, above all, we need new ideas. Einstein’s oft-quoted words remain true: ‘We can’t solve problems by using the same kind of thinking we used when we created them.’

1. The emergence of an economics of innovation

'Innovation is the outstanding fact in the economic history of capitalist society'

Joseph Schumpeter, 1939²

Each major era in capitalism has been marked by the emergence and eventual domination of a distinctive set of economic policy ideas, based on a particular view of the economy. In the post-war years, policy across the developed world was guided by an analysis developed by Keynes in response to the 1929 crisis and the Great Depression. From the 1970s onwards, with the perceived failure of Keynesian demand management, ideas about the power of free markets became increasingly influential both with policymakers and in some academic circles.

As we stand on the threshold of a new era, we can expect a new view of what is fundamentally important about capitalist market economies to emerge that will guide policy thinking over the next 30–40 years. As with previous eras, new thinking will be driven by how events, such as the 2008–09 financial crash and subsequent recessions, come to reveal what was deficient in the old thinking.

In this chapter, we argue that the elements of this new view can already be seen in new thinking in academic economics, especially in complexity and evolutionary economics. These approaches emphasise the dynamic nature of capitalist market economies, driven by constant innovation and adaptation. We explore the idea of placing innovation at the centre of policy in the new era, in a position analogous to those held by Keynesian demand management and market liberalisation in previous periods.³

Putting innovation centre-stage involves a fundamental change in focus. Ever since Adam Smith published *The Wealth of Nations* in 1776, economics has wrestled with two essential questions – how is wealth created, and how is wealth allocated? Over the last 30 years, much of the debate between left and right has focused on the latter issue, raising discussions on the roles of the state and markets in the efficient allocation of resources and on the ability of redistribution to tackle poverty.

We argue that, while these debates are important, they have taken for granted the extraordinary dynamic, wealth-creating potential of capitalism – something that the classical economists (including Smith and Marx) were fascinated by. In our view, examining capitalism's dynamism is not only important for a fuller

understanding of the economy but it also points to more effective and sustainable ways of addressing some of the problems that concern progressives, including persistent inequality.

In developing this argument, it will become clear that we are defining modern capitalist economies in a particular way, which goes beyond the simple existence of markets. Our definition of capitalism has at its core the idea that companies make investments aimed at increasing the productivity with which they produce what they sell, and that they do so for the purposes of making profit, which they in turn reinvest in a continuous cycle aimed at producing more profit. Such companies rely on markets to buy labour and raw materials, and of course to sell their output. But markets alone do not make capitalism, and there are plenty of examples of markets in which this particular process of growing (or accumulating) profits does not happen. Crucially, moreover, this description of capitalist activity is not just about manufacturing – it applies equally to creative and service industries like fashion, film, music, videogames, brand management or even hairdressing.⁴

Financial crisis and a crisis of ideas

Many Western economies are in the middle of a period of related crises that started with the bursting of the sub-prime mortgage bubble in the United States, went on to become a global banking crisis in 2008–09, became a sharp global recession in 2009–2010, and has now transformed into a period of deep fiscal austerity across Europe. The UK economy has been amongst the most severely affected, mainly because of its degree of dependence on the City and its financial services sector.

Beyond the trigger point of the sub-prime bubble, the origins of the crisis lie in a number of structural tensions that have been building up over the last two decades. The decline of manufacturing in much of the West and its rise in China has led not only to huge trade gaps but also massive financial imbalances. Real wages have fallen globally. In China, the lack of a welfare safety net has led to a savings boom, while in the US and UK particularly, households on low incomes borrowed excessively to finance home ownership.⁵

The current crisis is different from previous bubbles in recent years, including the Asian crisis of 1997 and dot.com boom of the late 1990s. It has been global, has struck at the core of the financial system – with

the first failure of major banks since the 1930s – and has led to a serious questioning of ideas which have dominated economic policy for a generation. Indeed, the financial crisis has brought with it a crisis of ideas and, in particular, a crisis for the neo-liberal worldview which holds that markets are inherently stable, self-correcting, and able to form prices that correctly reflect all relevant information about supply, demand and risk.

In the case of financial markets, the most sophisticated and influential version of this idea was the ‘efficient markets hypothesis’, the idea that actors in markets for financial assets (including securitised mortgages and shares in the banks that owned them) would absorb all relevant and available information about such assets, making those markets efficient and essentially stable, with prices moving only when there was new information (‘news’) about a particular bank or the wider economy.⁶ As with the general neo-liberal approach, the theory implied that there was no case for regulation to improve the performance of markets.

In practice, a rational assessment of the risk involved in giving mortgages to people with no jobs or income was overtaken by a story about the inevitability of continually rising property prices.⁷ Furthermore, these mortgages were then securitised, leveraged and sold on in such complex ways, and with such interdependence between banks, that it was impossible for most market actors to know what they were buying.⁸ The efficient markets hypothesis was shown to be spectacularly wrong. The reality was not so much that risk was priced wrongly, but rather that there was no way that market participants could have known what the risks actually were. Rather than being incentivised to manage risk properly, traders and analysts in financial institutions from banks to credit rating agencies were being rewarded for ‘joining the herd’ in bidding up the price of assets whose underlying value was in reality completely uncertain. It turned out that financial markets were not allocating capital efficiently to productive purposes, but rather to speculation in paper assets whose value was obscure.

The idea that financial markets should be left to themselves was finally swept away by the panic which followed the decision by US Treasury Secretary Hank Paulson not to bail out Lehmann Brothers in September 2008.⁹ The instability was the product of a banking sector that looked very different from the neo-liberal ideal of a perfectly competitive market with many small, independent companies. On the contrary, the banks were all heavily interdependent and networked, and each ‘too big to fail’, making the supposed discipline of the market irrelevant. Alan Greenspan, Chairman of the US Federal Reserve Bank until 2006 – a market fundamentalist and architect of the regime that had allowed the emergence of the housing bubble –

admitted that he was in a state of ‘shocked disbelief’ because the ‘whole intellectual edifice [had] collapsed’.¹⁰

Two views of the economy

How did we reach this point? Why did neo-liberal thinking become so dominant in policymaking in many countries – and especially the UK – over the last 30 years, and what is the view of the economy that lies at its heart?

The story of economic policymaking over much of the 20th century is one of a struggle between two views of the economy.

One tradition, dominant from late 19th century through to the 1930s, and then again from the 1970s onwards, sees the market economy as self-correcting, inherently stable and efficient, maximising growth and giving consumers the best deal possible.

The immediate intellectual roots of economic neo-liberalism lie in the ideas of philosopher Friedrich von Hayek, who combined a moral and political argument about the importance of freedom with an economic argument about the superior ability of decentralised markets over government to solve of economic problems. Hayek argued that knowledge about costs and demands is always dispersed widely in an economy, so only competitive markets, in which prices carry information about those costs and demands, can act as an effective mechanism for solving economic problems. Just as with Adam Smith’s notion of the ‘invisible hand’, no single market participant knows in detail every aspect of the whole system of which they are part, but nevertheless the system as a whole will find a solution.¹¹

The other tradition, dominant from the late 1930s through to the 1970s and developed largely by John Maynard Keynes, argues that markets do not necessarily deliver efficient outcomes and that government can sometimes do better. At an aggregate level, economies can become trapped in states of high unemployment, with people not spending money and businesses unable to sell their goods and services.¹² In such a situation, only intervention by governments can break the deadlock, mainly by boosting demand through public spending and expanding credit.

Both of these traditions can be seen in academic economics, which has acted as a source of intellectual authority for policymakers on both sides.¹³

On one hand, Hayek’s view of markets fitted well with the emergence of neo-classical economics. From the second half of the 19th century onwards, this body of economic thought was built up on the foundations of utilitarianism, an assumption of representative rational decision-makers, and a concept of equilibrium – a

balanced, steady state – borrowed from 19th century physics.¹⁴ In their purest form, these building blocks added up to the powerful idea of a competitive market economy as a self-correcting system that would tend towards a stable equilibrium and which could not be improved on except by making someone worse off, implying that government should not intervene.¹⁵

While many economists saw this result as a purely theoretical special case, an increasingly influential group of economists, with their intellectual headquarters in Chicago, embraced its principle in the form of a fundamental commitment to the view that market outcomes would *always* be better than anything government intervention could achieve. A series of ideas emerged from the ‘Chicago School’ that gave intellectual legitimacy to the *laissez faire* policies that governments began adopting from the 1980s onwards. These ideas included monetarism, but also the efficient markets hypothesis, which would have such influence on financial regulators in the 2000s.

On the other hand, many economists have used the neo-classical tools of individual rational agents seeking to maximise utility or profit to help them explore circumstances – including those highlighted by Keynes – when free markets would fail to produce the best of all possible outcomes, and even cases when markets would not even exist without government action. One common source of ‘market failure’ which has attracted much analytical attention is ‘asymmetric information’, or the fact that in most markets people (and companies) know a lot about their own situation but have only partial knowledge about others’. Under these conditions, free market outcomes do not necessarily produce the best possible outcomes in a variety of settings, from employment to insurance to finance.¹⁶

Neo-liberalism in British economic policymaking

Victory for either ‘side’ in the battle for control over the policy arena has been achieved mainly by a perceived failure of the other in practice. Keynes’ proposals for stimulating economies out of recession were eventually adopted after the failure of orthodox policy in the 1930s. Equally, when the Keynesian project ran aground in the mid-1970s, and government attempts to stimulate economies out of recession seemed to result in inflation rather than growth, neo-liberalism offered a coherent intellectual alternative, able both to inform politics and provide a detailed policy agenda.¹⁷ Moreover, Hayek’s ideas about the superiority of market economies over centrally planned communist systems were borne out by the decline and eventual collapse of the latter in 1989.

However, ideas alone were not enough. From the end of the Second World War, Hayek had explicitly sought to spread his ideas through an elite club, the Mont Pelerin Society, established in 1947. Members included the Chicago economists Milton Friedman, George Stigler and Robert Lucas.¹⁸ The Society became the centre of a network, not only of individuals but also increasingly of influential think-tanks, such as the Heritage Foundation in the United States and the Institute for Economic Affairs in the UK. These groups in turn provided a rich source of ideas for political leaders on the right who sought a break from the post-war corporatist consensus, especially Margaret Thatcher, who was personally influenced by Hayek’s writings.¹⁹

It is of course true that many of Britain’s economic policies of the 1980s were driven as much by pragmatism as by ideology, that not all of the Chicago School economists’ theories were accepted, and that some ideas came from other sources.²⁰ Nevertheless, in macroeconomic management, in financial and trade regulation, in housing and labour market reforms and in the privatisation of state-owned enterprises, the policies of the Thatcher era were all driven at least in part by the underlying idea that state intervention distorted incentives and produced waste. Rolling back the state and allowing the market to flourish would lead to greater efficiency driven by competition.²¹ In the bumper sticker message of the Thatcher era: ‘You can’t buck the market’.

The power of market thinking survived the political transition from Conservative to New Labour government in the late 1990s. In certain ways, New Labour’s economic and political thinking was clearly different from that of Thatcher, Hayek and the Chicago School: the 1997 manifesto stated a belief in the need for and efficacy of government action in the economy²² and a concern with addressing child poverty. New Labour took the possibility of market failure seriously, and this was important in shaping policy in areas such as the establishment of the minimum wage²³ and more recently climate change, with the Stern Review.

However, despite the fact that some theorists were now pointing out that market failures were pervasive throughout the economy,²⁴ policymakers continued to regard those failures as special cases. The superiority of market over government in the allocation of resources remained the default view. New Labour pursued the use of market incentives and the concept of choice in areas from welfare to health to education. Both the party and its intellectuals also embraced the liberalisation of international trade and capital flows that had occurred since the 1970s.²⁵ Crucially, they also accepted and maintained minimal regulation of the financial markets that had become so central to the UK economy.

Learning from the crisis – insights from heterodox economics

The financial crisis has provoked many analyses of why it occurred.²⁶ Several of these analyses are couched within long-standing neo-classical critiques, especially imperfect information.²⁷ Others relate the crisis to wider trade and financial imbalances in the global economy.²⁸ However, the depth of the financial crisis has also prompted a more fundamental questioning of the neo-liberal story, using different methods and leading in new directions.²⁹

One source of different thinking is indicated in debates which took place in the 1990s about financial markets. It has been known for some time that prices in real-world financial markets do not behave in the ways that standard financial theory predicts they should.³⁰ In particular, mainstream economics could not explain the large movements found in the prices of financial assets (booms and busts), which were caused not by changes in the fundamental value of the assets but by interaction between traders in the markets, creating effects like herding. A set of alternative accounts that emerged during this period fitted the volatile real-world data much better.³¹

These accounts draw on two points of departure from neo-classical economics. One involves dropping the assumption of perfect rationality, in favour of a number of more realistic assumptions about human behaviour. The growing field of behavioural economics draws on empirical experiments with real people, and has revealed quite regular ways in which economic actors are likely to differ from the optimising superhuman calculators assumed by simple neo-classical theory.³² So instead of identical traders whose behaviour was modelled through a perfectly rational representative individual, there were different types of trader, who followed different rules of thumb as strategies. Markets were not assumed to clear instantaneously; rather, the models allowed for lags between price movements and responses by traders, between demand and supply.

A second key departure from neo-classical economics lay in allowing agents to react not just to market prices, but also to each other's behaviour, typically in non-linear ways.³³ The resulting models did not behave like the 19th century equilibrium physics that had been incorporated into neo-classical methodologies, but instead like modern complexity theory, which has itself been influential in contemporary physics, so this approach is sometimes known as 'complexity economics'. A few simple rules of interaction at the individual level can produce very complex patterns at the level of markets, which do not settle at one point in balanced states of equilibrium or move in a smooth way between steady states but rather are constantly out of equilibrium and capable of sudden jumps. A common form of interaction is where people copy

the behaviour of others. Resulting positive feedback effects can quickly create herding, and indeed this is one way of explaining financial bubbles.

Interaction between agents also introduces network effects, where a small change in one part of the economy can quickly spread across the whole system. A high level of interdependency within a network can produce vulnerability, as was the case in the 2008 financial crash. Each bank held liabilities of every other bank, but the extent of exposure of any one bank was not properly known, so when Lehmann Brothers went down it threatened to take the whole sector down with it very quickly.³⁴

“A few simple rules of interaction at the individual level can produce very complex patterns at the market level”

In addition to providing a different perspective on finance, complexity economics also offers compelling explanations for a range of other economic phenomena, including persistent income inequality³⁵ and the business cycle.³⁶

It is particularly useful in accounting for the phenomenon of 'lock in', where particular complementary technologies or products can very quickly gain dominance in a market even if they are inferior. Commonly cited examples include the QWERTY typewriter,³⁷ which came to dominate alternative layouts because it was initially taken up by typing schools, and VHS video, which won out over the technologically superior Betamax format in the UK because it benefited from the virtuous circle of video rental shops offering VHS format videos and people buying VHS format players which occurred before Betamax could get established.

