Rethinking Economic Modelling: the Case for Behavioural Economics

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The concept of Economic Man has been at the heart of economics since its early days. In this essay, Pierre Louis Boczmak assesses two models based on this precept; Expected Utility and Discounted Utility using Stigler's three criteria for a sound economic model: empirical accuracy, generality, and tractability. This essay also presents two alternative models offered by behavioural economist who deviate from the assumption of Homo Economicus. This essay then concludes that the behavioural models, Prospect Theory and Hyperbolic discounting take into account the limitations of Economic Man and improve the empirical accuracy of economic models without significantly impacting the other two criteria. However, much work is still needed in modeling the insights of behavioural economics before the discipline can move away from the concept of Economic Man.

Introduction

A large body of research has identified the relations between countries as well as internal social and political order as being strongly determined by economic prosperity, itself overwhelmingly associated with market economy. Thus, bettering our understanding of today's market economy could yield a wide range of benefits in the future. This essay shall therefore be concerned with the use-

fulness of the concept of Economic Man for theorising and modelling today's economy, and, by extension, the assessment of those models which make use of the concept. For this purpose, this paper will not be investigating the concept's usefulness from a philosophical and sociological standpoint, and recognises that real people's actions are much more complex than what the Economic Man concept allows for. Instead, this paper seeks to assess the concept of Economic Man in relative terms. To do so, I use Stigler's (1965) three criteria for a good economic model: empirical accuracy, generality, and tractability.

I assess the widely-used models of Expected Utility for decision under uncertainty and Discounted Utility for intertemporal decisions. For each, I outline the neoclassical model's predictions, identify systematic deviations, or anomalies, and present the theoretical improvements made by behavioural economists to account for those anomalies. I then apply those findings to real-life situations in the fields of portfolio and savings theory, respectively. I argue that the neoclassical Expected Utility and Discounted Utility models built upon the Economic Man concept have become outdated with the emergence of behavioural economics. Indeed, behavioural economists have managed to formally and mathematically integrate the limitations of Economic Man into those models with the Prospect Theory and Quasi-hyperbolic Discounting.

EXPECTED UTILITY MODEL AND PORTFOLIO THEORY

Decision-making under uncertainty, or risk, is part of people's everyday lives and neoclassical economists use the Expected Utility model to predict their choice under such circumstances. According to this model, Homo Economicus will attribute a utility value to each possible outcome consistent with his atomic preferences, attribute a probability to each of those outcomes using his complete knowledge and unbounded calculation abilities, and select the course of action yielding the highest probability-weighted utility, or expected utility. In this situation, the assumption that Homo Economicus is the decision-maker allows economists to derive unambiguous and consistent predictions about his choices under risk (Samuelson, 1937), and the Expected Utility model thus easily passes two of Stigler's (1965) three criteria for a good economic model, namely, those of generality and tractability.

However, the model has some serious shortcomings regarding Stigler's first, and arguably most important, criterion: empirical accuracy. Many economists have exposed the variety of anomalies, defined as consistent deviations from the model's predictions (Smith, 2005), found at the empirical level when surveying people's decisions under uncertainty. Allais (1953) was one early critique of this

neoclassical Expected Utility model and highlighted people's bounded rationality, seen in their inability to perfectly judge the utility and probability of outcomes, as the cause of such deviations. Simon (1955) too recognised the fact that people are boundedly rational and not perfect utility maximisers, even more so under uncertainty, but, in line with Allais, argued that people are coherent and consistent within their cognitive and computational limits. Moreover, Simon (1955) contended that since acquiring information was costly in time and resources, the use of heuristics to reduce the need for complete information can be rational. In this regard, early critiques of the concept of Homo Economicus did not fundamentally challenge the neoclassical theoretical framework and merely sought to point out the causes of its inconsistent empirical accuracy. Following on this, Kahneman and Tversky (1974) first focused on the heuristics employed by people to judge probabilities of outcomes and assess the value of such outcomes, and highlighted people's many unconscious biases.

In later studies, Kahneman and Tversky went on to show the deeper flaws of the neoclassical Expected Utility model and the preference reversals of the Homo Economicus, violating both the axioms of atomism and subjective rationality (Screpanti, Zamagni and Field, 2005). They did so by experimenting with simple situations in which information required to take a rational decision was inexpensive and fully available. Kahneman and Tversky (1979) observed that people were subject to a 'certainty effect', or the tendency to overweight certain events against uncertain ones when computing their respecting expected utility, reflecting an aversion to risk involving sure gains and the opposite in situations involving sure losses. More importantly, Kahneman and Tversky (1979) found that people's risk-aversion, assumed to be coherent and consistent by Allais (1953), was influenced by both the point of reference from which the decision was made, in terms of losses or gains, and from the magnitude of the losses and gains at stake. They found people to be more sensitive to losses than gains, and that sensitivity to both losses and gains decreased as the distance from the reference point increased. These deviations were proven to be recurrent and consistent anomalies and as such, predictable. This provided a rationale for integrating those findings into mainstream economic models of choice under uncertainty to improve their empirical accuracy. Kahneman and Tversky (1979) did so forcefully with their alternative Prospect Theory and without neglecting Stigler's tractability and generality criteria. In their model, gains and losses matter more than overall wealth, and real probabilities of events are replaced by subjective weights to account for people's biased judgements and irrational choices. They eventually arrived at an 's-shaped' value function, convex in the loss zone and concave in the gain one, steeper in the

loss one that in the gain one, reflecting their findings aforementioned.

