Article

ELRR

The Economic and
Labour Relations Review
2017, Vol. 28(2) 177–196

DOI: 10.1177/1035304617706849
journals.sagepub.com/home/elrr
SAGE

Keynes' psychology and behavioural macroeconomics: Theory and policy

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Abstract

Until recently, modern macroeconomic models have remained solidly grounded on assumptions of rational expectations, efficient markets and representative agents, with policy prescriptions focused on the power of markets, and complex and esoteric financial intermediation instruments justified as solutions to problems of asymmetric information and risk. In modern microeconomics, behavioural economic analysis has flourished, focusing on individual responses and interactions. By contrast, in macroeconomics, humans are assumed to behave as if they are mathematical machines, making decisions in a mechanical, objective way. From this perspective, it is difficult to properly capture the instabilities that characterise modern macroeconomies and financial systems. While some progress has been made in recognising the bounds to rationality, the complexity of the macroeconomy can be captured fully only by embedding psychological and sociological forces more fully into macroeconomic models. Keynes was a pioneer in analysing the impacts of socio-psychological influences on macroeconomic phenomena. This article explores some of Keynes' fundamental ideas about socio-psychological macroeconomic influences, including insights from *A Treatise on Probability* (1921) onwards, and links these insights both with modern behavioural economic theory and current macroeconomic policy debates.

JEL Codes: E03, E6, B22

Keywords

Behavioural macroeconomics, Keynes, macroeconomic policy

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Introduction

Modern macroeconomic models are characterised by strong assumptions about the rational expectations of representative agents. These assumptions are embedded in the dynamic stochastic general equilibrium models of real business cycle theory, and in New Keynesian variants incorporating involuntary unemployment, market frictions and asymmetric information. Rational expectations models have dominated macroeconomic theory and policy since the 1970s. Reflecting these approaches, until the financial crises of 2007/2008, macroeconomic policy focused on the importance of information and the power of markets – with inflation targeting and central bank independence dominating macroeconomic policy, and complex financial intermediation instruments justified as solutions to problems of asymmetric information and risk in financial markets. Since the 2007/2008 crisis, however, links between macroeconomic theory and policy have become increasingly tenuous: modern policy tools including quantitative easing and very low (and in some cases, negative) interest rates are not obviously grounded in rational expectations macroeconomics. The inconsistencies between theory and policy indicate that modern macroeconomics lacks direction and will remain in crisis until new theories can be developed that combine analytical rigour and intuitive power, alongside useful practical insights for policymaking.

In understanding the macroeconomic and financial instability of recent years, Keynes' insights about the operation of the macroeconomy may be more helpful than rational expectations macroeconomics. Together with George Katona, John Maynard Keynes was a pioneer in bringing socio-psychological factors into his analyses of the macroeconomy and financial markets.[1] Keynes (1936, 1937) argued that economic and financial decision-making is driven by a series of 'fundamental psychological laws': the propensity to consume, attitudes to liquidity, expectations of returns from investment – all driven by social conventions in financial markets, and by the emotions and animal spirits of entrepreneurs. Keynes' focus on psychological forces mirrors his preoccupation with uncertainty. When the world is uncertain, judgements of probability – and the expectations on which they are based – lack robust foundations and so the more subjective socio-psychological and emotional influences will dominate. With fundamental uncertainty, decisions are fragile and volatile because it is difficult to form reliable predictions of future events.

Keynes' analysis of uncertainty and psychology in the macroeconomy is exemplified in *The General Theory of Employment, Interest and Money* (*GT*) (Keynes, 1936), but his approach does not rest easily with rational expectations macroeconomics. In Keynes, uncertainty is not about incomplete information; it is fundamental and irreducible (Dow, 2016). But Keynes' psychological and behavioural analysis does not connect strongly with insights from psychology either. Aside from his interests in Freudian analysis, he did not engage deeply with the psychological research of the time. Economics and psychology were quite distinct subjects, at least until the advent of George Katona's work on psychology in the macroeconomy – first published a few years after GT (Katona, 1946, 1953, 1960, 1975).[2] Keynes' analysis does, however, resonate with modern behavioural economics – now a vast subject, with many different threads and themes.[3] But while behavioural *microeconomics* has thrived, behavioural *macroeconomics* remains underdeveloped, partly reflecting the complexities of macroeconomic model-building. The

https://doi.org/10.1177/1035304617706849 Published online by Cambridge University Press

simple aggregative approach that characterises rational expectations macroeconomic models precludes incorporation of behavioural complexities because behavioural economics focuses on differences *among* people, such as personality traits and susceptibility to particular emotional states. It also explores how behaviour is driven by changes *within* a person, formed by context – for example, shifting risk and time preferences (versus mainstream economics, which assumes stable risk/time preferences).

Behavioural macroeconomists have attempted to resolve some of these complications with softer behavioural assumptions (De Grauwe, 2011, 2012; Farmer and Guo, 1994; Gabaix, 2016; Howitt and McAfee, 1992; Porter and Smith, 2008; Woodford, 1990).[4] Nevertheless, many of these modern behavioural macroeconomic models either lack a coherent analytical structure or incorporate behavioural influences as random shocks (Baddeley, 2014). Either way, they do not engage deeply with the socio-psychology of decision-making and do not allow sufficiently for the complexity and endogeneity that characterises macroeconomic systems. On the upside, many of these approaches incorporate modern empirical innovations, such as computational modelling and Big Data analytics. Therefore, empirical macroeconomic analysis is no longer dependent on the availability of published statistics (which are inevitably limited in capturing psychology) and so the potential properly to incorporate psychology is improving.

Given the limits of extant behavioural macroeconomic models, and with the rapid growth and dominance of behavioural economics in microeconomics and policy design, is there now potential to connect Keynes' insights with micro-foundations from behavioural economics to provide a better alternative to existing behavioural macroeconomic models? This article explores such potential, focusing specifically on behavioural bias and rational belief; confidence and weight; objective reason versus subjective emotion; personality, animal spirits and individual differences; and social influences and conventions. It also assesses whether a combination of insights from Keynes and modern behavioural economics can provide useful policy insights as an alternative to policy prescriptions from rational expectations macroeconomics.

Behavioural bias and rational belief

Many behavioural economists share with Keynes a preoccupation concerning the extent to which our everyday behaviour is rational. Defining rationality is a complex task because it is understood quite differently within and across different disciplines. Here, we focus on rationality as understood in terms of the role played by probability judgements in expectations formation. Some analysts argue that there is a continuity in Keynes' understanding of rationality that extended from his early work on probability, as outlined in *A Treatise on Probability* (*TP*) (Keynes, 1921), to his analysis of how limits to rational behaviour drive macroeconomic fluctuations.[5] In TP, rather than constructing a model of rationality and assuming that all economic agents behave accordingly, Keynes attempts to develop an understanding of the *limits* to rationality – a focus which is paralleled in early work on behavioural economics, especially by Herbert Simon (1955, 1979).

