

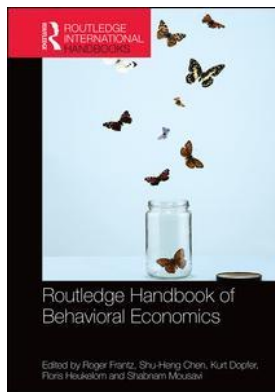
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BEHAVIOURAL
MACROECONOMICS

Time, optimism and animal spirits

*Michelle Baddeley***Introduction**

The 2007–8 financial crisis precipitated growing disillusionment with standard macroeconomic tools and models. The most influential macroeconomic models in policy terms are the dynamic stochastic general equilibrium (DSGE) models which assume forward looking agents facing random events within a general equilibrium framework focusing on complete sets of interacting markets, as opposed to a partial equilibrium approach analysing one market at a time. Of the two forms in which DSGE models are generally seen, monetarist/neoclassical versus New Keynesian versions, both are dependent on narrow conceptions of economic behaviour and rationality, and both are founded on rigorous micro-foundations. Neoclassical and monetarist models assume perfect competition in smooth running markets with many buyers and sellers, flexible prices, perfect information and market-clearing—and these assumptions are applied to labour markets as well as goods markets. In this world, unemployment is voluntary, reflecting a worker's choice about working only when the equilibrium real wage is large enough for workers to give up their valuable leisure time. Traditionally, Keynesian models focused on involuntary unemployment and sticky prices and New Keynesian models blend these insights with a softening of some of the strict assumptions associated with neoclassical and monetarist models to allow for imperfect information, sticky prices and transaction costs, including menu costs—and via these routes allow for involuntary unemployment: imperfectly competitive wage bargaining generates labour markets in which the real wage set by negotiations between employers and insiders (and their unions) is too high to clear the labour market. Involuntary unemployment of outsiders excluded from wage bargaining is the consequence of this insider-driven wage bargaining process.

While New Keynesian models and conclusions fit better with what we see in the world around us than neoclassical and monetarist models, they are nonetheless founded on similar conventions about behaviour, made mainly for empirical tractability. Via the representative agents hypothesis, the macroeconomy can be simplified to an analysis of two main groups of rational maximising economic agents: workers/householders, selling labour and buying goods and services; and employers/firms, selling goods and services and buying labour. If the average behaviour of agents is perfectly rational, then the model can be operationalised by assuming that all agents act as if they are identical. The task of understanding a complex macroeconomy can then be simplified to the task of understanding just two types of rational and selfish optimisers, where

rationality is defined narrowly in terms of the rational expectations hypothesis. Rational agents (workers and firms) use all currently available information, respond quickly to news, and do not make systematic mistakes—if they make a mistake in one period of time, once that mistake is realised, they are clever enough to know not to repeat it. These models also assume that agents are forward looking optimisers, making decisions taking their whole (often infinite) lifetimes into account. Their preferences—including both discount rates and risk preference—are stable. In these models, people behave as if they are mathematical machines, processing inputs of information to generate outputs in the form of decisions: a firm maximises profits and minimises costs and this drives their investment and production decisions; workers and households maximise utility—and this drives their decisions about work/leisure and consumption/savings—for example, in deciding whether or not to work, they are driven by forward looking judgements about the relative benefits of the real wage they can earn from working versus the utility they can derive from consuming leisure. In this view of the world, work is just about the monetary valuations of the opportunity cost of leisure in the form of lost wages.

These conventional models are obviously highly artificial and unrealistic—and the justification for this is that they are parsimonious abstractions that enable us to simplify the world so that we can better understand and analyse it. Whether or not these models achieve this is not the focus of this chapter—there is already a substantial literature on these methodological issues. Instead, the questions explored here are: Can behavioural economics provide more realistic foundations without losing too much in terms of theoretical and empirical tractability? And can behavioural economics offer anything more in terms of improving macroeconomic theory and policy? This chapter explores some of the ways in which insights from behavioural economics can be incorporated into a new approach to macroeconomic theory, policy, and forecasting. So far, the most promising starting steps in achieving this goal have been in the behavioural economic literature, which focuses on behavioural insights about time, optimism, and animal spirits. This chapter will explore ways in which these phenomena can be embedded into a macroeconomics framework. The chapter also explores some of the constraints facing behavioural macroeconomists, especially in terms of constructing an empirically tractable model of the interactions of different types of agents and the implications of their behaviour for the macroeconomy as a whole.

