

Do economic crises reflect crises in economics?

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The 'series of unfortunate events' in the global economy since 2008 make it natural to ask where the economists have been.¹ If you have a leaky boiler, you expect the plumber to mend it; a dentist should cure your toothache; so why haven't the economists been able to fix the economy?

When economists meet privately these days, we will most often whisper to each other, isn't it all so interesting? These are fascinating times. Every day brings something new to think about. It isn't only economists who want to understand what's going on. There has been an increase in the number of students choosing economics at university, and there seems to be a strong appetite for popular books and lectures.

Even Her Majesty the Queen has shown an interest in why economists didn't predict the crisis, a question she posed to academics on a visit to the LSE.² She was too polite to say so directly, but a lot of people blame economists and economics – as the title of this session indicates. Some of this criticism has been fierce; the film 'Inside Job' savaged economists as essentially corrupt and directly responsible for the financial crisis.³ The rest of us squirmed when we watched his treatment of the economists unlucky enough to have been interviewed by him.

So I'm torn between my quiet exhilaration about how interesting things have become and a nagging doubt: I wasn't doing macroeconomic forecasting, and never worked in finance – but am I still somehow to blame for the crisis because I'm an economist? Is it my fault? Has my profession, just by the way it thinks about the economy, caused all this damage? We have to ask ourselves this question.

A lot of people think so. And a lot of the criticisms they make of economics have been made in the past. The Post-Autistic or Real World Economics Movement has been gaining prominence but it's been around for a long time.⁴ The difference now is that the crisis seems to be proof that the criticisms are true – they are not so easy now for the mainstream of the economics

¹ See Lemony Snicket's novels in the series of the same name, <http://lemonysnicket.com/>

² <http://www.telegraph.co.uk/news/uknews/theroyalfamily/3386353/The-Queen-asks-why-no-one-saw-the-credit-crunch-coming.html>

³ <http://www.sonyclassics.com/insidejob/site/>

⁴ <http://www.paecon.net/>

profession to shrug off. In fact, many economists are on the contrary taking the critique very seriously.

So I would like to present a paradox. Economics is both in crisis and experiencing an extraordinarily fruitful renaissance. There is already a new approach emerging from the pre-crisis framework, like a butterfly hatching out of its chrysalis. It's much less tied to a particular theoretical approach, more pragmatic, more empirical. It is rooted in a lot of existing work that has been more or less hidden from public view but is what most economists actually do. It's vital for the contribution of economics to the real world that we don't throw this baby out with the bathwater.

I will start with the crisis and the problems it has demonstrated with economics as a subject and the influence economists have had for the past generation. Then I will describe the way economics has been changing for at least a couple of decades, making it now a much more useful but also a more modest discipline. Finally, I'll explain how these two elements can be reconciled – the answer being a fundamental reappraisal of the basic methodology and assumptions by economists themselves is under way. This does predate the crisis but has definitely been accelerated by it.

The problems with economics: (1) Theory

There is a well-known joke about economic methodology. Two friends are walking along when one spots a €50 note on the floor. "Look!" he says, "Let's pick up the money." His friend, an economist, replies: "No, don't bother. If it were really there, somebody would have picked it up already." The joke of course is about the lack of realism in the assumptions economists conventionally make in order to analyse the real world. This is a very long-standing area of criticism. Sometimes it simply concerns the use of mathematical equations in economic models at all, which misunderstands how you do statistical work. Sometimes, however, it concerns the underlying assumptions – in particular, that people and firms make their choices by rational and selfish calculation. Isn't that obviously untrue?

In practice, the version of this assumption used in applied analysis is rarely as strong. In practice, it is more like: given the limited information available to them, and the various transaction costs they face in taking certain courses of action, and given that the future is very uncertain, we'll assume people act broadly in their self-interest, however they would define that.

I would strongly defend the use of this contingent version of the standard assumption as it's a powerful analytical tool. One rightly famous paper by the economist Mancur Olson is called 'Big Bills on the Sidewalk: Why Some Nations Are Rich and Others Poor', in a reference to the old joke.⁵ Ideas and

⁵ Reprinted in *A Not-So-Dismal Science*, ed Olson and Kahkonen, OUP, 2000.

capital can move freely around the world. So the logic of self-interested rationality suggests there is obvious untapped economic potential in poor countries. But instead of concluding that poor people are irrational, we must turn instead to an explanation in terms of the systematic differences in economic institutions and policies in different countries. And these differences are based on transactions costs and externalities that account for apparent inefficiencies. Modern institutional economics, which is a thriving area of research, is founded on the use of the rationality assumption as a tool of analysis. If people do not seem to be making the rational choice, then looking at the difference between what would happen if they did so and the reality is instructive.

