Models, uncertainty, and imagination in economics

One of the few prejudices that many economists and artists share is to assume that economics and markets are the province of cold reason, dry empiricism, and the remorseless logic of mechanical calculation, optimal performance, and a tendency to equilibrium. If emotions play a part in markets, they are presumed to be the base emotions of personal greed – leading to exploitative behaviour – or irrational fear and exuberance, leading to unfortunate distortions in otherwise rational expectations. It is generally assumed that economics is – or at least should be – the province of scientific rationalism, with little intellectual or practical overlap with an artistic emphasis on the structuring and creative role of the imagination, let alone human empathy.

I want to convince you today that this view could not be more wrong – and that both sides of C.P. Snow's two culture's divide[1] have underestimated the role that metaphors and models play in structuring economics and economic behaviour. Both sides, too, have largely ignored the extent to which imagination drives the essential creativity of capitalist markets and makes the future radically uncertain; and they have overlooked the part played by the imagination in shaping the stories that motivate consumers and investors, engage their emotions, and help them navigate the uncertain future.

Indeed, I want to convince you that the business of being an entrepreneur, or – within government – of developing good economic policy, is an *art*. It involves creativity and an imaginative openness to new ways of thinking, as well as large amounts of disciplined analysis. Economics and economic behaviour are the province of what William Hazlitt called 'a reasoning imagination'[2], which applies the lessons of experience to possible futures created in the mind and enables us to make *judgments* about how to act when the future is uncertain. At the same time, economics involves the ability to empathise with – the better to judge – the imaginaries and narratives motivating those with whom we interact socially, economically, or politically. If behaviour is structured by narratives – as I argue – then we can only predict or influence outcomes by 'reading' the stories that matter to others and trying to convince them of our own narratives of how the future *should* be.

As Harriet mentioned in her kind introduction, I wrote a book a few years ago called *The Romantic Economist – Imagination in Economics*.[3] And, as one reviewer noted, 'It is hard to imagine a more oxymoronic title' for my apparently paradoxical effort to highlight the imaginative aspects of the dismal science. [4] But this effort sprang from my seventeen years of practical experience in markets and economic policy, which – perhaps because of an earlier university training in literature and philosophy – led me to become increasingly intrigued by the frequent mismatch between the way economists model economies and the way that markets and investors work in practice. It was a mismatch that prompted me to wonder if the theories of the nineteenth-century Romantic poets and philosophers about the role played by imagination and sentiment in perception, thought, and behaviour might in fact have much to teach those studying markets. Let me explain.

Most economists rely on relatively static equilibrium models to make predictions – models that assume that economic agents optimise within given constraints, on the basis of rational expectations of a future that is predictable (at least in probability terms). But the entrepreneurs and investors I met were constantly engaged in thinking up novel strategies and products and seemed permanently challenged by uncertainty about the creative strategies of others. Confidence, a will-to-win, and an intuitive grasp of emerging patterns were clearly essential to these entrepreneurs facing the radical indeterminacy of a future that they and others were seeking to reshape. As the economist Joseph Schumpeter famously noted, the type of competition that counts most in markets comes from the 'new commodity, the new technology … the new type of organisation'; and the consequent 'process of industrial mutation … incessantly revolutionizes the economic structure *from within*'. It is this process of 'Creative Destruction' that Schumpeter argued is 'the essential fact of about capitalism'.[5] Think, for example, of the impact of the internet, mobile phones, and artificial intelligence over recent years. As the sociologist Jens Beckert puts it, the modern capitalist system is subject to constant change, novelty, and 'unending disruption of the present'.[6]

How then are economic agents meant to know what the future holds and optimise among well-defined options? The answer, of course, is that they cannot. When novelty and innovation abound both in the economy itself and in the economic policies guiding it, it is far from rational to assume, as economists generally do, that the future is a statistical shadow of the past; and it is quite fanciful to assume that – with enough data, the correct model, and sufficient market incentives – economic agents will be able to work out the *best* course of action, let alone to assume that – thanks to free-market exchange – their actions will collectively lead to the most mutually advantageous outcome possible. Instead, as Jens Beckert and I point out, economic actors have no choice but to *imagine* the future *yet to be created* by how they and others envisage or will it to be. It is these imaginaries or 'fictional expectations' that enable us to act *despite* the uncertainty we all face; and – when crystalised into shared narratives and models – it is these imaginaries that help coordinate our actions with others. And, since narratives and models influence behaviour and help construct the future, they inevitably become instruments of government policy and market power. In this way, imagination turns out to be not only the root cause of much of the economic uncertainty we face but also one of our principal tools for coping with that uncertainty, projecting market power, and influencing outcomes.[7]

So here is the first thing we can learn from the Romantic poets and philosophers: while they did not themselves, it is true, tend to focus on this aspect of markets any more than economists have, their general emphasis on the creative power of the imagination to visualise counterfactuals, come up with entirely novel ideas, and elaborate new visions – or as the poet William Wordsworth put it, to 'build up greatest things / From least suggestions'[8] – lies behind their insistence that rational calculation alone cannot explain human behaviour. Moreover, as John Stuart Mill – the English philosopher and economist most influenced by the Romantics – reminded us: 'the imaginative emotion which an idea when vividly conceived excites in us, is not an illusion but a fact, as real as any of the other qualities of objects.'[9] Imaginaries and the emotions attaching to them – for example, imagined holidays and the anticipatory pleasure we attach to them – matter every bit as much to market prices and behaviour as they do in the rest of life.