Behavioural macroeconomic theory: the state of play

A key way in which behavioural economics can offer a different approach to understanding the macroeconomy is by relaxing the standard rational expectations hypothesis, that rational agents make full use of all available information, and do not make systematic mistakes. Behavioural economics allows a broader view of rationality and, following Herbert Simon, allows that rationality can be bounded by information and cognitive constraints, giving a perspective on rationality that can be defined in a broader way than is conventional in standard economic models. Standard economic theory is founded on a substantive form of rationality: there is a substantive, objective basis to decision-making. In mainstream macroeconomics and in micro-founded versions of macroeconomics described above—this comes in the form of an optimisation problem defined in terms of an objective function (e.g. utility) and a set of constraints (e.g. the household budget). Substantively rational agents optimise by maximising utility or profits using mathematical tools, for example differential calculus. In this way they can identify the objectively best solution for themselves in a mechanistic and deterministic way. Simon observed however, that economic decision-making is more likely to be characterised by a process of procedural rationality—people often making decisions in a world of fundamental uncertainty,

where the information and forms of quantification required to set up decisions as an optimisation problem are neither feasible nor available. In these circumstances, people will use judgement, prior experience, intuition and gut feel to guide their decision-making (Simon, 1976; Baddeley, 2006).

Behavioural macroeconomics can use insights from behavioural economics to devise behavioural assumptions that are more consistent with softer conceptions of rationality and our intuitions about what drives human action. If behaviour in the macroeconomy is driven by wider variety of decision-making tools than those needed for rational optimisation, then the approach to macroeconomic modelling and forecasting, as well as macroeconomic policy tools, will be profoundly different, but not necessarily easier. This section outlines the key ways in which insights from behavioural economics are being used in the development of macroeconomic models and approaches, either via refinements that relax assumptions embedded into macroeconomic models, or by introducing a profoundly different approach to macroeconomic analysis which embeds socio-psychological influences alongside economic fundamentals. Key insights from behavioural economics can be embedded into macroeconomic models in a number of ways—but the literature so far has concentrated mainly on efficiency wage theory; heuristics and biases; time and risk preferences; and animal spirits.

Efficiency wage theory

Efficiency wage theory, while focused on the labour market rather than the macroeconomy as a whole, does have important macroeconomic implications in terms of labour supply–demand relationships that drive macroeconomic performance, specifically in terms of labour productivity, employment and involuntary unemployment. Efficiency wage theory allows that the role played by the real wage is more nuanced than that described in standard labour market theory in which employers pay a real wage reflecting marginal productivity of labour, with labour productivity determined by labour supplied (assuming diminishing marginal productivity of labour), capital–labour ratios and human capital investment. It is dominated by standard, non-behavioural approaches but the literature is growing to incorporate insights from behavioural economics and social psychology. For example, New Keynesian models allow for the possibility that the market-clearing wage is not necessarily the optimal wage, even for an employer: paying a higher wage can lead to proportionately greater increases in productivity and/or proportionately greater decreases in unit labour costs, and in this way paying a wage above the market-clearing wage can raise a firm's profits rather than lower them (see Katz (1986) for a comprehensive survey of efficiency wage theories and explanations). For example, Shapiro and Stiglitz (1984) show, in a world of asymmetric information, that firms will pay a wage higher than the market-clearing wage in the hope that it will discourage shirking by encouraging workers to value their jobs more highly. But Shapiro and Stiglitz also demonstrate that this can lead to a perverse consequence—if all firms in a perfectly competitive market raise their wages to discourage working shirking, then the real wage moves beyond the equilibrium level that would clear the market, generating involuntary employment in the macroeconomy, which in turn disciplines the insiders who do have a job: it is not the higher wage that dis-incentivises shirking; it is the threat of involuntary unemployment.