What did Keynes assume about the extent of rationality in macroeconomic behaviour? Did he believe that the behaviour driving the macroeconomy and financial markets was sometimes irrational and lacking systematic foundations? Or did he believe that

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these behaviours were sensible and reasonable? Opinion is divided into three broad camps. O'Donnell (1989, 1991), Littleboy (1990), Gerrard (1994), Meeks (1991), Bateman (1990), Skidelsky (1992), and Dow and Dow (1985) argue that there is a continuity in the development of Keynes' understanding of rational behaviour, from his early work on probability to GT. They argue that, in terms of Keynes' theory of rationality developed in TP, the economic behaviour described in GT is rational because lack of information and knowledge about the future in a world of profound and immeasurable uncertainty means that it is impossible to form substantively rational beliefs. In contrast, Shackle (1955, 1967, 1972), Winslow (1986, 2003) and Mini (1990) emphasise the subjectivism of economic behaviour: to them, Keynes presents the volatile characteristics of the economy emerging as a result of 'dangerous human proclivities … [of people] strongly addicted to the money-making passion' (Keynes, 1936: 374). A further group of interpretations occupies the middle ground between the polar emphasis on rational calculation and irrational animal spirits. Littleboy (1990), Runde (1997), Lawson (1988, 1995), Robinson (1979), Crotty (1992), Colander and Guthrie (1981), Minsky (1975), Carabelli (1988) and Howitt (1997 [1979]) argue that in GT, expectations and the conventions which determine them are sensible and reasonable rather than strictly rational or irrational (Crotty, 1992; Littleboy, 1990; Robinson, 1979).

Keynes connects the judgement of probability with expectations of future events. When it is difficult to form precise mathematical expectations, when it is difficult to form a rational belief, psychology plays a more dominant role. In TP, Keynes links rational belief with the quantification of probability and argued that the cases when we can precisely quantify probabilities are special cases. Sometimes we can reduce our judgements of probability to a single number, sometimes we can make ordinal comparisons and sometimes we may not be able to quantify our probability judgements at all, and then we can only say that a conclusion based on the evidence is not impossible, not certain but nonetheless cannot be compared with other probabilities. For example, when entrepreneurs are deciding about fixed asset investment, they may not be able to quantify their probabilities at all.

Continuity in Keynes' thinking leads through to Keynes (1936), where he argues that standard approaches problematically assume that relevant facts about the future are more-or-less known, allowing quantification of expectations and risks. In the real world, given profound uncertainty, quantification of expectations may be difficult especially, for example, in the context of fixed asset investment, when the consequences of investments today will unfold over a long time-horizon. For Keynes (1921), the fact that people are able to make decisions does not mean that these decisions have an objective mathematical basis: 'we may sometimes confuse the practical certainty attaching to the class of beliefs upon which it is rational to act with the utmost confidence, with the more wholly objective certainty of logic' (p. 275). The principles of behaviour adopted because of a need for action are misinterpreted as having a precisely quantifiable, rational basis, and emotional factors such as 'utter doubt, precariousness, hope and fear' are underestimated (Keynes, 1937: 224).

Therefore, did Keynes preclude irrationality? He argued that irrational belief characterises situations when we believe in a non-existent probability relation when we should not, or fail to perceive a probability relation when we should:

https://doi.org/10.1177/1035304617706849 Published online by Cambridge University Press

> [W]we can through stupidity fail to make any estimate of probability at all, just as we may through the same cause estimate a probability wrongly. As soon as we distinguish between the degree of belief which it is rational to entertain and the degree of belief actually entertained we have in effect admitted that the true probability is not known to everybody. (Keynes, 1921: 34–35)

Probability judgements are subjective and this allows a role for individual differences. Inherent randomness in the socio-economic world means that justifiable mistakes are inevitable – decisions that turn out *ex post* to be misplaced are not necessarily irrational if they are strongly grounded in information available at the time. Fluctuations in inventories arising from mistaken short-term expectations are an example (Keynes, 1936: 332), as are estimates of user cost (Keynes, 1936: 290). The very concept of 'mistake' implies that there is a knowable fundamental value to discover, but with profound uncertainty and inherent randomness, there will be no fundamental value (Davidson, 1995; Davis, 1998; Lawson, 1988). So there can be no 'mistakes' in the conventional sense. This is where alternatives to the highly mathematical modes of rationality assumed in rational expectations macroeconomics have power. In particular, Herbert Simon identified a range of different forms of rationality, including bounded rationality and substantive versus procedural rationality (Simon, 1955, 1979). Substantive rationality has some objective foundation, often in the form of a mathematical model – for example, the constrained optimisation models associated with rational expectations macroeconomics. Procedural rationality involves 'appropriate deliberation', intuition, experience and judgement (Simon, 1979) – none of which can be incorporated into the parsimonious mathematical models usually associated with economics, but connected with Keynes' analysis by Meeks (2003). But if the problem we are facing is complex and fluid, how can we meaningfully define 'appropriate deliberation'?

Harvey Leibenstein's analysis of limits to rationality is similar to Simon's, with his focus on selective rationality and inert areas – where people are not changing their decisions, either sensibly to avoid wasting time and effort or because psychological barriers, for example, laziness, prevent them from making the effort (Leibenstein, 1976). Simon's view was that objectively rational behaviour (objective in the sense of defined in terms of analytical solutions) is uncommon with economic decision-making in a complex and uncertain world. In this context, human processing capacity is limited relative to the size of the problems we need to solve, and these limits reflect limits on processing power as well as on information.

These different conceptions of rationality can help us to link Keynes' analysis of uncertainty with modern behavioural economic literatures on heuristics, bias and prospect theory (Fontana and Gerrard, 2004). But complete triangulation from Keynes to Kahneman and Tversky (1979) to Simon and Leibenstein has not been achieved and it is not widely acknowledged that Simon and Leibenstein's analyses connect not only with Keynes but also with Kahneman and Tversky (1979) and Tversky and Kahneman (1974).[6] For Kahneman and Tversky, using heuristics is often sensible in situations of choice overload, information overload and/or when people are deciding quickly – so heuristics are not irrational devices, but they can create systematic biases. This connection between heuristics and bias does pre-suppose, however, that there is a stable point

associated with the 'correct' answer – the answer that a rational optimiser would choose. But in situations of fundamental uncertainty and complexity, there will be no anchor defining a correct answer, and then deviations from strict rationality may involve erratic as opposed to systematic behaviour and choices (Earl, 2015; Heiner, 1983). Use of heuristics, while inconsistent with the strong assumptions of rational expectations macroeconomics, is consistent with behavioural economic modelling that allows a softer definition of rationality.

Confidence and weight

Expectations are central to GT and also Keynes (1937) and are grounded in probability concepts from TP. Entrepreneurs do not form a single expectation about future profits for example – but instead hold a bundle of expectations, held with varying degrees of probability and weight – foreshadowing Kahneman and Tversky's (1979) prospect theory in which decision-makers are choosing between bundles of prospects. Keynes reiterates an important distinction between probability and weight. Expectations based on probability judgements capture the likelihood of a future prospect; weight is about how strongly we believe in those probability judgements. Choices are clearer when an entrepreneur draws on an expectation held with the greatest weight (Keynes, 1936: 24) and acts as if his or her behaviour reflects one undoubting expectation held with certainty. Here, Keynes (1921, 1936) foreshadows Kahneman and Tversky's (1979) concept of weight as embedded in the prospect theory weighting function, including their analysis of the certainty effect, consistent with non-linearities in the probability weighting function.