In complexity economics, while market volatility, lock-in and income divergence arise from the interactions of individual people or companies, they are viewed as qualities of whole systems, that is, of markets and economies. They are explained not just by adding up the actions of isolated individuals as in neo-classical economics (a consequence of assuming identical individuals), but instead by understanding the interactions between individuals. In complexity science, this phenomenon is known as 'emergence', where the pattern cannot be seen at the individual level, only by looking at the whole.

The most important aspect of complexity economics is that it produces an analysis of economies not as essentially static, responding only to external shocks, but as changing and evolving over time in ways which are determined by their own internal dynamics. And indeed, real capitalist economies are not static,

but constantly changing, moving through booms and busts, with the appearance of new physical and social technologies and organisational forms and the disappearance of old ones. In this sense, they behave like evolutionary eco-systems, which like the models described above are a type of complex adaptive system.

Evolution is most commonly thought of as a biological process, but it can more usefully be seen as an algorithm, a characteristic of any system in which many different strategies are tried (differentiation), some work and some fail (selection), and those that work are amplified (multiplication), within a constantly repeating cycle. In the natural world, the differentiation comes from mutation. In the economy, where people and companies are constantly trying to find new ways to meet needs and desires, the differentiation comes from human creativity and inventiveness.³⁸

Recognising this fact, a school of evolutionary economics has developed alongside complexity economics, outside the mainstream but with growing influence.³⁹ This school lays particular emphasis on the role of technology in the evolution of capitalist economies, with particular groups of new technologies emerging every 50–70 years, instigating major disruption not only to production, but also finance and social organisation.⁴⁰

The evolutionary story – a different view of the economy

An understanding of the economy as an evolutionary system leads to a different perspective on, and a different story about, capitalist market economies.

Both sides of the 20th century debate between free markets and state intervention have useful insights to

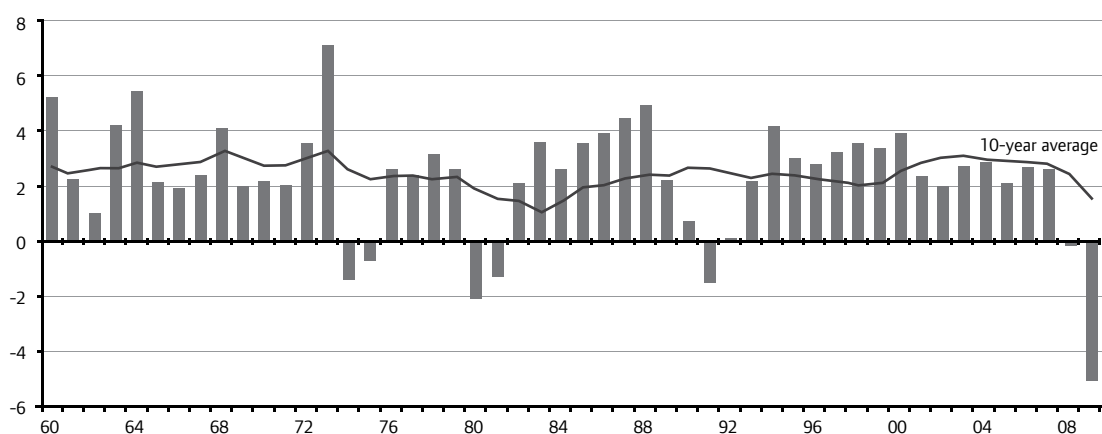
offer. Markets are clearly important as a decentralised mechanism for organising the production, distribution and consumption of goods and services in a way that an authority in a centrally planned economy would struggle to do. But markets can fail and are sometimes far from efficient, and governments can and frequently do intervene in markets successfully.⁴¹

However, this debate is ultimately limited in a crucial way – it does not connect with the essential nature of capitalist economies, and the fundamental determinants of growth in material wellbeing. Neither free markets nor Keynesian demand management in itself is a guarantor of long-term growth in the economy. Contrary to the claims made for them by proponents, neo-liberal policies did not unleash greater growth in the post-1980 period than before (see figure 1).⁴² Likewise, while deep unemployment or high inflation do not help growth, fiscal and monetary policy that yields macroeconomic stability in no way by itself guarantees an innovative or high-growth economy.⁴³

Stepping outside the debate allows a different perspective. An evolutionary view of capitalist market economies suggests that their most important aspect is their potential to create wealth through the process of innovation.

There is no doubt that modern capitalist economies are incredibly dynamic and innovative, producing growth not only in the quantity of things and services produced but also in their diversity and quality. Estimates of long-term economic growth show an explosion in incomes and wealth dating from the emergence of modern capitalism in the 17th century, while comparisons with contemporary hunter-gatherer societies show how vastly more complex and diverse a modern capitalist economy is.⁴⁴

Figure 1: Annual real GDP growth, UK 1960–2009 (% change)



Source: Office for National Statistics

Box 1: Defining innovation

If necessity is the mother of invention, invention is the mother of innovation. Joseph Schumpeter, the Austrian economist who was the first to place innovation at the centre of economic activity, saw innovation as a three-stage process:

- *invention* – the demonstration of a new idea
- *innovation* – its first commercial application
- *diffusion* – the spreading of the technology or process through the market.⁴⁵

Subsequent accounts of the innovation process are not so linear, and highlight complex feedback mechanisms between different stages. However, whatever the model used, the basic point remains that innovation is a process which contains many phases, and will therefore draw on a range of different skills, usually provided by a range of people and institutions, even if the original idea comes from one individual.

If innovation is more than just invention, then it is also about much more than just physical technologies. As we are currently in an era defined by innovation in information and communications technology, the popular idea of an ‘innovation’ might be a new device like an iPad or a 3G phone. However, innovations are constantly happening in all areas of the economy and society, including services (think of Amazon, EasyJet or Ocado, all new services made possible by the internet), cultural products and movements, business models, management practices and institutions.

Indeed, the idea of the economy as an evolving system with innovation at its heart has a long history, and was a central pre-occupation of the classical economists, including Adam Smith and Marx, and Schumpeter. Hayek also saw the economy in an evolutionary way, with markets playing the role of a discovery process whereby the pressure of competition drove individuals and enterprises to develop new technologies – in the end, a far more useful set of insights than his deeply ideological political views.⁴⁶

More recently, a number of studies taking this approach – drawing both on neo-classical and complexity methodologies – have shown that innovation-based accounts give a better fit with data on patterns of growth across countries, on wage differentials and on industry structure, than do earlier growth theories.⁴⁷ More innovative economies grow faster than less innovative ones. This includes not only cases where an economy is driving innovation in a global sense – that is, by pushing out the boundaries of technology – but also where it is ‘catching up’ with global leaders, adopting successful ideas or products that already exist but have not yet been tried in the national economy.

However, it is crucial to recognise that innovation has negative as well as positive impacts in the economy. The invention of new products, processes and services displaces old ones, rendering skills, knowledge and capital equipment obsolete in old industries. Innovation raises productivity and growth, but it also creates winners and losers. In Schumpeter’s famous words, it is a force of ‘creative destruction’.

This is especially important in the case of landmark innovations, such as electricity or computers (sometimes called ‘general purpose technologies’), which emerge periodically and whose impacts typically reverberate for decades as economies undergo the major adjustments that come in their wake.

Conclusion

Transformations in the dominant world view do not happen just because of debates about new ideas. Such episodes are always highly political and involve the use of political power. New agendas always need money and an institutional home. But it remains the case that without a set of ideas that can explain the failure of rivals, and have a demonstrable truth at their core, political movements rarely have traction. Ideas still do matter.

Neo-liberalism was based fundamentally on the assumption that markets cannot be improved on, both because they are inherently stable and self-correcting, and because they offer the best achievable allocation of resources.

Keynesian economics challenged these notions, and made the case for government intervention to spark economies out of situations of high unemployment and insufficient demand.

However, neither of these two dominant 20th century schools of policy thought paid much attention to the underlying dynamics of growth in capitalist economies. Newer approaches, such as complexity and evolutionary

“A key step is to think about the most important role of government intervention as being not the stabilisation or correction of markets but support for innovation”

economics, do not see the economy as fundamentally in equilibrium, nor do they posit the central role of government to be helping to move the economy towards such equilibrium. Complexity economists have built models that are inherently unstable but which give a better fit with data from real markets, especially in areas like finance. Evolutionary economics takes a longer-term view of the volatility we see in capitalism,

locating its enormous wealth-creating ability in its inherent tendency towards technological and social innovation.

The latest financial crisis has shaken confidence in the neo-liberal paradigm more fundamentally than any event since the 1970s, and Keynesian policy has enjoyed a renaissance. But in thinking ahead to the new economic era, we believe that we must look beyond the debates of the last century. A key step in this is to start to think about the most important role for government intervention as being not the stabilisation or correction of markets *per se* but rather support for innovation, and particularly for innovation that serves social goals. The rest of this pamphlet develops this basic idea.

2. Innovation in the 20th and 21st centuries: An evolutionary perspective

Evolutionary economics argues that the constant transformation of products and services, and the invention of new ones, has been an integral part of capitalism throughout its history. This process – innovation – has unleashed huge advances in productivity, wealth and living standards, which arguably together constitute the positive legacy of capitalism. This chapter explores briefly how major innovations have driven these advances since 1900, and then looks at how this history of change has affected the UK economy in particular.⁴⁸

As in the evolution of species in the natural world, innovation has not proceeded evenly. Great upheavals, when entirely new ways of doing business erupt into capitalist economies, are interspersed with quieter periods of more incremental change (a pattern some have described as ‘punctuated equilibria’).⁴⁹

Breakthrough moments in system-wide innovation are not based on a single technology but on so-called ‘general purpose technologies’ (such as electricity or the computer) which can be applied to a very wide range of sectors, alongside subtle but crucial shifts in associated business practices. It is a complex confluence of macroeconomic, cultural, political and social conditions that allows these new technologies and business practices to coalesce into a new business model offering major productivity gains while both reshaping old markets and creating new ones. In evolutionary terms, a new ‘adaptation’ emerges which rapidly comes to dominate the ‘fitness landscape’, squeezing out older and less fit adaptations of the past.⁵⁰

Prior to the 20th century, there were three such radical transformations.⁵¹ The first was the Industrial Revolution of the late 18th century, which was centred on Britain and used a new understanding of mechanisation to create the first factories. The second was driven by the invention and spread of steam power, the railways and canals in the early to mid-19th century – this transformation began in Britain but came to have a significant impact on continental Europe and the United States. The third was centred in the United States and Germany as much as Britain and used the revolutionary technology of electricity and new methods of steel production to drive the creation of the heavy engineering industry.

The following section looks in closer detail at the two systemic innovations that occurred in the 20th

century and argues that we are now starting to see the emergence of the first major innovation of the 21st.

Transformative innovations since 1900

Mass production and consumer satisfaction

The first economy-wide innovation of the 20th century – with technological advances in machinery, and changes in factory organisation and product distribution – had its roots in a mass of incremental developments in the second half of the 19th century. Famously, these elements would be drawn together by Henry Ford, who delivered the first mass-produced car from his Detroit factory in 1913.

The great achievement of industrialists like Henry Ford and production experts like Frederick Taylor was to organise workers around new technologies of electricity and high-performance machinery in such a way that very large numbers of products could be produced more quickly and more cheaply.⁵²

These higher volumes and lower prices coincided with, and in some ways promoted, the emergence in the first half of the 20th century of a new middle class, who worked in the expanding state and service sectors and in the managerial bureaucracies which grew up around the new business of mass production. This burgeoning social group, keen to join in with the conspicuous consumption that had once been the preserve of the wealthy, was able to afford and willing to buy the new mass-produced goods.⁵³

However, it was after the Second World War that mass production really came into its own, utterly transforming capitalism. In combination with a complex confluence of factors – including collective bargaining, greater job security, more reliable and generous welfare, and easier access to affordable credit – the technologies of mass production created the most sustained and rapid period of growth, productivity and affluence in the history of industrial capitalism.⁵⁴

In the resulting consumer boom, the quantity of consumer durables sold rose dramatically: in 1955, just 18 per cent of households in the UK had a washing machine; by 1975, 70 per cent owned one. Television ownership soared from 19 to 96 per cent of households over the same period, and the presence of central heating systems rose from 5 per cent of homes to 47 per cent.⁵⁵ This post-war growth amounted to a doubling of purchasing power in a generation.⁵⁶

Flexible production and consumer choice

Despite the huge success of mass production and mass consumerism in driving up growth and wealth, it became increasingly clear during the 1960s that many of the markets which had been developed since the war were becoming far less easy to exploit. Selling someone a replacement or additional car or household convenience was always going to be more challenging than selling them their first.

However, driven partly by the need to seek out and create new markets and partly by technological breakthroughs, new production techniques were beginning to be implemented, opening up opportunities to exploit consumer demand for products providing not just convenience and entertainment but also to fulfil desires for novelty, fashion, self-validation and the projection of personal identity. While the original mass markets offered consumers satisfaction, the new markets offered both satisfaction and increasing choice.⁵⁷

The new technologies and techniques of production used during this period drew on breakthroughs in computer processing power and design. These not only brought greater productivity but also allowed producers to respond more rapidly and with greater variety to shifts and fragmentation in consumer demand. Moreover, while the old mass production factories relied on single-purpose machinery and low-skilled labour to churn out huge numbers of standard products over long periods, the new factories relied on multi-purpose machinery staffed by workers with more varied skills and flexible work patterns producing smaller runs.

The result was an explosion in the sheer number of product lines. The UK food industry introduced 1030 new products in 1970; this doubled to 2016 new introductions in 1980 and by a factor of nine to 9192 new introductions in 1990. By this time, the beverage market alone was seeing 2000 new products a year. In the early 1990s, over 20,000 new lines were being introduced into UK supermarkets every year.⁵⁸

Brands that had survived perfectly well with one or two varieties for decades now found they had to produce dozens of products to meet consumer demand and stay profitable. By the early 1990s, Crest and Colgate between them were producing 35 different types of toothpaste. Even a relatively new industry, such as the personal computer market, had 2000 available models even before mass ownership had taken off.⁵⁹

The new production and distribution techniques that made this possible were widely known as flexible specialisation,⁶⁰ and they broke with the focus and style of mass production. Broadly speaking, mass production achieved competitive advantage through

lower prices resulting from economies of scale, while flexible production achieved competitive advantage through the characteristics of the product and from 'economies of scope' (in which efficiencies are achieved by producing and distributing more than one product simultaneously).⁶¹

This new focus on consumer choice was a response not just to the stagnation of post-war mass markets but also to the new cultures which had developed amongst the advanced economies in the wake of the social revolution that began in the post-war period and grew into an international phenomenon during the 1960s. The old cultural and social emphasis on conventionality, collectivism and self-sacrifice that had strongly characterised the immediate post-war decades was increasingly replaced by a new emphasis on individuality, personal ambition, self-fulfilment and sensory pleasure.⁶² The notion that consumption was no longer simply about survival, convenience or entertainment but could also be a central feature of one's choices and values as an individual was also extended, shaped and exploited by the advertising and marketing industry.