Behavioural economics can also expand understanding of labour markets and their impacts on macroeconomic employment, unemployment and productivity by allowing that workers face a broader range of motivations than purely extrinsic monetary rewards—there may be other extrinsic rewards, for example reciprocity and social approval. The role of exchange in a social context captures the impact of effort and loyalty, for example via gift exchange between employer and employee (e.g. see Akerlof, 1982). Behavioural economists have also explored the idea that

working relationships involve trust and social norms—and these are also associated with wages above a market-clearing level—an insight that can feed into macroeconomic models. Existing behavioural research also captures the impact of worker incentives and motivations more broadly defined, linking with insights about intrinsic motivation and extrinsic incentives and their impacts on worker effort (e.g. see Kreps, 1997; Frey & Oberholzer-Gee, 1997; Bénabou & Tirole, 2006). Worker effort reflects not just the wage paid but also intrinsic rewards associated with motivation and the inherent satisfaction that can come from working in a job that is rewarding either in terms of its intrinsic rewards or in terms of its social rewards. For behavioural macroeconomics, the problem is that these insights have yet to be embedded within a full macroeconomic model.

Heuristics and biases

Instead of decision-making as the outcome of an objective, mathematical process, people use heuristics and are prone to make systematic mistakes, especially when their decisions are distorted by social influences and herding. A range of heuristics could have macroeconomic impacts. The availability heuristic, which is about people making decisions on the basis of information easy to recall rather than all relevant information, could generate disproportionate responses to short-term events, contributing to instability. The representativeness heuristic, capturing decision-making via (sometimes spurious) reference to apparently similar events, could connect to inertia, feeding into macroeconomic problems such as unemployment hysteresis for example. Anchoring and adjustment would also feed into inertia and play a role in driving herding behaviours if, for example, financial markets are driven by people anchoring their financial investment decisions around conventional valuations; for example in housing markets, buyers may anchor their willingness to pay around socially driven valuations.

Not all heuristics and biases will necessarily have negative consequences. Some cognitive biases may have positive impacts—for example: optimism bias may boost entrepreneurship ensuring higher levels of investment and production than there might have been otherwise—and this could link to animal spirits, as discussed below. Social influences including herding and social learning drive behaviour and, if other people's actions are genuinely informative, this may have positive impacts on fixed asset investment (for example, see Acemoglu, 1993). Other biases may have detrimental effects, for example if present bias, where decisions are biased towards current rewards ahead of future rewards, leads to disproportionately short-termist decisions about saving and investment.

Time and risk preferences

Standard macroeconomic models generally assume that people are substantively rational—they make their decisions via a mathematical optimising process. In this, people are assumed to be forward looking, judging the present value of future rewards using an exponential discounting process. This leads to decisions over time which are time consistent with no present bias or preference reversals, that is, people do not change their mind over time; for example if they decide in November to give up smoking on New Year's Day then they do not change their mind on New Year's Eve. The behavioural literature brings in a range of alternative assumptions about time preference, to replace the standard economic assumption of exponential discounting.¹ With quasi-hyperbolic discounting, standard discount factors are nested within a specification that allows for present bias capturing the fact that people are disproportionately impatient in the short term and disproportionately patient in the long run. This is potentially a strong link to develop in macroeconomic theory, as the discount function is an essential component of most mainstream

macroeconomic models because these tend to assume that people are making decisions over long time horizons. One example of a way in which this behavioural insight can link with macroeconomic behaviour is in explaining trends in consumption, savings and investment—Laibson’s “golden egg” hypothesis that people hold onto illiquid wealth and short-term borrowing simultaneously in the hope that their golden eggs will deliver positive returns in the distant future is an important insight for macroeconomics (Laibson, 1997; Harris & Laibson, 2001). Behavioural discounting functions can be embedded into otherwise conventional structural models of the macroeconomy to generate simulations of liquid/illiquid wealth, borrowings and investment, for example see Angeletos et al. (2001). This type of behavioural innovation is a relatively simple tweaking of conventional models via the addition of a present bias parameter, but whilst it is not a radical re-think, nonetheless offers some potential for development in behavioural macroeconomic theory. In the context of short-term versus long-term behavioural adaptation, one example of short-run momentum versus preference reversals in the long run is explored by De Bondt and Thaler (1985) in their analysis of market over-reaction, associated with long-term reversals and winner–loser effects. It also connects with Bernatzi and Thaler’s (1995) analysis of the equity premium puzzle as a reflection of short-term myopia alongside loss aversion.

