

## Is Economics Unscientific?

I will spare you the ‘joke’, but George Bernard Shaw was on to something. Economics really is all about supply and demand, no matter how abstruse the model, or mathematically complicated.<sup>1</sup>

To the novice student, demand and supply analysis looks like a very simple, sensible and powerful way of analysing market behaviour. The examples of demand curves in introductory courses are usually fairly folksy and bland. They’ll be in terms of the kinds of thing we all buy from day to day – chocolate bars or gas (petrol), computer games or shirts. It looks so simple. You can easily imagine your own demand schedule for say, chocolate bars. Then - apparently - you simply add your own demand schedule to all the other demand schedules to come up with a market demand curve. A similar process applies to supply. Then it’s just a case of finding the intersection of the supply curve and demand curve. This is the market equilibrium price. If price deviates from this equilibrium, there is a natural mechanism to push the market back toward the point of intersection in terms of excess supply and excess demand. Once you have internalised that model, that’s it – you’re an economist.

As economists, we all know deep down that this is a fiction. Yet we have a collective amnesia about it. What no-one ever wants to talk about is that the examples used to draw the supply and demand curves for new economics students are always fictitious. Look through as many introductory textbooks as you like. You will not find one example of real supply and demand curves from an actual market. Not a single one. This is because, in real life, supply and demand curves are difficult, if not impossible, to observe. If one really could draw supply and demand curves, that would be really useful information for investors in tea, copper, gold, company shares and government bonds – to name but a few. But you will not find a single real life supply and demand curve in the Financial Times or in the Wall Street Journal either.

It’s curious that you can go through a whole course on economics without anyone ever mentioning the obvious limitations of these most basic tools. Even more astonishing is the fact that you can go through a whole career as an economist without ever truly admitting to yourself that you can’t actually draw supply and demand curves. Certainly, it is possible to statistically estimate supply and demand curves. But that would be to use ex-post data with all the attendant pitfalls. An ex post demand curve is very far from the real thing and the hallmark of the Economist is to understand the subtle but important distinction between ex ante and ex post. A demand curve should map what people *intended* to buy at all potential prices, before trading started, equilibrium was reached and the market price established. Concomitantly, ex ante supply is what people planned to sell at different prices prior to the market process. To collect all this information about everyone’s *intended* transactions at different prices, would be next to impossible.

Firstly, we would have to know every person who was likely to participate in the market.

Secondly, we would need to have a schedule of quantities people would be prepared to buy or sell at every conceivable price. That is a long list for each market participant, multiplied by hundreds perhaps millions of participants. Even in financial markets, where trading takes

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<sup>1</sup> The famous playwright George Bernard Shaw is alleged to have said that you could train a parrot as an economist, by simply teaching it the phrase, ‘Supply and Demand, Supply and Demand’.

place from second to second, and it is possible to produce aggregate buy/sell orders, it's still impossible to derive ex ante supply and ex ante demand schedules.

Thirdly, there would have to be no inconsistency between what the market's customers told you they planned to buy at various prices and what they actually planned to buy 'in the heat of battle' when confronted with the prospect of real transactions in real markets using their own very real money. They may not truly understand their own preferences until confronted with the actuality. In financial markets for example, supply and demand are probably slightly unstable emergent phenomena which are contingent on current information and how that is processed and depending on the influence of the trading behaviour and expectations of other market participants.

Of course as we all know, economists get round this problem by Making an Assumption. *Ceteris paribus*, IF information is perfect, and IF market participants interpret that information the same way (homogeneous expectations) and IF market participants are rational (implying stable preference orderings) then it follows by logical necessity that supply and demand curves are stable and well defined. This allows our new minted economics undergraduate to do some impressive analysis right away including the classics on Rent Control, Minimum Wage and why the NHS is almost purpose designed to remain in permanent financial crisis.