Confidence and weight have important implications in Keynes' macroeconomic analysis. When the state of confidence is low, and people do not believe strongly in their judgements of the future, the liquidity premium will rise, reflecting a precautionary motive. In more stable times, when people are surer of their judgements, the state of confidence will be buoyant. The state of confidence is crucial in determining investment activity both via profit expectations and liquidity preference. Therefore, it is important to emphasise the distinction between Keynes' state of confidence, Kahneman and Tversky's weight and the more common language usage of the word confidence. For Keynes, the state of confidence determines whether or not judgements of weight can be made. When the state of confidence is buoyant, judgements of weight are possible. When the state of confidence becomes more fragile, judgements of weight are more difficult: there will be no guide to rational action and non-rational forces will predominate. Kahneman and Tversky refer to individuals' weighting of probability judgements and (unsurprisingly given that their analyses are essentially focused on microeconomic behaviour) they do not make a distinction between a broader macroeconomic mood or sentiment determining our ability to assess weight, and weight as a separate force reflecting a conception of globally determined confidence. By contrast, Keynes analyses state of confidence as a type of macroeconomic mood which determines whether or not judgements of weight are possible. Furthermore, the terms 'business confidence' or 'consumer confidence' as commonly used capture valenced expectations (with positive or negative values), and are more consistent with Katona's work on consumer confidence (Katona, 1946, 1953, 1960). The difference can be clarified in terms of psychological concepts of valence

versus salience. Business and consumer confidence is about expectations of the valence of future prospects – the positive versus the negative; will the economic situation improve or deteriorate? Salience is about the power of evidence – how strong and convincing it is and weight has more to do with salience than valence.

In terms of links with macroeconomic fluctuations, Runde (1997) asserts that Keynes associates liquidity premia with judgements of weight and risk premia with judgements of probability, a distinction which links to Schumpterian conceptions of uncertainty.[7] A weakening state of confidence means that decision-makers place less weight on their judgements in situations of profound uncertainty, and their anxieties about predicting the future lead them to hold more cash – hence a higher liquidity premium.

Judgements of weight also underlie the convention of assuming that current events will continue – a common bias in macroeconomic decision-making, explored for example by Akerlof and Shiller (2009). When business people hold a strong belief in continuity, they will use their recent results as a proxy for short-term expectations (Keynes, 1936: 51). Keynes observes that recently realised results are given greater weight because using more rigorous but complicated methods of forming forecasts of the future will be disproportionately costly – a view that connects with Tversky and Kahneman's (1974) analysis of heuristics as quick decision-making rules for reducing transaction costs, including information search. Keynes' (1936) concept of weight also links to heuristics affecting business confidence:

> It is reasonable, therefore, to be guided to a considerable degree by the facts about which we feel somewhat confident, even though they may be less decisively relevant to the issue than other facts about which our knowledge is vague and scanty. (p. 148)

Objective reason versus subjective emotion

Fluctuations in the state of confidence, and difficulties in judging the weight of probabilities, leave a gap for psychological influences, especially emotions, in Keynes' macroeconomic analysis. Emotions play an important role when concrete objective decisions are difficult to make. Keynes (1979) argues that when a large number of alternatives exist and none are obviously more rational than the other options, '… we fall back … on motives of another kind, which are not rational in the sense of being concerned with the evaluation of consequences but are decided by habit, instinct, preference, desire [and] will' (p. 294). For example, alongside the objective determinants of consumption (including wages, income changes, windfall gains, discount rates and a government's fiscal stance), there are subjective emotional influences including 'Precaution, Pride, Avarice, Enjoyment, Generosity, Miscalculation, Ostentation, Extravagance, Shortsightedness …' (Keynes, 1936: 108). A key theme of GT involves the separation of objective versus subjective factors in driving consumers and investors. Keynes captures the impact of these influences via a series of 'thought experiments'. He starts from a position of 'stationary' equilibrium – focusing on objective factors and all the restrictive assumptions implied – then relaxes these assumptions to allow that people facing uncertainty are driven by subjective factors reflecting changing and often disappointed expectations. Thus, with uncertainty, the macroeconomic system is one of 'shifting' equilibrium

(Keynes, 1936: 293–294; see also Harcourt and Kerr, 2009; Kregel, 1976). The shifting influences of objective versus subjective factors are driven by the psychological influences associated with expectations. For example, liquidity preference includes objective factors such as Keynes' precursor of transaction demand, including the income motive (we want more cash when income is higher) and the business motive (businesses want more cash when activity is high); but it also includes subjective, socio-psychological factors – at the extreme manifested as a liquidity fetish.

Keynes' clear division between objective and subjective factors allows that decision-making is driven both by standard economic incentives and motivations, but also by more subjective socio-psychological influences; the interaction between these groups of influences is emphasised through Keynes' macroeconomic analysis. In chapters 8 and 11 of GT, Keynes analyses objective factors driving consumption and investment – with consumption a simple function of current income and his investment theory having much in common with orthodox investment theories from Fisher through to Jorgenson. The subjective factors driving consumption and investment, including a range of behavioural, psychological influences, are covered in chapters 9 and 12. Keynes' (1936) most powerful analysis of these psychological factors is explored in chapter 12, where he outlines a range of social and emotional factors driving speculation and entrepreneurship with impacts for fixed asset investment, all driven by shifting expectations and profound uncertainty. In chapter 9, he relaxes his simple analysis of consumption to introduce the role of psychology and a range of emotions, though not with the same depth and power as he analyses speculation, entrepreneurship and fixed asset investment. This is a key limitation of Keynes' analysis – the psychological drivers of consumption are listed, not analysed.[8] This distinction between the objective and the subjective parallels a similar distinction in behavioural economics – as popularised in Kahneman (2011) – between two different styles of decision-making: the quick, instinctive, gut responses and subjective styles associated with System 1 'quick' thinking; and the more deliberative, careful, cognitive and objective styles associated with System 2 'slow' thinking.

Personality, animal spirits and individual differences

A thread throughout Keynes' analyses, from his early beliefs (including those outlined in TP) through to GT, is that psychological motivations lead different people to behave in different ways in different circumstances – reflecting not just bounded rationality in terms of cognitive constraints and limits on information but also psychological responses to profound uncertainty in a world in which the future is unknowable. For Keynes, problems with precise quantification need not compromise the analysis of real-world business decision-making (Keynes, 1936: 39–40). But if probabilities are not precisely quantifiable, then different people may act in different ways even if they operate from the same knowledge base. This introduces a role for individual differences, including psychological traits. Keynes does not assume that all people will always behave in the same way. Modern New Keynesian and behavioural economic theorists accept this, but their treatment of heterogeneity is more limited. They concentrate on individual differences in otherwise stable preferences, including time and risk preferences, but do not challenge other aspects of economics' standard rationality assumptions. Individual differences in

personality are fundamental to Keynes' analysis of the macroeconomy, for example, in the very different personalities of the entrepreneurs and speculators in chapter 12 of GT. Entrepreneurs are forward-looking, unconventional, driven by action; speculators are short-termists blinkered by market conventions. These differences reflect the absence of a correct answer in a world of fundamental uncertainty. In financial markets, some speculators will be bearish, others bullish – and when a particular viewpoint dominates – even though it may have little basis in substantive fact – then macroeconomic and financial instability will take over.