Given uncertainty, actions are driven by interplays of risk preferences and time preference, as captured in discount functions. Risk plays a less direct role in standard DSGE macroeconomic models, perhaps reflecting implicit assumptions that risk preferences are stable and therefore not a driver of macroeconomic fluctuations and/or that, in aggregate, heterogeneity of risk preferences balances out. An issue to address in behavioural macroeconomic models is the separation versus conflation of risk preference and time preference. Uncertainty is in essence about the interaction of attitudes towards risk and time. If risk attitude is about decisions taken now with unpredictable future consequences, how to separate time and risk preferences in macroeconomic models is an important question. There is a growing literature exploring these themes, for example Andreoni and Sprenger (2012, 2015) and Andersen et al. (2008) argue that time preference and risk preference are different types of preference whereas empirical/experimental evidence can appear to suggest that risk and time preference are the same thing. This interchangeability is possibly an artefact resulting from imposition of theoretical assumptions. Experimental tests are being developed that are aimed to enable researchers to separate the two, but more theoretical work is needed to unravel the difference between the two, because there will be key implications for macroeconomic theory and policy.

Risk preference has received far more attention in the financial literature—for example portfolio theory and the capital asset pricing model are constructed around expected utility theory in which risk preferences and parameters are stable and constant, with a concave utility function usually assumed, which is consistent with risk aversion. One of the problems with modern macroeconomics is that money is a veil, and specific features of financial decision-making are given no independent role follows the Modigliani–Miller theorem of financing neutrality—the corporate finance structure of a firm makes no difference to fixed asset investment decisions because the costs of different financing instruments will equilibrate given perfect capital markets. While the assumptions underlying this theorem are problematic and unrealistic, nonetheless the relevant point here is that risk could be captured within macroeconomic models in some form, by embedding a financial sector properly within macroeconomic models. In terms of behavioural insights, prospect theory perhaps has some potential to fill the gap with a more realistic model of risk, moving beyond the expected utility theory approach in which risk preferences are assumed to be stable. The pioneers are Markowitz (1952), and Kahneman and Tversky (1979) who analysed the importance of reference points when people are making decisions about risky prospects, which explains some anomalies identified in experimental

evidence. It is also associated with conceptions of the fourfold pattern or risk, as more recently elucidated by Scholten and Read (2014). The fourfold pattern captures shifting risk preferences in domains of losses versus gains, and large outcomes versus small outcomes. Large outcomes are associated with risk aversion in gains and risk seeking in losses; on the other hand, small outcomes are associated with risk aversion in losses and risk seeking in gains. These shifting risk preferences cannot be explained by expected utility theory. These insights are useful in understanding real-world features of macroeconomic and financial instability; for example, as explored by Genesove and Mayer (2001) who analyse housing market instability in the context of loss aversion, consistent with prospect theory, and also explored by Bernatzi and Thaler (1995) on myopic loss aversion in the context of the equity premium puzzle, as noted above.

Prospect theory is well explored in behavioural finance, but there is currently little research done in behavioural macroeconomic modelling to capture shifting, unstable risk preferences—except via a connection with animal spirits and confidence, as discussed below.