But it also forces our market into a straight-jacket of well defined and analytically tractable stasis. All those imaginary supply and demand schedules do not change. Or at least they do not change for trivial, ephemeral or irrational reasons. And they only change one factor at a time, *ceteris paribus*. This is not entirely unreasonable. However it does rule out the analysis of all sorts of interesting market phenomena like crazes, snob effects, and herd effects. It may also rule out a convincing explanation of real life market volatility, bubbles and instability. And it leaves a big question mark hanging over how actual markets ever get to equilibrium in the first place in a world of imperfect and rapidly changing information where equilibrium is ill defined. Take my own area, financial economics and the market for shares.

The value of a share should be equal to the value of cash flow expected from owning the share, discounted for the fact that the income will arrive at various different points in the future. You would have thought then that this price is fairly stable, based as it is on the sum of cash that the firm is expected to be able to pay to shareholders in the future. Surely, at least in some industries, business performance does not change that much from year to year? However, share prices fluctuate all the time. Firstly, because new information is received frequently about the firm's prospects. Secondly, because new information is received all the time about prospects for the macroeconomic performance of the economy. Thirdly, the market mood can change. Market reports often use emotive words like 'fear' 'flight' 'exuberance' and 'bullishness'. There is precious little about this that is *ceteris paribus* and explanations tend to take place in terms of trader narratives concerning 'headwinds', 'tailwinds' and 'market moods'.

Financial markets are hugely influential on economic welfare. Yet, it really would not be impossible to find economic theorists who would dismiss the day-to-day fluctuation of markets as mere institutional detail. As for the language used by the professionals closely involved in the actual behaviour of real markets, this would be seen as descriptive rather than analytical. (Particular scorn is reserved by economists for the language of technical analysis).

However for many economists on the applied side, a narrative descriptive approach dealing in observable phenomena is very much a necessity.

But, even more fundamentally, notwithstanding the often puzzling lack of interest in real markets and real market dynamics among mainstream economic academics is the lack of interest in the possibility of drawing supply and demand curves in real life. Just because something is not observable given the current state of technology does not mean to say that it might not be possible in the future. For example, scientists recently managed to provide a photo of light as both a wave and a particle – something which was previously thought to be not directly observable.<sup>2</sup>

And the observability of the demand curve at least, may now actually be a possibility. In the context of the unobservability of the demand curve Orrell (2010, p.30)<sup>3</sup> relates that Steve Levitt found a ‘real life demand curve’ based on Uber’s dynamic pricing system, though Levitt described it as a customer response to spot changes in price as opposed to a long run demand curve. One would have thought this was a ‘eureka’ moment on a par with the photo of light as a wave and a particle. Yet it remains merely a curiosity. It’s not seen as a critical breakthrough. One has to ask, isn’t the very minor role assigned to observable phenomena in economics downright unscientific?

Indeed as Mandelbrot and Hudson observe, ‘When studying markets it is the supposedly aberrant that provides the greatest insight. Biologists know that studying disease helps to understand the healthy body. Physicists collide high energy particles to understand ordinary matter. Meteorologists study hurricanes to forecast the local weather. And economists? Well by comparison, they are a curiously incurious lot’. (2010, p. iv)<sup>4</sup>

The reason for the lack of curiosity is that logically watertight explanation is prized far above investigation of phenomena. What academic economists usually mean by progress is the expansion of the number of models that are available.<sup>5</sup> These are validated in terms of internal logic alone with any correspondence to empirical data and observable phenomena usually weak at best. In fact a distinct peculiarity of economic models is that they deal in concepts such as supply, demand, marginal product, marginal revenue etc., which deploy practical-looking and apparently countable numbers, but which often turn out to be abstractions which can’t realistically be realised.

The primacy of watertight logic over realism and observability, in itself, makes economics unscientific. Economics has skipped a normal initial stage of any budding science, which is taxonomy and phenomenology. The great mathematician and economist, Mandelbrot observed that ‘compared to other disciplines, economics tends to let its theory gallop well ahead of the evidence’. (2010, p229)<sup>6</sup>. Before you start constructing elaborate theories, it is a good idea to do a lot of careful, open minded observation as Ziman (1978)<sup>7</sup> pointed out in his wonderful guide to scientific method, ‘Reliable Knowledge’.