These insights are foreshadowed in Keynes (1921). The insurers in TP derive premiums allowing margins for error, and therefore, while insurance premiums appear to be based on a precise quantification of the probability of events, they in fact have an arbitrary, psychological component. Keynes (1921) states that the practice of naming a numerical measure of risk

> shows no more than that many probabilities are greater or less than some numerical measure, not that they themselves are numerically definite. It is sufficient for the underwriter if the premium he names exceeds the probable risk … I doubt whether in extreme cases the process [of naming a premium] is wholly rational and determinate. (p. 23)[9]

Similarly in GT, changes in news are interpreted differently by different individuals. The bulls and bears dealing in bond markets each hold a different set of beliefs about the likelihood of a change in the interest rates, which reflects their subjective judgements (Keynes, 1936: 170). Insurable does not necessarily imply precisely quantifiable.

Individual psychological differences will be fed through into propensities to experience particular emotions, and this is captured by the different temperaments of the key macroeconomic actors described by Keynes – particularly his speculators and entrepreneurs. Short-termist and impulsive speculators are preoccupied with their attempts to 'beat the gun' and 'outwit the crowd'. Speculation is like 'a game of Snap, of Old Maid, of Musical Chairs – a pastime in which he is the victor who says Snap neither too soon nor too late …' Unregulated financial markets encourage liquidity 'fetishism' among speculators exacerbating instability. Emotional influences also reflect Freudian themes, for example, in Keynes' concept of hoarding, explored by Winslow in the context of Freudian psychodynamic themes (Winslow, 1986, 2003). Winslow (1986) analyses money-loving instincts in the macroeconomy to connect Freud's conception of the anal personality – characterised by miserliness, orderliness and cleanliness – with Keynes' analysis of speculation and attitudes towards money. Themes from psychoanalysis also emerge in Tuckett's (2011) analysis of emotional finance, which also draws on insights from Keynes.

In contrast to speculators, Keynes emphasises strongly that entrepreneurs' personalities are governed not so much by mathematical calculation but by animal spirits, a type of positive emotion. Animal spirits are attributed to Galen, an ancient Roman physician, who asserted that *spiritus animalis* had origins in the brain and mediated nerve function. The term 'animal spirits' is widely used in modern behavioural macroeconomics, though often with little connection with Keynes' analysis.[10] Linking Galen's animal spirits with economics, Keynes argued that entrepreneurs cannot properly calculate the future benefits of investments because the future is not easily quantifiable. In this case, entrepreneurs will be guided by conventions in the same way that speculators are guided by them,

but they will also be affected by animal spirits: spontaneous urges to act and intervene, even when there is no rational basis for action. Most decisions

> to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits – of spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities. Enterprise only pretends to itself to be mainly actuated by the statements in its own prospectus, however candid and sincere. Only a little more than an expedition to the South Pole, is it based on an exact calculation of benefits to come. (Keynes, 1936: 161–162)

Entrepreneurs are driven by their sanguine temperament' and 'constructive impulses' and see business as a way of life. It is impossible to predict the long-term future prospects of a new enterprise so those who do start up new businesses are not preoccupied with quantifying profit expectations; the psychological force of 'animal spirits' takes over 'so that the thought of ultimate loss which often overtakes pioneers … is put aside as a healthy man puts aside the expectations of death' (Keynes, 1936: 162). The problem comes because entrepreneurs are vulnerable to waves of optimism and pessimism and easily discouraged by crises of confidence. Adverse economic, political and social changes will slow entrepreneurial investment. Slumps and depressions are exacerbated by entrepreneurs' flagging animal spirits. Keynes' (1936) analysis of animal spirits also emphasises the role of emotions including hope and fear:

> Thus if the animal spirits are dimmed and the spontaneous optimism falters, leaving us to depend on nothing but a mathematical expectation, enterprise will fade and die; though fears of loss may have a basis no more reasonable than hopes of profits had before. (p. 162)

The influence of emotional factors and animal spirits does not imply that speculators and entrepreneurs are irrational. With uncertainty, knowledge will be vague. There may be no information available on which entrepreneurs can base their expectations. Two courses of action are available: they can rely instead on non-rational forces to drive behaviour or they can do nothing. It may be better to act spontaneously than do nothing at all. As Dow and Dow (2011) also emphasise, Keynes did not describe animal spirits as an irrational phenomenon. Many alternatives may exist and if none are clearly better than others and it is impossible to rank the alternatives, then non-rational motivations will drive the entrepreneur's choices. Even if there is no basis for rational *belief*, rational *action* is nonetheless possible because rational action is not always defined in terms of acting upon a discernible probability judgement.

Overall, Keynes' (1936) view of behaviour was that it was neither strictly rational nor irrational and, given Knightian, fundamental uncertainty, is necessarily an interaction of cognitive and emotional factors:

> we should not conclude that everything depends on waves of irrational psychology … it is our innate urge to activity which makes the wheels go round, our rational selves choosing between the alternatives as best we are able, calculating where we can, but often falling back for our motive on whim, or sentiment, or chance. (p. 163)

Keynes' entrepreneurs are doing the best that they can in the circumstances, and this conception of rational behaviour is consistent with Simon's (1979) procedural rationality and appropriate deliberation, as noted above. It also links with Keynes' (1921) insights about the 'propriety' of actions (p. 339). If animal spirits are desirable, then they can be justified as rational action even though they do not emerge from a rational belief. In this way, Keynes envisages entrepreneurial behaviour as a creative force dictated by subjective factors rather than as a mechanical response from robotic decision-makers using the mathematical calculus of constrained optimisation to guide their decisions. Keynes argues that investors operate in an uncertain, transmutable reality and the actions of entrepreneurs today will have impacts on the economic future (Davidson, 1995). This has implications for the elemental basis of the economy – that is, the current capital stock not only reflects past expectations and past decisions but also dictates future productive capacity and in this way links past, present and future (Robinson, 1979).

Social influences and conventions

Keynes focuses strongly on the role of socio-psychological influences in the macroeconomy, and conventions are their principal conduit – and, in this, Keynes' analyses have sociological foundations (Bibow et al., 2005). There are many examples of conventions in Keynes' macroeconomic analyses. Keynes (1936) describes the propensity to consume as a convention. Conventions, herd instincts, mass psychology and animal spirits are more important to an understanding of long-term investment decision-making than quantitative judgements. Similarly, he argues that the rate of interest is 'highly psychological' or 'highly conventional'. It will endure if people believe it will endure because other people believe it will endure, but then dealers nonetheless perceive it to have an objective basis, and this may lead to the prevalence of inappropriate complexes of interest rates, again as illustrated in the sub-prime crisis. Also linking with Keynes, Townshend (1937) presents a psychological interpretation of liquidity preference and underscores Keynes' emphasis on the role that conventions play in determining asset prices more generally.