This was not a shift, of course, that happened overnight but one which gradually grew in resonance with consumers and importance for producers during the 1970s and into the 1980s and 1990s. The relationship between new production techniques, increased consumer choice and the post-1960s social revolution was never simple or 'one-way', but rather it was complex and symbiotic.

Web technologies and 'prosumption'

More recently, it has become clear that production techniques and consumer expectations are being transformed once again. The rapid growth of web technologies since the mid-1990s has had a dual effect.

First, it has very significantly expanded consumer choice even further, by allowing access to products and services which may have been denied previously. A clear example of this is the way back catalogues in the music and publishing industries have become increasingly significant income generators, as customers have been given the ability to purchase older recordings and books with ease, without having to undertake laborious searches through specialist outlets.⁶³

Second, web technologies are giving rise to a new phenomenon: direct consumer participation in the production process. In some ways, this is the logical outcome of flexible production, which aimed to place the shifting needs and demands of the customer rather than the constraints of the production process at the heart of workplace operations. It may also be seen as an extension of the principle long-seen in large, complex projects like airports or power plants, in which the client plays a major role in specification and design of the final

Box 2: Defining presumption

'Prosumption' refers to the breaking down of the barriers between production and consumption, so that consumers can be directly and personally involved in the production of the goods they are purchasing.

1. Market research intensification: Prosumption, in perhaps its least radical manifestation, can take the form of web technologies being used by businesses to intensify and expand their market research relationship with customers. Proctor and Gamble, for example, have made wide use of their Vocalpoint initiative, which uses the web to engage customers in forums discussing beauty and household products.⁶⁴
2. Personal specification: Companies are increasingly making use of product customisation as a way of improving sales and profitability. Dell, for example, has grown very rapidly off the back of a business model which emphasises a 'built to order' approach. Sky has made efforts to introduce ever-greater capacity for customers to shape satellite and cable TV packages around their own viewing demands and, with the introduction of Sky Plus, has used digital technology to allow viewers to escape the constraints of television scheduling. Project Canvas is an initiative to introduce similar levels of personal specification for viewers of the UK's terrestrial channels which will launch in the near future. The internet is being increasingly used to intensify this process of customisation, allowing consumers to introduce ever-greater detail and personalisation into the process. Lego DesignbyMe, for example, allows customers to design and purchase their own Lego models, while Ordnance Survey now allows customers to order maps that cover the precise area in which they are interested rather than those based on the artificial territorial boundaries established by the designers of conventional OS maps.
3. Collaborative specification: A further development can be seen in the way consumers are involved in the collaborative design of products. This trend has been clear in the world of computer software design for a number of years. The 'open source' movement is famous for creating some important software packages by drawing on the expertise of thousands of designers and users, who provide their services for free over the web. This trend is now growing in other product areas. Threadless.com, for example, allows customers to submit t-shirt designs which, if they win enough votes from other customers, are then produced and sold. National Instruments, a company that produces measurement devices, undertakes half of its R&D work through an online community of customers. And Wikipedia, and the 'wiki' approach more generally, are entirely based on the notion of collaborative shaping of a product by users and customers.
4. Consumer into producer: Perhaps the most radical example of prosumption is the way new technology allows consumers to become producers. Mobile phone 'apps', for example – which now number into the tens of thousands – can be created by anyone with widely available computing equipment, the skills to use it and a good idea. The popular online game *Second Life* has created its own real-world economy, with players generating income for themselves by selling game features they have designed or developed to each other. One particularly notable development in this regard is the efforts currently being made to develop stereolithography for use in the home. This is a manufacturing technology widely used by designers to produce real items from a machine which uses the layering and manipulation of plastics to replicate an item designed on a computer screen. It is generally used to produce prototypes and models but can also be used to generate parts for other machines. If such technology could be adapted for use in the home, it would offer consumers enormous capacity to design and produce their own products. Although the development of such technology is in its earliest stages and it is, as yet, unclear how viable it will be, the potential for prosumption to take a leap into the world of commodity production is clear.
5. Open innovation: One further development must be mentioned. This is firms' growing use of a much wider base of expertise for R&D. Technically this is not always prosumption, because businesses often consult well beyond their customer base, especially in the realm of more technical issues. InnoCentive, for example, is a website that allows companies to offer cash rewards for anyone who can solve the R&D problems they face, many of which are highly technical with a specialist scientific aspect. However, the site has proven very popular and claims to have found solutions to a third of the R&D problems posted. Another example is given by Proctor and Gamble, which has for a decade now set itself the goal of sourcing half of its new ideas from outside the company.

Continued over

It is, of course, important to acknowledge that typologies of this sort are based on ideal types that aid understanding and analysis rather than entirely accurate reflections of real distinctions. Certainly there are many activities that could fall into two or more of these categories. For example, Research in Motion has combined consumer-into-producer processes with open innovation by holding an annual competition (with prizes totalling \$1.5 million) for the best app designs for its Blackberry platform.

product. But what the internet has allowed is a far more direct and precise engagement between the producer and ordinary individual consumers, so that the concept of 'prosumption' (see box 2) is gaining currency.⁶⁵

It is, of course, extremely difficult to predict how new production techniques and technologies will influence consumer behaviour. In particular, while the spread and influence of web technologies is undoubtedly a transformation of enormous significance that has far from run its course, it may transpire that prosumption as a concept fails entirely to describe consumer shifts over coming years. And other new emerging technologies, such as nano-technology and bio-technology, may also transform business practices. As a result, this section is somewhat speculative and will certainly require further detailed work to confirm its observations.

Nevertheless, we believe a focus on prosumption offers an important pointer to future trends that could be as significant as the historical shifts to consumer satisfaction in the era of mass production and to consumer choice in the era of flexible production.

Prosumption is a nascent but rapidly growing business transformation that has very clearly been driven by important technological developments. However, it is also a response to the growing complexity and speed of markets. The proliferation in product lines has made it increasingly more difficult for companies to make the right decisions in product development in the face of diverse and rapidly changing consumer demands. Breaking down the organisational barriers and time-lag between production and consumption is a highly effective way to make product decisions that are more immediately responsive to consumer demand.

With new generations of consumers increasingly comfortable both with high levels of product choice and with their own use of sophisticated web technologies, it is clear that the principles of novelty, self-validation and individuality – crucial to the shift towards consumer choice since the 1960s – are well served by companies that can deliver precisely tailored products which bear an individual stamp. Indeed, a shift towards prosumption can be seen as a response to the growing desire for 'authenticity' among a younger generation of consumers which is increasingly suspicious of the manipulation inherent in conventional advertising and marketing strategies.

What could be more authentic than an item produced by yourself and your peers?

Adjusting to transformational technologies

The major, economy-wide innovations of the 20th century have been of enormous significance, and the first of the 21st has the potential to be equally important. Each of these innovations, because of their capacity to so significantly increase the productivity of the firms that employed them, invoked a wave of creative destruction. But perhaps more importantly, by developing new types of products (in a symbiotic relationship with shifting consumer demands), they created whole new markets. As a result, the destructive aspect of these shifts occurred not simply because the firms which failed to employ the new techniques were less productive and therefore less competitive but also because their products rapidly became outdated and unwanted.

The profundity of these changes arose from the fact that, although destruction tends to occur more rapidly in some sectors since general innovations do tend to be sector specific in their earliest stages, these were not innovations that could be restricted to one sector or one market. These transformational technologies had much wider general applications and so, ultimately, came to have an impact upon every sector and market. The gains in productivity and opportunities to create and exploit new markets offered by a general innovation inevitably attract entrepreneurs and investors from outside the sector where the innovation originated, who may have to adapt processes to suit the specific circumstances of their market but often deliver similar outcomes to those delivered by the trailblazers.

For example, flexible production techniques had a particularly powerful influence on the automobile and textile industries in their earliest days, though their impacts were felt much more widely over time. Similarly, web technologies at present have their greatest impact on the media and creative sectors but seem unlikely to be 'contained' in that field, as some of the examples given above illustrate. This is why complacency in the face of a general innovation is nearly always the wrong strategy. Indeed, the result for firms, sectors and whole economies that fail to adapt in the face of a powerful general innovation can be extremely damaging.

So what should those seeking to adjust to transformations in general technologies be aware of? Perhaps most important is the fact that such transformations tend to divide old from new not just in terms of companies and markets but also in terms of national and regional economies. Specifically, they tend to favour emergent economies over established economies.

The creation of the mass market during the 20th century played a fundamental role in establishing the United States as the world's leading economy. The United States rapidly developed the most modern and productive economy during the first half of the century, as it eagerly adopted the mass production techniques and mass consumerism, which had themselves been developed by American entrepreneurs and experts. However, Germany, France and Italy took the opportunity – not often available to older economies – to restructure their shattered economies in line with mass production techniques after 1945. As a result, they soon became significant exporters of mass-produced goods and were often more dominant in key European markets than the United States. During the post-war period, these countries also managed to significantly, although not entirely, close the productivity gap between the US economy and their own.⁶⁶

However, with the shift to flexible production and the emphasis on consumer choice from the 1970s onwards, the position of America and Europe at the top of the global economy was challenged by the growing productivity and market share enjoyed by Asian economies, most notably Japan's. Japan was the instigator of flexible production techniques in the automobile and electronics sectors, radically expanding consumer choice in markets which had been at the heart of the mass production revolution and so, in the

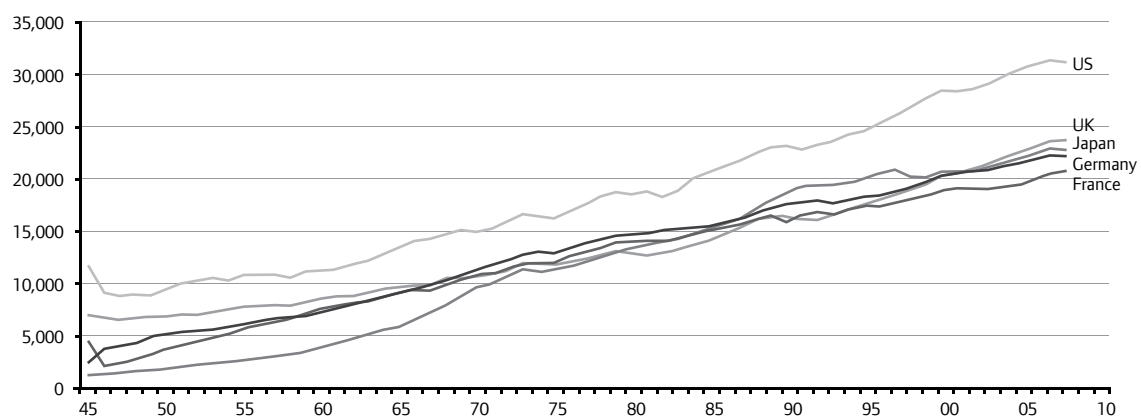
more established economies, had become particularly inflexible and sclerotic.⁶⁷

After a major industrial reorganisation that owed much to Japanese techniques and the application of information and communications technologies (or ICT), the United States did manage to seize back some of its market share and address its productivity lag, although it was never able to regain the global economic pre-eminence it once had.⁶⁸ Indeed, the United States' transformation from net exporter to net importer of goods over the last 30 years says much about the way the century's second wave of business transformation, aided by the globalisation of capital flows, came to reshape the world.

There is nothing mysterious about why business transformations should favour newer over older economies. A country which is only just beginning to build its business base, provided it has adequate capital, is better placed to invest in, develop and adopt the most modern techniques and equipment than those countries which have already invested money and other resources into established approaches and technology. The inertia of management, resistance to change among the workforce and outdated skills-base that inevitably exist in older economies also make it far more difficult for those economies to adopt new techniques, even when they become aware of their validity.

While history is important, however, strategy still matters. Emergent economies are in general more likely to benefit from business transformations than older economies, but this is not inevitably the case. For example, while the United States and other older economies were undoubtedly outperformed by Japan and its neighbours from the 1970s

Figure 2: Income per capita 1945–2008, selected countries



Source: <http://sites.google.com/site/econgeodata/maddison-data-on-population-gdp>

onwards, some managed to flourish in the wake of the flexible production revolution. Most notably, certain regions of Italy and Germany were able to grow very effectively by adopting flexible production methods in markets including textiles, ceramics and engineering.⁶⁹

This analysis begs some fundamental questions about our current period. In particular, to what extent will emergent economies in Asia and Latin America make web-driven techniques their own? And how can older economies take advantage of this current wave of transformation, rather than being sidelined by it? The first question is beyond the scope of this pamphlet, but we do address in later chapters how the oldest capitalist economy in the world – the United Kingdom – might develop a policy framework that allows it to benefit from this latest upheaval in the long history of general innovations. It is vital first, however, to understand how the UK responded to previous transformations, as this highlights many of the barriers that exist to its development of a full response to current circumstances, and what is at stake if such a response is not developed.

The UK's record on innovation

The historical record suggests that Britain has performed unevenly on adapting to the major system-wide innovations described above, with individual sectors tending to perform in very different ways. In the post-war period, this uneven response damaged the productivity and market share of some of the UK economy's most important sectors, a result which contributed to the country's serious economic problems in the 1970s and 1980s. It also contributed to the UK's rapid and uncontrolled shift to a service-based economy in the 1980s and 1990s, which resulted in the regional and sectoral imbalances that the current government has pledged to reverse.

This failure to respond fully was primarily caused by inertia and a lack of awareness of major innovative change on the part of business leaders, particularly during the 1940s and 1950s. This was compounded by the failure of policymakers to effectively challenge that inertia or to prioritise business innovation, at least until the 1960s, by which time overseas competitors were already well ahead of the UK in terms of productivity and market share. By the 1980s, while there was certainly more innovation in certain sectors, there remained an inconsistency among policymakers who preached the benefits of the free market and competition but refused to acknowledge that some of the most innovative sectors of the time survived with significant state support while others were allowed to die on the grounds that they could no longer compete in a global market without that very same support from the state.

Innovation and policy after the war

During the inter-war period, British policymakers and business people were well aware that the United States was making major leaps forward in productivity by adopting new manufacturing techniques. Indeed, debate about how British industry could learn from the United States was commonplace.⁷⁰ In particular, concerns were raised about the virtually monopolistic nature of much of British industry and how this militated against adoption of the most modern approaches. In practice, however, this debate led to no major attempts to modernise either by business or by government during this period.⁷¹

The effort required to shift to wartime production after 1939 exposed many of the severe inefficiencies in British industry, so by 1945 there was a determination on the part of the new Labour government to raise productivity by promoting understanding and adoption of American techniques.⁷² A series of efforts along these lines was made by Labour and continued by the Conservative administrations of the 1950s. These generally took the form of awareness-raising and management training exercises, often liberally funded by the United States itself.⁷³ For the Labour government, however, industrial modernisation was very much the poor cousin to its other major economic policy aims: to build a new welfare state and to ensure macroeconomic stability through planning and controls.