Now before I return to this role of narratives and economic models in 'performing' the future by motivating beliefs and behaviour, I want to draw attention to perhaps the greatest legacy of Romantic thought – a legacy that can help explain how economists and policymakers have become locked into a way of thinking about markets that is largely blind to the creativity and instability of economic activity and the power of imaginaries. The Romantics – influenced directly or indirectly by Immanuel Kant's account of the human mind necessarily reading into the *world-as-it-appears-to-us* certain structuring principles – understood that we never have unmediated access to brute reality. Rather our observation and analysis are structured by the particular languages, conceptual categorisations, and metaphors used. Wordsworth linked the poet's imaginative ability to present things in a new and different light to the use of metaphor. But the genius of Wordsworth and his contemporary, Samuel Taylor Coleridge, was to see that the same process that is obvious when poets are consciously colouring their vision by the use of surprising metaphors is at work in everyday perception and analysis. For Coleridge, the imagination is the 'prime Agent of all human Perception';[10] and Wordsworth argued that the human mind 'half-creates' the world it sees and is a 'creator and receiver both'.[11] In other words, what we see is a co-creation of the sense data we receive and the interpretative frameworks our minds supply. It cannot be otherwise because we cannot make sense of brute reality, or see it as a collection of meaningful objects, unless our minds project a framework of interpretation provided by language, metaphor, or model. As Coleridge put it, 'You must have a lantern in your hand to give light, otherwise all the materials in the world are useless, for you cannot find them, and if you could, you could not arrange them'.[12]

The relevance of this general truth for understanding the discipline of economics and its impact are manifold. For one thing, economics is, as Kurt Heinzelman noted, a 'resonant system of metaphor'.[13] Indeed, as Deirdre McCloskey pointed out in her book, *The Rhetoric of Economics*, economic theories are particularly saturated in metaphors – from demand 'curves' to 'game theory'.[14] Crucially, since many of these metaphors are no longer consciously recognised, they unconsciously structure the way economists think about markets. Take, for example, the notion of a market 'equilibrium' – a concept borrowed, as the historian of economics Philip Mirowski points out, from the less than obviously relevant field of nineteenth-century energy physics and applied metaphorically to dynamic capitalist markets.[15] Such metaphors, and the models based on them, help economists focus on some aspects of reality – in this case, the potential allocative efficiency of market exchange – but usually at the cost of limiting their ability to make sense of, or even notice, other aspects.

Equally crucially, it is not possible simply to rely on testing theoretical models (based on metaphor) against real-world facts as a fool-proof way of ensuring that economics is on the right track because the data economists use is partly constructed by the particular data collection methods and conceptual frameworks applied. As the literary critic M.H Abrams puts it in his book, *The Mirror and the Lamp*, facts (as the derivation of the word from the Latin *facta* implies) are 'things made as much as things found, and made in part by the analogies through which we look at the world as through a lens.'[16] In other words, the facts at our disposal cannot be an entirely objective touchstone for assessing the truth-value of an economic theory. While they matter enormously, of course, to the urgent business of assessing the relative merits of different theoretical constructions of reality, facts themselves are part-creations of theory and metaphor. This means that facts – almost as much as theoretical models – should always be seen as provisional artefacts.

The practical and policy implications of such Romantic epistemology are enormous. For if any theoretical framework or conceptual grid (such as that provided by standard equilibrium-based economics) has limitations as a way of parsing reality and making sense of it, it follows that reliance on any *one* such framework implies an inevitable bias or limitation in the way we see and analyse our predicament. The political scientist Wade Jacoby and I have summed up the dangers of such modelling monocultures like this:

> 'We need theories and conceptual structures to make sense of the chaos around us, in the same way that we need a lantern to see in the dark. Yet when we only have access to *one* theoretical or conceptual structure—one source of light—then our field of vision is likely to be severely limited and our analysis biased. It is for this reason that a monoculture—which involves the widespread internalization of *one* mental framework or model—is so dangerous. Even when a shared mental model is apparently the best available, reliance on this single model or framework implies that we will keep stumbling on aspects of reality we earlier missed, simply because these aspects lie outside the area illuminated by the framework or model we used.'[17]