Conventional behaviour also plays a key role in determining the long-term expectations that dictate decisions of speculators versus entrepreneurs (Keynes, 1936: 152–153):

> We are assuming, in effect, that the existing market valuation … is uniquely correct in relation to our existing knowledge of the facts which will influence the yield of an investment, and that it will only change in proportion to changes in this knowledge. (p. 152)

When knowledge is precarious, speculation in financial markets is propelled by conventions and by other social influences including herding, beauty contests and reputation effects. There are implications for the real-side, not just in terms of impacts of financial investment on fixed asset investment but also impacts on housing markets, for example, as explored by Earl et al. (2007).

Conventions reflect interplay of individual and aggregate behaviour, where aggregate behaviour affects individual behaviour and vice versa and this complicates the rationality of conventions. As explored above, rationality is not easy to define. According to Keynes, conventions may be rational, non-rational or irrational/psychological depending on the

nature of belief underlying them; for example, the convention of assuming that the existing situation will persist appears to combine rational and non-rational elements because it is based in knowledge. Lawson argues that conventions in Keynes have both a reasonable and a psychological element: they become self-fulfilling prophecies, and therefore, to assume that they will persist becomes the most sensible thing to believe, once the convention is established (Lawson, 1995).

For example, the convention of assuming that the current state of affairs will continue indefinitely is not based on the rational belief of one individual. It is not rational for one individual to believe, in isolation, that the current situation can be projected into the future, but given that outcomes are determined by the aggregate behaviour, a conventional belief in the current situation as a guide to the future, when adopted by many decision-makers, does have a reasonable basis.

Keynes' analysis of conventions supports interpretations focusing on his ideas about the non-binary nature of rationality (as explored in more detail above). Robinson (1979) views Keynes' conventions as non-rational, and Littleboy (1990) argues that 'conventional behaviour lies between two extremes, the fully rational and the fully irrational' (p. 34). Conventions are not the same as customs/habits; they emerge from rational, purpose-oriented behaviour under uncertainty and promote coherent behaviour (Littleboy, 1990: 271). According to Crotty (1992), social conventions 'create' and 'imagine' the missing data which link the logical chain connecting data to decisions. All this suggests a distinction between individual and social rationality, which further complicates the definition of economic rationality.

Linking with modern behavioural economics, Keynes (1936, 1937) focused on three main reasons why people herd with the crowd in a world of uncertainty: social learning, beauty contests and reputation. Herding in financial markets may be a response to uncertainty and individuals' perceptions of their own ignorance; social learning will lead people to follow the crowd if they think that the rest of the crowd is better informed and then market fluctuations will be driven by conventional beliefs because others may have better information about prospects: 'we endeavour to fall back on the judgement of the rest of the world which is perhaps better informed' (Keynes, 1936: 217).

These insights find their way into the modern microeconomic theories of herding. The most influential are the models of herding driven by social learning via Bayesian updating (Banerjee, 1992; Bikhchandani et al., 1992, 1998). In these Bayesian models, decision-makers will use every bit of available information, including social information about the actions of others. In the microeconomy, herding can be understood as an extension of principles of rational behaviour while nonetheless allowing that human actions are not necessarily independent. Bayesian models explain herding in the form of 'information cascades' – a sequence of decision-makers will balance probabilities in deciding whether or not to rely on social information publicly revealed, or their own private information. As more and more people discount their private information in favour of social information about others' actions, the probability of the next decision-maker also following the herd is increasing. In this way, information about others' actions cascades through the herd, with sequential social learning reflecting a largely mechanical process as each person updates probabilities sequentially as the decisions of other individuals are revealed.

Keynes' concepts also connect with the modern literature on beauty contests from Nagel (1995) onwards, and modern microeconomic analyses of herding by fund managers preserving reputations (Scharfstein and Stein, 1990).[11] These analyses neglect the psychology of decision-making, however, so in that sense diverge from Keynes' original conception of the nature of herding and conventions. Psychological factors, and perhaps evolutionary influences too, underlie our propensity to follow conventions formed socially: people prefer stable routines and conventions ameliorate the anxiety that uncertainty about the future creates (Earl, 1983; Lawson, 1995).

An alternative link with behavioural economics is to conceptualise Keynes' conventions as a type of heuristic – adopting a social convention can be a quick and easy way to decide, and this may explain why entrepreneurs fall-in with the ideas of the market even though they may be better instructed than the market about the prospects of their individual investments. As explored by Tversky and Kahneman (1974), the problem with heuristics is that they may be associated with behavioural biases, and the corollary with Keynes' conventions is the distortion of macroeconomic decision-making, particularly entrepreneurs' decisions to invest, when groups adopt a misplaced belief in the objectivity of group judgements and the wisdom of crowds. In the real world, again, this problem was illustrated amply in the sub-prime crisis. Mistakes and biases around interest rates, driven by misplaced social conventions, means that sub-optimal levels of employment persist for as long as conventional, stable but disproportionately high interest rates prevail.

Keynes' social influences also connect with psycho-sociological models of behaviour. Mass psychology drives Keynes' (1936) conventions, with consequences for financial instability: the 'conventional valuation which is established as the outcome of the mass psychology of a large number of ignorant individuals is liable to change violently' (p. 154). Speculators' decisions focus disproportionately on short-term outcomes: the long-term value of an asset is unimportant if you intend to sell the asset quickly (Keynes, 1936).

These ideas are developed in modern Keynesian and post-Keynesian literatures, in particular by Minsky (1976, 1992) who analyses the evolution of financial fragility during times of stability. In stable times, euphoria leads to excessive lending and borrowing generating financial fragility so that when the bubble bursts, the economy lurches in the other direction, and this volatility and instability is transmitted to the real economy via the financial system.

If time horizons are short, discount rates are high and financial markets are very liquid, then the speculative bubbles generate negative herding externalities, in which case the social costs of liquid financial markets may be disproportionately high, feeding through in undermining general business confidence and generating self-fulfilling speculative episodes. Traders will purchase an asset at a seemingly exorbitant price not because they independently believe that the object is worth the cost but because they believe that other people think that it is. While herding means that conventional beliefs will hold sway for sustained periods of time, during episodes of extreme uncertainty, financial markets will become very fragile. Investors and speculators will respond in a volatile way to ephemeral changes in information because decisions and choices do not have a substantive basis (Keynes, 1936: 153–154).

The social costs, if copying and herding spread through large groups of people, are that volatile speculative episodes will become more likely. Given uncertainty, if people are learning about financial assets from looking at others' trades, then herding may be the outcome of a rational learning but it may also be irrational if propelled by blind convention and unreasoning speculative frenzies.