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<sup>2</sup> <https://phys.org/news/2015-03-particle.html>

<sup>3</sup> Orrell D (2010) ‘Economics Myths’, Icon.

<sup>4</sup> Mandelbrot B and Hudson R. (2010), ‘The (Mis)behaviour of Markets’, Profile Books.

<sup>5</sup> For example, see Rodrik D. (2015), ‘Economics Rules’ Oxford University Press

<sup>6</sup> Mandelbrot B and Hudson R. (2010)

<sup>7</sup> Ziman R. (1978) ‘Reliable Knowledge’, Cambridge University Press

Does it matter? From a practical point of view, for those of us not involved in deep theory, arcane debates about the scientific status of the demand curve may not be an issue. Supply and demand are without doubt the tools of the trade and very useful at every level as an organising principle. Even when our typical undergraduate course goes beyond the supply and demand curve to embrace the additional abstractions involved in consumer theory, production theory and the theory of the firm, the neoclassical ‘story’ of resource allocation is a useful way of looking at the world. The neoclassical ‘story’, abstract as it is, and bristling with assumptions is a useful narrative and organising principle even though apparently simple everyday concepts like marginal utility and marginal cost are difficult to observe in practice. The problem is that the models get much much more complicated than this, both in terms of what’s taught to students and in terms of cutting edge theory. Not only is it not clear that this is scientific, it’s not clear that is useful in a subject which is supposed to fundamentally utilitarian. The marginal cost of painfully working through the dense mathematics is the huge cognitive load in terms of manipulating the more advanced economic models. Is this really outweighed by the marginal benefit? For example, in a previous incarnation I was a mainstream economist with an interest in GDP growth. I remember my despair in trying to plough my way through the mathematically dense set of endogenous growth models in presented in a textbook by a Barro and Sala I Martin<sup>8</sup>. A particular bugbear was the added complication of the incorporation of inter temporal optimisation. As the Great Man of GDP growth, Robert Solow (1994) observed, ‘It adds little or nothing to the story anyway, while encumbering it with unnecessary implausibilities and complexities’.<sup>9</sup>

And yet despite the huge amount of work, all I had done was to check the internal logic of a set of abstract propositions with at best weak correspondence with anything observable. This is because an obsession with imaginary pareto optimality. Economic models are a form of logic checking which manipulate unobservable abstract entities to establish whether rational agency leads to resource allocation and pareto optimality at least in principle. To be accepted as an acceptable theory, there must be a demonstration of how the model ties in with Pareto optimality or the precise logical reasons why it deviates from a Pareto optimum. These were a sine qua non of most endogenous growth models.

But pareto optimality is a highly abstract state which is probably unobservable at an economy wide level. The most robust result from the highly abstract general equilibrium systems of supply and demand is that a pareto equilibrium is a logical possibility. As for rational agency, it is simply assumed – despite all the evidence to the contrary. I scarcely need to rehearse to an audience of professional economists how robotic economic rationality can look

So why this modelling obsession; where is the need? It all goes back to Adam Smith’s Invisible Hand. Economics has long been locked into the idea that rational agency and Pareto optimality are one and the same with the Invisible hand. But it’s not clear that Smith was saying anything of the sort. He was merely making the case that markets when working well find all sorts of ingenious ways of giving consumers what they want, as efficiently as possible. All that’s needed is the profit motive and competition. One doesn’t need highly complex GE models to prove the point that capitalism is astonishingly successful at improving people’s living standards and lifting people out of poverty. To take another

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<sup>8</sup> Barro R. and Sala I Martin (1999) ‘Economic Growth’ 1<sup>st</sup> ed MIT Press

<sup>9</sup> Solow R. (1994) ‘Perspectives on Growth Theory’, Journal of Economic Perspectives, v 8, no1.