Animal spirits, optimism and pessimism

The most developed literature in behavioural macroeconomics is the literature on animal spirits in the macroeconomy. Animal spirits are most commonly associated with John Maynard Keynes (1936), who built on a concept first introduced by the classical Greek medic and physiologist Galen. Galen understood animal spirits as drivers of action and his conception was linked to the Hippocratic division of temperaments into the four humours: choleric, melancholic, sanguine and phlegmatic—with animal spirits associated with the sanguineous humour. Galen also developed conception of animal spirits as a type of nutrient that flows through the digestive system, eventually propelling action (Costandi, 2006). Keynes's animal spirits link most easily to the sanguine temperament, which is characterised by optimism, leadership and positive action. Keynes took Galen's concept of animal spirits and used it to argue that, in a market economy, private investment is subdued by uncertainty about the future and this leads the macroeconomy into persistent periods of under-investment and involuntary unemployment. Given uncertainty, most entrepreneurs would not be persuaded by a purely mathematical business case based around net present value calculations. Animal spirits play an important role in overcoming this barrier but what Keynes meant by animal spirits is not exactly clear. There is a link with optimism and spontaneity, and in Keynes's analysis, entrepreneurs' animal spirits drive them to act, reflecting a "spontaneous urge to action", and also reflecting a "delicate balance of spontaneous optimism" (Keynes, 1936: 161–2). This spontaneity contrasts with the forward looking assumption associated with neoclassical and monetary models and therefore, animal spirits are a concept that could be linked with analyses of present bias and short-termism, as seen in behavioural discounting models.

In modern behavioural macroeconomic models, Keynes's concept of animal spirits has been simplified and mostly they are equated with business/consumer confidence and/or general psychological influences. In some behavioural macroeconomic models, they are essentially an additional source of variance. For example, Woodford (1988), and Howitt and McAfee (1992) model animal spirit cycles, in which animal spirits are exogenous random noise in a two-state Markov switching model, with switching between high/low demand states.² Similar insights are developed by Topol (1991) in the context of financial markets to show how animal spirits, herding, and mimetic contagion operate and affect financial decision-making, again within an approach in which behaviour is driven by statistical judgements in a world of quantifiable "Knightian risk" versus unmeasurable "Knightian uncertainty." This distinction is explored by Knight (1921) and Keynes (1921), one of the few insights on which Knight and Keynes agreed.

The problem with these approaches is the assumption that risk and uncertainty are quantifiable, yet many of the most important socio-psychological influences driving macroeconomic outcomes are not inherently quantifiable in a straightforward way. In this sense, these models are suited to a world of substantively rational agents rather than procedurally rational agents.

Are there other ways in which these influences can be captured without requiring strong assumptions about the objective and quantifiable high levels of quantification? Akerlof and Shiller (2009) describe animal spirits as a set of five generalised psychological influences with macroeconomic implications, including confidence, fairness, corruption, money illusion, and storytelling. Akerlof and Shiller's broad approach is not necessarily a faithful account of Keynes's original insights and, more importantly in terms of constructing a tractable behavioural macroeconomic model, animal spirits are defined essentially as a synonym for psychological influences (Baddeley, 2009).

Other animal spirits models grounded in an alternative heterodox approach include Dow (2011), and Dow and Dow (2011) who focus on animal spirits as drivers of action and, in a world of uncertainty, the issue of whether or not these animal spirits are rational or irrational is moot because animal spirits are context dependent and their nature and role will vary across different sectors and firms. Nonetheless, their analysis does not explore how animal spirits might be incorporated into an analytical framework that could be useful in policy-making terms.

Overall, animal spirits models have much potential to offer in the development of behavioural macroeconomic models, but need to be set within a clearer analytical structure. This can be done by using animal spirits as a link that connects emotional influences, separates time preferences from risk preferences and captures different forms of motivation. The following section develops some ideas about how animal spirits models can be incorporated in more coherent and tractable versions of behavioural macroeconomic theory.

The role of rhetoric

A complete macroeconomic theory should include not only socio-psychological influences alongside economic fundamentals but also political and institutional contexts. The political environment will play a role via politicians' rhetoric, and this rhetoric does not necessarily have a clear connection with economic fundamentals, especially if it is obfuscating rhetoric designed for political purposes rather than a genuine desire to communicate objective information to the public. For example, rhetoric about reducing deficits and debt is not necessarily accompanied by significant movement in these policy variables. Nonetheless this political rhetoric affects the macroeconomic psychological state via its impact on consumer and business confidence, animal spirits and expectations—though evidence is needed to establish if fierce austerity rhetoric from government agencies either reassures businesses and makes them more confident in building up productive capacity in expectation of smoother macroeconomic conditions ahead, or depresses private consumption and investment activity. Either way, behavioural factors and socio-economic influences will play a crucial role in transmitting political events through to the real economy via verbal and online communication and conversation. These relationships and processes are not captured within conventional macroeconomic approaches and behavioural macroeconomic models perhaps offer a solution, if some of the empirical constraints can be resolved (some of the empirical constraints are discussed below).