The focus of the Conservative governments of the 1950s was different but probably no more successful. While they were quicker to accept consumerist culture, which helped them understand better the unfolding shifts in consumer demand, they were also prey to a consistent feature of British economic policymaking: loud complaints from leading business figures that it was not for politicians to interfere in the markets, which they knew best. As a result, to achieve productivity and growth the Conservative governments placed greater emphasis on lifting regulatory burdens on business rather than on ensuring the modernisation of those businesses.⁷⁴

Sadly, it transpired that the policymakers were right to be deeply concerned about the decision-making of the UK's business leaders. Many businesses seemed to suffer from an apparent lack of awareness of what exactly was taking place in the United States and other European countries: there was no clear understanding of the fact that a new mass market was being created and that producers needed to adapt to this. Seen through UK eyes, it was as if US producers had simply hit on more effective technical solutions to recurrent production problems, and this meant that British industry tended to cherry-pick specific aspects of the mass production approach rather than attempting to understand it holistically.⁷⁵

In sector after key sector, the result was that British business continued with outdated practices throughout the 1940s and 1950s while competitors overseas transformed their approach to production. Steel, textiles, machine tools, electronics, cars and motorcycles were all sectors in which the UK had leading businesses during the inter-war years and even in the 1940s. But by the late 1940s and early 1950s, those same businesses were all being outperformed by US and European companies that had placed a premium on transformation and innovation for the new era.⁷⁶

German machine tool firms, for example, rapidly became world leaders (and key drivers of export-led growth in Germany) as they developed increasingly sophisticated, skill-intensive products that outstripped UK-produced tools, which had remained static in their design literally for decades. The UK had a proud reputation for producing high-quality, reliable motorcycles, but this counted for nothing as the industry was caught on the hop when, in the 1950s, Italian and Japanese companies invaded the market with mass produced, lightweight and cheap machines. And in the car industry, the UK's capacity for design innovation was strong (perhaps culminating in the production of the Mini in the 1960s) but, as a result of their single-minded focus on transforming and improving mass production techniques, European companies like Volkswagen and Renault were far ahead of UK companies in terms of productivity and capacity.⁷⁷

It is important to recognise that the failings of the British economy at this time were relative. As already noted, living standards in the UK rose very rapidly in the post-war period, as did productivity. The UK was far from devoid of innovation and successful businesses. Certain companies and sectors remained world leaders. In some cases, companies did 'Americanise' in the 1940s, and remained highly competitive. This was particularly the case in heavy engineering markets, such as agricultural vehicles, construction equipment and diesel engines.⁷⁸ Other sectors in which the UK continued to perform well – such as chemicals, pharmaceuticals and aerospace – were those that were least reliant on mass production and were much more heavily dependent on discovery and design.

By the late 1950s however, because some key sectors had failed to adapt, it had become undeniable that the British economy was lagging behind comparable economies in terms of productivity, growth and market share. This led to a seemingly intractable deterioration in the UK's balance of payments position, a matter of serious concern in an era of fixed exchange rates.⁷⁹

In addition, it was clear by this stage that business leaders and policymakers had seriously overestimated the role that Commonwealth markets could play in

sustaining British business. This approach had previously appeared superficially attractive, as British companies were already dominant in those countries. However, as it became clear that Commonwealth markets were not able to generate the profits required to survive, British companies had to look to other markets, particularly in Europe, where the more innovative and advanced companies of Germany and France had already seized a strong market position.

Towards Thatcherism...

As a result, there was a shift among policymakers during the 1960s towards a more interventionist approach designed to address some of the now clearly apparent weaknesses in British business. The Conservatives established the tripartite National Economic Development Council in 1962 to improve business practices; some years later, the Labour government established the Industrial Reconstruction Corporation, which was designed to direct public and private funds towards technically advanced businesses and to aid takeovers of inefficient businesses by efficient ones.⁸⁰

“The historical record suggests that Britain has performed unevenly on adapting to major system-wide innovations”

This new forcefulness on the part of policymakers was matched by a developing awareness amongst business leaders that they needed to play a very rapid game of catch-up, particularly if they were to survive Britain's possible entry into a European common market. As a result, many companies looked to mergers as a way to achieve economies of scale and drive modernisation efforts.⁸¹

The irony was that by this time the mass market transformation was beginning to run into the problems described above, and it would not be long before Japanese companies were initiating a second transformation built on flexible production and consumer choice. So while UK policymakers and business leaders were belatedly seeking out the benefits of scale and standardisation in the machine tool sector, Japanese companies were pioneering flexible, computer-controlled lathes. As UK textile firms convinced themselves that the time was now right to standardise, German and Italian firms were searching for ways to differentiate. And while British car companies were merging to form mass producers, Japan was developing the flexible Toyota approach.⁸²

Ultimately, Britain's somewhat chaotic post-war economic policy was topped off by the confusion of Edward Heath's government, which initially committed itself to radical free market policies as a

way to address the UK's increasingly grim problems but then, in 1972, famously made a u-turn with the nationalisation of British Leyland. Alongside the dramatic rises in oil prices driven by OPEC, this skippered Britain into the economic doldrums, characterised by stagflation, rising unemployment, industrial conflict, and periodic fiscal and monetary crises, which continued into the early 1980s.

The Thatcherite solution to this drew as much on the long tradition of business opposition to state interference as it did on neo-classical, monetarist and Austrian economics. Convinced that Britain's pent-up entrepreneurial spirit was being crushed by over-powerful unions and a domineering state, the post-1979 Conservative governments set about a programme of privatisation, deregulation and trade union legislation, and the dismantling of any vestige of tripartite planning.

...inconsistently applied

But, as they were in the post-war period, the Conservative policies were applied inconsistently and had an uneven effect. Following radical restructuring, some sectors did flourish in the consumer choice era, including telecommunications, finance, media and retail. For others, Thatcher's tough medicine was effectively a poison pill. Exposed to the rigours of the global economy with no support from the state, the mainstays of British industry – mining, steel, textiles, ceramics, and large sections of the engineering and manufacturing sectors – went into precipitous decline, accelerating markedly a trend that had begun more slowly in the 1960s.

There was a strong sense, regularly expressed by the 'New Right' at the time, that these sectors were no longer competitive and were best left to sink or swim in the harsh reality of the global marketplace. But, as the examples of Germany and Italy had shown, there was still considerable life for manufacturing in the older economies, given the right management vision, government support and a willingness to adapt to the new demands of flexible production and consumer choice.

As well as the sectors which swam and those which sank under Thatcherite economic policy, there is a third, often overlooked group. In this supposedly *laissez faire* period, some sectors adapted well to the new era but with significant state support and with a strong union presence.

The auto industry, for example, was revived by the Conservative government's deliberate use of an indirect subsidy to attract more-advanced Japanese motor companies to the UK. Other high growth sectors such as pharmaceuticals and aerospace, now widely cited as British success stories, were in effect heavily supported by the state. Government continued to act as a leading

customer for both sectors and often worked very closely with key companies on long-term planning and restructuring. In pharmaceuticals, prices could be kept artificially high for many decades, in order to fund R&D, because the government, in the form of the NHS, was the industry's major customer. During the 1980s, the aerospace industry received major state financial aid to support the development of the Airbus airliners, the A200 and the A300, both of which went on to be exceptionally successful products globally.⁸³

It should also be noted that even those sectors that did flourish following restructuring were never entirely free of state support, even if the relationships were more complex than was the case for pharmaceuticals and aerospace. The BBC, funded by the licence fee payer, remained an important driver of innovation and growth in the media sector. Finance, some have argued, has enjoyed significant tax advantages in the UK compared to other sectors. And telecommunications, as recent debates have revealed, has always relied on the willingness of the state to provide key infrastructure developments that individual businesses are unable to provide themselves.

Until 2008, Labour governments did not make any significant break with this approach. Labour in power certainly did place a more direct emphasis on driving innovation itself, arguing that the UK had to embrace the 'knowledge economy'. But the fundamental belief, or at least the rhetoric, remained strong: the main driver of innovation was competition and the state's role was to improve supply-side measures only. For example, the 1998 Competitiveness white paper restricted government action to investing in technological skills and capabilities, encouraging business collaboration and opening-up and 'modernising' markets.

However, a departure from this approach did come after the 2008 crash when the New Industry, New Jobs agenda briefly revived the idea of identifying and offering proactive financial and regulatory support to key growth sectors and taking active measures to improve R&D and business investment. Since the 2010 election, the new government has implied that it will break with this approach although, at the time of writing, its interest in some form of green investment bank and proactive support for green industries seems to have survived any such about-face.

Despite the recent policy shifts, inconsistency over the longer-term and an unwillingness to acknowledge the reality of how certain sectors have been helped has contributed to the unbalanced economy widely cited as a key cause of the current economic crisis. While some of the UK's older sectors did survive the post-1979 consensus with the state help mentioned above, others were left to shrink dramatically or to disappear

altogether. Those sectors, most notably retail, which were able to adopt flexibility and emphasise consumer choice precisely because they were expanding in the wake of the post-war mass market, thrived without support.

Equally importantly, investors moved in line with the shifting sectoral fortunes, with investment finance retreating from UK manufacturing and finding a new focus in the service, IT and property sectors and in finance itself. The result was an ever-greater reliance on debt-financed imports and the expanding financial services that maintained them. The fundamentally unsustainable nature of such an economy, and indeed why and how it had originated, went undebated as the 10 years to 2008 saw consistent growth and stability. Unfortunately, this golden age now appears to have been a case of the UK benefitting from the medium term fruits of benevolent global economic conditions without seeing to the fundamental underpinning of highly innovative companies spread across a range of sectors.

Lessons from history

What this brief history reveals is that the UK has never had a consistent or sustained proactive industrial policy focused on encouraging business innovation. Instead, the UK policy and business community has tended to respond slowly and inadequately to major business transformations. For much of the post-war

period, the focus was on macroeconomic planning and welfare rather than on business innovation. In the 1980s, the focus was on an inconsistent application of free market principles (influenced as much by classical liberal political philosophy as economics) rather than on identifying the conditions that might create a revolution in innovation.

“Even those sectors that did flourish following restructuring were never entirely free of state support”

As a result, the UK spent much of the 1970s without a resilient, productive and innovative business base fit to survive the hurricane of an increasingly competitive and volatile global economy. By the 1990s, certain sectors had undoubtedly been transformed and were adapting well to an era of flexible production and consumer choice, but other sectors simply disappeared, ultimately creating an economy over-reliant on finance, property, imports and debt. This was a model which proved its own lack of sustainability in striking fashion in 2008.

It is clearly vital that policymakers and business leaders learn the lessons of the mistakes which led to both the crises of the 1970s and the 2008 crash. The next chapter draws on this troubled economic history and on the heterodox economics detailed in chapter 1 to explain what these lessons might be and how they might be applied.

3. Developing an economic policy for the 21st century

The UK's history of innovation and growth outlined in chapter 2 shows how the UK's potential has been limited by the lack of focus on innovation. This chapter begins to explore what an economic policy with innovation at its core might look like. In this pamphlet we present only a broad outline and identify some underlying principles, rather than offering detailed prescriptions.

We argue that the insights of evolutionary economics and the lessons of the UK's recent history suggest that economic policy should be *innovation-centred*, *pragmatic* and *aware*. Each of these principles is explained in turn.

Innovation-centred

Chapter 1 argued that innovation is the fundamental driver of wealth, growth and living standards in a capitalist society. This provides a powerful rationale for economic policy placing an emphasis, at the very least, on encouraging and supporting innovation and business transformation. However, as we have seen, an explicit focus on innovation has either been largely absent from UK economic policy or has been relegated to a second-order concern.

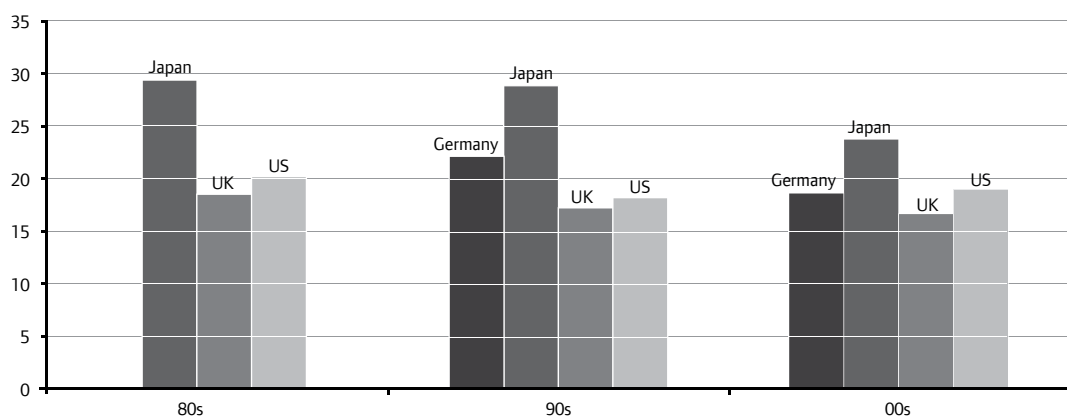
In particular, an emphasis on innovation raises awkward questions about the tendency of economic policy to focus primarily on the control of macroeconomic conditions. It is undeniably true

that benevolent macroeconomic conditions will help businesses and innovation flourish, while instability and uncertainty will not. Counter-cyclical policy measures may be important in countries with weak financial sectors that are unable to maintain the credit flows necessary to support business innovation during deep recessions. But fiscal and monetary policy yielding macroeconomic stability by itself in no way guarantees an innovative and high-growth economy – it may be necessary but it is not sufficient.⁸⁴ At the same time, an open economy without innovation in an evolving world cannot sustain macroeconomic stability.⁸⁵

Our argument is that, whatever the macroeconomic framework adopted, it will ultimately fail unless it is underpinned by a robust policy for innovation across many sectors of the economy.

There are many ideas in circulation about what such a policy for innovation might include (some are discussed below) but one policy pillar must be the direction of investment towards innovative business activity. It is a long-term problem of the British economy that the rate of business investment has run behind that in other major advanced economies. It is also true that a large proportion of the investment that does occur has tended to be directed elsewhere, most notably towards a narrow range of sectors – particularly the property and financial markets – over the last 20 years.

Figure 3: Investment rates, selected countries



Source: OECD

To ensure that higher levels of business investment go into innovative activities, policymakers must understand some of the barriers preventing that from happening at present.

