

Department of Economics

## Uncertainty-Denial

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### Abstract

The uncertainty which has characterised the financial crisis has encouraged renewed attention to uncertainty in economics. Yet, not only is uncertainty seen as unpalatable in financial markets and economic life more generally, it also poses challenges for economists to the extent that uncertainty is absent from most of mainstream theory. The purpose of this paper is to consider the reasons for this in terms of attitudes to uncertainty and the coping mechanisms which society develops to deal with uncertainty. The causes, nature and consequences of uncertainty are therefore reviewed, both in the economy and among economists. This is followed by a review of mechanisms for bringing order to uncertainty. It is argued that the coping mechanism of uncertainty-denial can be counterproductive where it arises from a closed-system understanding of uncertainty as being exogenous and inevitably anathema. But an open-system understanding sees uncertainty as more integral to economic life. Further it allows for uncertainty which, as the counterpart of creativity, can be seen in some circumstances in a positive light. It is concluded that economists could profitably consider embracing uncertainty by tailoring our methodologies and theories to address uncertainty. In this way we can tailor policy to reducing uncertainty in the economy and also reduce our own uncertainty.

**Keywords:** uncertainty, open systems, financial behaviour

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## Abstract

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## **Introduction**

It is hard to deny that there is uncertainty in economic life. But then why is there so much resistance among economists to addressing it? There has been a revival of interest in Keynesian solutions to the crisis, yet little attention is paid to the centrality of uncertainty to Keynes's thinking or to the way in which Keynesian uncertainty theory offers an explanation for the crisis. This juxtaposition is made clear in Stiglitz's (2010) review of Skidelsky's (2009) demonstration that uncertainty is at the core of Keynes's ideas. Stiglitz argued rather that the crisis could be analysed without reference to uncertainty. Certainly there has been renewed attention to Keynes's key concept of effective demand, with consequent renewed attention paid to fiscal policy supported by the central bank. But, without uncertainty, how far is this development Keynesian? More important, without uncertainty, can this 'Keynesian' development in economics adequately explain the crisis and give guidance to policy makers?

Uncertainty has loomed large in the financial crisis. Here we mean by uncertainty unquantifiable risk, or 'fundamental uncertainty', as distinct from the conflation of uncertainty with quantifiable risk which is common within much of economics. The crisis itself created uncertainty, which in turn has inhibited the effectiveness of the policy response to the crisis. There has in consequence been a stream of papers arguing that uncertainty should be more prominent in economic analysis (see for example Skidelsky 2011). Further, there has been uncertainty, not only within the economy, but also among economists in seeking to develop analysis which better explains and analyses the crisis. Yet, while some have therefore perceived a crisis in economics, that view does not seem to be shared by the large number of economists who continue to exclude uncertainty from

their theories, except in the different form of quantifiable risk. After the early unsettling days of the crisis, economists once again do not even appear to be unduly concerned with their own uncertainty. While Stiglitz addressed the possibility that uncertainty might be important, albeit to dismiss it, the resistance of most economists is implicit in their exclusion of fundamental uncertainty from their theories.

The purpose of this paper is to consider why so many economists resist thinking in terms of uncertainty, in order then to address the question of whether and how economic analysis might develop to encompass uncertainty. This discussion requires a review of the source, nature and extent of uncertainty in general. We consider separately uncertainty within the economy and uncertainty among economists. Economies and economists can clearly normally function in spite of uncertainty, so we then consider how uncertainty is dealt with in practice. Within economics the presumption is generally that uncertainty (if addressed at all) is by its nature uncomfortable and unwelcome, in contrast to the possibility in standard choice theory of risk-loving preferences. We consider the mechanisms adopted by society to deal with uncertainty, ranging from institutional arrangements to conventional knowledge to denial. The analysis then proceeds to address the uncertainty of economists and to consider the mechanisms employed by economists to deal with uncertainty (in the economy and among themselves).

The argument to be developed is that, although society generates mechanisms to deal with the problems posed by uncertainty, these mechanisms may have damaging consequences, particularly in an environment of dynamic change. The financial crisis arguably stemmed from mechanisms which fostered over-confidence in expectations as to risk and return, that is, inattention to uncertainty. Given that most economists treat

uncertainty, if at all, as peripheral, we assess the consequences of this coping mechanism. Indeed it will be argued that the uncertainty-denial adopted by financial markets and by mainstream economists has ultimately been counterproductive, actually increasing uncertainty.