A behavioural macroeconomic model

The approaches outlined in the section above provide some valuable insights about the potential impact of socio-psychological influences in the macroeconomy, but building these insights

convincingly into a coherent behavioural macroeconomic model is not straightforward. The key influences on individual decision-making that feed through into macroeconomic outcomes include heuristics and biases, time and risk, broader forms of motivation and incentives beyond the standard monetary incentives, and animal spirits as a proxy for personality and emotion. In addition, influences beyond the individual will have an impact—for example embedding insights about social mood can link with some of social and political influences that drive confidence among businesses and consumers, linking with insights from Keynes (1936, 1937) as well as with socioeconomic models in which social mood is the ultimate independent variable (Prechter & Parker, 2007; Casti, 2010). All these factors together can be incorporated into a model that uses socio-psychological influences as the grounding for macroeconomic fluctuations driven by macroeconomic psychological phenomena, linking into consumer and business confidence, as well as by influences from individual firms and workers in the form of entrepreneurial activity and workers' effort.

Key behavioural assumptions

As a first step in developing a new approach to macroeconomic modelling, some key assumptions can be introduced as alternatives to the standard economic assumptions of rational expectations: agents make full use of all available information and do not make systematic mistakes and the efficient financial markets (with rational agents, asset markets efficiently process information, ensuring that perfect arbitrage generates current asset prices are an unbiased indicator of future asset prices). The overarching approach is one in which macroeconomic actors are procedurally rational, not substantively rational.

Assumption 1: Macroeconomic phenomena are driven by procedurally rational behaviours, including heuristics, biases and socio-psychological influences.

Assumption 2: Propensities to exhibit systematic biases correlate with individual differences including demographic factors, socio-economic characteristics and personality traits.

Assumption 3: Decision-making is affected by a range of intrinsic as well as extrinsic motivations and incentives. For example, labour market outcomes are driven by efficiency wages and so worker productivity reflects social rewards and intrinsic motivations as well as real wages. Also, entrepreneurs' animal spirits drive positive actions in the form of investment and production, and these constitute a form of intrinsic motivation, in addition to the extrinsic monetary incentive of expected profits.

Assumption 4: Discount functions and discount rates are endogenously determined, varying across individuals and over time, reflecting social influences and psychological factors.

Assumption 5: Decisions today with future consequences, e.g. entrepreneurs' investment decisions, are driven by animal spirits and predispositions towards optimism and pessimism.

Assumption 6: Animal spirits are determined by a mix of individual traits and social influences including personality traits and social mood. Positive animal spirits are associated with an optimistic, sanguine temperament and therefore a propensity to act now to ensure future rewards, rather than procrastinating.

An approach combining these elements could form the basis for a behavioural business cycle theory in which fluctuating animal spirits drive up discount factors and encourage more forward looking behaviour via pro-cyclical future bias and optimism during upswings, in contrast to anaemic animal spirits driving counter-cyclical pessimism and present bias during downswings. Instead of assuming that the discount rate is an exogenously determined stable preference and/or that the discount factor evolves in a stable and deterministic way (as assumed even in analyses of

hyperbolic and quasi-hyperbolic discounting), an alternative approach would be to specify discount functions determined endogenously, as well as being neither constant nor deterministic. The truly independent explanatory variables within the macroeconomic system would be the socio-psychological factors, depending on whether animal spirits are positive and buoyant, during upswings, or dimmed and in abeyance, during recessionary/depressive episodes. For example when the economy is in the doldrums, a mood of pessimism will take hold and this will lower everyone's discount factors.

