

# Behavioural Anomalies

Andrew Reeson  
CSIRO Sustainable Ecosystems  
GPO Box 284, Canberra  
Ph: 02 6242 1640  
[andrew.reeson@csiro.au](mailto:andrew.reeson@csiro.au)

*This is a working paper only. Please check with the author before quoting.  
Please feel free to contact me with any comments, suggestions, criticisms, etc.*

As well as testing specific institutions and policies, experimental economics is used to develop theories of human decision making. Neoclassical economics began by assuming that people act in an entirely rational and self interested manner. This assumption is now challenged by a substantial body of experimental findings, which show that in many circumstances people consistently deviate from narrowly defined rational, self-interested behaviour.

## Psychological factors

In many cases there appear to be psychological reasons for people to act in ways that deviate from wealth maximising behaviour. One such example is risk aversion. A fully rational economic agent is indifferent between \$50 and a 50% chance of \$100 or \$0. However most people are risk averse to some extent, and would prefer the certain \$50. Most would also prefer a certain \$49 to the 50% chance of \$100 – something that Homo economicus would never do! The degree of risk aversion varies between individuals (and some are risk seeking, preferring the riskier option with the higher payoff). A related finding is loss aversion<sup>1</sup> – people tend to give potential losses greater weight than potential gains. This can lead to apparently anomalous decisions, particularly since the way in which a decision is framed can determine whether an outcome is seen as a potential loss or gain. Related to this is the endowment effect,<sup>2</sup> people value things they already hold more than equivalent things they do not have. This means that the amount a person is willing to pay to acquire something tends to be less than the amount they would be willing to accept to part with it.<sup>3</sup> These effects lead to status quo bias,<sup>4</sup> in which the perceived disadvantages of making a change can outweigh the perceived benefits, even if the benefits are likely to be greater.<sup>5</sup> These issues have a major impact on decision making behaviour, and can be relevant to markets. For instance, the endowment effect and status quo bias means that people may be less willing to trade than the economic models predict, in some cases preferring to keep their initial allocation of assets. Therefore, when creating markets for public policy, measures may be required to promote trade. If the endowment effect and status quo bias cause traders to stick with their initial allocation (for instance of pollution permits), then the gains from trade that the market can provide will be foregone. One such method is to revoke and re-sell a proportion of permits every year, forcing people to trade whether or not they want to retain their initial position. Experimental economics has the potential to identify these issues, and test ways of minimising their impact.

---

<sup>1</sup> Kahneman & Tversky 1984

<sup>2</sup> Thaler 1980

<sup>3</sup> It has been argued that much of this may be due to inexperience – see Plott & Zeiler 2005

<sup>4</sup> Samuelson & Zeckhauser 1988

<sup>5</sup> A well documented consequence of status quo bias is that people are reluctant to switch investments. If they make a loss from switching from one fund to another, this will weigh more heavily than if they make a profit from the switch. In this light it is not surprising that the introduction of ‘super choice’ has led to relatively few people switching funds.

It is also necessary to consider that people seldom calculate the consequences of each alternative – rather they tend to use heuristics (“rules of thumb”) as short cuts, which give the right decision most of the time, and greatly simplify the decision-making process. In some cases this can result in apparently perverse behaviour which defies conventional economic explanations. New York taxi drivers provide an excellent example of such anomalous behaviour.<sup>6</sup> In cities the demand for taxis varies considerably from day to day. For instance on wet days, people are more likely to take a taxi than on dry days. Taxi drivers are therefore able to make more money on wet days. One might expect that a ‘rational’ taxi driver would be more willing to work on high demand days, and so perhaps do longer shifts. In fact, the opposite happens. On high demand days there are fewer taxis on the streets, leading to frustrating delays and missed opportunities. It turns out that many taxi drivers have an earnings target in mind when they begin work each day. On high demand days, they reach this target sooner, so they finish work earlier. On low demand days it can take a lot longer, resulting in an over supply of taxis. This simple behavioural heuristic results in supply being inversely related to demand, with poor outcomes for all concerned.