We end by going back to the causes of uncertainty in order to revisit the presumption that uncertainty is anathema and a challenge to rational decision-making. This presumption is shown to follow from the mainstream habit of thinking in terms of closed systems, such that uncertainty is, if anything, an unwelcome exogenous disturbance. Within the alternative, range of open-system frameworks, uncertainty is shown instead to be embedded in the decision-making environment. While uncertainty can at times be debilitating, it can be seen at other times as being the counterpart to creativity and emergence. It is concluded that, rather than recoiling from uncertainty to the extent of not addressing it seriously, economists would do better by accepting its significance and developing methodologies and theories accordingly. The resulting improved understanding of economic processes would in fact serve to reduce economists' uncertainty and, potentially, uncertainty in the economy.

### **The Consequences, Source and Nature of Uncertainty**

In a crisis situation uncertainty increases as the range of apparently possible outcomes increases and as awareness increases of the extent of potential 'unknown unknowns' which cannot feasibly be incorporated into calculations. Indeed it is commonplace to refer to the damage caused by uncertainty in financial markets. These markets require that all assets (including their risk) be priced in such a way as to incorporate a view of the

future. But uncertainty means that there can in general be no ‘true’ price), something which poses increasing problems as uncertainty rises (Townshend 1937; see further Dow 2013). Uncertainty during the recent crisis reached such a pitch that the interbank market, for example, has at times been unable or unwilling to price trades.

For firms, uncertainty can pose particular difficulties too, but primarily with respect to long-term investment planning. This was a primary focus of Keynes’s (1936) argument for fiscal intervention to prevent slumps. High uncertainty among producers has the consequence of an unwillingness to commit to new investment and to debt, with multiplier effects on aggregate demand and thus on output and employment. Banks too respond to uncertainty by being less willing to expose themselves to default risk, at the same time as facing reduced confidence in their ability to assess this risk. Credit thus becomes more expensive and less available. Households in turn respond to increasing uncertainty about employment, income and credit prospects by curtailing their own expenditure, further discouraging firms’ investment plans. All sectors are expressing liquidity preference (Dow and Dow 1989; Bibow 2009). *Pace* Stiglitz, the uncertainty of knowledge in financial markets, and more generally, therefore provides a sound basis for an analysis of the crisis along Minskian (1986) lines, drawing also on Keynes.

Keynes’s argument about the generality of uncertainty extended to its domain among economists as well as economic agents (Dow 2003). Just as agents face fundamental difficulties in forming quantitative probabilistic expectations, so do economists face uncertainty in their own forecasting. Keynes showed how uncertainty can vary in degree; it is conversely related to the degree of confidence in our judgements. Confidence in turn depends on the relative amount of relevant evidence which can be

brought to bear on a probabilistic judgement. But relevance in turn depends on a theoretical perspective which is itself subject to varying degrees of confidence. Indeed the economist's uncertainty about the validity of models being employed has been the subject of the (mainstream) model uncertainty literature. However model uncertainty is only addressed there in a limited way (Dow 2004). Either uncertainty is applied to the choice between a limited range of existing models, or else it is captured in a stochastic error distribution. Being calculative, these analyses of uncertainty in fact refer instead to quantifiable risk. Indeed the methodological framework within which mainstream economics focuses on calculative rationality supports the presumption that there is one best (or even true) model of the economy (arrived at through the calculative rationality of economists themselves). It is within this context that many economists responded to the crisis initially by opening up to different ideas (like a return to a Keynesian theory of aggregate demand), but then retrenched into variations of pre-crisis thinking. The question was posed in terms of the calculative search for a better model, rather than considering whether a single deductivist formal model is in fact the best way of formulating economists' knowledge (Lawson 2009).

Nevertheless, the possibility that conditions do not allow probability to be quantified has been given attention recently in some of the mainstream literature, notably the new behavioural economics and New Keynesian economics. However the treatment of uncertainty is limited by presuming that quantified probabilities are in principle knowable, so that uncertainty arises from constraints on acquiring that knowledge, i.e. epistemic constraints. One condition for uncertainty which has been drawn to economists' attention by recent inputs from psychology is cognitive limitations.