Lessons for behavioural macroeconomic policy

The preceding sections have outlined the ways in which Keynes' analyses in TP (1921) and *GT of Employment, Interest and Money* (1936) connect with insights from modern behavioural economics – especially with themes around behavioural bias and rational belief; confidence and weight; systems models capturing objective reason versus subjective emotion; personality, animal spirits and individual differences; and social influences and conventions. Given the connections between Keynes' macroeconomic analyses and modern behavioural economics, what is the potential to use these insights to inform macroeconomic policy, and provide a more robust alternative to policies developed from rational expectations macroeconomics – now largely discredited in the aftermath of the 2007/2008 financial crises?

For behavioural economics, and particularly following the success of Thaler and Sunstein's (2008) book *Nudge*, and its public sector equivalent *Mindspace*, public policy informed by behavioural economics has been enthusiastically adopted by politicians and policymakers from Barak Obama, David Cameron and various other governments – some of whom have provided work for the Behavioural Insights Team (2014–2017), now privatised as BIT Inc. (including a collaboration with the New South Wales Department of Premier and Cabinet). The foundation of nudge policies is libertarian paternalism – allowing people to choose for themselves, ideally, but using government policies to influence people in a more constructive, efficient direction – without forcing them – essentially it is about carrots not sticks.[12] Nudge-based policy initiatives have been focused on microeconomic and industrial policymaking, though the application of these nudge policies is not uncontroversial. In terms of macroeconomic policy, Keynes was possibly the most significant figure from the 20th Century in terms of macroeconomic, but can a blend of his insights with behavioural public policy be extended to modern macroeconomic policy?

The influence that behavioural economics has had on public policy partly reflects the fact that insights are strongly grounded in real-world empirical evidence – particularly experimental evidence, which is harder to collect on a macroeconomic scale. The main behavioural macroeconomic policy insights have been around themes of well-being, happiness and life satisfaction as alternative measures of macroeconomic performance. In contrast with rational expectations macroeconomics, many of the theories are not analytically tractable and/or incorporate variables (e.g. expectations) that are not easily measurable and amenable to econometric analysis. Empirical analysis of rational expectations macroeconomic models has tended to focus on calibrated, simulated models that do not necessarily have a deep connection with real-world evidence and are strongly dependent on unrealistic behavioural assumptions. By contrast, Keynes argues that scientific theories should be able to cope with real-world situations and should not force the

facts to conform to theoretical assumptions. Keynes' insight that experience does not follow by necessity but is determined by the business environment and by psychological propensities can also be developed in a macroeconomic context, with a form of micro-foundations that connects with some of Keynes' psychological insights.

Perhaps contrary to caricatures of Keynes' thinking, his view of policy was not a radical. He argued for state control of investment whilst aiming to preserve private initiative. This vision of enabling rather than supplanting the private sector parallels the libertarian paternalism of the nudge policymakers. In policies to moderate cyclical fluctuations in real-side economic activity created by financial instability, understanding and moderating the uncertainty and instability created by the psychology of economic decision-making is central. Keynes' (1936) policy insights are focused on the psychology of business decision-makers:

> there is social and psychological justification for significant inequalities of income and wealth, but not for such large disparities as exist today … dangerous human proclivities can be canalised into comparatively harmless channels by the existence of opportunities for money-making and private wealth, which if they cannot be satisfied in this way, may find their outlet in cruelty, the reckless pursuit of personal power and authority, and other forms of self-aggrandisement. It is better that a man should tyrannise over his bank balance than over his fellow-citizens. (p. 374)

This analysis must seem prophetic to modern Americans in the aftermath of the 2016 Presidential Election, but has wider implications too.

Managing the psychology of decision-making as it affects the macroeconomy involves focusing on the various fundamental determinants, and a behavioural macroeconomic policy could be designed to encourage optimism and action when the economy is in a slump. Thaler (2009) explores an example of how this could be achieved: in 2008, Hyundai allowed buyers to return their cars if they lost their jobs, thus overcoming pessimism bias and flagging consumer confidence and helping increase Hyundai car sales despite the pessimism and uncertainty that characterised the post-financial crisis macroeconomic environment.

For Keynes, consumption spending was the priority both as an end in itself and as a means to boost employment via multiplier effects. Applying his insights about the psychology of consumer spending and the influence of various emotions – including avarice, generosity and short-sightedness – behavioural fiscal policies could be designed to leverage emotions and behavioural biases to overcome the recessionary impacts of pessimism and flagging consumer confidence, paralleling Katona as well as Keynes. Policymakers could focus more closely on boosting the state of confidence and consumer/business optimism when low (or even negative) interest rates are not insufficient to encourage borrowers to borrow and spend. Mirroring Hyundai's strategies, on a broader scale, behavioural fiscal policies could be designed to encourage private sector activity and boost entrepreneurs' dimmed animal spirits and apathy. The nature of political rhetoric could be adapted to encourage a more positive macroeconomic sentiment in times of recession. For example, in Britain, the current unapologetically (and fantastically?) positive Tory rhetoric around Brexit could be interpreted as an attempt to keep up the animal spirits of business people. On the consumer psychology side, focusing more on subjective emotions than objective economic incentives could be used in the design

of behavioural multipliers – and perhaps a form of behavioural multiplier led lots of Brexiteer consumers to spend more, not less, in the aftermath of the European Union (EU) Referendum vote, propelled by an instinct to prove doom-saying economists and other experts wrong.[13]

To conclude, given the crisis that macroeconomics is now facing, this article has assessed the extent to which Keynes' insights about the psychology of the macroeconomy could be used as a foundation for a new approach to behavioural macroeconomics, not only to redress some of the limitations of existing behavioural macroeconomic models, but also as a route towards coherent, powerful behavioural macroeconomic policy design. Returning to Keynes' original insights, alongside the insights from other early behavioural macroeconomists, in particular George Katona, could provide a powerful alternative to rational expectations macroeconomics, and a route into a more coherent and realistic account of macroeconomic fluctuations, and effective policies to dampen them.

Acknowledgements

My profound gratitude goes to Geoff Harcourt for encouraging me to persist with this paper. My thanks also to anonymous reviewers for their comments and advice – which helped me to think more deeply and carefully about key themes, as well as read more widely.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

Notes

1. There is a rich heritage of work connecting macroeconomics and behaviour, largely missed in mainstream economics. The focus here is on Keynes' original ideas. Some of the key contributions beyond Keynes include Katona's extensive analysis of psychological influences in the macroeconomy, especially in terms of the role of consumers (Katona, 1946, 1953, 1960, 1975, 1980). A selection of other key contributions includes Shackle (1970) and Earl (2014).
2. Katona's analyses suffered from their own limitations, partly reflecting the fact that Katona was a psychologist, focusing his analysis on consumer sentiment and its empirical measurement without strong foundations in economic principles. See also King (2016), Juster (1961) and Wärneryd (1982).
3. See Baddeley (2017) for a survey of behavioural economics.
4. See Baddeley (2016) for a survey of key issues and approaches in behavioural macroeconomics.
5. There are other important links between Keynes' early work and his psychological perspectives as outlined in Keynes (1936, 1937) – including 'The Economic Consequences of the Peace' (1919) and 'Economic Prospects for Our Grandchildren' (1930).
6. Extensive collections of the early behavioural economics literature in this tradition include Kahneman and Tversky (2000) and Kahneman et al. (1982).
7. Schumpeter analyses liquidity preference in the presence of uncertainty, in which there is no stable reference point. In a world of uncertainty and technological change, entrepreneurs' decisions are linked to the endogenous uncertainty arising from novelty and innovation that drive changes associated with creative destruction and innovative imitation within macroeconomic systems (Potts, 2000; Schumpeter, 1942).