There is, as everyone will know, a good deal of evidence now (as if we needed it) that human behaviour is rarely characterised by rational calculation. The idea of bounded rationality acknowledges the time and effort involved in calculation. Behavioural economics uses much greater psychological realism. I'll say more about this shortly. Still, I would defend using the assumption of rational choice as long as one realises that it is not a description of reality. But there is one area where for 30 years economists – and others – have been making that mistake. That is unfortunately, of course, in the financial markets. Practitioners and policy makers acted as if the strong form of the Efficient Markets Hypothesis held true – in other words that prices instantly reflect all relevant information about the future – even though this evidently defies reality.⁶ What's more, a political philosophy valuing limited government leapt on what was taken as proof that markets left to themselves deliver better economic outcomes. This was translated as the deregulation of markets, especially financial markets, and became entwined with the growing importance of the finance sector in the economy globally. So politics fed the trend. The computer and communications technologies fed the trend as well, by making more and more financial transactions possible.

I think an honest conventionally-trained economist has to at least acknowledge that we grew intellectually lazy about this. Although we all knew at some level that the rational choice assumption was being made to bear too much weight, very few economists openly challenged its everyday use in justifying public policy decisions. Very few of us put this weight on it in our own work. But not all that many economists challenged its pervasive use in the public policy world.

One result has been that many critics think all economists are right-wing free marketers. The 'Occupy' movements would blame economics for much more than just the financial crisis, in particular also the much greater inequality in almost all OECD economies now. In fact the survey evidence is that left-of-centre outnumber right-of-centre economists, although by much less than in

⁶ There is convincing empirical support for the weak form of the EMH, namely that it is not possible to beat the market consistently, and that the successful runs of certain individual funds or investors can (almost) always be explained by chance.

the other social sciences.⁷ But a particular ideological version of economics became the framework for analysing public policy, and very few mainstream economists challenged that. We got on with our work and ignored the importance of the public rhetoric.

There is an interesting concept in linguistic philosophy, '*performativity*'.⁸ This refers to the phenomenon when saying something constitutes the act, for example, when the pastor says the words, "I now pronounce you man and wife," or if I bump into you and say, "I'm sorry!" Some sociologists have suggested that economists' rational choice theories, especially in the financial markets but also in wider economic life, have become performative. For example, Donald Mackenzie has pointed out that financial models of option pricing actually created the options market.⁹ A looser version is that a public sphere founded on the world view of narrow, rational choice economic models has over time led people to behave like the selfish, calculating beings assumed in those models. If regulations assume that you are going to behave in a certain way, there must surely be a temptation to live up to the assumption. I don't know if this theory of economic performativity is true; perhaps the causality runs the other way, and a period of free-market politics especially in the US and UK changed the character of economics? We can't test these alternatives, but this criticism is worth considering.

Critics also dislike what they see as the reductionism of economics, the philosophy that the economy can be understood as the aggregation of individual profit- or income-maximising decisions by independent economic agents. I think economists would acknowledge that there are definitely circumstances where this assumption is not valid, and it has been used as a matter of practicality, of simplicity. Again, though, it was very much taken for granted. The crisis, so strongly marked by herd behaviour, firmly underlines its limitations.

For all these reasons, the financial and economic crisis also spells a crisis for certain areas of economics, or approaches to economics. Financial economics and macroeconomics are particularly vulnerable. They are the subject areas where the consequences of the standard assumptions have been most damaging, because they are actually least valid. Financial market traders are not remotely like Star Trek's Mr Spock, making rational calculations unaffected by emotion or by the decisions of other people. Macroeconomics – the study of how millions of individual decisions aggregate into economy-wide measures – is essentially ideological. How macroeconomists answer a question like 'What will be the effect of cutting the budget deficit on growth next year?' depends on their political views. This is not remotely a scientific area of the discipline. The consensus about

⁷ See *The Soulful Science*, Diane Coyle, Princeton University Press (2009).