Experimental evidence has supported the view (stemming from the work by Kahneman and Tversky 1974) that subjects suffer from limitations on making judgements on which to base rational choice, such that they resort to heuristics and biases. Experiments generally supply subjects with the information necessary for making calculations, focusing therefore on information processing errors. But, even if we had adequate calculative capabilities, epistemic uncertainty may also arise in non-experimental situations if the information that is necessary for making probability calculations is inaccessible. The information may exist but be concealed; this is the case of asymmetric information which has been at the centre of much New Keynesian analysis. Alternatively inaccessibility may be seen as temporary, being resolved as events unfold and new information emerges.

This uncertainty as to whether or not propositions are true (given limited computational capabilities or limited information) is classified by some as ‘truth’ uncertainty and distinguished from the particular uncertainty as to the meaning of propositions which can be classified as ‘semantic’ uncertainty (Lane and Maxfield 2005). This further source of uncertainty has been a particular focus of monetary authorities in their attempts to communicate their expectations and the reasoning behind them. A growing literature has grown up around this issue of central bank communication. But the framework continues to be one of constrained optimisation with respect to information which is in principle knowable. Elimination of semantic uncertainty in this sense is seen as requiring only increased transparency as a mechanism for reducing information asymmetries, thus facilitating rational choice (Dow, Klaes and Montagnoli 2007).

But epistemic and semantic uncertainty may be much more extensive and pervasive if full information, including shared meanings ascribed to information, cannot be available even in principle. This was the general case analysed by Keynes (1921) in his *Treatise on Probability*. Here he argued that the ultimate source of uncertainty is the nature of the subject matter, such that uncertainty is aleatory.<sup>2</sup> Social systems (of which the economy is part) cannot in general yield certain knowledge because they are open and organic (Chick and Dow 2005). This means that structures evolve and interrelations between agents evolve in such a way that the past is a very limited guide to the future. Individual creativity is also a key ontological source of uncertainty, as emphasised by Hayek (1960). Unless creativity is understood as uncovering existing possibilities, it is by its nature unpredictable. As Shackle (1955) argued, quantitative probability requires that all possible outcomes are known in advance, so that the sum of probabilities is one.

If risk is to be quantified, then, the subject matter must conform to a closed system, in the sense that structure, changes in structure and interrelations within the structure are all knowable within a probability distribution (an argument developed fully by Lawson 1997). Any disturbances take the form of shocks to this system, where the shocks are known to be stochastic. The closed-open distinction is not dualistic (a characteristic of closed-system thought) since there is a range of possibilities for the alternative of openness. The degree and nature of openness may vary over time, and different groups of economists focus on different aspects of openness. Further, as we will explore below, a particular source of openness is that the very structures and mechanisms

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<sup>2</sup> See Lawson (1988) for a careful exploration of epistemic and aleatory uncertainty in economics. The distinction corresponds to the distinction between truth uncertainty and ontological uncertainty discussed by Lane and Maxfield (2005) and Tuckett, Chong and Ruatti's (2012) application of the framework to the financial sector.

which society has developed to address uncertainty. These are part of the ontology itself, such that it is limiting to consider uncertainty independent of the socio-economic system (i.e. as being purely epistemic or semantic).

We continue the discussion on the basis, irrespective of economic theory, that fundamental uncertainty is a feature of economic life, i.e. it is not just epistemological. In the next section we consider the range of mechanisms which have evolved in response to uncertainty, changing the pre-existing ontology. Rather than considering uncertainty as some kind of periodic externally-generated shock or constraint, therefore, we will consider how it has helped to shape the institutions, practices and conventions which structure economic life.

### **Coping Mechanisms: imposing order on uncertainty**

If indeed social systems are open, such that uncertainty is general, how then do we manage to function at all (in the economy and as economists)?<sup>3</sup> Uncertainty may vary in degree, such that there can be significant periods during which uncertainty is relatively low. This could be said of the Great Moderation period which pre-dated the crisis, for example. Does this mean that uncertainty is only significant temporarily, as a consequence of crisis (even as an exogenous shock)? Was the crisis just a Minskyan ‘moment’ (Amariglio and Ruccio 1995; Whalen 2007). But Minsky regarded the economy as inherently potentially unstable, while capable of long periods of apparent macroeconomic stability (which in fact create the seeds of instability). To regard a crisis instead as a temporary aberration is to reflect the mainstream closed-system approach,

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<sup>3</sup> The focus of Keynes’s (1921) philosophical work was the question of how grounds for belief, as the basis for action, could be established under uncertainty as the general case.

whereby the norm is gravitation to a stable equilibrium. From this perspective, uncertainty is only relevant, if at all, as a temporary exogenous source of anxiety and impediment to markets reaching equilibrium. This contrasts with Minsky's systemic analysis of the macro economy over time.