## Social issues

Another, perhaps more encouraging, series of deviations from the rational actor paradigm, are social concerns. It turns out that money really isn’t everything after all.<sup>7</sup> Experiments have repeatedly shown that many people are concerned not just with their own well being, but also that of others. Behaviour is shaped not just by self interest, but also by concerns for fairness and reciprocity. Many people value outcomes which they perceive as fair, even if it involves them receiving less than they otherwise might. Similarly reciprocity is a strong motivation in many circumstances<sup>8</sup>. Most people will act positively towards someone who has acted positively towards them, again even if it involves some personal cost. This can result in greater than expected levels of cooperation in public good and other environmental dilemmas. However there is a flip side to reciprocity – if someone is perceived as having acted unfairly, many people will go out of their way to punish that person.<sup>9</sup> There is also evidence from experiments that people will act altruistically to a degree – many people seem to get a “warm glow” from successfully cooperating with or helping others<sup>10</sup>, and there is evidence that it can have a positive effect on one’s self image.<sup>11</sup> And of course social approval is a powerful non-financial motivation, even in laboratory situations.<sup>12</sup> These social motivations can be harnessed to encourage people to voluntarily contribute to environmental and other public goods. However there is evidence that these social motivations can be negatively impacted by formal economic institutions, particularly markets (see below).

These psychological and social effects mean that in many cases, straight neoclassical economics will be insufficient to explain and predict economic behaviour. This work has given rise to the disciplines of behavioural economics and behavioural finance, which have proved useful at explaining apparently irrational phenomena, including in labour and housing markets, and in investor behaviour.

---

<sup>6</sup> Camerer *et al.* 2004

<sup>7</sup> Yes, apparently this was a shock to some economists!

<sup>8</sup> See for example Gintis 2000, Fehr & Fischbacher 2002

<sup>9</sup> Fehr & Gächter 2002

<sup>10</sup> Andreoni 1990

<sup>11</sup> Benabou & Tirole 2004

<sup>12</sup> Andreoni & Petrie 2004

## Behavioural anomalies and policy design

Below is an example from our own research, which shows how behavioural anomalies can impact on policy design, and illustrates how experimental economics techniques can be applied to avoid costly policy failures.

### *How good incentives go bad*

People are motivated by many things. Contributing to environmental goods and services therefore involves a range of motivations. Economic and psychological studies are beginning to shed light on how and why such decisions are made. People may be motivated by deeply held values, they may feel good about helping the environment, they may think it is only fair that they do their bit, they may be seeking approval from others, or to encourage others to contribute themselves. These are all considered intrinsic motivations, that is they are largely derived from internal values and preferences. By contrast, extrinsic incentives are provided by others, such as markets or governments.

For public goods, which includes many environmental goods, extrinsic incentives are often lacking, due in part to the absence of property rights and markets. In some instances, intrinsic motivations by themselves may be sufficient to achieve a desired outcome. For instance in Australia voluntary blood donations are generally sufficient to meet demand without the need for any formal incentive scheme. However in many cases intrinsically motivated voluntary contributions are not sufficient to supply efficient quantities of public goods. Policies are required to address these inefficiencies. Policies typically focus on providing extrinsic incentives. These can be in the form of payments for extra supply, or sanctions for not contributing. All things being equal, providing additional incentives should increase people's motivation to contribute to environmental goods and services. However in human decision making, where economics meets psychology, and biology meets social science, all things are not necessarily equal.

Psychology suggests that people are intrinsically motivated when performing an activity improves their self image and gives them a sense of autonomy. This can potentially be undermined by extrinsic incentives. If somebody is being paid to do something, they are less likely to enjoy doing it than if they weren't being paid. They may also feel that they are doing it just for the money, rather than any "warm glow" they may get for helping the community or the environment, or just from doing a job well. And they may feel that they are being controlled by the money, rather than doing it for their own reasons. Similarly a threat of sanctions may also undermine any enjoyment, warm glow or sense of autonomy.

Therefore there is the potential that some incentives may undermine intrinsic motivations. This is particularly likely if people feel that they are being controlled, and that their voluntary efforts are going unrecognised. This is termed crowding out – the extrinsic incentives can crowd out existing intrinsic motivations. Even if the extrinsic incentive scheme is itself effective, it may achieve less than anticipated if it reduces intrinsic motivations. Conversely, incentives may crowd in, or reinforce, intrinsic motivation if they recognise and acknowledge effort without being perceived as controlling.

