A RATIONAL CHOICE MODEL OF DIVINE ACTION

Paul Oslington, **School of Business, Australian Defence Force Academy, University of New South Wales[1]**

1. Introduction

A number of papers have been published in the Association of Christian Economists Journal in recent years applying rational choice tools to religious topics. Contributors have included Ian Smith (1999; 2004), Andrew Britton (2003), and Ben Cooper (2004). One of the things that has been interesting about these contributions to our journal is their consideration of the content of religion, something American rational choice writers to religion have avoided (see for Iannaccone 1998 p1490 or Oslington 2003 p.ix). Applying economics to the content of religion, even divine attributes and activity seems to me perfectly legitimate, certainly no less legitimate than using philosophy to clarify divine attributes, which has a long history. It does though have its dangers, such as treating economics as something more than a helpful tool, and an imperialistic arrogance that is too common in our profession.

This paper presents a rational choice model of divine action, in particular of the salvation contract God offers and human response. Salvation is a sensible place to begin economic analysis of divine action, as it is central to Christian theology and the pattern for much other divine activity. The model is at working paper stage and comments are welcome. After presenting the model I will conclude with some general remarks about the value of this sort of exercise.

2. Model

Consider a pure exchange economy with many individuals i=1...n, each endowed with a bundle of commodities $\overline{x}^i$ and a utility function $U^i(x)$, which is increasing and concave. Commodity endowments and utility functions differ randomly between individuals. Trade leaves individuals with equilibrium commodity bundles $\hat{x}^i$ which maximise individual utilities given initial endowments, and equilibrium relative prices p. Individuals can be ranked by the value of their bundles at equilibrium prices $p\hat{x}^i$, which can be thought of as individual incomes.

Now introduce God who has a utility function $U^G(x^1...x^i...x^n)$ which registers divine satisfaction with the bundles chosen by the i=1...n individuals. This divine utility function is assumed to be known to all individuals, consistent with the Christian doctrine of revelation.[2] For simplicity it is assumed to be separable in the individual bundles, allowing us to focus on God's valuation of a representative individual's $U^G(x^i)$. This is assumed to be concave, but not necessarily increasing in each commodity consumed by the individual. The God of the Christian

---

[1] I thank Ian Smith, Philip Esler, Geoffrey Brennan, Gordon Menzies, Keiran Sharpe and Paul Helm for helpful discussions and comments, with the usual caveat.
[2] This assumption that the divine utility function is known sidesteps problems in modelling the formation of religious beliefs discussed by Montgomery (1996) and others.

scriptures desires that humans enjoy good things in creation, represented by $U^G(x^i)$ being increasing in these good things. Some commodities though will be frowned upon by God (the reader can compose his or her own examples) with $U^G(x^i)$ decreasing in these. The fundamental point is that divine and individual utility functions will diverge, following the Christian doctrine of the fall.

God recognises this and intervenes in human affairs offering salvation to those who repent and have faith. Faith is indicated by individuals conforming their choices to God's will as expressed in the divine utility function, but as we cannot observe faith the model will focus on commodity choices that express faith. The salvation contract God offers is as follows. If an individual chooses a bundle of commodities which is approved by God, which means generating utility for God above some threshold level:

$$U^G(x^i) > \theta \qquad\qquad (1)$$

then individual i receives salvation. Salvation denoted *s* is a discrete good, either gained or not gained, and yields utility $U^i(s)$. This utility is assumed to be finite, and need not just be afterlife rewards although it will include these.

The human problem is whether to rearrange the consumption bundle to take advantage of the offer of salvation. Let the best consumption bundle for individual i which satisfies the salvation constraint $U^G(x^i) > \theta$ be denoted $\tilde{x}^i$. The individual will choose salvation if and only if the value of salvation exceeds the opportunity cost of salvation, which is the difference between the values of the unconstrained and constrained bundles:

$$U^i(s) \; > \; U^i(\hat{x}^i) - U^i(\tilde{x}^i) \qquad\qquad (2)$$

Examples of unconstrained and constrained bundles are given in figure 1. The unconstrained bundle $\hat{x}^i$ is the point of tangency between the budget constraint $px^i \le p\bar{x}^i$ and indifference curve $U^i(\hat{x}^i)$, in the usual fashion. The constrained bundle must satisfy $U^G(x^i) > \theta$ as well as the budget constraint. Figure 1 shows a salvation constraint where commodity 1 is positively valued by God, and commodity 2 is frowned upon, so the bundle must lie below $U^G(x^i) = \theta$ if the individual is to attain salvation. The constrained bundle is marked $\tilde{x}^i$ and generates utility $U^i(\tilde{x}^i)$. The individual then compares the opportunity cost of salvation with its value according to (2). It is possible though that the individual's income is insufficient to purchase a bundle approved by God. In figure 1 salvation is unaffordable for incomes below the budget constraint $px^{\#}$ and no constrained bundle $\tilde{x}^i$ exists.

Turning now to the divine problem, it has two parts. First, God must set the optimal salvation threshold. The number of individuals saved is decreasing in θ, but the consumption reallocations of these saved towards what God prefers is increasing in θ, so a rational maximizing God will have to balance these effects. In calculating optimal θ God will have to take account of changes in the consumption bundles induced by the price effects of the salvation mechanism. The salvation mechanism will increase demand for the commodities God values, increasing their relative prices and inducing individuals to substitute away from these commodities.