But there are further reasons why it is inappropriate to limit considerations of uncertainty to times of crisis. Periods of stability in fact owe much to the mechanisms which have evolved over time to address uncertainty and which therefore have as much relevance during periods of stability as during periods of crisis. Consideration of mechanisms (both epistemological and institutional) to cope with uncertainty goes back at least to Hume and Smith, who both had an ontologically-founded view of knowledge as being uncertain. Both rejected Cartesian rationalism in favour of a view of knowledge as partial and provisional, resting on experience and designed to satisfy psychological requirements (since there was no scope to demonstrate truth in any absolute way). Reason and evidence alone were rarely sufficient for knowledge, so reliance is placed on conventional understandings or belief, built up over long periods of experience. Indeed Hume argued that such beliefs, as in existence, were prior to other forms of knowledge. Conventional understandings are thus a way to cope with uncertainty, enabling action.

For Hume, the motivation for action, and indeed for seeking knowledge, was the passions. Keynes (1937) developed this argument, similarly integrating the emotions with cognition (Dow 2011). He identified reliance on the views of peers and the views of experts, as well as extrapolating from the past, as a way of both underpinning and supplementing reasoned argument drawing on evidence. But non-routine action required further the impetus from 'animal spirits' (Dow and Dow 2011).

New contributions from psychology are contributing to our understanding of this relation between emotion and cognition. For example, the role of psychology in the study of behaviour in financial markets under uncertainty is approached by Tuckett, Chong and Ruatti (2012) from the starting point of Freudian psychoanalysis (see further Tuckett 2011). Supported by survey evidence from the financial sector, they explain the decision to act in spite of uncertainty as being based on judgements about market valuations mediated by the motivation to beat the market in some combination with fear of being beaten by the market. The justification for action is expressed in the form of a narrative that presents an argument which is convincing in that it is in itself coherent. For Tuckett all knowledge is constructed so that these narratives are all fictional. But Keynes had argued that beliefs are formed by applying judgement to a combination of sources which include reason and experience. So it is a matter of the nature of the sources, the balance of their combination and the judgement applied to develop a coherent narrative. We can adapt Tuckett's ideas by drawing on Lawson's (1997) application of the term 'fiction' only to those assumptions that contradict (rather than simplify) our understandings of real experience. This useage allows for consideration of degrees of fictionality in the sense of how far a narrative contradicts understandings of real experience.

Simon (1955, 1986) had also introduced his notion of bounded rationality on ontological grounds, that it is the open nature of social systems which limits the availability of information. He considered cognitive limitations in a broader sense than Kahneman and Tversky's subsequent analysis. These limitations stem not just from insufficient information but from information overload, challenging the scope for calculative rationality itself. Simon (1957) pioneered the concept of heuristics (mental

short-cuts) as an alternative to calculative rationality, providing a basis for behaviour under uncertainty, where rationality is bounded.<sup>4</sup> Indeed, starting from evidence of the nature of actual decision-making rather than the benchmark of constrained optimisation, Simon saw heuristics in a positive light (not a constraint), as *enabling* decision-making under uncertainty (Earl 2012). This emphasis on the important positive role of heuristics has been developed further by Gigerenzer (see e.g. Gigerenzer 2007).<sup>5</sup>

Conventions and heuristics introduce what would appear as rigidities in a mainstream version of choice theory. In contrast, Bayesian theory presumes that agents are capable of forming subjective quantified probabilities such that there is no uncertainty to be addressed by knowledge conventions (only mistaken probability estimates). But to argue that subjective calculation is always possible is to ignore the problem of true uncertainty, which refers to the degree of confidence in any estimate. Where uncertainty is high (confidence is low) there is an unwillingness to settle on any subjective calculation. This is the rationale for liquidity preference due to precautionary demand – an unwillingness to place bets (Runde 1995).<sup>6</sup>

Both Hume and Smith also discussed the role of legal structures (particularly those surrounding property rights and contracts) with government enforcement as a way of organising society which reduced uncertainty. Their work was a strong influence on Hayek (1960, 1973-9), for whom social order arose, not through deliberate action, but through the unintended consequences of habitual action on the part of individuals. Again, what appears in choice theory as a rigidity is in this view something which serves to

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<sup>4</sup> These bounds might apply to the taking in of evidence; Shackle (1968: 67) introduced the notion of expectational time as a mechanism for abstracting from the passage of real time, thus reducing uncertainty.