Crowding can be more easily understood by imagining an example. Cooking dinner for a friend is likely to involve a range of intrinsic motivations and no formal incentives<sup>13</sup>. Personally I am likely to benefit when a friend cooks dinner for me, and I may wish it happened more often. As an economist I may consider that the way to increase the supply of dinners is to increase the price, and so next time I might offer my host \$10. Of course this is

---

<sup>13</sup> After Frey 2001

unlikely to work<sup>14</sup>. By introducing the formal incentive, I am crowding out the sense of enjoyment and warm glow that my dinner host had, and perhaps implying that I control them, by requiring them to cook dinner when I pay for it. Since \$10 is unlikely to be sufficient payment for an evening's work, I would not be invited back. If I paid \$100 I perhaps would be; while my friend may no longer enjoy cooking for me, the money may be sufficient to make it worthwhile.

As a policymaker I may instead look for incentives that acknowledge and reward their effort, without being perceived as controlling. For instance I may buy flowers or chocolates, or send a card – this has the potential to crowd in rather than crowd out intrinsic motivations, hopefully leading to more dinners. If intrinsic motivations are initially less important, then crowding out is much less of a problem. Paying an extra \$10 in a restaurant is likely to result in a significantly better dinner; buying flowers would probably be less effective.

Clearly there are some instances where crowding out intrinsic motivations can have negative consequences. Intrinsic motivations have been shown to be important in such areas as tax compliance, employment, and volunteer work effort. They are also likely to be significant in environmental management. How can we ever know whether to bring flowers, or offer cash? Many of the lessons of incentive design have been learned through trial and error, which can be a costly and socially damaging process. An alternative is to use controlled experiments to examine how incentives and motivations might interact. Experiments are increasingly being used to incorporate the social and psychological aspects of human decision making into economic theory. Economic experiments typically involve observing how people respond to simulated markets and institutions. The setting can be controlled by the experimenter, enabling alternative policies to be tested and compared. Subjects are paid based on the decisions they make, so observed behaviour is real rather than hypothetical. Experiments can serve as a 'wind tunnel' to gather empirical data on how people respond to proposed market structures, incentives and policies.

We have used experimental economics to examine how intrinsic and extrinsic motivations might interact. We created a scenario in which people had to trade-off narrow self interest against the public good. The optimal outcome for the group occurs if everyone contributes to the public good; however each individual has an incentive to free ride – by not contributing they increase their private income, but at a greater cost to the group. This reflects the dilemmas faced by many decision makers. For instance in a salinity threatened area, a farmer may benefit the group (ie all farmers in that area) by reducing irrigation, but at a personal cost in terms of foregone production.

In our experimental scenario, we found that many people were prepared to make voluntary contributions to the public good, even though it was costly for them to do so. There was much variation among individuals – some made large contributions, some less and some contributed nothing<sup>15</sup>. Introducing a regulation specifying a minimum level of contribution led, unsurprisingly, to an increase in total contributions. However if that regulation was subsequently revoked, contributions declined sharply, and were significantly below the levels seen before the regulation was introduced<sup>16</sup>. One explanation for this is that being regulated has crowded out some people's intrinsic motivations to contribute.

In another series of experiments we introduced a financial incentive for people to make voluntary contributions. This took the form of a competitive tender, in which participants could name their price for guaranteeing to make a contribution, with funding going to those

---

<sup>14</sup> Unless my host is another economist!

<sup>15</sup> This is also typical of the pattern reported from similar experimental scenarios

<sup>16</sup> And also significantly lower than in a control group to which the regulation was never introduced

who offered the lowest prices<sup>17</sup>. Many people were already making costly voluntary contributions, so this scheme should theoretically provide a means of reducing the personal costs of contributing, and perhaps encourage others who were not already contributing to consider doing so. However introducing the competitive financial incentive changed the way people contributed to the public good. Rather than seeking to reduce their costs, the vast majority of people submitted bids that exceeded their costs – they were now seeking to make a profit from contributing, even though many of these same people had initially been doing it for free. Furthermore if their bids were rejected, most people made no voluntary contribution, even if they had previously contributed in the absence of a formal incentive scheme. This strongly suggests that the extrinsic incentives are crowding out intrinsic motivations. As with the regulation, removing the incentive scheme led to a fall in contributions – people did not simply go back to doing what they were doing prior to the incentive. Therefore the effects of crowding may be difficult to reverse.