⁸ J.L. Austin. "Performative Utterances" in "Philosophical Papers", 233-52. London: Oxford University Press (1970)

⁹ http://www.sps.ed.ac.uk/staff/sociology/mackenzie_donald

macroeconomics during what's been described as 'the Great Moderation' of the 1990s has entirely broken down.

Observers of the profession tend to think that macroeconomics, and particularly forecasting, is what economists do, although relatively few of us are forecasters. The prominence is partly because this is what media interviews tend to be about – what do you think will happen next? In reality, forecasts about either economic variables such as inflation and GDP growth or financial market prices are based on the past. They are clever extrapolations, and the prediction for GDP growth will after a year or two be just the average of past GDP growth. These conventional models, used in finance ministries and central banks everywhere, are inherently unable to predict significant change.

There is a good reason for using these models, though. Because understanding and forecasting the aggregate behaviour of millions of businesses and individuals is an impossibly hard task. It is much harder than long-range weather forecasting because it ought to incorporate both the effects individual decisions have on each other, and because it ought to incorporate expectations of the future into today's decisions. There is a very real sense in which we think ourselves into recessions and booms. Macroeconomic forecasts have to do something much simpler. No wonder they always seem to be wrong. A sensible economist will always obey the rule, predict either what will happen or when but never both at the same time. The kind of conventional macroeconomics that pretends to greater confidence about the future is greatly flawed, and macro has become a political argument rather than an empirical science – just as it was in the 1970s. The Great Moderation meant macroeconomists grew complacent.

Problems with economics: (2) Practice

I can't omit here a few other problems with economics as it has been practised. These are not so much intellectual as practical problems.

There is the question of the economics curriculum in universities. In most cases, it gives too much time to macroeconomics, on which as I just argued there is no professional consensus. Students are often taught one macroeconomic world-view as if it were true, with no intellectual context, no history of economic thought. They learn almost nothing about economic institutions such as the banking system. They have little sense of economic history, which is usually not required now (although it used to be in many PhD programmes). As the present crisis followed a long period of unusual stability, you might have thought it was essential to teach the current generation about the serious downturns of the 1970s and 1930s, before immersing them in dynamic stochastic general equilibrium models.

Students are also not systematically taught new aspects of the subject that their potential future employers are already trying to apply. For example, the competition authorities realise that the findings of behavioural economics have strong implications for any remedies depending on consumer choice they might propose in merger cases or market inquiries. There is already a large amount of research on the psychology of choice, and it would be useful for students to learn a bit about this, and about new experimental approaches.

Undergraduates are also taught as if they are all planning to go on to study for a doctorate and become academic economist. The curriculum does not acknowledge that most students, if they stick with the subject, will become applied (micro-)economists. They will go to jobs in government, regulators, the financial markets, consultancies and industry. They are not, as undergraduates, given a good enough grounding in the careful handling of data and practical econometrics, with the result that there is too much poor quality empirical work being done in government and business.

The crisis seems to have prompted these employers of economics graduates to become more interested in curriculum reform; for example, there will shortly be a conference in the UK hosted by the Government Economic Service and Bank of England to bring together employers and academics for a discussion about reforming how economics is taught. It is probably worth considering what a different kind of economics degree would involve, one that regarded economics a bit more as a professional vocation rather like law or medicine rather than purely as an academic subject.

In that case, professional ethics would be a natural part of the territory. I've found the recent debate about the need for a code of ethics for academic economists a bit odd, because it seems to focus on the kind of ethical considerations that would apply to any university researcher. There is nothing about the recent guidelines from the American Economic Association on disclosing sources of research funding or external appointments that seems specifically relevant to economics. Surely all researchers should disclose their conflicts of interest? However, if an economics degree is regarded as more like vocational training, a professional code of ethics would be natural and appropriate. David Colander has proposed a code modelled on the one for engineers.¹⁰

Finally, many of these under-cooked economics graduates go on to work in government. Economists have come to have a particularly influential role in public policy, compared to other social scientists – in the UK we have chief economists in most departments, but not chief anthropologists or chief psychologists. Other social scientists of course give policy advice but unlike economists they do not have specific roles in the administration. There are

¹⁰ <http://ideas.repec.org/p/mdl/mdlpap/1103.html>

some good reasons for this special status – I’m about to come on to those – but the influence economists have in government needs seasoning with a corresponding degree of humility. One side-effect of the crisis may be to make economists a bit more humble, which would be a good result.