<sup>5</sup> A similar argument could be developed with respect to anxiety, as an *enabling* emotion.

<sup>6</sup> Speculative demand for money involves action as if under certainty.

reduce uncertainty and thus encourage action. The emergence of institutions more generally can be understood as a means of reducing uncertainty (see further Hodgson 1988). One institution which underpins all other market institutions is the institution of money (Davidson 1972). Keynes discussed liquidity preference in terms of the demand to hold money because it is the safest asset to hold when uncertainty is high.

The existence of the firm itself (indeed of any contractual arrangement) can be understood as a mechanism to reduce uncertainty for some parties involved, providing a pool of liquidity (Loasby 2011). Langlois and Cosgel (1993: 458) draw on Knight's use of a biological metaphor to make this point: 'The task of meeting uncertainty in an economic system is analogous to the brain of a living organism'. They go on to show how Knight, like Keynes, had emphasised the role of judgement under uncertainty. A particular methodology which has proved to be very helpful in practice for forming judgments within the firm in the face of uncertainty is scenario planning (Jefferson 2012).

All of these practices, conventions and institutions have evolved over long periods as society attempts to deal with uncertainty. Given that so much of the structure within which markets operate, therefore, is the product of long experience of uncertainty, uncertainty is a factor to take into account as a long-term phenomenon in addition to its short-term variations. But periods of crisis and thus of increased uncertainty can often prompt changes. These developments may be designed to reduce the chances of a recurrence of crisis and thus high levels of uncertainty, such as changes in relations between banks and the central bank following a banking crisis. There is a ratchet effect, such that these institutional arrangements continue beyond the crisis and condition the experience in the build-up to the next crisis. This was the thinking behind Keynes's

approach to monetary policy, which was to prioritise the promotion of financial stability (Tily 2007). But sometimes crisis situations can disrupt longstanding conventions and institutions, as when confidence is destroyed or large institutions fail.

Economists, like every other group, are exposed to uncertainty and have forged their own ways of coping with it. If indeed the subject matter is open and evolving, then, as Hume, Smith and Keynes had argued, our knowledge about it is in general uncertain. Indeed Smith (1795) argued that it was uncertainty prompted by novel events (what he called ‘wonder’) which motivated scientific enquiry; this was a psychological drive to set the mind at rest by finding patterns, through making new connections, which made sense of new phenomena. The study of economics is thus an attempt to reduce our uncertainty about the economy.

Faced with uncertainty, however, economists have developed conventions as to how best to reduce it. The dominant convention, which has gained force over the last 50 years, is to build theory within a formal deductivist framework. This framework builds up formal deductivist models on the basis of axioms about optimising behaviour on the part of individual agents, where knowledge is held with certainty (or certainty equivalence) although specific knowledge may be concealed (asymmetric information). The theoretical system is closed in the sense that variables are classified as endogenous or exogenous. Endogenous variables interact in a predetermined way within a given structure, while exogenous variables are known to be random. There is no place for uncertainty in the form of unquantifiable risk. If addressed at all, uncertainty is understood as an impediment to rational choice.

Chick (1995) has analysed this closed-system approach in terms of its dualism, drawing on Prigogine's critique of traditional science. Science had been understood as a means of identifying the order underlying apparent chaos. This 'mechanistic, linear approach that has pervaded the course of science over the past 350 years has led to the glorification of order and the subsequent objectification of reality. At the same time, the idea of mystery—a sense of the unknowable—has typically been dismissed by science as mere metaphysics or, worse, superstitious ignorance—the last refuge of a primitive mind' (Gordon 2003: 100).

To think of economic methodology in terms of conventions is to reflect the conclusions from the philosophy of science that there is no demonstrably best methodology of science. Rather, communities of scientists develop methodologies which make most sense to them in relation to the way in which they understand the subject matter (their ontology), perpetuate it through 'normal science' and propagate it through education. Non-mainstream approaches to economics, which have different ontologies, have therefore developed different conventions. Post Keynesians for example have put uncertainty at the core of their theory, seeing it as an essential feature of the economic process. As a result, just as economic agents employ a range of methods to build up expectations in which they can have confidence, so Post Keynesian economists employ a range of methods and styles of argument, that is, a pluralist methodology.