The perils of becoming locked into one way of analysing economic reality became painfully apparent during the financial crisis of 2008, when the global financial sector and national regulators for the most part internalised a homogenous set of VaR risk models that – by confusing radical uncertainty with measurable risk – left the key players blind to early warning signs of a catastrophe that, in retrospect, were obvious. Likewise, central banks almost all used a type of dynamic stochastic general equilibrium (DSGE) model that simply assumed rational expectations, a tendency for markets to return to equilibrium and, most remarkably of all, actually ignored the financial sector and the possibility of default. It is not surprising that central bankers relying on such models mostly failed to spot emerging problems until too late. Likewise, many would argue that accounting practices and economic models that ignore environmental externalities have predisposed companies and governments to ignore the long-term costs of carbon emissions and other forms of pollution.

For this reason, perhaps the most urgent use of imagination in economics is to experiment with new metaphors and diverse modelling assumptions that can cast new light on complex multifaceted reality. For example, when economists apply epidemiological models metaphorically to the study of market contagion and financial panic, it helps them unearth key tipping points in highly interconnected financial networks; and it helps policymakers isolate highly connected institutions that may act as 'super-spreaders' of default risk. More generally, I would argue, businesses and government departments should be structured to encourage the disruptive insights provided by alternative models and theories; for, as Paul Feyerabend puts it, there 'exist facts which cannot be unearthed except with the help of alternatives to the theory' being tested.[18] If you want to detect unconscious interpretive biases in perception and analysis, you have to learn to hover between different conceptual frameworks. Indeed, if you want to avoid the perils of groupthink, you have to exhibit a version of what the poet, John Keats, called '*negative capability*' – the capacity to be in 'uncertainties, mysteries, doubts, without any irritable reaching after fact and reason'.[19]

Such receptiveness to new perspectives is also required when coping with uncertainty about the future – with the radical indeterminacy in economic systems caused by the constant interplay of the innovative strategies of a myriad of different actors. You can only spot emerging patterns in dynamically evolving complex market systems if you are receptive to new pointers and flexible in how you see the world. Such *passive* receptiveness to novelty is – I would argue – a necessary component of imaginative thinking about the economy; but on its own it is not, of course, sufficient. Entrepreneurs, investors, and policymakers also need *actively* to experiment with different models and metaphors and use them as *diagnostic tools* for unearthing new trends. At the same time, they need actively to work up any new solutions they imagine and subject them to a rigorous scientific and ethical audit.

This sort of eclectic use of diverse models and metaphors may be the basis of creative thinking in economics, but it has, of course, its practical limits. In the end, governments have to choose a policy, and companies must pursue a particular course. And, while they must remain aware of the limitations of their chosen approach and open to challenge internally, they often have little choice but to promote a consistent narrative and modelling framework to others if they wish to coordinate investment in their chosen goal and stabilise the expectations of those with whom they cooperate. The *art* of entrepreneurship and good government then is to balance the need for agreed modelling frameworks and shared narratives (that facilitate coordination by providing a shared logic of action and a common set of beliefs) with the need to avoid dangerously myopic groupthink and encourage the trial-and-error search for new solutions.

This balancing act is easier said than done because of the trade-off between the ability to influence outcomes by promoting a consistent message and the flexibility of outlook required to spot new trends and change course in light of them. The coordination properties of models and their associated narratives – their tendency when internalised to frame expectations and influence behaviour and outcomes – makes them an instrument of corporate or government power. And this power may – initially at least – be in inverse proportion to the degree of humility with which the narrative or model is promulgated. Central banks have wrestled with this problem when giving markets forward guidance. Their aim is usually to settle market expectations around a policy target and a route map towards it that their models suggest is feasible. But – if they are to maintain long-term credibility – central bankers must also leave themselves with enough internal and external discretion to adapt to new pointers and adjust their message accordingly.

There is another aspect of the Romantic conception of the imagination that is central to economic behaviour and the skillsets of economists and policymakers – its role in fostering sympathy and empathy. The poet, Percy Bysshe Shelley, underlined the role of imagination in sympathy and therefore morality in his *Defence of Poetry*:

> A man, to be greatly good, must imagine intensely and comprehensively; he must put himself in the place of another and of many others; the pains and pleasures of his species must become his own. The great instrument of the moral good is the imagination – and poetry administers to the effect by acting upon the cause.'[20]

Such sympathetic identification with the plight of others is often seen as the quintessential opposite of the narrow self-interest of *homo economicus.* But care is needed with this simplistic view for several reasons. First, it's worth noting that the founder of modern economics, Adam Smith, was equally famous in his own day as author *The Theory of Moral Sentiments*, where he argued that susceptibility to the feelings of others and our ability to imagine ourselves in their predicament forms the basis of our moral judgments. Nothing in economics – the science of how markets behave – precludes us making judgments about how we *ought* to act to deliver particular non-market goals and help others.