Innovation and market structure

One of the most fundamental problems for investors is that major business innovation is often expensive and risky, and only delivers returns over a long period. When innovation is successful, it can be immensely rewarding. The billionaires of the information age, like Bill Gates of Microsoft and Larry Page and Sergey Brin of Google, are today's successors to innovators of the previous technological wave, such as Carnegie (in steel), Rockefeller (in oil) and Ford (in automobiles). Even on a smaller scale, it is innovation that drives the profitability of most companies. However, developing and offering new products, processes and services is always a risky process. It often involves a large upfront investment. In the US pharmaceutical industry, for example, companies typically spend between \$800 million and \$1 billion on a new drug, and scientists might have to trawl through 5000–10,000 new chemical compounds to identify 10 that are suitable for eventual use.⁸⁶ Moreover, by the very nature of innovation, some new ventures fail completely, either for technical or commercial reasons.

When a new product or service is successful, others will want to copy it immediately. One problem for innovators is pirating.⁸⁷ The protection of intellectual property is supposed to prevent this from happening, but enforcement is costly and sometimes impossible (increasingly so for some industries, which is one factor driving the move towards open innovation). However, the wider issue is the completely legal copying of good ideas in ways that do not infringe patent, copyright or other forms of intellectual property protection. One recent example is the way in which mobile phone producers rapidly produced their own version of Apple's iPhone.

These risks lead a complex relationship between competition, monopoly and innovation. Joseph Schumpeter argued that companies that enjoyed a monopoly in a particular product or service were incentivised to innovate because they would not be imitated by rivals. The logic was that unless companies could earn unusually high profits from a new invention (so-called monopoly rent) then they wouldn't bother putting the effort into innovation.⁸⁸ Monopolists are also typically large firms with lots of resources to put into innovation, and there is evidence from the UK that companies with a monopoly do spend more on R&D.⁸⁹ The policy implication is that too much competition can suppress innovation, and therefore competition policy should not be too strongly applied.

On the other hand, Schumpeter also saw that if monopolists were too well protected from new entrants

into their markets then they could sit back and relax – the threat of entry was also an important part of the spur to innovate. The ultimate implication of this idea is that companies in a competitive market will have a greater incentive to innovate, to try to get ahead of their competitors.⁹⁰ So, more competition should drive more innovation.

In practice, there seems to be evidence that both views are partially correct. Either too much monopoly or too much competition can suppress innovation. The most sophisticated study of UK firms shows an 'inverted-U' relationship – most innovation happens when there is enough competition that firms feel they have to undertake R&D to develop new products and services that will put them ahead of other firms, but not so much competition that their innovations become obsolete almost immediately.⁹¹ Innovation, it seems, flourishes in 'goldilocks' conditions, where the balance between monopoly and competition, between risk and rewards, is just right.

This is a particularly important conclusion for policy because, left to itself, the dynamic of innovation can actually run itself into the ground. Unlike the perfectly competitive markets of neo-liberal imaginings, real-world markets where innovation is important tend to drift over time towards dominance by a few large firms, or even a single monopolist, which try to close down competition and deter innovation.⁹² Competition – and, in particular, ensuring that new companies are able to enter markets – at the right level is vital to spur innovation, and the state has a core role in ensuring that level is maintained.

Micro-policy for innovation

There are other well-recognised barriers to innovation that also require some degree of state intervention. First, innovation may fail to occur because it often brings wider benefits to the economy and society that exceed the returns it generates for the company concerned.⁹³ Indeed, in some cases, these 'spillover' effects can be very substantial and very broad.

The ramifications of transformational general purpose technologies (such as electricity, for example, or the personal computer) played out over decades (as discussed in chapter 2) on a scale that could not have been foreseen by the companies that originally produced those innovations. And even where technologies are less groundbreaking, the social returns remain high, with studies of US data suggesting that the social return on R&D tends to be between two and three-and-a-half times higher than the private return.⁹⁴ However, because firms can never capture all of these wider benefits in the profits they earn from their innovations, they tend to under-invest in innovation, relative to what would be best for society and the economy as a whole. In the jargon,

there is a market failure because the spillovers from innovation are a positive externality.

Beyond this, investment in innovation may be too low because of high information and coordination costs. Innovation often requires collaboration between companies or between business and universities, but coordinating networks and consortia incurs a cost. It may not be worth it for any one company to meet this cost, meaning that the collaboration never happens (especially if it involves a lot of small firms). Keeping on top of all the information regarding a particular sphere of innovation is also costly. As a result, firms may be unaware of a potential research partner or complementary technology, or may not fully understand it, which can mean that a potentially profitable and useful innovation is never developed.

This analysis of market failures and transactions costs in innovation, which is now fairly well established, highlights a clear role for public policy in fostering innovation. Government cannot ensure that companies profit from the wider social benefits of innovation, but it can reduce the costs and risks involved.

The barriers suggest there is a requirement for policies such as public support to R&D (including tax credits), but also measures to help companies move innovations through the so-called 'valley of death' between demonstration and commercialisation, such as creating lead markets through price support, mandatory standards and procurement. It also means taking actions to reduce coordination and information costs, such as supporting or funding the formation of innovation clusters, information programmes, consortia with universities, and so on.

It can also mean intervention in the form of finance. Precisely because innovation is risky and often involves specialist technological knowledge, banks are unwilling to lend for purposes of innovative investment. Venture capital, often provided by individuals willing to take on a high level of risk, has developed as an alternative source of financing. However, dedicated state banks, often with good knowledge of an industry or region, have also been important. Those economies which have a better record on business transformation, during the eras of mass production and flexible production, have usually established some form of state investment facility with a clear remit to invest in business innovation over a long-term timeframe. Most famously, West Germany capitalised the KfW Bank with Marshall Aid in 1948 and it remains a cornerstone of Germany's high innovation, export-led economy to this day.

Pragmatic

Both the theory of innovation and historical experience in the UK and elsewhere show very clearly that an

ideological approach that rejects or unquestioningly embraces a role for the state in encouraging innovation is likely to fail. Instead of ideology, we need a pragmatic approach that emphasises, first, a *flexible approach* and, second, the importance of *learning*.

At times, the long post-war debate about the role of the state in the economy has been highly ideological, which has probably served to make solving the UK's deficiencies in innovation, including uneven sectoral modernisation, more rather than less difficult. As the experience of post-1979 policy has clearly revealed, the truth is that different sectors require different policy frameworks in order to adapt to different business transformations. The important task for policymakers is to identify which sectors require which policy framework, not to allow themselves to be led by a pro- or anti-state rhetoric.

The beginnings of such an approach can be seen in recent work conducted by Jaana Reemes at the McKinsey Global Institute.⁹⁵ Using an international comparisons approach, this work concludes that different sectors do indeed require different relationships to the state and to the market. No 'one size fits all' approach has ever worked. For example, certain domestic sectors (such as retail and hospitality) may well thrive and innovate in a free market environment. By contrast, while they require competition to progress, R&D-intensive, globally traded sectors (such as pharmaceuticals and electronics) also require the state to play a crucial role in maintaining the skills base and stimulating domestic demand. Infrastructure, meanwhile, often requires a much more direct relationship with the state, as a key investor in and director of the sector.

At the same time, a pragmatic approach also accepts that policy for innovation is never simple or straightforward, and that policymakers will have to adopt a reflexive style that allows them to openly reassess and calibrate policy as necessary.

In the neo-classical paradigm described in chapter 1, identical rational actors with fixed preferences are assumed to respond to system-wide variables such as prices, taxes and regulations in predictable ways. This way of understanding the economy unsurprisingly leads to the conclusion that policymakers can control economic outcomes fairly directly, making changes that work like levers (a key word in the policymaker's vernacular) acting mechanically on the economy. For example, an increase in taxes reduces demand by a predictable average amount, with some random variation.

In some limited areas of a real economy – in some simple and well-established markets – this may work. However, the evidence is that in macroeconomic

policy, in financial markets, and above all in innovative parts of the economy where neither costs nor preferences are fixed, the ‘lever’ metaphor for policy fails. Unlike neo-classical economics, complexity economics emphasises the ways in which direct, simple interactions between individuals can produce complex outcomes that defy short-term prediction. Large policy interventions may fail to have the desired impact, while smaller interventions may have significant but unpredictable effects.⁹⁶

This suggests that policymakers must become more like entrepreneurs themselves. Some evolutionary economists characterise what entrepreneurs do as ‘deductive tinkering’ – experimenting with a product or service, getting feedback from actual or potential customers, adapting their offer and trying it out again, until they get it right (or abandon it).⁹⁷ Similarly, in most contexts policymakers cannot expect to design a policy intervention that will have a precise and predictable effect first time out. They need to discover the underlying dynamics of the economy, partly from economic actors but also by trying out policy regimes, evaluating and learning, and then adapting them.⁹⁸

On this view, the economy is very definitely not like a machine; rather, it is much more like a living organism. Maybe we should understand the economic policymaker less as the skilled operator of a complex mechanism and more as an inexperienced gardener constantly learning through tentative trial and error, constantly having to modify their actions in response to the unpredictable behaviour of nature.

This idea that a central agent, such as a government, cannot exercise predictable control over the economy is reminiscent of Friedrich von Hayek’s view that a centrally planned economy cannot manage information in the same way as a decentralised market economy, and that the latter is always superior. However, the impossibility of running a centrally planned economy does not logically imply the impossibility of a government intervening successfully in a market economy.⁹⁹ The complexity of the economy does not mean that there is no role for public policy, and that we should simply leave the economy (and society) to its evolutionary ebb and flow. Rather, it means that we should think about economic policy in a different way. As Paul Ormerod puts it:

‘Despite the difficulties involved in managing a complex world, governments still have an important role to play. They should do very much less in terms of detailed, short-term intervention. And they should spend much more time thinking about the overall framework of whatever particular problem is at issue. For it is here that governments have the potential to achieve a great deal. Less can be more.’¹⁰⁰

This approach implies that what matters in policymaking is to learn about the underlying dynamics and to establish the right broad policy regime or institutions to shape those dynamics, rather than to try to micro-manage particular outcomes.¹⁰¹

“This analysis highlights a clear role for public policy: government cannot ensure that companies profit from the wider social benefits of innovation, but it can reduce the costs and risks involved”

What this implies for innovation policy is that the best strategy may be to establish, through ‘deductive tinkering’, a regime that encourages and supports innovation. This will require a shared process of learning by all the actors in the public and private sectors about the evolving nature of opportunities for innovation. Some countries have become quite good at this, and the development of such sets of policies and institutions have come to define the ‘national innovation systems’ many governments now strive to establish.

Aware

History tells us that to be effective policymakers should develop a high level of awareness about relevant innovations globally: how they are developing and how they will affect the UK, its competitors, specific sectors and companies. This does not just mean focusing on narrow technological developments, but also looking at the broader economic, social and cultural context which will be crucial in enabling the successful exploitation of any systemic innovation. The mass market was unimaginable without affluent, committed workers and secure, house-proud consumers. Flexible production and consumer choice could not have occurred without skilled, flexible workforces and confident consumers keen to project their individuality and identity. If policymakers can gain an understanding of the developments taking place in technologies and culture, they are better placed to be able to put in place appropriate responses to those developments.

Awareness also implies timeliness. As explained above, one of the UK’s greatest errors in the post-war period was that policymakers and much of the business community seemed unaware of the scale of the system-wide innovation that was occurring in the United States and elsewhere in Europe until it was too late. It is vital to not repeat this mistake.

The periods immediately prior to major business transformations have generally been characterised by crisis. The rise of the mass market was ushered in

by the Wall Street crash, the Great Depression and then war. Out of the stagnation of the 1970s, flexible production and consumer choice was born. Now, the crash of 2008 and ensuing global recession appear to be opening up opportunities for the spread of web technologies and new forms of consumer behaviour. Now is the time for UK business and policymakers to respond if our economy's less-than-happy record in this area is to become a matter solely for historical reflection. Waiting, as the UK did in the past, to take steps to adapt to major business transformations once they are already very well established in other parts of the world will have negative consequences in the long term.

“In practice, this means government must examine unfolding business transformations and explore how different sectors might adopt and benefit from shifts in production, distribution and consumption”

One frequent objection to the role for policymakers in guiding business decisions arises from Hayek's view of the economy. Hayek argued that knowledge is distributed within the economy, and that there is no reason to believe that a central authority is better able to recognise the right investment strategy than anyone else is. Indeed, in highly specialised markets and technologies, companies usually know better than the government which strategy is the right one. This may be true, but governments are still crucially different from companies, having a different role

and a different set of incentives. While companies will usually be keenly focused on the particular set of technologies or markets on which their bottom line depends, governments by their nature are better placed to take the wider view. They can and should be thinking about the state of transformative innovation, opportunities to catch up, and opportunities to push out the frontier.

In practice, this means government must examine the nature of currently unfolding business transformations, as web technologies become ever more significant, and explore how different sectors in the UK might adopt and benefit from the consequent shifts in production, distribution and consumption habits. It will also mean establishing the right institutional and policy framework to aid those sectors which must transform to survive as this wave of innovation sweeps ever deeper into the British and global economies. Such a framework cannot be predetermined or driven by ideological nostrums but requires pragmatism and sensitivity to different sectoral needs.

This chapter has outlined an approach to policy that draws upon the economic analysis detailed in chapter 1 and the historical analysis provided in chapter 2. It places innovation at the heart of economic policy as the key driver of resilient growth, but argues that a highly pragmatic and responsive approach is required to guarantee that innovation. We believe that such an approach reflects the lessons of recent history and of heterodox economics to point towards a judicious use of state investment and careful and pragmatic policy design as the best route to economic growth and stability.

4. Progressive principles for an innovative economy

The global financial crisis has both created a need and opened up an opportunity for thinking afresh about what ideas should guide economic policy over the next generation. In this pamphlet, we have argued that that new thinking should be based on the process of innovation which lies at the heart of modern capitalism, driving growth and the creation of wealth. In the previous chapter, we explored some principles for improving the UK's capacity for innovation. This capacity will be increasingly important not only because the entry of China into the global economy has accelerated technical change, but also because the world may be on the verge of another major shift in the organisation of production and consumption.

However, this view of the economy also throws up some significant challenges to the progressive perspective. It implies that the process of creative destruction has enormous potential to create wealth and higher living standards for all, but also that capitalist economies are inherently unstable. It implies that there will be winners and losers, and that a tendency towards inequality is a constant feature of the system. And it throws up the question of how an ever-growing and evolving economy can be made consistent with ecological limits.

Each of these dilemmas can be seen in the character of the financial crisis itself. First, there is a certain irony in what the crisis has revealed about certain economic ideas. As discussed in chapter 1, the crisis showed that financial markets, contrary to neo-liberal claims, were clearly not efficient, either in terms of processing information or in allocating capital. However, the proliferation of inventive and sophisticated derivatives and credit default swaps did show that they were intensely innovative. It was precisely this inventiveness that enabled the financing of new and risky business models in the early development of information technologies and internet start-ups.¹⁰² But, since the start of the century, financial innovation has become increasingly dysfunctional and destabilising, not only for financial markets themselves but for the real economy and wider society as well.

