WILL HOMO ECONOMICUS SURVIVE?

PHILIPP DOERRENBERG

Erasmus Student

In this essay, Philipp Doerrenberg highlights recent experimental work that has proven the shaky foundations of the concept of the rational, utility-maximising 'economic man'. It has been proven that people take account of fairness in their decision-making and, as such, do not conform to standard theory. Like Lisa Keenan and Jason Somerville, he examines the theory behind different games, and similarly finds it lacking. Homo economicus *is a pervading concept in economics, but his essay suggests it needs to be substantially revised to accord with observed human behaviour.*

Introduction

Most economic theories are based upon the concept of a so-called *homo economicus* or economic man. This image of man assumes that individuals are self-interested and pursue selfish motives, maximise their utility, behave completely rationally and have full information on prices, demand and supply (Franz, 2004). The concept of *homo economicus* can be traced back to John Stuart Mill and Adam Smith and still is one of the most accepted concepts in economic theory (Irene, 2008). Theories like the classic Walrasian model are based upon the rational, self-interested economic actor and could not hold if one abstracted from this assumption (Bowles and Gintis, 2000).

Economic models are easier to construct if this image of man is assumed, but there remains doubt if it is realistic. Experimental and behavioural economics tackle this question and try to investigate experimentally if *homo economicus* provides an adequate assumption for economics.

This paper firstly presents several economic experiments and explains if their results are in accordance with assumptions of *homo economicus* or not. Secondly, it briefly pictures the first attempts of economists to construct theories which are more consistent with empirical results than standard economic theory.

Experimental Games

There are several experiments to be found in academic literature. Most of them come to the conclusion that standard predictions which are based upon *homo economicus* are not in accordance with the results of experiments.

Some of the most common experiments are the Ultimatum and Dictator Games. In an Ultimatum Game two players are given a certain amount of money. The so-called proposer offers a division of the amount of money to the so-called responder. The responder can either accept or reject the proposer's offer. If she rejects the money, both players will have a payoff of zero and if she accepts, she will receive the amount of money that was offered and the proposer is paid the rest. The Dictator Game only differs slightly. The responder has no choice in this game and has to accept whatever amount is offered by the proposer (Camerer and Thaler, 1995; Forsythe et al., 1994). The *homo economicus* assumed in classical theory does not allow for any kind of fairness and for him more money is always better than less money. Thus, for the Ultimatum Game, standard theory would predict that the proposer offers the smallest amount of money possible as she can be sure that the responder will accept the offer because to her a little money is better than no money. In an equilibrium condition, a small amount of money is offered and the responder accepts. For the Dictator Game, standard theories would predict that the proposer does not offer any money to the responder, because she is only interested in her own payoff and is not considerate of the responder's payoff.

Forsythe et al., (1994) carried out both games with undergraduate economics and MBA students at the University of Iowa. They observed that proposers in Dictator and Ultimatum Games offered more than the minimal amount predicted by standard theory in almost all experiments run. However, because proposers fear a rejection by responders, offers were usually higher in the Ultimatum than in the Dictator Game. In 71% of all cases in Ultimatum Games with a pie of $10, proposers offered $5, in 17% of all cases $4 were offered. In a Dictator Game with the same pie, proposers offered $3 in 29%, $2 in 13% and $5 in 21% of all cases. Thus, the outcomes observed by Forsythe et al. differ sharply from standard predictions. It seems that individuals – at least in Ultimatum and Dictator Games – behave differently than a *homo economicus* would.

Heinrich et al., (2001) tested whether the results of studies like Forsythe et al. are evidence of universal patterns of behaviour or whether the individual's economic and social environments play a role. They conducted Ultimatum Games in eighteen different countries or societies and found out that the outcome was different from standard economic predictions in every observed society and country .[1] However, they also found out that there is behavioural variability across different cultural societies. Although the proposers' offers were strictly positive and higher than assumed by

[1] They examined different societies in Peru, Tanzania, Bolivia, Ecuador, Mongolia, Chile, Papua New Guinea, Zimbabwe, Kenya, Paraguay and Indonesia.

classical theory, they differed among different societies. The highest mean offer in their cross-country study was 58% of the pie, the lowest was 26%.[2] The average across all societies was 39%. Roth et al. (1991) also conducted Ultimatum Games in different societies. In all four observed cities proposers offered more than the minimal amount of money and there were rejections as well.[3] As discovered by Heinrich et al., Roth et al. could also investigate differences among the different societies. Hence, observations that individuals behave fairly to some extent and do not only maximise their own profits seem to be robust and do not depend on culture or social environments.