Furthermore, our preferences as market participants – and even our sense of 'self' – are often extended laterally to include our desire to meet the needs and aspirations of those with whom we sympathise. Market preferences are very often for other-regarding and social goals – as companies chasing the green pound or dollar have clearly understood.

More iconoclastically still, the essayist William Hazlitt argued that the faculty of imaginative projection involved in sympathy with the feelings of others is fundamentally the same as that required to generate current interest in the future feelings of our own future selves. Indeed, in his hands, the quintessentially utilitarian conception of the pursuit of self-interest dissolves into an imaginative and creative enterprise: because the future is uncertain and even our identities and preferences change over time, we must imagine the interest that our imagined future selves would feel for an imagined future, and it is this imaginary that excites in us a current 'emotion of interest' sufficient to motivate us to act.[21] In other words, *homo economicus* – whether self-centred or altruistic – has no choice but to be a creature of the imagination – able to imagine what it will be like in a different time, place, or version of self if certain decisions are made and then to act accordingly.

The ability to place ourselves in someone else's shoes and then stand back and judge how we want to behave can, of course, be the basis of market exploitation as well as moral restraint. Indeed, any entrepreneur or marketing agent has to imagine what it is like to be the client and then, armed with that empathic reading, to judge how best to meet or exploit their preferences. Moreover, there is a wider sense in which empathy is the basis of good social science and good policymaking. As we have seen, market participants face a complex and multifaceted reality and an uncertain future that can always bear a number of different rational but inevitably partial and provisional interpretations. This means that, if we want to understand market behaviour or predict the impact of a novel policy or product offering, we have to interpret the contingent interpretations that others place on their predicament.

As a *social* science, economics cannot then escape the need to interpret a pre-interpreted world. And policymakers, too, must interpret the diverse ways in which economic actors visualise the present and imagine the uncertain future. This puts a premium on what the co-founder of the London School of Economics, Beatrice Webb, called 'analytical imagination'[22] – the ability to project yourself into the contingent mindset of others and understand how they see the world. At the same time, it explains the emphasis placed by governments on focus groups and by central banks on regional agencies that can access the narratives motivating the beliefs and actions of key players. It can also explain the recent explosion of interest in what Robert Shiller calls 'narrative economics.'[23] As he argues, many key inflection points in the economy reflect a sudden shift to a new dominant narrative. Among the most important of the real-time data that economists seeking to understand emerging trends must follow are sudden changes in the stories guiding investors and consumers.

Let me conclude then by drawing together the three strands of the new more imaginative approach to economics I have outlined, while summarising the lessons of Romantic epistemology – in particular, the ubiquity of uncertainty and the structuring role of models. And let me do so by showing ways in which these strands and lessons suggest that the *applied* use of economics in business or government is an art form rather than a mere exercise in calculating optimal policies on the basis of big data.

The first key lesson is that the creativity of business in designing new products and novel methods and the constant drive for policy reform on the part of governments imply that the economic future is often radically uncertain – a long way from being the statistical shadow of the past it is assumed to be in standard risk models. This means that entrepreneurs and policymakers alike must use economic and financial models not as latter-day oracles predicting the future but as *diagnostic tools* for spotting emerging patterns. They also need to emphasise system resilience in the face of unexpected events rather than concentrate entirely on short-term allocative efficiency.

The second key lesson is that all scientific theories, models, and metaphors are selective and focus only on certain aspects of multi-faceted reality. Models and theories necessarily abstract from complexity to isolate and make sense of certain systematic tendencies. Their findings are presented with the caveat that 'other aspects' are assumed to 'remain equal' and can be safely ignored. But in the complex and uncertain world of modern capitalism – embedded as it is in plural societies and a global environment under stress – other things are rarely equal. As a result, the art of business or government requires insight into the interplay between the different relevant aspects of reality captured by different scientific disciplines and models. It requires *judgment* about how to balance pools of knowledge with credible imaginaries about uncertain futures; and it involves a combination of humility about how little is known with constant experimentation in new metaphors and methods.

Finally, as we have seen, economists, entrepreneurs, and policymakers need to learn to read the narratives, the stories, dreams, and dystopias that motivate their fellow citizens or might in future do so. In the fiendishly complex world of modern markets – and when faced with uncertain futures – we all have no choice but to *imagine* the future, *interpret* the creative interpretations that others place on their predicament, and *invent* new ways of making sense of our own.

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An edited version of this talk is published in *The New Platform Papers: What Future for the Arts in a post-Pandemic World, Volume 1: Imagination, the Arts and Economics*, Currency House. ISBN 9780648426561 – see Academic Papers section of imaginationineconomics.com website for link.