The effects of crowding will depend on initial levels of intrinsic motivation. If people are not intrinsically motivated to contribute to the public good, then crowding out will not be a problem, and extrinsic incentives should perform as anticipated. However in the presence of intrinsic motivations, as is likely to be the case in most environmental decisions, the dangers of poor incentive design are increased. Weak regulations or small financial payments may give the worst results as they can trigger the negative consequences of crowding while providing only small extrinsic incentives – in our experimental scenario it was possible to actually reduce overall contributions despite paying out additional incentive money.

Intrinsic motivations are difficult to define or measure, but they must be considered, even if only to avoid nasty surprises from new policies. Institutional changes can impact on these motivations in complex ways. Our initial experiments provide evidence that crowding out is a potential problem in incentive design. We hope to extend this work to look at how the effects of crowding out might be mitigated, and how incentives might be designed to strengthen and support, rather than reduce, intrinsic motivations. An exciting aspect of experimental economics is the potential to empirically test how intrinsic and extrinsic motivations combine and interact in a range of settings. Theory and experiment can be used to develop scientifically rigorous guidelines to inform environmental policy design.

## References

- Andreoni, J. (1990) Impure altruism and donations to public goods: A theory of warm-glow giving? *Economic Journal* **100**, 464-477.
- Andreoni, J. & Petrie, R. (2004) Public goods experiments without confidentiality: A glimpse into fund-raising. *Journal of Public Economics* **88**, 1605-1623.
- Benabou, R. & Tirole, J. (2004) Incentives and prosocial behaviour. Centre for Economic Policy Research Discussion Papers: 4633
- Camerer, C.F., Babcock, L., Loewenstein, G. & Thaler, R. (2004) Labor supply of New York City cab drivers: One day at a time. In *Advances in Behavioral Economics*, ed Camerer, C.F., Loewenstein, G. & Rabin, M.E. Roundtable Series in Behavioral Economics. New York: Russell Sage Foundation.
- Fehr, E. & Fischbacher, U. (2004) Social norms and human cooperation. *Trends in Cognitive Sciences* **8**, 185-190.

---

<sup>17</sup> In order to test for crowding out, our competitive tender was a deliberately ‘bad’ institution – the budget was small and participants were not provided with any feedback or advice on their bids.

- Fehr, E. & Fischbacher, U. (2002) Why social preferences matter - the impact of non-selfish motives on competition, cooperation and incentives. *The Economic Journal* **112**, C1-C33.
- Fehr, E. & Gächter, S. (2002) Altruistic punishment in humans. *Nature* **415**, 137-140.
- Fehr, E. & List, J.A. (2004) The hidden costs and returns of incentives - trust and trustworthiness among CEOs. *Journal of the European Economic Association* **2**, 743-771.
- Frey, B.S. (2001) *Inspiring economics: Human motivation in political economy*. Edward Elgar, Cheltenham.
- Gintis, H. (2000) Strong reciprocity and human sociality. *Journal of Theoretical Biology* **206**, 169-179.
- Kahneman, D. & Tversky, A. (1984) Choices, values and frames. *American Psychologist* **39**, 341-350.
- Plott, C.R. & Zeiler, K. (2005) The willingness to pay/willingness to accept gap, the "endowment effect" and experimental procedures for eliciting valuations. *American Economic Review* **95**, 530-545.
- Reeson, A.F. & Tisdell, J. (2006) When good incentives go bad: An experimental study of institutions, motivations and crowding out.  
[www.ecosystemsproject.org/html/publications/markets.html](http://www.ecosystemsproject.org/html/publications/markets.html)
- Samuelson W. & Zeckhauser R. (1988) Status quo bias in decision making. *Journal of Risk and Uncertainty* **1**, 7-59.
- Thaler, R. (1980) Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization* **1**, 39-60.

### **Further reading**

- Camerer, C.F., Loewenstein, G. and Rabin, M.E. (2004) *Advances in behavioral economics*. Roundtable Series in Behavioral Economics. New York: Russell Sage Foundation.
- Gintis, H., Bowles, S., Boyd, R. & Fehr, E. (2005) *Moral Sentiments and Material Interests: On the Foundations of Cooperation in Economic Life*. Cambridge, MIT Press.
- Thaler, R.H.E. (2005) *Advances in behavioral finance, volume 2*. New York: Russell Sage Foundation.