This approach to specifying the discount function goes beyond the hyperbolic discounting models that allow behavioural time inconsistency as a facet of an individual's boundedly rational decision-making at a microeconomic level. It is distinct from the dynamic inconsistency problem identified by rational expectations theorists, which is associated market/institutional failures reflecting sub-optimal interactions between strictly rational agents (e.g. as outlined by Kydland & Prescott, 1977), though the interactions between time inconsistency at a microeconomic level versus dynamic inconsistency as a market failure is an interesting theme to explore. The behavioural approach outlined here allows not only for present bias and time inconsistent preferences but also for the discount function to be driven by socio-psychological factors and intrinsic incentives, as well as economic fundamentals.

The factors driving the discount function are also determined by individual differences and this allows for heterogeneity amongst the populations that constitute the macroeconomy. For example, there may be a mixture of impatient consumers and patient savers and investors, and the difference between them can be modelled by allowing that these different groups have different discount functions. The problem in macroeconomics is that this complicates aggregation. Conventional models assume homogeneity of agents; that is, everyone is behaving in the same substantively rational maximising way. With this simplifying assumption, it is easy to aggregate individual behaviours just by multiplying the relationship that describes the behaviour of the two representative agents. When we allow not only that people are different, in terms of personality, preferences and demographics but also allow that their preferences are shifting, the empirical problem of modelling this behaviour becomes much more complex.

Combining these influences allows that the present bias parameter from the quasi-hyperbolic discount function (*DF*) to be re-specified as:

$$DF = f(t, X, Z)$$

where *t* is a time trend, *X* is a vector of socio-psychological factors including animal spirits, risk attitudes, mood and business confidence; and *Z* is a vector of contextual influences including economic fundamentals (output growth, employment, unemployment, inflation), financial market conditions and contextual factors including the socio-political environment. The latter also has the potential to capture the impact of political events that affect macroeconomic policies and outcomes. A current example is the impact of political events on the fate of the euro and financial system including substantial real-world impacts of austerity and migration flows (from policy or enforced by recent events in Greece and the euro zone and also more recently in response to conflict in the Middle East and Africa).

Behavioural macroeconomic modelling: empirical constraints

What are the empirical constraints? A key problem is that socio-psychological influences are much less easily measurable than the conventional macroeconomic data regularly collected by national and international statistical agencies. One reason why mainstream DSGE models have

power is that they are relatively easy to use, estimate and forecast using standard monetary-based statistics easily available from published statistical sources, with widely agreed (though not infallible) conventions about the best ways to collect the data. The mathematics of DSGE models is also relatively easy to analyse because the models are based on a limited number of key variables. In a behavioural macroeconomic model, data is harder to collect and socio-psychological influences are harder to capture—not least because of the aggregation problem. As noted above, in DSGE models, the representative agents hypothesis enables easy aggregation—the whole is the sum of the identical parts so describing one set of representative agents is enough. But once we allow that social interactions are an essential feature of economic relationships then the whole is not equal to the sum of the parts and simple aggregation is misplaced. Another question is the extent to which GDP and GNP, as money-based measures of economic performance, are good measures of macroeconomic performance more widely. The limitations of conventional measures of macroeconomic performance are being more widely recognised in recent years. In parallel, measures of happiness and subjective wellbeing are increasingly being accepted by the mainstream as legitimate indicators of macroeconomic performance. The award of the 2015 Economics Nobel Prize to Angus Deaton is a testament to this because some of his most important empirical work has been in the analysis of happiness and wellbeing. In response, governments are re-orienting their data collection to focus on collection of wellbeing and happiness statistics: the OECD and a number of national statistical agencies are collecting measures of wellbeing and devising robust econometric solutions to the problems of sampling and self-reporting biases that limit the accuracy of many measures of collecting wellbeing statistics (e.g., see O'Donnell et al. (2014) for a survey of the possibilities for wellbeing statistics and analysis). Given data constraints, another promising empirical route is to use computational methods such as agent based modelling to model the macroeconomic impact of decisions driven by socio-psychological factors.

Another approach would be to use public mental health indicators as proxies for macroeconomic performance, such as suicide rates and mental health statistics. These could be statistical proxies for social mood and/or novel methods for measuring collective mood. Additional methods include incorporating other novel data such as weather data, as applied for example by Hirshleifer and Shumway (2003), and Kamstra, Kramer and Levi (2003).