Just because conventions evolve with experience of uncertainty does not mean that they necessarily succeed in reducing uncertainty. For example, Earl (1984) shows how the coping mechanism of thinking in terms of (Shackle's) expectational time leads firms to ignore evidence to which they should really have responded. Similarly Dow's

(1995) Keynesian analysis of uncertainty shows levels of recognition of uncertainty such that a refusal to recognise uncertainty allows the suppression of recognition of ignorance. Uncertainty-denial may be enabling in some contexts, e.g. when it comes to entrepreneurial action. Indeed Keynes (1936: ch. 11, 12) pointed out that a rational (in the mainstream economics sense) investor would never have sufficient basis for action. But suppressing awareness of uncertainty can be counterproductive in other contexts. While mainstream theory associates true uncertainty with irrationality, Gordon (2003: 98) argues on the contrary that '[o]ur typical response to chaos is an instinctual drive to impose order and regain control. Our fear of uncertainty often impels us toward irrational and sometimes bizarre behavior.'

While Tuckett, Chong and Ruatti (2012) explain the scope for profit-seeking behaviour in financial markets as arising from the same conditions that generate uncertainty. But the financial crisis arguably stemmed from mechanisms which fostered over-confidence in expectations as to risk and return, that is, inattention to uncertainty. Tuckett (2011) explains this phenomenon in terms of Freudian psychoanalysis applied to the emotional aspects of financial behaviour: 'as human beings we deal with such conflicting feelings by making the painful ones unconscious; we behave as though we never thought or felt whatever it is we don't like' (Tuckett and Tafler 2007: 19). Tuckett explains excessive upswings in asset values in terms of pursuit of the 'phantastic object', suppressing reason grounded in evidence. The resulting theory of emotional finance has provided an interpretation of survey evidence of the emotional withdrawal from uncertainty into fear (see also Gordon 2003: 111). The conviction narratives which Tuckett, Chong and Ruatti (2012) identify as being necessary to enable action under

uncertainty inevitably require more than reason and evidence (just as Hume had argued). But these narratives can deviate unduly from reason and evidence when focused on a ‘phantastic object’. In terms of our discussion above, the degree of fictionality in the narratives used to justify action increases. Such narratives in turn may be the source, further, of semantic uncertainty when they provide accounts which conflict with other accounts, particularly reality-based accounts. But there may be a strong motivation to avoid such uncertainty. Cognitive dissonance arising from conflicting constructions put on experience is uncomfortable, encouraging the reaction of denial (Earl 1992).

A powerful conflict of narratives is provided by the fact that financial markets have relied increasingly on quantitative models which exclude uncertainty, while the experience of uncertainty became palpable in the crisis. We know that practice in financial markets relies also on judgement and that individual traders are aware of some of the limitations of quantitative models (McKenzie 2006, Tuckett 2011). But this awareness extended only to the scope for ‘mis-pricing’ relative to a correct price, and thus the scope for trading opportunities. Strategy in the financial sector in the run-up to the crisis arguably was shaped by institutional narratives that were unduly influenced by the excessive confidence which arose from a basic modelling approach which ignored uncertainty. Indeed this modelling approach was institutionalised by the very capital adequacy requirements which were intended to reduce risk. The mechanism which therefore evolved in financial markets to address uncertainty in the run-up to the crisis was denial. The institutional arrangements which had evolved over a long period to address uncertainty had steadily been dismantled since the 1970s (Chick 2008 and forthcoming), leaving markets vulnerable to the onset of crisis which, rather than a

random shock, was the systematic outcome of behaviour governed by denial of uncertainty. This proved not to be a successful coping mechanism since the outcome was a debilitating level of uncertainty.

Given that most economists treat uncertainty, if at all, as peripheral, they too have been engaging in denial, suppressing cognitive dissonance. As Gordon (2003: 15) states with respect to the unknowable: '[f]or the positivist, there is only denial'. This can be seen as a coping mechanism, but also follows from the dualistic methodological approach which is based on understanding the economy as a closed system buffeted by random shocks. Because apparently this basic understanding has not fundamentally changed, the uncertainty evident in mainstream economics at the onset of crisis seems to have been dispelled and confidence in theorising restored. But, while denial of uncertainty has reduced the uncertainty of mainstream economists, it has had widespread consequences for the economy. Economists have presented themselves as experts, whose judgements serve to reduce uncertainty among economic agents and policy-makers. Yet in the crisis economists were widely criticised for their failure to predict and then, in the immediate aftermath, explain the crisis. Mainstream economists had compounded the problem of denying uncertainty in their theories by failing to acknowledge the uncertainty attached to their own expertise. There is a conflict between the way in which mainstream economists present themselves and how they are often regarded in society (see further Hayek 1974).