The benefits of this innovation were also extremely unequally distributed, with unprecedented bonuses in banking hugely inflating the incomes of the top few percentile of the population and recreating levels of inequality in the United States, Canada and the

UK not seen since the 1920s.¹⁰³ Moreover, the debt-fuelled consumption boom of the 2000s was not only economically unsustainable but ecologically disastrous too.¹⁰⁴ Just as the rate of growth in carbon dioxide emissions should have been slowing to avoid dangerous climate change, it started to accelerate.

Innovation and progressive values

This example raises the question of what innovation in a capitalist economy is – or should be – for. In evolutionary theory, species thrive or decline according to how well they fit their environment. Over time, 'fitness' is determined by changes within a species (genetic mutations) and by changes in the natural environment. Such changes can be driven by the relationship between species but also by external shocks, such as when volcanoes erupt or the climate shifts, and these shocks can be abrupt.

In an evolving economy, individuals or businesses also face a changing environment to which they must respond in order to flourish, and innovation is the central form of response. The success or otherwise of these innovations is determined by their 'fitness' in a changing social and economic environment. This environment in turn is determined by a complex mix of changing markets and external shocks, institutions, social movements and even fashions – but, crucially, it can also be shaped by policy.

Thus, while we argue that a progressive approach to the economy should focus primarily on innovation as a means to the wealth on which rising living standards depend, that approach should also seek to shape the context within which innovation takes place, ensuring that it serves socially productive as well as economically productive ends.

As discussed in chapter 3 above, innovation in capitalist economies is always driven by the balance between risk and reward, in the shape of profit. Sometimes this coincides with socially useful ends – for example, a demand for new drugs that an innovative pharmaceutical industry can provide or, as happened in the early 1970s, when high energy and mineral prices drove a wave of innovations in extraction methods, substitution of materials and energy efficiency technologies.

But this is not always the case. The most important case today is that of climate change: when markets do not by themselves attribute a value to reducing carbon emissions, the question of how innovation can be harnessed to solve the climate problem becomes a central economic problem¹⁰⁵ Another global need for innovation lies in dealing with the consequences of an ageing population (although markets appear to be playing a somewhat more successful role in driving the ‘right’ kind of innovation here).

However, our approach implies that policy can and should shape not only the *goals* of innovation but also the innovation *process* itself. Over the last generation, innovation has been concentrated in a few sectors, and a disproportionate share of the rewards have been captured by a small minority. Meanwhile the inevitable costs and disruption of creative destruction have often fallen on those least able to manage. We believe that there is a role for policy both in widening participation in innovation and broadening the group who gain its rewards, and in better protecting those who do lose out, without disrupting the innovative process itself.

Innovation and climate change

Innovation in capitalist market economies has been a major cause of anthropogenic climate change. From the invention of the steam engine onwards, innovation in mechanisation and electrification has meant a huge increase in the use of energy by the economy. At the same time, innovation has contributed to a countervailing development, by continually reducing the carbon and energy intensity of each unit of GDP: innovation has facilitated the move in fuels from wood to coal to gas, each with lower carbon content than the last, and now to renewable energy sources. However, historically, energy use has increased more rapidly than we can decarbonise it. The challenge now is to accelerate the innovation of low-carbon energy and energy efficiency radically, in order to slash absolute emissions.

Some argue that this is not possible, precisely because it has not been achieved to date, and instead advocate the end of economic growth.¹⁰⁶ As we have argued in chapters 1 and 2, evolution and growth are inherent in capitalism, so a no-growth economy could not be a capitalist economy. While proponents of no-growth accept (and indeed welcome) this implication, it is not clear what economic system would take capitalism’s place, nor how the transition would be achieved politically. Moreover, even if the world economy stopped growing altogether, a period of radical decarbonisation would still be required in order to stabilise the climate. Without innovation, decarbonisation will be far more difficult and expensive.

However, the no-growth school is correct to point to the fact that the kind of transformative innovation

required for decarbonisation has not happened so far,¹⁰⁷ and it is very unlikely that markets alone will deliver it. The pressure of higher energy prices may help to drive a certain amount of change, but the climate change problem is too urgent to rely on this approach.

The failure of innovation to bring about absolute decarbonisation so far does not mean that it will not be able to do so given sufficient acceleration and direction by policy. There are many examples of so-called ‘induced technical change’ – both positive and negative. One such episode took place during the Second World War, which saw the development of radar, sonar and synthetic rubber, huge advances in the aerodynamics of aircraft, the invention of the atomic bomb, and a massive scaling-up in the use of medicines such as penicillin. Other episodes include the massive social and institutional innovations that constituted the invention of the welfare state, and the space race.

In tackling the decarbonisation challenge, we are also helped by the information technology revolution. This has the potential (and increasingly the actual ability) to bring about very large improvements in energy efficiency, as well as smarter infrastructure better able to accommodate renewable energy. We also need to hasten the onset of the next wave of general purpose technologies, which will probably comprise biotechnology and nanotechnology, both of which are only possible because of IT. These developments have the potential to significantly increase the productivity of renewable energy and to facilitate energy storage.

It is also important to realise that low-carbon innovation is still in its infancy. Governments globally have done relatively little to support such innovation (the current UK government has cut its support for R&D from an already-low level). So much attention has gone into carbon pricing that not enough has been directed towards the specific measures needed to invent and develop new technologies.

There are plenty of sensible suggestions for strategies to accelerate low-carbon innovation, and these are generally similar to the policy packages discussed in chapter 3: support to R&D and for partnerships between innovative companies and universities; creating niche markets through procurement, subsidy or regulation; helping to finance early market deployment; and facilitating networks and clusters of innovative firms.¹⁰⁸

However, what is novel about the climate problem is that we face the need for a long, sustained and energetic policy commitment to driving a particular kind of innovation. We will probably need induced technical change for several decades to develop and deploy new technologies and adjust our institutions accordingly. These changes are arguably unprecedented in modern capitalism – in the language of evolutionary economics,

they represent collectively a massive change in the fitness landscape that needs to be accomplished in a relatively short time, alongside an acceleration in the background pace of innovation.

Innovation, inequality and poverty

Innovation raises productivity and cuts costs: it makes goods and services better and cheaper. These changes benefit everyone, and in particular tend to open up access to what are originally luxuries, making them much more widely available. Common examples include cars, air travel and mobile phones.

However, in a capitalist market economy innovation is also necessarily a disruptive process, and will always involve winners and losers, for three reasons.

The first is that, as indicated by Joseph Schumpeter's characterisation of innovation as 'creative destruction', the successful development of a new product or service typically destroys the value of existing alternatives, which become obsolete.¹⁰⁹ Workers and shareholders of companies making the now-obsolete products or services will lose out, while those working for or holding shares in the innovative company will do well.

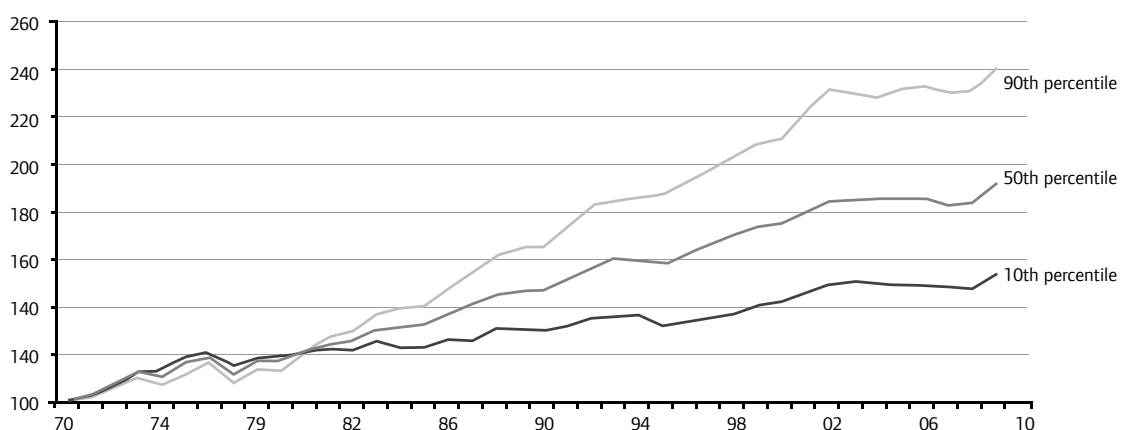
The development of information technologies in the 1970s, and their increasing application from the 1980s onwards, has been the main driver of this kind of change in developed countries. Many jobs were created by the advent of IT, but at the same time many were destroyed. In the UK, officially measured unemployment surged from under 600,000 in 1975 to almost 2 million by 1983. The numbers thrown out of work were even higher than this, because so many manual workers aged in their 50s and 60s went on long-term sickness benefits – a 'lost generation' who never worked again

and did not appear on official unemployment statistics. Some of the rise in unemployment was the result of fiscal and monetary contraction under the first Thatcher government, but the rapid deindustrialisation of the 1980s was fundamentally caused by a long overdue release of pent-up potential for technological change that had been resisted in the 1970s. The effects of technical change on manufacturing employment in the UK have reverberated since. In 1978, around a quarter of the workforce was employed in manufacturing – by 2009, that proportion had declined to around 8 per cent, even though the value of production almost doubled over the same period.

The losers are usually thought of as 'unskilled' workers. But more specifically, those who have lost out are people carrying out routine tasks that can be handled by computers or robots, including not only manual workers on assembly lines but also medium skill level workers, such as typists and clerks in the 1980s and 1990s and now, for example, supermarket checkout workers. By contrast, non-routine manual workers (for example in construction) have not been so badly affected.¹¹⁰ One result is an increasing polarisation of the labour market, in which the middle is squeezed.

A second effect of innovation, and particularly the IT revolution, has been a relative rise in wages for skilled non-routine workers, for whom IT radically raises productivity (once they have mastered the relevant software skills). While through the 1960s and early 1970s earnings at all levels of the UK economy grew together, from the late 1970s they diverged sharply, as demand fell for routine manual work and rose for those who could turn the new technology to skilled tasks (see figure 4.1 below).¹¹¹ Strikingly, the rise in relative earnings for university graduates increased in the United States and UK through the

Figure 4: Indexed male fulltime real hourly earnings by percentile



Source: New Earnings Survey and Annual Survey on Hours and Earnings (Office of National Statistics)

1980s and 1990s even while their numbers expanded considerably.¹¹²

In summary, according to Paul Krugman writing in 1994:

*'[T]he growth of earnings inequality in the United States – and quite possibly therefore much of the rise in structural unemployment in Europe – has been the result of technological change that... works against unskilled workers.'*¹¹³

A common view, especially in the United States, is that both the loss of manufacturing jobs and the relative erosion of unskilled wages are due to direct competition from low-cost Chinese imports into established markets. It is true that a 'reserve army' of hundreds of millions of Chinese workers has entered the global labour force, keeping real wages low and allowing huge cost reductions in everything from garments to electronics. In fact, before the mid-1990s, the evidence is that the direct impact of Chinese exports on jobs and wages was small, as the quote from Krugman above implies. Since then, and especially since China joined the World Trade Organisation in 2001 and trade barriers came down, Chinese exports have grown significantly and this direct effect may have become more important.¹¹⁴

However, recent research suggests that direct wage competition from China is still limited in comparison with the *indirect* effects of China's rise on European workers through technological innovation.¹¹⁵ Such 'trade-induced technical change' happens when firms based in developed economies respond to, say, Chinese competition by increasing productivity through adopting new technology but in the process shedding jobs.

A third distorting effect of innovation is that, because it continually pulls up the median incomes of those in work, it continually widens the gap with those not in work, including pensioners and many lone parents. This has important implications for policies aimed at poverty defined in relative terms, such as the child poverty target to which New Labour was committed. Meeting such targets through redistribution from taxes was always going to be difficult because government was attempting to swim against this tide. Thus the proportion of households with incomes below 40 per cent of the median actually increased from 1997 to 2008, despite the implementation of redistributive policies.

The fact that innovation creates inequality in these ways poses a major dilemma for progressive policymakers. It means that it is quite possible for an economy to be highly innovative but also highly unequal – the prime example being the United States. But what should we do if we do not want simply to adopt the US model wholesale? On one hand, if the benefits from innovation in terms of new employment and higher earnings accrue

to some while others lose out, then a simple *laissez faire* approach is unfair and indeed costly. On the other hand, if innovation underpins growth and wealth generation, then governments should not stand in its way and risk impeding change by, for example, bailing out failing companies.¹¹⁶

During the 1970s, the left did indeed try to oppose technical change in many industries. New Labour, by contrast, accepted the role of innovation in the economy, and tried to bring along those excluded from the process by way of redistribution via the tax and benefits system. As already noted, this approach will always struggle in the face of rising economic productivity.

An alternative progressive approach would instead give a central place to two other governmental roles: first, to spread the benefits of innovation more widely and maximise participation in innovation; and second, to more actively help workers in obsolescent companies find good jobs in new companies and new sectors. These approaches would be complementary to a strategy for innovation itself that, rather than trying to suppress the process, tried to nurture it, as described in chapter 3.

Spreading the benefits from and participation in innovation

Spreading the benefits from innovation more widely may involve a range of policies by, for example, allowing and encouraging increased entry into new markets for a greater range of types of enterprise, especially community and social enterprises. Crucially, however, it will seek to maximise the number of people who are able to exercise their creativity at all levels in the economy.

In part, this will require educational levels to be raised across the wider population; in an economy like the UK's, close to the technological frontier in many sectors and industries, this means investing heavily in higher education.¹¹⁷ This certainly calls into question the current government's approach, with its sharp contraction in public investment in higher education and disruptive move to a heavily fee-based system. We would also argue that, throughout the education system, policy should be steered towards a greater nourishing of creativity, with less emphasis on testing and skills.

Another aspect of this policy push is to encourage, recognise and reward creativity in work. In some celebrated cases, such as the *kaizen* system adopted by Toyota and others in Japan, such a culture is fully institutionalised, from the shop-floor to the canteen.¹¹⁸ However, even in work seen as low-skill or low-value, there is scope for workers to contribute to innovation. For example, in her experiences of low-paid work for the book *Hard Work*, Polly Toyne observed that the best

care homes are those that listen to their staff and take on their suggestions.

We believe that, in addition to the economic rationale for explicitly aiming for the development of a highly innovative workforce, this approach should also yield wider self-realisation, or flourishing, of people in the economy. We see this happening in two ways: through consumption and through work.