8. George Katona presents a much more extensive and powerful exploration of consumer behaviour in the macroeconomy (Katona, 1946, 1953, 1960, 1975).
9. See also Runde (1994) and Runde and Mizuhara (2003) for analyses of Keynes' insights around uncertainty and liquidity preference – including the precautionary motive.
10. Akerlof and Shiller (2009) explore animal spirits in a very general sense – and use the term to describe a wide range of psychological influences. Keynes has a much narrower conception of animal spirits.
11. Links with Keynes are also explored in neuroeconomic analyses; see Baddeley (2010) and Burke et al. (2010).
12. Sunstein (2015) provides a thought-provoking account of the philosophical, ethical tensions implicit in this focus on enabling better choices.
13. In the quarters after the UK vote to leave the European Union (EU), consumer spending did not fall relative to consumer spending in the pre-Referendum vote quarters, though the monetary stimulus from the Bank of England may have helped sustain spending (Elliott, 2017).

References

Akerlof G and Shiller R (2009) *Animal Spirits: How Human Psychology Drives the Economy and Why It Matters for Global Capitalism*. Princeton, NJ: Princeton University Press.

Baddeley M (2010) Herding, social influence and economic decision-making: socio-psychological and neuroscientific analyses. *Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences B* 365(1538): 281–290.

Baddeley M (2016) Behavioral macroeconomics: time, optimism and animal spirits. In: Frantz R, Chen S-H, Dopfer K, et al. (eds) *The Routledge Handbook of Behavioral Economics*. Abingdon: Routledge, pp. 266–278.

Baddeley M (2017) *Behavioural Economics: A Very Short Introduction*. Oxford: Oxford University Press.

Banerjee A (1992) A simple model of herd behavior. *Quarterly Journal of Economics* 107(3): 797–817.

Bateman BW (1990) The elusive logical relation. In: Moggridge DE (ed.) *Perspectives in the History of Economic Thought: Keynes, Macroeconomics and Method*. Aldershot: Edward Elgar, pp. 73–84.

Behavioural Insights Team (2014–2017) Publications. Available at: http://www.behaviouralinsights.co.uk/publications/ (accessed 29 March 2017).

Bibow J, Lewis P and Runde J (2005) Uncertainty, conventional behavior, and economic sociology. *The American Journal of Economics and Sociology* 64(2): 507–532.

Bikhchandani S, Hirshleifer D and Welch I (1992) A theory of fads, fashions, custom and cultural change as informational cascades. *Journal of Political Economy* 100(5): 992–1026.

Bikhchandani S, Hirshleifer D and Welch I (1998) Learning from the behavior of others: conformity, fads, and informational cascades. *The Journal of Economic Perspectives* 12(3): 151–170.

Burke C, Tobler P, Baddeley M, et al. (2010) Neural mechanisms of observational learning. *Proceedings of the National Academy of Sciences* 107(32): 14431–14436.

Carabelli A (1988) *On Keynes's Method*. London: Macmillan.

Colander DC and Guthrie RS (1981) Great expectations: what the Dickens do 'rational expectations' mean? *Journal of Post Keynesian Economics* 3(2): 219–234.

Crotty J (1992) Neoclassical and Keynesian approaches to the theory of investment. *Journal of Post Keynesian Economics* 14(4): 483–496.

Davidson P (1995) Uncertainty in economics. In: Dow S and Hillard J (eds) *Keynes, Knowledge and Uncertainty*. Aldershot: Edward Elgar, pp. 107–116.

Davis JB (1998) Davidson, non-ergodicity and individuals. In: Davidson P and Arestis P (eds) *Methodology, Theory and Policy in Keynes: Essays in Honour of Paul Davidson*, vol. 3. Cheltenham: Edward Elgar, pp. 1–16.

De Grauwe P (2011) Animal spirits and monetary policy. *Economic Theory* 47(2–3): 423–457.

De Grauwe P (2012) Booms and busts in economic activity: a behavioural explanation. *Journal of Economic Behavior & Organization* 83(3): 484–501.

Dow A and Dow S (1985) Animal spirits and rationality. In: Lawson T and Pesaran H (eds) *Keynes' Economics – Methodological Issues*. Beckenham: Croom Helm, pp. 46–65.

Dow A and Dow S (2011) Animal spirits revisited. *Capitalism and Society* 6(2): 1–23.

Dow S (2016) Uncertainty: a diagrammatic treatment. *Economics* 10(3): 1–25.

Earl PE (1983) *The Economic Imagination: Towards a Behavioural Analysis of Choice*. New York: Sharpe.

Earl PE (2014) Shackle and behavioural economics. In: Rael P and Littleboy B (eds) *Great Thinkers in Economics: GLS Shackle*. London: Palgrave Macmillan, pp. 154–179.

Earl PE (2015) Anchoring in economics: on Frey and Gallus on the aggregation of behavioural anomalies. *Economics: The Open-Access, Open-Assessment E-Journal* 9(2015–21): 1–25.

Earl PE, Peng T-C and Potts J (2007) Decision-rule cascades and the dynamics of speculative bubbles. *Journal of Economic Psychology* 28(3): 351–364.

Elliott L (2017) UK GDP growth shows consumers spending despite Brexit worries. *The Guardian*, 26 January. Available at: https://www.theguardian.com/business/2017/jan/26/uk-gdp-growth-consumers-spending-brexit-george-osborne (accessed 29 March 2017).

Farmer REA and Guo J-T (1994) Real business cycles and the animal spirits hypothesis. *Journal of Economic Theory* 63: 42–73.

Fontana G and Gerrard B (2004) A Post Keynesian theory of decision making under uncertainty. *Journal of Economic Psychology* 25(5): 619–637.

Gabaix X (2016) *A behavioral new Keynesian model*. NBER working paper no. 22954. Available at: http://www.nber.org/papers/w22954 (accessed 29 March 2017).

Gerrard B (1994) Beyond rational expectations: a constructive interpretation of Keynes's analysis of behaviour under uncertainty. *The Economic Journal* 104(427): 327–337.

Harcourt GC and Kerr P (2009) *Great Thinkers in Economics – Joan Robinson*. Basingstoke: Palgrave Macmillan.

Heiner RA (1983) The origin of predictable behaviour. *The American Economic Review* 73(4): 560–595.

Howitt P (1997 [1979]) Expectations and uncertainty in contemporary Keynesian models. In: Harcourt GC and Riach PA (eds) *A 'Second Edition' of the General Theory*. London: Routledge, pp. 238–260.

Howitt P and McAfee RP (1992) Animal spirits. *The American Economic Review* 82(3): 493–507.

Juster FT (1961) Review of Katona (1960). *Journal of Political Economy* 69(5): 503–504.