Most of the above experiments are run with relatively small stakes, although it could be the case that classical assumptions become more adequate as the stakes grow. One could suppose that in Ultimatum Games responders would rather accept, say, 100 units of money in a game with a pie of 1000 than 1 unit in a game with a pie of 10 - even though, both proposers' offers represent 10% of the pie. Hoffman, McCabe and Smith, (1996) investigated this question and conducted Ultimatum Games with higher stakes. From a research fund they were able to run experimental games with stakes of $100. They used a game with stakes of $10 as a comparison and came to the result that the proportions offered by the proposers were not mentionable different in the high-stake than in the low-stake games. Hence, the authors concluded, low stakes do not bias the results of Ultimatum Games.

To test whether individuals tend – unlike *homo economicus* – to behave fairly, Fehr, Kirchsteiger and Riedl (1993) carried out a different game: some probands are given the role of firms and the rest are assigned to be the workers. In the first step, the firms offer a wage to the workers; afterwards the workers choose a level of effort. The firm's profit is positively related to the worker's effort level. By contrast, workers derive utility from their wage and their level of effort; a low effort provides higher utility than a high effort. For this game, classical theory would predict that workers choose the lowest possible level of effort after they are offered any wage by the firms. This – sometimes referred to as a Moral-Hazard Problem – is due to the fact that workers are paid their wage anyway and therefore can put less effort into their work without any loss of wage. Firms anticipate this and thus have no incentive to offer high wages. In a standard equilibrium firms offer the reservation wage and workers choose the lowest level of effort.[4] Unlike this prediction from classical theory, Fehr, Kirchsteiger and Riedl found in their experiments that wage and effort level are positively correlated. Workers work harder if they are offered high wages and thus firms have an incentive to pay higher and fairer wages. The authors interpret this result as an indicator that economic subjects indeed tend to behave more fairly than assumed by standard *homo economicus* theory.

Theory

Experiments like those described above suggest that individuals behave differently than assumed in standard theory. Hence, it seems necessary to construct theories that are able to describe economic behaviour somehow more realistically and in accordance with experimental observations. In the following section, two recently published theories will be briefly explained: Bolton and Ockenfels' 'Theory of Equity, Reciprocity and Competition' (2000) and Fehr and Schmidt's 'Theory of Fairness, Competition and Cooperation' (1999).[5] Both theories presume that the individual's utility or as called in Bolton and Ockenfels' model, *motivation functions*, do not only depend on the individual's own payoff, but also allow for fairness and thus are different from those in standard theories. However, the way these functions are constructed is different in both models.

Theory of Equity, Reciprocity and Competition (ERC)

Bolton and Ockenfels' ERC is based upon results of experiments which the authors consider to be robust. Among other experimental results, ERC can explain the results of Forsythe's Dictator and Ultimatum Games and Fehr's 'wage-offer' experiments.[6] The authors derive a utility or motivation function which is more in accordance with experimental results than standard utility functions. It is assumed that individuals do not only like a high monetary payoff for themselves, but also that they want their payoff to be as close as possible to the average payoff of all individuals:

$$v_i = v_i(y_i, \sigma_i)$$

---

[2] In Indonesia and Peru respectively.

[3] Jerusalem, Ljubljana, Pittsburgh and Tokyo.

[4] This is the wage that workers would receive from an alternative such as unemployment benefit. Firms will have to pay at least this wage in order to convince the worker to work.

[5] These two theories have attracted a lot of economists' attention recently. For an older theory which allows for fairness and considers experimental results, see Rabin (1993).

[6] See previous section for a brief sketch of both experiments and their results.

where y_i is the individual i's pecuniary payoff and σ_i is i's share of the sum of all payoffs paid (relative payoff). Hence, $\sigma_i = \frac{y_i}{c}$ where $c = \sum_{j=1}^{n} y_j$ = sum of the payoffs paid to all of the n players (henceforth the pie). It is assumed that for a given share of the pie, individuals prefer a higher payoff for themselves to a lower payoff.[7] Furthermore, it is assumed that individuals have a sense of fairness and dislike inequalities. They like their payoff to be as close as possible to the equal share. For any given pecuniary payoff, an individual's motivation decreases as the share of the payoff diverges from the equal share of the pie. Individuals always suffer from unequal shares; regardless of whether the inequality is to their advantage or not. y_i being fixed, individuals maximize their utility, or motivation, if $\sigma_i = \frac{1}{n}$ = the equal share of the pie.