In a world with rapidly changing technologies, the boundaries between production and consumption are becoming blurred (see our discussion of ‘prosumption’ in chapter 2), meaning that consumers have a much more active role in designing their own goods and services. Innovation in this direction suggests a way in which modern societies might move beyond ‘consumerism’, with its connotations of passivity and futile striving to gain satisfaction and status from buying and owning. ‘Creativism’, where status comes from the deployment of individual imagination (mediated through global production systems) may come to take its place.

Creativity at work, meanwhile, matters because of the link long recognised by sociologists between greater autonomy at work, status and health.¹¹⁹ Since the 1960s, there has been a clear trend towards autonomy at work in many organisations in richer countries like the UK, with the evolution from hierarchical to flat management structures, and with increasing levels of skill and expertise.¹²⁰ However, this also means that those who lack autonomy and opportunities for creativity at work (and in consumption) are increasingly excluded. The aim of policy, therefore, should be to encourage and incentivise all companies to extend such opportunities.

These emerging ideas suggest that there may be much value in placing human creativity, and the potential to innovate – a key enlightenment concept – at the heart of the modern progressive project.¹²¹

Helping people move from destruction to creation

Innovation in the 1970s, and especially during the IT revolution, produced major disruptions in the western world. The wave of job losses that followed in the UK in the 1980s happened under – and was to a certain extent unleashed by – a government that did not seem particularly concerned about what happened to those thrown out of work. People suffered not just unemployment but also community breakdown in the face of a rising tide of crime, depression and drug use. A generation of workers was thrown on the scrapheap. Some found new work, although this was usually lower paid than their old jobs; others never recovered and never worked again.

This experience drives home the key progressive principle for an innovative economy: that while

technologies may become obsolete and companies may go to the wall, we cannot allow the same to happen to people. We need to find better ways to help people adapt to economic change and the disruption it brings. The tough, and fundamental, question for progressives is whether it is possible to aid those who lose as a result of this disruption without reducing the innovative potential of an economy.

For many on the right the answer is ‘no’, especially where that assistance involves providing the ‘losers’ with some sort of safety net, such as welfare. The suggestion is that security dampens risk-taking, since the stark outcomes – especially poverty – that people face if they do not compete successfully are needed to spur that risk-taking in the first place.

“While technologies may become obsolete and companies may go to the wall, we cannot allow the same to happen to people”

There is powerful evidence to contradict this view, however. Germany and the Scandinavian countries – all of which have more generous social security systems than the UK – also all have higher levels of innovation.¹²² Set against a pessimistic view of human nature that prioritises sticks over carrots, a more balanced perspective is that it is only when people feel secure can they take the risks associated with enterprise and innovation. This is reflected, for example, in the Swedish Social Democratic Party’s slogan ‘Secure people dare’. Indeed, it is precisely this kind of thinking that inspired the creation of the limited liability company, a legal device which limits the risks that entrepreneurs take on. Given that one interpretation of the current shifts in producer and consumer activity outlined in chapter 2 is that entrepreneurial innovation is becoming a mass rather than elite affair, this might suggest that the notion of the limited company likewise needs to take on a popular aspect.

Of course, it is sometimes argued that generous safety nets are no longer politically viable because immigration and diversity have undermined the post-war social contract, which was based on a homogenous national community. This may be the case if social security is seen simply as basic welfare, and those on benefits simply as recipients of transfers from others. Reconceptualisation of social security as a lifelong springboard to participation in an innovative economy may be politically as well as economically necessary.

The future of low-skilled work

A final issue concerns what happens to workers in those jobs ‘left behind’ by innovation, both in the sense that they are not actually destroyed by technical change, especially change driven by IT, and in the sense that

their productivity and wages are not significantly enhanced by technical change. These jobs are typically low-skilled but not routine. They are often service jobs, such as caring for the elderly, collecting rubbish, driving a van or cooking in a fast-food restaurant. These jobs will not go away, and indeed sophisticated industries from finance to computer game design could not function without them. Real wages in such jobs have not necessarily declined but they have not increased as fast as wages in more skilled jobs. The question is whether the rise in inequality implied by these trends is acceptable in a modern society.

One approach to this issue is to support people to move out of such work into more skilled and productive parts of the economy, through lifelong learning, while others take their place – in this way, many people pass through the low-skill part of the economy but few or none stay permanently. This agenda was partially taken on by New Labour, but a really effective policy would need to go beyond providing training opportunities and be built more integrally into the low-skill labour market.

A second point focuses on pay. Contrary to Friedrich von Hayek's view that inequality merely reflects the value of individual's labour in the market, there is no single set of wages that a free market economy would necessarily produce.¹²³ Relative pay reflects social values as well as productivity. If nothing else, this can be seen in the huge inflation in the ratio of CEO pay to workers' pay in firms in the UK over the last 25 years, a change out of all proportion to any conceivable increase in the value of their labour. Much the same applies to bonuses in

the financial sector. These trends are more to do with changes in culture (imported from the United States) than any change in productivity.

These are extreme cases, but the influence of social values in pay can also be seen in the variation in relative wages across countries in a range of occupations. Nurses and teachers are relatively much better paid in Scandinavian countries than they are in the UK. Likewise, many low-skilled jobs are much better paid in Japan than in the West. In the UK, the minimum wage has been important in underpinning pay in low-skilled non-routine jobs, and this probably remains the best way of limiting the potential of some sections of the economy to be left too far behind by creative destruction in the labour market.

Looking at inequality through an innovation lens reveals some important possibilities for a new policy approach: broadening and deepening higher education, and a more creative approach across the education system; encouraging and rewarding innovation in the workplace; a combination of flexible labour markets with a safe support system that offers real security as a base from which to retrain, undertake education or even start a business (so-called 'flexicurity'); and a good minimum wage for those in jobs left behind by the innovative process. But, as with the approach to innovation policy in chapter 3 above, the principle of reflexivity and pragmatism in policy is useful. If we are committed to the goals outlined here, we have the chance to move on from entrenched ideological positions, both left and right, and evolve our way to the solutions we will need to build a progressive and innovative Britain.

Conclusion

Much of the current debate on economic policy has centred on the short to medium term, which is to be expected at a time of economic and fiscal crisis. This pamphlet, like the New Era Economics project more widely, has chosen a different focus, looking in greater depth at our underlying theories about the economy and thinking about an analysis and broad framework that can sustain policy over the long term.

We have done this because we believe that the UK economy faces major challenges well beyond the immediate post-recession travails. It may be tempting for policymakers to believe that once the current crisis is resolved, economic life will return to normal. We believe this would be a profound error. Rather than the end of the crisis signalling the return to a sedate 'business as usual' (as mainstream economics with its focus on equilibrium suggests), market economies are inevitably riven by major upheavals, unpredictable change and, sometimes, rapid swings in fortune. Policymakers, as well as business leaders, need to be constantly vigilant.

This vigilance is needed more now than at any time in the last 40 years. We have shown how over the 20th century advanced capitalism has twice been transformed, first by the rise of mass production and mass consumerism, and then by flexible production and consumer choice. We now appear to face a further transformation, as yet in its early stages, with the roll-out of web technologies and the advent of prosumption.

At the same time, the problem of climate change, alongside other social and environmental challenges, is making clear that innovation must be targeted towards important socially desirable goals, and not just economic imperatives.

Such major changes are a challenge to any business or economy at any time but, as we have explained, they can often pose a bigger threat to more established, less nimble capitalist economies. However, there are two further reasons why this is particularly pressing for the UK.

Firstly, the UK has a relatively poor record of adapting to major innovations, and twice faced economic crises as a result of its failure to fully adopt first mass production and then flexible production techniques in a timely fashion. Some argue that, following the Thatcher revolution, Britain is now far better placed to respond

to such innovative shifts than in the past. We disagree. In fact, we believe that the way a simplistic free market rhetoric has come to dominate British economic discourse may prove our undoing.

The truth is that responding to major innovative shifts requires significant changes in the skill sets of the labour force, and in the way businesses are organised and conduct their daily activities. These changes, in turn, require major investment and a strong will amongst businesses to retrain and adapt. And yet, for all the changes wrought by Thatcher, the UK still struggles with a business community mostly unwilling to commit to redressing the significant and ongoing lack in training and, most worryingly, business investment that for decades has seen our economy run behind our competitors' and become too heavily focused on property and finance.

“What we have argued for is a far more pragmatic approach: competition will always be a central driver of innovation and adaption, but it is only necessary, not sufficient”

What we have argued for is a far more pragmatic approach. Competition will always be a central driver of innovation and adaptation, but it is only necessary, not sufficient. Policymakers will need to pay particular attention to differences between different sectors, as each needs to respond to innovative challenges in different ways. In some cases, this may mean a need for greater competition; in others, it may mean state intervention of a greater or lesser intensity. It is for policymakers to recognise the challenge, assess the differential impacts on various sectors and then fashion an institutional framework and policies to ensure companies respond adequately. In some cases, this may well mean that where a skills or investment gap urgently needs to be plugged, the state may have to take a key role.

The second reason for extra vigilance is the UK's now heavy reliance on the service and cultural sectors as a generator of wealth and jobs. The transformations that came to define 20th century capitalism originated in – and had their most significant impact on – the manufacturing sector. Although consumer choice became a hallmark of new service industries (many of which were born in that era), it was pre-existing

manufacturing firms which were most badly damaged and dramatically transformed by flexible production. With the rise of web technologies and prosumption, we are witnessing the first major transformation of the existing service and cultural sectors, posing a huge challenge to any economy that relies heavily on those sectors. Failure to adapt and innovate fully could spell deep economic trouble.

One example is the retail sector, in which the widening and ever-more sophisticated use of the web will present an ongoing challenge to traditional store-based distribution and sale. Most notably, this could open up the sector to international competition to an extent it has not faced previously. The prospects for less productive and innovative local services (many of which employ many people) could prove grim. As the spread of the web expands the potential for prosumption, consumers may well come to expect opportunities to 'prosume' and those firms which lack the awareness, know-how, or capital to innovate in this direction may soon find themselves outperformed by overseas competitors.

“The task confronting those who agree with our analysis is to challenge the limited thinking that currently afflicts all three main political parties”

Given the potential scale of these challenges for the UK, it is disconcerting that none of the three main political parties have engaged in a more detailed or higher profile debate about the longer-term future of the UK economy. Since 2008, we have seen the emergence of two opposing positions, but neither has engaged with the full implications of major innovative change.

In its final years, the Labour government launched the 'New Industry, New Jobs' agenda, which began to develop a number of more interventionist tools than had previously been favoured, in a bid to aid a handful of sectors regarded as having high growth potential. However, given the point in the electoral cycle not enough time was available to develop those ideas. Moreover, while New Industry, New Jobs was an interesting and appropriately pragmatic development, its conception did have flaws. Specifically, its focus on four or five key sectors – without any wider awareness of the major innovative change that might confront the whole of the economy – ensured that it could never develop the necessary knowledge base to construct a truly effective policy of the sort we outline in chapter 3.

The present Coalition government has made a long-term commitment to transform the UK economy into one built on sound public finances, a higher savings rate, net exports and higher business investment. However,

these ambitious goals are not to be met by any pragmatic industrial policy akin to New Industry, New Jobs. The recent Spending Review did propose some significant investment in infrastructure and set aside some resources for the establishment of a network of innovation centres, but these measures must be viewed in the wider context of cuts to capital spending and, further afield, the far larger sums of public money being spent by other advanced economies on supporting business research and development.

Instead, the Coalition's key lever is to raise return on investment by enacting a 'supply-side revolution' through improved skills, a more productive and cheaper public sector, an improved welfare-to-work programme, lower business taxes and deregulation. While parts of this strategy will undoubtedly boost innovation and growth, as a whole it is an approach that seems to owe a lot to the type of neo-liberal economics criticised in this pamphlet. In particular, it appears to be built on an assumption that business innovation will automatically be driven in the right direction by greater competitiveness. As pointed out above, this remains a partial view, especially as the most interventionist aspects of the programme – improved skills and welfare-to-work – remain constrained by the tough austerity package unveiled in the government's first budget.

For those with progressive ambitions, there is in fact a third set of reasons why British policymakers must tackle the challenges posed by this pamphlet head on. An innovative economy is an economy which grows and generates wealth – a vital outcome for most progressives, as wealth provides the resources needed for tackling poverty and financing public services, and is the foundation upon which jobs are created. But of course, the creation of wealth by itself isn't sufficient to meet progressive ambitions. Therefore, we are arguing that innovation must also meet progressive standards in terms of who it involves and its ultimate economic and social impacts.

This is important to stress, because policy is crucial to determining whether or not innovation is progressive. We can see examples in our recent past where innovation has been wealth-creating but ultimately socially harmful, such as the complex products developed by the financial sector in the years leading up to the crisis. These were highly innovative and generated enormous wealth for their creators, but unfortunately also were at the heart (as chapter 1 made clear) of our financial and real economy crash. In a different but vital field, it is clear that government intervention will be crucial in determining whether new energy technologies are developed which contribute to addressing climate change, something which seems unlikely to occur at the speed required without such intervention.

Participation in innovation is vital too for progressives. As chapter 4 made clear, not only will this spread the financial benefits associated with innovation more widely but being part of the innovation process can promote autonomy and contribute to self-realisation and human flourishing.

So what now? The task confronting those who agree with the analysis in our pamphlet is to challenge the limited thinking that currently afflicts all three main political parties. A paper of this length can only be a provocation, a brief call to arms, to begin such a task.

However, if the analysis presented here is correct, there is a great deal of policy thinking to be done, if we are to meet some very major challenges. It is also vital that this thinking – and consequent action – begins as soon as possible. As our brief survey of the UK's recent economic

history shows, British businesses and policymakers have a tendency to come too late to the party when major business transformations are underway internationally. At a time when new and potentially very large economies are striding on to the world stage, we cannot afford to make this mistake again.