example of a more micro nature, one thinks of the persistence and ingenuity of drug cartels from Colombia, Mexico and Afghanistan. Huge expenditure has done little or nothing to shut down an industry worth billions of dollars. Even the mighty US government is powerless against this particularly malign invisible hand. Or if we require a more wholesome example, there's the celebrated case study of the Mumbai tiffin tin distributors who solve complex organisational problems to ensure delivery with an astonishingly low failure rates.<sup>10</sup> Do we really need complex abstract models to explain what's going on here? Smith's Wealth of Nations has almost as much relevance today as it did in 1776. Smith certainly dealt in models, i.e. stylised representation of merchants and consumers, and he also used 'political arithmetic'. But it hardly needs to be said that there are no mathematical models as we might recognise them today, not even supply and demand curves, which of course had not been invented at the time.

Yet the distortion of Smith's Invisible-Hand continues to be perpetrated in a proliferation of highly abstract models, usually because it's coupled with a version of Friedman's methodology. For example, Friedman's methodology is used to justify the idea that economic behaviour is the result of constrained optimisation using marginalist principles in The Core Project in Economics.

Billions of people organize their working lives without knowing anything about MRS [Marginal Rate of Substitution] and MRT [Marginal Rate of Transformation] (if they did make decisions that way, perhaps we would have to subtract the hours they would spend making calculations). And even if they did make their choice using mathematics, most of us can't just leave work whenever we want. So how can this model be useful?

Remember from Unit 2 that models help us 'see more by looking at less'. Lack of realism is an intentional feature of this model, not a shortcoming.<sup>11</sup>

There is no direct evidence that people do allocate their labour time in this way, nor indeed that consumers set marginal utility equal to price or that firms have marginal cost and marginal revenue schedules. Marginalist concepts of optimal decision making follow by definition from the assumptions made, yet as noted above, they are almost certainly unobservable. Nevertheless, they persist as a methodology for teaching, despite protests from students, including the Mankiw walkouts in the US and the Econocracy movement in the UK.<sup>12</sup>

The response to this is the same as it has always been. Descriptive realism doesn't matter as Friedman averred. What matters is prediction. But it's hard to see what predictions do actually follow that are not weak or trivial. To take those staples of undergraduate teaching,

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<sup>10</sup> <https://www.bbc.com/future/article/20170114-the-125-year-old-network-that-keeps-mumbai-going>

<sup>11</sup> <https://www.core-econ.org/the-economy/book/text/0-3-contents.html>

<sup>12</sup> <https://www.nytimes.com/2011/12/04/business/know-what-youre-protesting-economic-view.html> and <https://www.theguardian.com/books/2017/feb/09/the-econocracy-review-joe-earle-cahal-moran-zach-ward-perkins>

consumer behaviour theory and production theory, they predict that under certain highly restrictive assumptions, the demand curve is downward sloping while the supply curve is upward sloping. This is not so much prediction as torturing mathematical logic until it produces the end point which was desired in the first place. Indeed at the start of my career, I taught these topics to business students on a college course with a practical bent. I sometimes wonder how much good it did them given how little these theories have to say about actual consumers and actual production decisions. And in fact these theories were never intended to explain real life consumer behaviour and production decisions. They were intended to establish that in theory markets produce a Pareto optimal allocation.

To be fair though, there was a sound reason for abstract theory and the Friedmanite approach many years ago, which was that supply and demand curves were held to be ephemeral and unstable and the 'neoclassical story' provided a satisfactory narrative for general explanation of economic phenomena. Moreover the process of what actually went on inside people's minds when they made a decision was difficult to observe and quite possibly unknowable. So the assumption of logically consistent preference ordering and hyper rational utility maximisation was a reasonable approach.

However it seems perverse to cling on to what looks increasingly like an unscientific approach in the light of the remarkable results of Kahneman.<sup>13</sup> Kahneman's work suggests that preference ordering and rationality may not be so 'simple' as has been assumed. His main result is that a lot of our decision-making takes place using System 1, which is a default standby mode of cognition which deals with most of our day to day life and decision making. System 1 'generates impressions, feelings and inclinations'; when endorsed by System 2, these become beliefs, attitudes and intentions' (2011, p105).