Policy-makers, even when following a course set by mainstream theory, are in a special position. Because they are required to engage with an economy which is conditioned by uncertainty, they have to face up also to their own uncertainty. Indeed speeches by members of the UK's Monetary Policy Committee have frequently referred

to uncertainty (see for example King 2010). The lead for much of the discussion of economists' model uncertainty came from central banks, and methodological pluralism has even been advocated by the Bank of England (1999). But, since the theoretical guidance is taken from the mainstream, the view taken of uncertainty is in practice very limited. Thus the efforts to promote transparency with respect to central bank thinking presumes that full information is in principle available, while the central bank view of risks with respect to forecasts is quantified, e.g. by fan charts.

While the term 'uncertainty' is given different meanings in economics within the mainstream and outside the mainstream, these differences go beyond the question of whether or not it is quantifiable. In the next section we explore further how uncertainty is understood.

### **A non-dualistic approach to uncertainty**

Within mainstream economics it is generally implied that uncertainty is by its nature uncomfortable and unwelcome, challenging our liking for order, while standard choice theory allows for risk-loving preferences: some may find risk exhilarating. Indeed we have discussed the response to the experience of uncertainty so far in terms of reducing its damaging effects. This negative view of uncertainty is evident in the non-mainstream literature that studies the evolution of behaviour and institutions in terms of uncertainty as a central feature of the economic process. In this section we consider further the way in which uncertainty is understood in order to understand the coping mechanisms of economists in the face of uncertainty. But we will also explore the positive side of uncertainty.

Within a closed-system approach, the mode of thought is dualistic, such that certain knowledge is juxtaposed to its opposite, ignorance/uncertainty. Since the purpose of theory is understood to be the uncovering of universal law-like behaviour which can be captured within a deductivist framework, there is no scope for aleatory uncertainty.<sup>7</sup> Any uncertainty therefore arises from cognitive limitations, which lead to reliance on heuristics for the informational basis for rational optimisation. While the new behavioural economics is uncovering evidence of such behaviour, the challenge ultimately has been to translate these results into the formal deductivist framework (Dow 2012). Uncertainty represents a lack (of certainty or certainty-equivalence) which prevents agents from fully-informed rational optimisation, so that it is seen as anathema in financial markets. It acts as an impediment to the optimal operation of free markets, in much the same way as the exercise of emotion (equated with irrationality and typically viewed as another exogenous disturbance), and thus reduces social welfare.

This view of uncertainty finds some support in the psychology literature where it is often equated with anxiety (Smithson 2008). Further, in the interface between psychology and economics, it is common to find the equation of uncertainty with quantifiable risk (Weber and Johnson 2008). We have classified this as uncertainty-denial. But psychology, like economics, is characterised by different schools of thought, such that this is not a universal view of uncertainty. Indeed there is a view in psychology that uncertainty should not be understood in dualistic terms, but rather as the outcome of creativity, with both positive and negative features. The psychologist Gordon (2003: 96) for example challenges the traditional scientific approach to uncertainty, referring to: ‘Prigogine’s assertion that uncertainty is an inherent cosmic expression, deeply

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<sup>7</sup> See Elster (1999) for an alternative to the covering-law approach to the social sciences.

embedded within the core of reality. The deep psychic expression of this experience is anxiety which, following Heidegger, is conceived not as pathology but rather as an essential state of being emerging simultaneously with uncertainty’.

Gordon explicitly contrasts his view of uncertainty with that which arises from a formal deductivist framework. If there is creativity (one feature of the economist’s open-system economy), then the full range of possible outcomes cannot be known, far less their probability quantified. Creativity is an innate aspect of human nature which is generally regarded in a positive light. It creates a form of uncertainty which is exciting and gives meaning to life. Similarly economists such as Hayek, Knight and Shackle have focused on creativity as central to entrepreneurial activity and in turn to economic growth (Loasby 2011). Tuckett, Chong and Ruatti (2012) emphasise the importance of semantic uncertainty in financial markets, whereby traders seek to benefit from alternative narrative interpretations of evidence. Competitors are not content with normal profits but continuously seek abnormal profits by creative differentiation from others. This creativity is associated with the pre-conditions for uncertainty, which can be energising rather than debilitating.