The strengths of economics

So far, not many readers will have been disagreeing with me; there is a ready market for criticism of economics. I will now become more contrarian and turn to the distinctive strengths of economics.

The first of these is the counterpart to the limitations described above. Economics is almost brutally analytical and logical, in a world with no shortage of emotion and fuzzy thinking. Let me give just a few examples out of many.

Accounting identities play an important role in economics. Ex post, after the event, the balance of payments will have balanced. If one country has a current account surplus, it will necessarily have exported more capital than it imports. Contrary to the kind of statement one hears in the US policy debate, it is therefore not possible that China simultaneously has a trade surplus and is sucking in investment as well – it must be a net overseas investor. Conversely, running a deficit on the current account, like the UK, means being a net importer of foreign capital to finance that domestic spending.

Another example with some relevance now: an indebted country having to pay a real rate of interest to foreign lenders that is higher than its real growth rate will not be able to reduce its level of debt. So the magic bond yield for debt sustainability is not 7%, as a lot of comment on the Euro crisis has implied. If you take a pessimistic view about real growth prospects in the troubled economies, a bond yield as low as 3% might result in a growing debt burden, no matter what austerity measures are introduced to balance the government’s primary budget, whereas a burst of 5% inflation would dramatically reduce the real debt burden even if potential growth stays low. Inflation and growth are the powerful levers for resolving debt crises.

Another area of ‘inconvenient truth’ at the heart of economics is the concept of opportunity cost. Economics concerns the allocation of scarce resources to different uses. Opportunity cost says that using resources in one activity makes them unavailable for another activity – whether the resource is tax revenue, coal or time. That’s all. In effect, it is a statement of the physical reality of the universe. But it is often a highly unpopular observation in public policy discussion.

This kind of hard-headedness dates back to the start of the subject. David Hume was writing about the balance of payments and its implications for capital flows in the late 18th century. However, for much of the time since Adam Smith published *The Wealth of Nations*, the development of economics

has been limited by a lack of empirical evidence. It is almost as young a science as geology or evolutionary biology but until recently lacked anything like as much data as these other non-experimental, historical sciences.

Take the question of growth theory – why have some economies experienced dramatic improvements in per capita incomes and consequently health, longevity, and living standards, while others have not? It must be the most basic question in economics. Yet it was not until the concept of GDP was developed in the late 1930s that any measurement of ‘the economy’ in that aggregate sense could begin. Not until 1980 was there data for a significant number of countries dating back at least half a century – previously, there had been about 30 annual measurements for a handful of countries. It is hard to find definitive empirical results from so little data. No wonder economists have been overly-focused on abstract models.

The situation has changed spectacularly in the past 20 years or so, thanks to the availability of new databases, the computer power to use them, and the statistical techniques to make valid inferences from different types and structures of data. Just recently, the UK’s ESRC announced that it would be making freely available online to anybody the 200 large-scale datasets it has funded and another 700 provided by ESRC-funded researchers on smaller projects. Every national statistical office, but especially the US authorities and the international agencies, provides data access now. Usually economic researchers will make the data they use for their papers available to others so results can be assessed and validated. The availability of online surveys and mobile apps to collect data means it is even becoming easy and relatively cheap to create data sets where none existed.

It is easy to underestimate how important this is. When I was a PhD student, access to both the data and computer time was very costly. Sometimes the data had to be loaded by threading a big reel of magnetic tape into the computer. I had to write regression programs in Fortran as the only commercial software available was quite limited. Each regression had to be run, one by one, overnight. One had to choose a thesis subject depending on whether or not any data would be accessible. The combined computer processing and information revolution is transformational – and still in its infancy in terms of its eventual impact on the state of economic knowledge and the science of economics.

This is not the only area where there has been quite dramatic change. There are a number of areas of methodological change, which will together also end up having a dramatic effect on the state of economics. I’ll mention them in descending order of the support they get from mainstream academic economics.

I’ve already touched on behavioural economics, drawing on results from psychology experiments that demonstrate some clearly non-rational choice decision-making. This is very popular with many of our critics because they

think it disproves economics. Yet many economists are very interested in the 'rules of thumb' about decision making that emerge from this research programme. Although rationality is a convenient assumption, and can be an illuminating one as I argued earlier, I don't think any economist would hesitate about dropping or modifying the assumption as we come to understand more realistic decision processes.