We are concerned in this essay with the usefulness of the concept of Homo Economicus for modelling economy and making predictions about economic behaviour. For this purpose, I now outline how Kahneman and Tversky's findings regarding decisions under uncertainty can be applied to theories about financial markets, a field still largely dominated by neoclassical models. Markowitz (1952) formulated a theory for building portfolios in which the expected return on assets for a predetermined risk level is maximised, with an emphasis on diversification and aggregate risk level. Together with the Capital Asset Pricing Model developed by Sharpe (1964) and used to estimate an asset's rate of return in the long run, these theories form the bulk of Modern Portfolio Theories. This body of theory rests upon the assumption of rationality of investors, and a perfect functioning of the financial market as understood by the neoclassical orthodoxy, and thus rejects the need for psychological and emotional considerations (Fromlet, 2001). While these theories have the merit to be generalised and tractable, their predictions are often not validated empirically. Behavioural economists argue that these deviations follow from the underlying, unrealistic model of Expected Utility, itself based on the Homo Economicus concept, as investors assembling a portfolio find themselves in a situation of decision under uncertainty (Weber, 1999).

In particular, Benartzi and Thaler (1995) have highlighted the fact that stocks have outperformed security bonds over time with a remarkably large margin and wonder why people do not invest more in stocks. The differential is too large to be accounted for by modern portfolio theories simply by invoking the mechanism of risk premium compensating for the higher volatility of stocks. They contend that, drawing on Kahneman and Tversky's findings, people are relatively more averse to losses than gains and far more short-sighted than the Homo Economicus concept allows for. As a result, investors re-evaluate their portfolios too frequently and privilege safe security bonds over volatile and relatively risky stocks in the short-run. Because of investors' irrational perception of risk, stocks become undervalued and further outperform security bonds (Camerer, 2002). To make their point, Benartzi and Thaler provide the example of pension funds which should naturally have a long-term investment strategy, allowing them to mitigate the short-term volatility of stocks, and should thus be expected to hold a larger share of stocks in their portfolios than private investors. However, the empirical evidence shows that pension funds have historically held only half of their total assets in stocks. This irrational investment strategy, they argue, is due to a form of principal-agent problem between the funds and their managing di-

rectors: their irrational loss-aversion and short-sightedness compel them to hold security bonds.

De Bondt and Thaler (1985) devote their attention to the volatility of stocks, which has been found to be consistently higher than the efficient market hypothesis can account for, assuming the rationality of investors. They find that investors irrationally overreact to news instead of correctly adjusting the expected value of stocks and make use of the representativeness heuristic (Kahneman and Tversky, 1974). This leads them to give too much importance to short-term fluctuations and overlook the real value of stocks based on fundamentals. Their hypothesis seems corroborated by the fact that portfolios holding stocks with low price-to-earnings ratio tend to outperform over three years those with 'better' stocks at the same time-reference point by more than 25% (De Bondt and Thaler, 1985)— evidence of a gradual correction of investors' pessimistic overreaction as stocks with low price-to-earnings ratio became momentarily undervalued.

DISCOUNTED UTILITY MODEL AND THEORY OF SAVINGS

I now address the failures of a second model widely used in neoclassical economics, the Discounted Utility model for intertemporal decision making, and the ways in which behavioural economists have sought to improve it by questioning the concept of Homo Economicus upon which it rests. As formalised by Samuelson (1937), one important early contributor to utility theory, the traditional model assumes that Homo Economicus discounts utility over time at a constant rate, and expresses it with an exponential discounted utility function. Concretely, this means that Homo Economicus is assumed to prefer consuming today rather than tomorrow, and is also indifferent between consuming today or tomorrow and in one year or one year and one day. Though modelling time discounting in this way is analytically convenient for modelling economic behaviour and making unambiguous inferences (Samuelson, 1937), it has nonetheless been proven to be empirically inaccurate by many economists (Camerer, 2002; Laibson 1997; Prelec and Loewenstein 1993; Shefrin and Thaler, 1992).

Behavioural economists indeed argue that people actually discount utility over time in a quasi-hyperbolic fashion (Prelec and Loewenstein 1991), that is, their discount rate is not constant over time. In simple terms, they found by the means of experiments in simple intertemporal decision setting that people would much prefer consuming today than tomorrow, but would be rather indifferent between consuming in one year or in one year and a day. In a similar fashion to Kahneman and Tversky (1979), Prelec and Loewenstein's (1993) ability to express their insight mathematically by changing the traditional exponential utility

function into a quasi-hyperbolic one allowed them to improve on the Discounted Utility model without neglecting Stigler's other two criteria of tractability and generality. By doing so, behavioural economists have shed light on the neoclassical model's inherent flaws, for it assumes an unrealistic utility function.