While these are the pre-conditions also for entrepreneurship, the entrepreneur is characterised as someone who acts in spite of uncertainty. (Entrepreneurial behaviour can be understood as extending beyond production to attempts to out-perform in financial markets.) This is a form of uncertainty-denial which occurs within the open-system understanding of reality within which new opportunities are created and without which no non-routine action would be taken. Similarly semantic uncertainty can act as a spur to new understandings which facilitate innovation (Lane and Maxfield 2005). For

economists themselves, uncertainty can act as a spur to innovative theoretical developments. When Smith (1795) wrote of the sense of wonder at novel events as a motivation for science, he did not talk about anxiety or cognitive dissonance in negative terms, which is what uncertainty can promote in a pessimistic environment, but more of the excitement of uncertainty in an optimistic environment. Indeed, as Loasby (2011:773) points out, Knight had concluded that a life without uncertainty would be unappealing.

Within such an open-system framework, uncertainty is shown to be embedded in the decision-making environment. For economists to understand that environment, they need to understand uncertainty. Uncertainty-denial protects the economist from anxiety, but at the cost of failing to understand something fundamental to the economy. By embracing the presence of uncertainty, therefore, non-mainstream economists are able to build up knowledge which is precluded from mainstream economics. As a result, by understanding uncertainty, non-mainstream economists are in a better position to address in particular the potentially damaging consequences of uncertainty and develop theories and policy prescriptions designed to reduce it.

But a changed understanding of uncertainty also requires a changed way of thinking in much of economics. The closed-system approach requires resistance to incorporating uncertainty, while uncertainty-denial reinforces the preference for closed-system thinking. Change would be required at the conceptual level, allowing for the positive aspects of uncertainty for example, as well as the implications of uncertainty for the scope for knowledge. It would also require a move from the monism of mathematical formalism to one of the many possible pluralist methodologies, where a range of methods is employed in order to build up a considered view with the aid of judgement. The

outcome would allow for a greater focus on the factors which are central to economic behaviour under uncertainty and thus a greater capacity to address any resulting problems. A case in point is the current crisis which could not readily be understood or analysed with existing mainstream theories but which made perfect sense from a Keynes/Minsky perspective which has uncertainty at its core.

## **Conclusion**

It has been argued here that the mainstream form of uncertainty-denial goes hand-in-hand with the prevailing closed-system mode of thought. Fundamental uncertainty can only enter as an exogenous distortion, seen in negative terms. Similarly in economic life uncertainty can be ignored, or at least suppressed. Thus, though the future was unknowable while the stock market boomed as well as when it crashed, the boom was propelled along by denial of such uncertainty, creating the conditions for the crash. But it was only in the crisis that uncertainty gained some attention. Compounding the problem of market behaviour based on uncertainty-denial, the denial of uncertainty in mainstream economic theory had encouraged the process of deregulation of financial markets which had facilitated the boom. When markets collapsed, mainstream theory was unable to address the resulting loss of trust, freezing of markets and increased liquidity preference associated with the uncertainty of a crisis situation. Uncertainty-denial among economists as well as market players had contributed to the increase in damaging, anxiety-provoking uncertainty. If uncertainty had been more widely addressed in economics, then the outcome would have been less uncertainty among economists themselves and in the economy in the face of the crisis.

This suppression of uncertainty could be explained by the prevailing closed-system mode of thought. But then we need to consider why such a mode of thought persists when it excludes such important factors as uncertainty. What if the attachment to closed-system thinking is, at least in part, psychological? Chick (1995) identifies the source of dualistic thinking in psychology and neurology. But she argues that there is currently a secular process of transition in psychic states such that open-system thinking is becoming more prevalent. But, in considering the scope for promoting open-systems thinking through economics education, Chick (forthcoming) is less optimistic. Earl (2000) has drawn on the educational psychologist, Perry's (1970) work in order to analyse the evolution of psychic states in students as a result of education as well as the normal process of maturation. Perry had suggested that students evolve from closed-system, dualistic thinking through a series of six stages of development towards open-system thinking, to the point that they are able to commit to one approach or another. The nature of economics education is therefore crucial for the future of the discipline. It is being addressed by a range of publications (e.g. Groenewegen, ed., 2007 and Reardon, ed., 2009) as well as a range of practical initiatives such as those pursued by the Institute for New Economic Thinking (INET).

Economics education is too large a subject to consider further here. But, if a programme of education can facilitate a move towards open-system thinking, then so can open discourse on the subject. It is in this spirit that the present paper is offered.

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