Kahneman D (2011) *Thinking, Fast and Slow*. London: Allen Lane.

Kahneman D and Tversky A (1979) Prospect theory – an analysis of decision under risk. *Econometrica* 47(2): 263–292.

Kahneman D and Tversky A (2000) *Choices, Values and Frames*. Cambridge: Cambridge University Press.

Kahneman D, Slovic P and Tversky A (1982) *Judgement under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press.

Katona G (1946) Psychological analysis of business decisions and expectations. *The American Economic Review* 36(1): 44–62.

Katona G (1953) Rational behavior and economic behavior. *Psychological Review* 60(5): 307–318.

Katona G (1960) *The Powerful Consumer – Psychological Studies of the American Economy*. New York: McGraw-Hill.
Katona G (1975) *Psychological Economics*. New York: Elsevier.
Katona G (1980) *Essays on Behavioral Economics*. Ann Arbor, MI: University of Michigan Institute for Social Research.
Keynes JM (1921) *A Treatise on Probability*. London: Macmillan.
Keynes JM (1936) *The General Theory of Interest, Employment and Money*. London: Macmillan.
Keynes JM (1937) The general theory of employment. *Quarterly Journal of Economics* 51(2): 209–223.
Keynes JM (1979) *The General Theory and after: A Supplement, Collected Writings of John Maynard Keynes*, vol. 29. London: Macmillan and Royal Economic Society.
King J (2016) Katona and Keynes. *History of Economics Review* 64(1): 64–75.
Kregel J (1976) Economic methodology in the face of uncertainty: the modelling methods of Keynes and the Post-Keynesians. *The Economic Journal* 86(342): 209–225.
Lawson T (1988) Probability and uncertainty in economic analysis. *Journal of Post Keynesian Economics* 11(1): 38–65.
Lawson T (1995) Economics and expectations. In: Dow S and Hillard J (eds) *Keynes, Knowledge and Uncertainty*. Aldershot: Edward Elgar, pp. 77–106.
Leibenstein H (1976) *Beyond Economic Man*. Cambridge, MA: Harvard University Press.
Littleboy B (1990) *On Interpreting Keynes: A Study in Reconciliation*. London: Routledge.
Meeks GT (2003) Keynes on the rationality of decision procedures under uncertainty: the investment decision. In: Runde J and Mizuhara S (eds) *The Philosophy of Keynes's Economics – Probability, Uncertainty and Convention*. Abingdon: Routledge, pp. 18–35.
Meeks JG (ed.) (1991) *Thoughtful Economic Man*. Cambridge: Cambridge University Press.
Mini P (1990) *Keynes, Bloomsbury and the General Theory*. London: Macmillan.
Minsky HP (1975) *John Maynard Keynes*. New York: Columbia University Press.
Minsky HP (1976) *Stabilizing an Unstable Economy*. New York: McGraw-Hill.
Minsky HP (1992) *The financial instability hypothesis*. Working paper no. 74. Levy Economics Institute. Available at: http://www.levyinstitute.org/pubs/wp74.pdf (accessed 29 March 2017).
Nagel R (1995) Unraveling in guessing games: an experimental study. *The American Economic Review* 85(5): 1313–1326.
O'Donnell RM (1989) *Keynes: Philosophy, Economics and Politics*. London: Macmillan.
O'Donnell RM (1991) Keynes on probability, expectations and uncertainty. In: O'Donnell RM (ed.) *Keynes as Philosopher-Economist*. London: Macmillan, pp. 3–60.
Porter D and Smith VL (2008) Thar she blows: can bubbles be rekindled with experienced subjects? *The American Economic Review* 98(3): 924–937.
Potts J (2000) Uncertainty, complexity and imagination. In: Earl P and Frowen S (eds) *Economics as an Art of Thought: Essays in Memory of GLS Shackle*. Abingdon: Routledge, pp. 187–213.
Robinson JV (1979) What has become of the Keynesian Revolution. *Collected Economic Papers*, vol. 5. Oxford, UK: Blackwell.
Runde J (1994) Keynesian uncertainty and liquidity preference. *Cambridge Journal of Economics* 18(2): 129–144.
Runde J (1997) Keynesian methodology. In: Harcourt GC and Riach PA (eds) *A 'Second Edition' of the General Theory*. London: Routledge, pp. 222–243.
Runde J and Mizuhara S (2003) *The Philosophy of Keynes's Economics – Probability, Uncertainty and Convention*. Abingdon: Routledge, pp. 1–16.
Scharfstein DS and Stein JC (1990) Herd behaviour and investment. *The American Economic Review* 80(3): 465–479.

Schumpeter JA (1942) *Capitalism, Socialism and Democracy*. New York: Harper & Brothers.
Shackle GLS (1955) *Uncertainty in Economics and other Reflections*. Cambridge, UK: Cambridge University Press.
Shackle GLS (1967) *The Years of High Theory: Invention and Tradition in Economic Thought 1926–1939*. Cambridge, UK: Cambridge University Press.
Shackle GLS (1970) *Expectation, Enterprise and Profit: The Theory of the Firm*. London : Allen & Unwin, 1970.
Shackle GLS (1972) *Epistemics and Economics*. Cambridge: Cambridge University Press.
Simon HA (1955) A behavioral model of rational choice. *Quarterly Journal of Economics* 69(1): 99–118.
Simon HA (1979) From substantive to procedural rationality. In: Hahn F and Hollis M (eds) *Philosophy and Economic Theory*. Oxford: Oxford University Press, pp. 65–86.
Skidelsky R (1992) *John Maynard Keynes. Volume Two. The Economist as Saviour 1920–1937*. London: Macmillan.
Sunstein CR (2015) *Choosing Not to Choose: Understanding the Value of Choice*. Oxford: Oxford University Press.
Thaler R (2009) Does Hyundai have a bunch of behavioural economists on its staff? Available at: https://nudges.wordpress.com/2009/06/18/does-hyundai-have-a-bunch-of-behavioral-economists-on-its-staff/ (accessed 29 March 2017).
Thaler R and Sunstein C (2008) *Nudge – Improving Decisions about Health, Wealth and Happiness*. New Haven, CT: Yale University Press.
Townshend H (1937) Liquidity premium and the theory of value. *The Economic Journal* 47(85): 157–169.
Tuckett D (2011) *Minding the Markets: An Emotional Finance View of Financial Instability*. Basingstoke: Palgrave Macmillan.
Tversky A and Kahneman D (1974) Judgement under uncertainty: heuristics and biases. *Science* 185: 1124–1131.
Wärneryd K-E (1982) The life and work of George Katona. *Journal of Economic Psychology* 2: 1–31.
Winslow T (1986) Keynes and Freud: psychoanalysis and Keynes's account of the 'animal spirits' of capitalism. *Social Research* 534: 549–578.
Winslow T (2003) The foundation of Keynes's economics. In: Runde J and Mizuhara S (eds) *The Philosophy of Keynes's Economics – Probability, Uncertainty and Convention*. Abingdon: Routledge, pp. 138–153.
Woodford M (1990) Learning to believe in sunspots. *Econometrica* 58(2): 277–307.

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