System 2 is much more recognisably what we'd think of as rational agency. The problem is that System 2 is 'lazy', necessarily so because deep analytical thinking is more energy intensive and quickly depletes glucose – which was a scarce resource for the human body in evolutionary times. Consequently, the more superficial and shallow System 1 is usually in charge. This must necessarily be the case both in day to day life and from an evolutionary point of view in order to avoid 'paralysis through analysis'. However, the problem is that System 1 is capable of numerous cognitive biases, which have been carefully researched and catalogued by Kahneman.<sup>14</sup> This problem is further exacerbated by System 2's laziness. System 2 is evolved to intervene when System 1 senses danger or when System 1 detects an anomaly in the immediate environment which may indicate danger. But most of the time it's on idle.

System 2 is much more recognisable as the Rational Economic Agent that we are familiar with. But given that it's usually absent, models based on rational agency may be impeccably logical, but highly misleading. We can and do make predictable and consistent mistakes, often in a way which is not consistent with our long term welfare.

Perhaps the most striking example of the violation of rationality is given by Kahneman. As he pointed out, the von Neuman-Morgenstern principle demands that 'any weighting of

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<sup>13</sup> Kahneman D. (2011), 'Thinking Fast and Slow', Penguin.

<sup>14</sup> (Space does not permit a full description of the biases of System 1. A very useful summary can be found on page 105)

uncertain outcomes that is not proportional to probability leads to inconsistencies and other disasters'. (2011, p312). Yet the empirical evidence suggests that people do not weight uncertain outcomes in proportion to probability. In particular there is a tendency to overweight improbable outcomes and underweight highly probable outcomes. At a conference of high-powered economists in 1952, Maurice Allais put some survey questions to the audience designed to elicit their evaluation of probability. As expected, they demonstrated consistent violation of von Neuman-Morgenstern. Their weightings were not proportional to probability. Among this very august audience who all demonstrated consistent violation of rationality was Milton Friedman himself. Oh the irony.

So where does that leave us? There are two issues to address. Firstly there are limitations to modelling approach. Secondly it may well be that the concept of economic rationality will have to be substantially modified.

To take the first point, as observed earlier, economics has missed out on an important stage in the normal development of a science. This is the taxonomic stage, where academics collect samples and instances and attempt to fit them into a classification scheme. However, there is a distinct reluctance to engage in phenomenology in economics, with a marked tendency to jump into abstract modelling before the facts have been established. Yet by carefully engaging with human subjects, Kahneman has established a solid and impressive body of work on human rationality and its limitations. Yet despite winning a Nobel award in Economics for his efforts, his technique, laboratory experimentation, still tends to be treated with deep skepticism by economics academics.<sup>15</sup> This seems downright unscientific given the demonstrable achievements of Kahneman. But then again the lack of curiosity about actual demand curves and the complacent attitude to Allais' findings concerning rational agency also seem pretty unscientific as does the absence of interest in the status of the demand curve.

Secondly, there are surely obvious questions to be asked of rationality. One obvious point is that some people are far more rational than others – it is far from universal. Another is that rationality may fail altogether as Allais so memorably demonstrated in a room full of very eminent economists. In addition, it is also necessary to state the conditions under which System 2 is activated enough to engage in rational behaviour and what this implies. A well known result that Kahneman describes is that people behave differently depending on whether or not they are money activated. They tend to be more selfish and individualistic when primed by financial cues. Selfish and individualistic may or may not be rational in a world of other people which often requires cooperation and where our happiness depends also on the happiness of others.

But perhaps the most striking thing about Kahneman's immense contribution is that it links human behaviour back to biology. There is something rather cold, robotic and individualistic about the economic concept of rationality. And it stretches credibility to breaking point that it can be used to fully explain phenomena such as addiction, sexuality and reproduction, and the orgy of consumption that goes on in festive occasions like Christmas or Chinese New Year. As for material utility and happiness, I have just spent two very happy years with my young grandson during Covid lockdown. Money can't buy this. There is no financial equivalent.

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<sup>15</sup> Rodrik (2015), p.104