Bolton and Ockenfels give an example of a motivation function for a two-player game like the Ultimatum or Dictator Game:

$$v_i(y_i, \sigma_i) = a_i y_i - \frac{b_i}{2}(\sigma_i - \frac{1}{2})^2$$

The first term simply measures the utility gain from the players' own payoff, the component after the minus sign is the loss from a share of the pie that is different from the equal share $\frac{1}{2}$. a_i and b_i represent the weights individuals give the two objects own payoff y_i and relative payoff σ_i, respectively. They depend on the individual's preferences and thus it is allowed for heterogeneity in preferences, which was observed in all experiments.

A motivation function of this functional form can, among other things, explain experimentally observed outcomes of Dictator and Ultimatum Games. Proposers and responders do not only try to maximise their own pecuniary payoff, but are also interested in a fair division of the pie. In this two player case, both proposers and responders suffer from offers that do not equally share the pie. Although a proposer offering the minimal amount of money gains utility from a very high monetary payoff for herself, this gain can – depending on her preference for equality – not offset a loss in utility from a very unequal share of the pie. Thus, they usually offer more than a minimal amount – even in the Dictator Game where they do not have to fear a rejection by a responder.

ERC can explain that a responder would not accept an offer of, say, one unit of money if the pie was ten units, but would accept a one unit offer if the pie was two units - even though her own pecuniary payoff y_i would be one in both cases. A motivation function which allows for this kind of human behaviour is in accordance with experimental results and differs from *homo economicus'* motivation function. Of course, *homo economicus* would accept the one unit offer in both cases, because to him a little money is always better than no money. Using ERC's notation, standard theory assumes a motivation or utility function of the form: $v_i = v_i(y_i)$, where v_i is strictly increasing in the payoff y_i and does not consider fairness at all.

Theory of Fairness, Competition and, Cooperation (FCC)

Fehr and Schmidt's FCC is also based upon the observations that individuals seem to be inequality averse. As in ERC, Fehr and Schmidt construct a utility function which is different from standard economic utility functions. The authors assume that individuals dislike inequalities, which they experience if they are worse or better off in monetary terms than other individuals. However, in this case, it is also assumed that people find inequalities to their disadvantage to be worse than inequalities to their advantage. For a set of n players, an individual i's FCC utility function is of the form:

$$U_i(y) = y_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max[y_j - y_i, 0] - \beta_i \frac{1}{n-1} \sum_{j \neq i} \max[y_i - y_j, 0]$$

where y_i is i's pecuniary payoff, α and β represent the individual's preferences for disadvantageous and advantageous inequalities, respectively, and where $\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$. The first term represents the utility gain

---

[7] For a given relative payoff σ, i chooses (y^1, σ) over (y^2, σ) if $y^1 > y^2$

from an individual's monetary payoff, the second term measures the utility loss from disadvantageous inequality and the third term measures the loss from advantageous inequality. For a given payoff y_i, i maximizes her utility if y_i is equal to the payoffs of all other individuals. Hence - in contrast to ERC, which assumes that individuals want their payoff to be as close as possible to average payoff – FCC assumes that individuals dislike payoff differences to any other individual. In ERC individuals are indifferent between a situation where all receive the same and a situation where some are rich and some are poor as long as they receive the average payoff. Individuals in FCC prefer a situation where all receive the same payoff.[8]

Outcomes of experiments vary, because not all individuals have the same preferences for equality. FCC accounts for this fact by including preferences α_i and β_i. In an extreme case with $\alpha_i \neq \beta_i \neq 0$, an individual would not be inequality averse at all.[9] Nevertheless, as described in the previous section, experiments suggest that most individuals are inequality averse ($\alpha_i \neq \beta_i \neq 0$).

However, FCC is, among other experimental outcomes, also able to explain observed outcomes in Ultimatum and Dictator Games. For the case with two players i and j the utility function simplifies to:

$$U_i(y) = y_i - \alpha_i \max[y_j - y_i, 0] - \beta_i \max[y_i - y_j, 0]$$

Both, responders and proposers, thus, suffer (lose utility) if their payoff differs from the other player's payoff (if $y_i \neq y_j$). A responder will reject an unequal share of the pie if the utility gain from the pecuniary offer cannot offset the utility loss from the inequality. Formally, a responder will not accept an offer y_i if $y_i < \alpha_i \max[y_j - y_i, 0] + \beta_i \max[y_i - y_j, 0]$. Proposers do not only offer more than a minimal amount of money, because they fear a rejection by the responder, but also because they would loose utility from a very unequal division of the pie. Since $\beta_i \leq \alpha_i$, individuals suffer more from disadvantageous offers ($y_i < y_j$) than from advantageous offers ($y_i > y_j$). This implies that responders in Ultimatum Games might – for a given pecuniary payoff - rather reject a 40% than a 60% offer.