I recently attended a workshop at the Toulouse School of Economics attended jointly by economists on the one hand and psychologists and cognitive science on the other. Scientists are starting to learn about how the structure of the brain affects the allocation of attention (ironically, through a market competition between neurons).¹¹ The economists were hungry for systematic conclusions about how this shapes decisions, but the psychologists are not yet ready to draw them. At present, what's known is that in some circumstances conventional rational choice economic models explain reality extremely well – whether that is mobile phone companies bidding for spectrum in an auction or rhesus monkeys bargaining for food – while in other circumstances the rule-of-thumb decision patterns of behavioural economics fit better.

This is an active area of research. It might lead to better public policies – the idea of the 'nudge' has gained some popularity, even on the basis of the rather limited knowledge we have at present.¹² It will certainly lead, in time, to better economic theory and evidence. And, to repeat, I don't think many economists will hesitate at all to abandon rational choice models where they are at odds with the evidence and no use as an analytical lever.

A second important methodological innovation is the use of experimental methods in economics – either in psychological experiments, or in the form of randomized control trials. These are used in economics just as they are in medicine, with a matched treatment group and control group, randomly selected. They are being used quite frequently now to assess aid programmes in developing countries. There is an excellent recent description of the approach and its implications in the book *Poor Economics* (2011) by Abhijit Banerjee and Esther Duflo. The use of RCTs has not been warmly embraced by all economists – the doubts centre on the extent to which a trial permits any generalisation of results to other contexts. Nevertheless, it would be natural to extend this methodology to policy trials here at home. Why would we care more about the effectiveness of aid spending than about any other form of government spending? Although it should be noted that firm evidence on the effectiveness of otherwise of cherished policies might not be welcome by everyone.

¹¹ The Invisible Hand meets the Invisible Gorilla
<http://www.idei.fr/doc/conf/psy/2011/summary.pdf>

¹² After the title of the book by Cass Sunstein and Richard Thaler

There are other innovations in terms of analytical tools. Game theory was an early example and is universally acknowledged as a powerful approach to modelling and predicting behaviour. Others are more on the fringe although interest is growing – they include fractals, non-linear mathematics and complexity theory, network theory, and agent-based modelling.

A third point about methodology is the growing interest on the part of some economists in inter-disciplinary work. This is not universal. In fact, I think quite a few of their colleagues would see inter-disciplinary research as a watering down of economics, or as moving outside its proper domain, and in some universities there is tension between these two perspectives. None of these inter-disciplinary areas is new – economic geography, for example, economic sociology, complexity science, or the psychological research I've already mentioned. Political economy in the old-fashioned sense has also experienced a revival of interest, which is not surprising in the context of the crisis. They are, though, all quite vibrant at the moment. Perhaps the crisis has directly prompted more researchers to look at areas outside the core of the discipline? Or perhaps a pre-existing discontent with the perceived narrowness of economics was already prompting an internal reaction that took this form of exploring the overlap with other disciplines?

A new synthesis?

At the same time as defending their profession against extreme criticism, then, economists have to varying degrees started to respond to the criticisms in their own professional practice. It's said that if you laid all the economists in the world end to end, they still wouldn't reach a conclusion, so I mustn't exaggerate the extent of any agreement about the implications of the crisis for economics.

But it's certainly the case that the crisis has quite rightly triggered a debate about the subject. The recent macro consensus has gone, there is no settled view. Some economists have been vocal in insisting that nothing is wrong with economics or its conventional assumptions. This includes Eugene Fama, the Chicago-based father of the Efficient Markets Hypothesis. Interviewed about what the financial turmoil said about the EMH, he replied:

I think it did quite well in this episode. Stock prices typically decline prior to and in a state of recession. This was a particularly severe recession. Prices started to decline in advance of when people recognized that it was a recession and then continued to decline. There was nothing unusual about that. That was exactly what you would expect if markets were efficient.¹³

¹³ <http://www.newyorker.com/online/blogs/johncassidy/2010/01/interview-with-eugene-fama.html#ixzz1jd57Wgv3>

No signs of doubt there, then. Other economists have been insistent on the need for 'new thinking' or a whole 'new paradigm'. While not going quite so far, Paul Krugman has written of the need for a fundamental change of approach, abandoning the long-standing ambition of a consistent theoretical framework:

Many economists will find these changes deeply disturbing. It will be a long time, if ever, before the new, more realistic approaches to finance and macroeconomics offer the same kind of clarity, completeness and sheer beauty that characterizes the full neoclassical approach. To some economists that will be a reason to cling to neoclassicism, despite its utter failure to make sense of the greatest economic crisis in three generations. This seems, however, like a good time to recall the words of H. L. Mencken: "There is always an easy solution to every human problem — neat, plausible and wrong."¹⁴

This division of opinion certainly shows that economics is not monolithic, as some of its critics claim. But this kind of more-or-less ideological difference is a symptom of the terminal state of conventional macroeconomics. I don't believe macroeconomics can survive the crisis in its present form – nor in its 1970s Keynesian form either. We have to go back to the drawing board to understand the aggregate behaviour of the economy and financial markets. Some of the most creative thinking on this front draws on ecological models, network theory, and agent-based computer simulations – in other words on some intellectual traditions that are new to economics. It is very encouraging to see this kind of work, although it is not what most macroeconomists are doing.

The rest of economics – in other words, most of it – is already in a very healthy state. Applied microeconomics is not torn by completely different ideologies and world-views, only by normal scientific disagreements. I tried to give an indication earlier of why economics has entered a fruitful period. Let me end now with some examples of what it can deliver.

I already mentioned spectrum auctions, designed by microeconomists and game theorists, some drawing on experimental lab work. There is a broader market design approach using similar techniques. Economists around the world are designing effective congestion charging schemes, transport pricing mechanisms, environmental trading schemes. The pace of deforestation of the Brazilian rainforest has declined for three successive years, following the introduction of a scheme, designed by economists, to sell lawful leases for logging. Economists designed the bonds that have enabled the Global Alliance on Vaccines and Immunisation to raise \$3bn since 2006. Search companies like Google and Yahoo! employ economists to work on their advertising and search algorithms. Not all of these economists are always

¹⁴ <http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html?pagewanted=all>

right. Not all of them are very good as economists – like any profession, there will be a wide range of ability. The point, though, is that the bread-and-butter applied work that most economists do is thriving, and more useful than ever to businesses and governments because of the relatively recent advances in techniques.

It would be ironic, and regrettable, if the crisis causes people to distrust economics at exactly the time when it has more to offer. This is one reason that we economists have to put our house in order now, and acknowledge our collective faults. It's no good making criticisms without suggesting solutions, so here are a few reforms the discipline of economics needs:

- You can predict a macroeconomist's political views from the confidence of his statements about the economy. They are bringing all of us into disrepute, and instead of going on TV to criticise the government or the opposition (delete as appropriate), they need to become more humble about what they know. Economists who are genuinely interested in how the economy functions in the aggregate will need to open their mind to different approaches, as there is nothing like a consensus on this part of the subject.
- It will be obvious that I'm an advocate of curriculum reform. The top priorities are better teaching of practical statistics and econometrics, and a wider view of economic history and institutions. Academics in general do not have strong incentives to teach well, so it would be good to see that improved. I would also like to see universities and research funders encourage disciplinary innovation and fresh thinking, to ensure that academic economists do not simply draw up the barricades against their critics and resist any change. There has been a large increase in the UK in the number of school pupils studying economics (more than 50% since 2006), and I'd hate to see their enthusiasm squeezed out of them by unreformed courses when they get to university.¹⁵
- Like any area of expertise, economics has its special jargon and economists like to safeguard their status by appearing to have arcane knowledge. But our subject affects people's lives very directly, we have great power in public policy compared to other experts, and the crisis has undermined public confidence in what we say. This combination means we have a special responsibility to explain clearly what economics brings to any specific issue. As a populariser of economics, it will be obvious that I think communication is important anyway. But now more than ever.

¹⁵ <http://tutor2u.net/blog/index.php/economics/comments/a-level-economics-continues-to-grow/>

I hope that the crisis will strengthen economics by stimulating reform from within. Most economists are actually very practical, not abstract theoretical people. They are passionate about using their knowledge to improve the world and keen to test their theories against the evidence, even if the evidence sometimes needs knocking into shape before it confirms that the theory is correct.

In the end the data explosion is what makes me most optimistic that we will see the subject evolve in important ways. Although there's no doubt that political ideology colours economists' work, fundamentally economics remains the same discipline it always was – the application of Enlightenment empiricism to human societies, to how they allocate and use resources.