Policy implications and conclusions

Behavioural macroeconomic theory introduces a new set of insights for policy-makers, but insights that could supplement rather than replace standard policy approaches. The policy insights from models building within a DSGE framework tend to focus on ameliorating market failures—especially in terms of reducing uncertainty and improving information via greater transparency about government and central bank policy-making. How will a behavioural macroeconomic model change textbook accounts of standard goals and instruments? In the pre-crisis years the focus in macroeconomic policy was on inflation targeting and anchoring inflationary expectations by promoting the transparency and credibility of central bank decision-making. The real-side goals of boosting employment and promoting growth and productivity were assumed to follow from the decreased uncertainty associated with a low inflation environment. Other standard instruments included manipulation of interest rates and, in recent years, boosting the money supply and bank lending via quantitative easing. Expansionary fiscal policies have fallen out of favour for most governments, while the contractionary fiscal policies associated with austerity and deficit-debt reduction are now fashionable.

How might a behavioural approach affect these policy prescriptions? Once the psychology of the macroeconomy as a whole, as well as the potential biases and socio-psychological influences on the economic decision-makers that make up the macroeconomy are considered, the impacts of socio-psychological factors on increased instability in periods of profound uncertainty suggest that macroeconomic and financial policies should be designed to stabilise the macroeconomic psychology. This could include ameliorating or compensating for the negative consequences of moods, emotions and present bias. Political rhetoric could play a role in this. Austerity rhetoric might reassure financial markets, increasing the supply for lending and thereby putting downward pressure on commercial lending rates, enabling entrepreneurs to embark on more new fixed asset investment projects. On the other hand, it may have a dampening effect on business confidence, optimism and entrepreneurs' animal spirits, putting downward pressure on discount factors (upward pressure on discount rates) generating an atmosphere driven by caution and delay, with increasing short-termism, present bias and risk aversion contributing to under-investment in private fixed capital, with knock-on effects in the short term on aggregate demand and an erosion of future productive capacity for the long term. The mood of pessimism would lead to under-investment, with knock-on effects in terms of falling employment, rising unemployment and deflation.

Conventional policies have additional backing once socio-psychological factors are taken into account—for example if pessimism and social mood mean that the private sector is floundering, the justification for expansionary fiscal policy can be expanded to include the positive impact that public investment for example in infrastructure, can achieve, not only in promoting future productivity and growth, but also concrete returns in the long term via a boost to entrepreneurs' animal spirits and consumer and business confidence. Financial policies are primarily designed by central bankers to increase the availability of finance and supply of bank lending. In addition, there will be knock-on socio-psychological effects associated with positive sentiment in the financial sector—what Keynes (1936) refers to as the “state of credit”. Relaxing private sector financing constraints may reduce pessimism and present bias, as well as generating cheaper finance. Both will work in concert to lower the hurdle rate of return on projects, making more fixed asset investment projects viable. There will be feedback effects as the increased volume of investment boosts the hopefulness of entrepreneurs and consumers, partially overcoming self-fulfilling prophecies of sluggishness and stagnation. For example, Akerlof and Shiller (2009) identify housing market instability as an example of this: before the sub-prime mortgage crisis, a narrative emerged that house prices could never fall, fuelling housing demand and contributing to self-fulfilling prophecies of rising house prices. Many other examples of speculative episodes from throughout history reflect similar factors.

To conclude, there is pressing need to re-think macroeconomic theory and analysis, especially in the wake of financial crisis, global recession and fiscal pressures. If insights from behavioural economics can be embedded into macroeconomic models, then this might lead to significant advances in the design of effective macroeconomic policies to achieve a wide range of macroeconomic goals, from lowering unemployment, boosting growth and productivity, and also increasing levels of wellbeing and happiness. The problem, however, is that the logistics of blending behavioural economics with macroeconomic theory are complicated. If ways can be found to bring the two subjects together convincingly, then the potential benefits for economies and societies as a whole will be significant.

Notes

- 1 See Frederick et al. (2002) for a review of the literature.
- 2 See also Farmer & Guo (1994), and de Grauwe (2011, 2012a).

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