Of course, FCC's utility function is also different than standard utility functions because it does not only consider monetary, but also relative payoffs.

Conclusion

Experimental and behavioural economics clearly suggest that standard assumptions of *homo economicus* are not completely in accordance with observed human behaviour. Individuals seem to be fairer and less self-centred than assumed in almost all important economic theories and models. In order to meet experimental observations it is necessary to construct economic theories which consider an image of man different from *homo economicus*. ERC by Gary Bolton and Axel Ockenfels, and FCC by Ernst Fehr and Klaus Schmidt, allow for a different image of man to emerge and thus are very useful. Both theories can explain outcomes of experiments which cannot be explained by standard theories. However, although it is almost certain that more theories based on real human behaviour will be published in the future, it is very likely that *homo economicus* will not be banished from economic textbooks. Theories based upon a self-interested image of man are a lot easier to construct and understand. Especially for education purposes it remains useful to refer to standard theories. Economists have to and will keep working on incorporating a more realistic human image into their theories, but it is unlikely *homo economicus* will become extinct.

Bibliography

---

[8] Engelmann and Strobel (2000) conducted an experiment to check whether ERC's or FCC's assumptions about inequality aversion are more precise. Their results are in favour of FCC.

[9] The Utility Function would in this uncommon case reduce to $U_i(y) = y_i$. In a game with two non-inequality averse players, the outcome would be as predicted by standard theory.

Bolton, G.E. & Ockenfels, A. 2000. 'ERC: A Theory of Equity, Reciprocity, and Competition'. *The American Economic Review* 90:1:166-93.

Bowles, S. & Gintis, H. 2000. 'Walrasian Economics in Retrospect'. *The Quarterly Journal of Economics* 115:4:1375-1409.

Camerer, C. & Thaler R.H. 1995. 'Anomalies: Ultimatums, Dictators and Manners'. *The Journal of Economic Perspectives* 9:2:209-19.

Engelmann, D. & Strobel, M. 2000. 'An Experimental Comparison of the Fairness Models by Bolton and Ockenfels and by Fehr and Schmidt'. *Econometric Society World Congress 2000 Contributed Papers 1229*.

Fehr, E. Kirchsteiger, G. & Riedl, A. 1993. 'Does Fairness Prevent Market Clearing? An Experimental Investigation'. *The Quarterly Journal of Economics* 108:2:437-59.

Fehr, E. & Schmidt, K.M. 1999. 'A Theory of Fairness, Competition, and Cooperation'. *The Quarterly Journal of Economics* 114:3:817-68.

Franz, S. 2004. 'Grundlagen des ökonomischen Ansatzes: Das Erklärungskonzept des Homo Oeconomicus'. *International Economics Working Paper 2004-02, University of Potsdam, Germany.*

Forsythe, R., Horowitz, J., Savin, N. E. & Sefton, M. 1994. 'Fairness in Simple Bargaining Experiments'. *Games and Economic Behavior* 6:3:347–69.

Heinrich, J., Bowles, S., Boyd, R., Camerer, C., Fehr, E., Gintis, H., & McElreath, R. 2001. 'In Search of Homo Economicus: Behavioral Experiments in 15 Small-Scale Societies.' *The American Economic Review* 91:2:73-78.

Hoffman, E., McCabe, K. & Smith, V. 1996. 'On Expectations and the Monetary Stakes in Ultimatum Games'. *International Journal of Game Theory* 25:3:289-301.

Irene, C. L. Ng. 2008. 'Learning to be Sociable. The Evolution of Homo Economicus'. *American Journal of Economics and Sociology* 67:2:265-86.

Rabin, M. 1993 'Incorporating Fairness into Game Theory and Economics'. *The American Economic Review* 83:5:1281-1302.

Roth, A.E., Prasnikar, V., Okuno-Fujiwara, M. & Zamir, S. 1991. 'Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An Experimental Study'. *The American Economic Review* 81:5:1068-95.