Moreover, as people were observed to be incoherent within their bounded rationality when choosing under uncertainty, they were also found to be incoherent within their bounded rationality when quasi-hyperbolically discounting their utility over time. Indeed, Thaler and Shefrin (1981) found that people discounted gains more than losses, and smaller amounts more than larger ones for both gains and losses. Furthermore, differences in framing elicited preference reversals in a fashion reminiscent of the cognitive biases highlighted by Kahneman and Tversky (1974). Prelec and Loewenstein (1991) remarked that anomalies were of the same types in the cases of risky and intertemporal decisions, namely, depending on ratio, sign, magnitude, and point of reference. This forcefully reinforces the contention made by behavioural economics that those anomalies, or systematic deviations from neoclassical models' prediction, are so systematic and significant that they must be integrated into economic models.

For judging the usefulness of the Homo Economicus concept, we are concerned with real-life situations in which his limitations in judgement and choice can be observed and have meaningful consequences. One such typical intertemporal choice situation is that concerning the saving decisions made by people. Friedman (1957) is the father of the Permanent Income Hypothesis, or the traditional neoclassical model for predicting saving patterns over time. This theory assumes that people rationally maximise their utility over time and wish to maintain a constant level of consumption. It predicts that, in anticipation of the loss of regular income following their retirement, or any other change of income which can be anticipated, people will smooth their consumption over time. This means that their consumption depends on both their current and future expected assets. This seems reasonable at first considering people experience diminishing marginal utility from the consumption of goods in the same period and are, thanks to their unbounded rationality, able and willing to plan ahead. As we have seen before, however, in real-life people discount their utility over time quasi-hyperbolically and not exponentially — that is, they much prefer consuming today than later.

Thaler and Shefrin (1981) thus picture people as having two selves, a short-sighted, pleasure-seeking one, and one able to see the need for savings as retirement looms over the horizon. They contend that most often it is people's irrational self that dominates their intertemporal decision-making and, as a re-

sult, often lack the willpower to smooth their consumption over time. Following from this, Mullainathan and Thaler (2001) found that people's consumption substantially decreases when they retire. Thaler and Shefrin (1981) argue that people's short-sightedness and lack of willpower can explain why they are willing to bear the cost of self-imposed rules reducing their discretion for current spending. Specifically, the neoclassical model cannot account for the existence of Christmas Funds in which people lock their savings without being compensated with a return. Indeed, it would be more rational to invest this money in stocks or security bonds to reduce the opportunity cost of saving. However, people who are aware that they lack self-control become willing to bear this opportunity cost if it enables them to save for later in life.

Furthermore, Thaler and Benartzi (2004) found evidence that in most cases people were simply not aware of their intertemporal choice irrationality. They found that employees enrolled in a compulsory saving plans aimed at reducing their discretion over current spending saved 13.6% of their income on average while those who were not saved 3.5%. Neoclassical saving theories cannot account for this either since Homo Economicus is expected to maximise his utility over time without the need for self-imposed rules. Thus, by realising the extent of people's bounded rationality when it comes to intertemporal choice, behavioural economists can design better policy to encourage savings, with concrete benefits for economic agents and society as a whole.

CONCLUSION

I have sought in this paper to assess the usefulness of the concept of Homo Economicus for modelling and predicting intertemporal decision and decision under uncertainty. To do so, I have used the neoclassical models of Expected Utility and Discounted Utility which both rest on the concept of Homo Economicus. I have identified their principal flaw, their lack of empirical accuracy, and outlined how behavioural economics could improve on this by acknowledging the limitations of the concept of Homo Economicus. For the Expected Utility model, Kahneman and Tversky (1979) proposed a Prospect Theory which takes into account people's imperfect judgement and decision-making abilities. Similarly, Prelec and Loewenstein (1993) suggested the use of a quasi-hyperbolic discounted utility function instead of the exponential one typically used.

The real value of these advances in behavioural economics is that they have improved the predictions of traditional models without undermining significantly their qualities of generality and tractability. Indeed, in both cases findings about man's limited judgement and decision-making abilities were quantified and for-

mally integrated into the models, allowing for unambiguous and much more realistic predictions than under the Homo Economicus assumption. Nonetheless, more work needs to be done to exploit the full potential of these two models. In this respect, integrating them in the broader theoretical economic framework by rendering them compatible with microeconomic models of reference is crucial. Moreover, as pointed out by Fudenberg (2006), behavioural economics has to this day not been able to quantify and model all its insights about the limitations of Homo Economicus. Indeed, though behavioural economists have demonstrated in many instances that people have social preferences and are not solely interested in maximising their own utility, they have yet to come up with a strong model allowing them to make tractable, general, and unambiguous predictions for this field of study (Wisnewski and Brzezicka, 2013).

In short, though I have shown that the concept of Homo Economicus appears outdated for models of decision under uncertainty and intertemporal choice, more work needs to be done before we can fully move away from this unrealistic, yet still necessary, concept of Economic Man.

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