“British businesses and policymakers have a tendency to come too late to the party when major transformations are underway. At a time when new and potentially large economies are striding on to the world stage, we cannot afford to make this mistake again”

Notes

1. For a literal representation, see Danny Quah's animation at: http://econ.lse.ac.uk/~dqah/index_own.html#ECG-animation
2. Schumpeter 1939: 86
3. Keynesian demand management, market liberalisation and policy for innovation are very different from each other, and can (to some extent) coexist. The point here is that in each era, one set of ideas dominates.
4. Hairdressing may seem like a trivial example, but is a large employer in most developed economies. It is often seen as a low-innovation, low-value activity, but developments such as the permanent wave (dating from 1872), dyeing and hair extensions show that this is not true. The pattern of investing to enhance productivity to seek more profits can clearly be seen across the industry, but especially in the large branded hairdressing chains, like Vidal Sassoon, which typically also diversify into related products, like shampoo.
5. Holtham 2009
6. Malkiel 1973. Since there could be good news or bad news about companies, the hypothesis was that financial asset prices would move in a random (statistically unpredictable) way over the long run (the so-called 'random walk'). This was later shown to be inconsistent with data on real financial markets.
7. Shiller 2008
8. Tett 2010, Akerlof and Shiller 2009. At the same time, the mistakes that financial markets were making were amplified by the introduction of 'mark-to-market' rules in accounting by US regulators in 2007 (Kaletsky 2010 p 139).
9. Kaletsky 2010, chapter 10. At the time, the long-forgotten historian and theorist of financial market collapse, Herman Minsky, suddenly came back into fashion.
10. Clark A and Treanor J (2008) 'Greenspan – I was wrong about the economy. Sort of' Guardian, 24 October 2008. <http://www.guardian.co.uk/business/2008/oct/24/economics-creditrunch-federal-reserve-greenspan>
11. Gamble 1996. Hayek's ideas were developed at a time when Communist economies were seen as real rivals to capitalist market economies, and he put considerable energy into arguing with Oscar Lange and others about the impossibility of decision-making by a single authority in a centrally planned economy.
12. Keynes 1937
13. In the United States, this schism has sometimes been characterised as a battle between neo-liberal 'freshwater' economists from Midwest universities and neo-Keynesian 'saltwater' economists from East and West coast universities. Krugman (2009) – amongst the saltiest of saltwater economists – describes freshwater economists as: 'essentially, neoclassical purists. They believe that all worthwhile economic analysis starts from the premise that people are rational and markets work.' In return one Chicago economist, John Cochrane, is quoted as describing Keynesian ideas as 'fairy tales'.
14. For a detailed account of how Walras and Jevons raided elementary physics textbooks of their day see Beinhocker 2007: 29–35.
15. The expression of this view of markets reached its apotheosis in the 1950s with the general equilibrium theory developed by Kenneth Arrow and Gerard Debreu (1954), giving a rigorous mathematical proof under certain assumptions of the existence, uniqueness and efficiency of equilibrium in a perfectly competitive market economy.
16. Stiglitz 1993
17. For detailed accounts see Backhouse 2005, 2009, Phillips-Fein 2009.
18. Backhouse 2009
19. John Ranelagh (quoted in Gamble 1996: 151) relates a story from the 1970s told by a senior Conservative Party figure, in which one of Thatcher's colleagues was arguing that the party should seek a middle way between left and right: 'Before he had finished speaking to his paper, the new Party Leader reached into her briefcase and took out a book. It was Friedrich von Hayek's *The Constitution of Liberty*. Interrupting our pragmatist, she held up the book for all of us to see. "This," she said sternly, "is what we believe," and banged Hayek down on the table.' See also Young 1993.
20. The iconic Thatcherite policy of selling council houses to their tenants was originally proposed by Bernard Donoghue, adviser to James Callaghan, the Labour Prime Minister before the 1979 election, and may well have become a Labour policy had they won the election. More widely, Steve Davies (2009) cautions against overestimating the actual impact of neo-liberal think-tanks and questions the degree to which neo-liberal policies were actually adopted.
21. The promotion of many elements of these policies to developing countries by the International Monetary Fund and the World Bank became known as the 'Washington Consensus' (Williamson 1989)
22. As Gamble (1996) notes, while Hayek's ideas about the efficacy of markets were actually quite powerful when compared with a centralised non-market economy, they are much weakened in relation to a mixed economy of the kind that became the norm after the Second World War.
23. Gregg et al 1994
24. Stiglitz 1994: 44
25. Meeting the challenges of globalisation was a key theme for New Labour – see for example Giddens 1998, 2000, Balls et al 2007.
26. Eg Akerlof and Shiller 2009, Krugman 2010, Tett 2009, Johnson and Kwak 2010, Roubini and Mihm 2010. Several actors in financial markets themselves, such as George Soros and Paul Wolley, have also advanced theories to explain the crisis (Soros 2009, Ford 2008).
27. For example, according to Ford 2008. Wolley argues that the roots of the financial crisis lie in a principal-agent problem incorporating asymmetric information, two concepts with long pedigrees in conventional neo-classical economics. See also Stiglitz 2010.
28. Eg Holtham 2009
29. Kaletsky 2010, Hutton and Schneider 2008
30. See the review in Beinhocker 2007: 381–390. Stock market price-movement data is more volatile than predicted by the random-walk hypothesis, following a power law distribution rather than a normal Gaussian distribution.
31. Eg Shleifer and Vishny 1997, and Arthur 1995 and Farmer 1998 cited in Beinhocker 2007. Complexity economics also draws on the behavioural economics literature, which emphasises the fact that in real life, people are not perfectly

- rational but tend to use heuristics to guide behaviour. For an application of behavioural economics to the financial crisis see Akerlof and Shiller 2009.
32. Behavioural economics has grown to be a major sub-discipline, with its own journals and conferences. For recent non-technical reviews of insights from behavioural economics see Beinhocker 2007, chapter 6, and Thaler and Susstein 2008.
 33. Ormerod 1998
 34. Eg Cookson et al 2009
 35. Eg Durlauf 1996
 36. Ormerod 1998
 37. Eg David 1985
 38. Note that this is true of finance as much as anything else. The complicated collateralised debt obligations at the heart of the financial crisis didn't exist 30 years ago. They have evolved out of earlier but simpler generations of derivatives, which in turn evolved out of futures contracts.
 39. A landmark work in this school is Nelson and Winter 1982.
 40. Eg Perez 2002
 41. A reminder of the need for periodic intervention to stabilise economies is what happened in the global recession that followed the 2008 financial crisis. To avoid a re-run of the Great Depression of the 1930s, OECD and Asian governments were forced to make a swift, coordinated (and apparently successful) return to Keynesian fiscal policy with a series of stimulus packages.
 42. Eg Glyn 2007. It is striking that the French economy grew at about the same rate as the UK economy in the 15 years from 1985, despite that fact that policy sharply diverged, with neo-liberalism in the latter and considerable dirigisme in the former. There has been considerable debate about why OECD economies didn't grow as fast in the post-1980 period as in the 'golden age' after the Second World War. Part of the explanation must be that the earlier period was one of catch-up after the war, and also reflected the entrance of women into the labour force. But the point here is simply that there was no leap in growth following privatisation, regulation and liberalisation.
 43. Romer 1994
 44. Beinhocker 2007: 5–11
 45. Schumpeter 1934
 46. Gamble 1996: 192–193
 47. Eg Howitt 2000, Aghion and Howitt 1992, Aghion 2002, Dawid 2005
 48. Different evolutionary economists have developed distinct takes on the history of capitalism and the wider social and political world. This chapter presents one particular approach which is heavily influenced by the work of Carlota Perez but which also departs from her understanding in some aspects. Of course, no one narrative perfectly captures the entirety of the way in which innovation has proved central to capitalist development given this is such a complex process. As such, this is presented very much as a contribution to understanding and as an illustration of the points made in chapter 1 rather than as a 'final word' on the issue.
 49. Freeman 1992
 50. This complex and often unpredictable interaction between technology breakthroughs and a wide range of other highly contingent factors is what strips evolutionary economics of any tendency towards the 'technological determinism' of which it is sometimes accused.
 51. Perez 2002
 52. Boyce and Ville 2002, Perez 2002
 53. Benson 1994
 54. Benson 1994, Obelkevich 1994
 55. Obelkevich 1994
 56. Obelkevich 1994
 57. Armstrong et al 1984, Boyce and Ville 2002, Perez 2002, Piore and Sabel 1986
 58. Kantor 1991
 59. Bayus and Putsis 1999
 60. Although other names have been employed too, especially where production techniques seem to differ from the narrower conceptions of flexible specialisation that were proposed in the early days of the transformation.
 61. Boyce and Ville 2002, Perez 2002
 62. Marwick 1998
 63. Anderson 2007
 64. Humphreys and Grayson 2008, Lakhani and Panetta 2007, Leadbeater 2009, Prahalad and Ramaswamy 2004, Ritzer and Jurgenson (date unknown), Tapscott and Williams 2006, Toffler and Toffler 2006, Von Hippel 2006
 65. NESTA 2010
 66. Eichengreen 2007
 67. Armstrong et al 1991
 68. Armstrong et al 1991
 69. Owen 2000
 70. Tomlinson 1990
 71. Tiratsoo and Tomlinson 1993
 72. Tiratsoo and Tomlinson 1993
 73. Tiratsoo and Tomlinson 1993
 74. Cairncross 1995, Tiratsoo and Tomlinson 1998
 75. Tiratsoo and Tomlinson 1993
 76. Owen 2000
 77. Owen 2000
 78. Owen 2000
 79. Tomlinson 1990, Owen 2000
 80. Cairncross 1995
 81. Owen 2000
 82. Owen 2000
 83. Merlin-Jones 2010, Owen 2000
 84. Romer 1994
 85. We can see this clearly by revisiting the problems of the UK economy detailed above. The post-war obsession with planning designed to deliver full employment, low inflation and a strong balance of payments ultimately ran into serious trouble, because for too long policymakers ignored the failure of key businesses and sectors to innovate. The result was that no amount of macroeconomic management (for example, through exchange rate devaluation) could counter the ultimate consequences of running an economy that had lower levels of growth, productivity and market share than its competitors. The same lesson can be drawn from more recent events. Since the early 1980s there has been a strong emphasis on holding inflation at low levels, mainly through control of interest rates. Monetary policy was seen as so important it was given its own independent institutional framework in 1997. The UK economy did enjoy high growth, low inflation and low unemployment until 2008. However, the failure to encourage innovation and adaptation in a wide variety of sectors allowed the growth and productivity of the UK economy (and the public finances) to become heavily reliant on the financial and housing sectors. The result, of course, was that policies for macroeconomic stability, with the inflation-targeting architecture at its heart, counted for little when these historically volatile sectors finally collapsed,

- leaving the UK economy among those most badly exposed to the crisis.
86. See for example <http://www.america.gov/st/business-english/2008/April/20080429230904myleen0.5233981.html>
 87. With music and film, copying in digital format is now very cheap and easy, and it is now not uncommon for new blockbusters, which might have cost several hundred million dollars to produce, to be pirated ahead of the official release date.
 88. Companies can have a monopoly over a market if entry by other companies into that market is very expensive, for example if a company has to incur high costs to take part at all (such as in steel or complex software). Companies can also enjoy a monopoly over a particular product, typically by protecting it by patents, copyright or other intellectual property rights.
 89. Blundell et al 1999. Dyson in recent years is a good example. This was initially a small company that entered an established market with a new product, and gained a large market share. The company has a monopoly over its vacuum technology, which has proven difficult to copy. It has used the profits earned to employ thousands of engineers who have developed innovative products in new markets, such as hand-dryers and fans.
 90. Eg Arrow 1962. The view of competition as a driver of discovery is also present in Hayek's thinking.
 91. Aghion and Howitt 1992
 92. Geroski 1990
 93. Romer 1990 was one of the first economists to draw attention to the importance of knowledge spill-overs.
 94. Margolis and Kammen 1999, Bloom et al 2005
 95. McKinsey Global Institute 2010
 96. Ormerod 1998
 97. Beinhocker 2007
 98. For a similar view see Kaletsky 2010.
 99. As Gamble 1996 notes, Hayek's arguments have much less force against the mixed economy, which is now a widespread form.
 100. Ormerod 1998
 101. Ormerod 1998 gives the example of monetary policy in the 1990s, contrasting the long-term and more relaxed view taken in the United States favourably with the short-term micro-targeting in European countries.
 102. Perez 2002
 103. Atkinson et al 2009, Bell and van Reenen 2010
 104. Helm 2009
 105. The collapse of biodiversity is another major urgent issue, which is itself caused partly by climate change.
 106. Jackson 2009
 107. Steward 2008
 108. See Watson 2008 for a recent review of the UK's record in these areas.
 109. Aghion and Howitt 1992
 110. Van Reenen 2010
 111. At the very top, earnings in the last decade have also exploded in the finance sector. This sector was one of the earliest to adopt IT, and that adoption has been very deep. However, top pay in banking, as with the pay of CEOs in the private sector more widely, is also clearly influenced by a general culture. The oft-claimed link between reward and performance in the market (which Hayek based his theory of social justice upon) is clearly flawed, as shown by recent experiences in the financial markets. At the same time, neo-liberal economic theory (in particular the Sonnenschein–Mantel–Debreu theorem) implies that there is no necessary link,
 112. Eg Acemoglu 2002. Because not everyone in a skill or wage category learns to master a major new technology like IT at the same time however, there has also been more diversity of earnings within such groups (see Aghion 2002).
 113. Krugman 1994: 37
 114. van Reenen 2010, Krugman 2007
 115. Bloom et al forthcoming
 116. Eg Romer 1994
 117. Eg Aghion and Howitt 2006
 118. Eg Imai 1986
 119. Autonomy at work is a long-standing interest of sociologists, for whom it is closely related to social status. Famously, the Whitehall Study of civil servants by Michael Marmot showed a strong association between health and autonomy at work. However, we are not arguing for such autonomy on utilitarian grounds here, but rather on grounds of political philosophy.
 120. See Florida 2005
 121. This goal draws on a tradition of thought about human nature that goes back to the Enlightenment, inspired by Aristotelian perspectives – that each person is an autonomous being, with the potential for rationality, self-expression and creativity. Flowing from that essentially optimistic view of human nature are the values of the Enlightenment, amongst these the freedom and equality of individuals, but also the desirability of the realisation (and indeed self-realisation) of that human potential. This principle is politically important, because the idea of flourishing has the same philosophical roots as the idea of freedom. Clearly freedom has been a powerful political concept in the neo-liberal era, especially in the Anglo-American world. By contrast, social democratic traditions have often been accused of being hostile to freedom, and a frequent criticism of the 'strong state' under New Labour was that it had veered into social engineering. The opportunity for progressive politics is that the neo-liberal version of economic freedom is fairly one-dimensional – 'free to choose', in Milton Friedman's famous words. By contrast, a progressive account of freedom encompasses a much wider self-realisation – free to create, to express one's ideas, to participate.
 122. As measured by patents per thousand people.
 123. This follows from the Sonnenschein–Mantel–Debreu theorem which holds that more than one set of prices can clear all markets simultaneously. We are grateful to Paul Ormerod for pointing this out.

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This is a very stimulating and provocative contribution to the debate on economic policy. There are so many ideas in it, everyone is bound to disagree with something, but it is a coherent and wide-ranging attempt to completely rethink the economic position of the centre-left and to bring it into the 21st century. It deserves a wide readership.

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'The global economic crisis dramatically showed the limitations of current economic thinking. But there are ideas emerging from the field of complexity economics with the potential to give us a much more realistic view of the economy – a view that takes into account real-world human behaviour and institutions. This pamphlet is an important step in developing those ideas and beginning to think how they might be applied to improving policy, with the promise of a more robust, resilient, and innovative economy. With its New Era Economics programme, ippr is helping to reframe economic debates and turn crisis into opportunity.'

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Author of *The Origin of Wealth: Evolution, Complexity, and the Radical Remaking of Economics*