The second part of the divine problem is checking the optimal salvation contract is gainful. Christian scriptures teach that the sacrifice of Jesus which opened the way to salvation was a costly act for God, and a rational God must check that the divine utility gains from offering the contract exceed this cost which will be denoted K. The sacrifice will be worthwhile for God if

$$U^G(\tilde{x}^1 \ldots \tilde{x}^n) - U^G(\hat{x}^1 \ldots \hat{x}^n) > K \qquad (3)$$

Throughout the paper it will be assumed that this condition is satisfied.

3. Why doesn't God save everyone?

The first prediction of the model is that God will not offer a salvation contract where everyone is saved. If God sets $\theta=0$ then all individuals receive s, but there would be no consumption reallocations and hence no utility benefits for God to balance the lump sum cost K. This cannot be an equilibrium. On the other hand setting $\theta=\mathbb{N}$ would mean no individuals choose s, and no reallocations, and so cannot be an equilibrium. Thus θ will be set between these extremes, with the value depending on the forms of the divine and human utility functions and endowments. Some, but not all individuals are predicted to choose salvation, which is consistent with both the scriptures and observation.

4. Who is saved?

Further predictions can be made about which individuals will be saved. Utility functions differ randomly between individuals and those whose utility functions are closely aligned to God's incur only minimal utility losses in rearranging their consumption bundles to gain salvation, and are thus more likely to choose salvation.

Endowments also differ randomly between individuals. Those with low incomes are more likely to choose salvation because their opportunity cost of salvation $U^i(\hat{x}^i) - U^i(\tilde{x}^i)$ is less than high income individuals. The divine and human utility functions in figure 1 imply the relationship between the utilities of the constrained and unconstrained bundles as income changes shown in figure 2. In figure 1 the income consumption path for the unconstrained individual is flatter (homothetic utility functions are illustrated for simplicity) than the divine constraint, so the difference between unconstrained and constrained utility increases with income, as shown in figure 2. Figure 3 compares this utility difference to the utility of salvation and illustrates the impact of income on an individual's decision whether or not to accept the offer of salvation. For incomes below $px^{\#}$ salvation is unaffordable, but once affordable it is chosen up to income px^* when the opportunity cost of rearranging consumption to take advantage of the offer of salvation becomes too great.[3] God here is a God of the poor, as suggested by certain

---

[3] Varying our assumptions about the divine utility function yields different relationships between salvation and income. For instance if all commodities are positively valued by God the divine constraint line would be downward sloping with the feasible region above it. This implies (again assuming homothetic utility functions) that the gap between unconstrained and constrained utility would fall with income, and higher income individuals would be more likely to choose

strands of Christian theology, but not exclusively so because both preferences as well as endowments are randomly distributed. The other caveat is that the very poor may miss out on salvation if it is unaffordable, generating an inverted U-shaped relation between the probability of choosing salvation and income.

The implication across time is that salvation would become more attractive in bad economic times for the same reason as poor individuals will tend to choose salvation–the opportunity cost of salvation falls. The model predicts that religious revivals will typically occur during economic downturns.

5. Conversion and apostasy

Consider an individual with an income close to px^* in figure 3, who is on the edge of accepting or rejecting the salvation contract. A small shock to endowments or prices will lead to a large discrete change in the consumption bundle from $\hat{x}^i$ to $\tilde{x}^i$. Salvation is thus not predicted to be like other commodities which will be smoothly substituted by all individuals as economic conditions change. This accords with observations of the dramatic nature of religious conversion and apostasy.

6. Moderating effect of salvation

A saved individual's life is predicted to be more stable than an unsaved individual's in the sense that the consumption choices will be less responsive to shocks. The saved individual will also be less greedy in the sense that marginal utility of income is lower, as illustrated in figure 2. These are straightforward consequences of the LeChatelier principle that a constrained equilibrium will be less responsive to parameter changes than an unconstrained maximum.

7. The unsaved

Paradoxically, the more effective is the salvation mechanism the more it will turn the unsaved away from what God prefers. Individuals choosing salvation will force up the prices of commodities God prefers be consumed, so that unsaved individuals will substitute away from commodities God prefers to those God frowns upon.

8. Conclusions

Considered within the genre of Chicago style rational choice economics the paper applies rational choice tools to a new area - the content of religion - and generates a number of testable predictions consistent with casual observation of religious behaviour. More careful empirical work is obviously needed. While generating and testing predictions is challenging and sometimes illuminating, I'm personally more interested in the implications for the economics and

---

salvation. This is interesting as the harsh God (illustrated in figures 2 and 3) who frowns on consumption of some commodities is a God of the poor, while a softer God who disapproves of nothing is a God of the rich.

religion dialogue. Playing with rational choice models seems to me interesting in number of ways.

First, it is an exercise in translation – of making theology accessible to economists, and bringing economic methods to the attention of theologians. This point is well made by Britton (2003). As such it can contribute to a renewal of interdisciplinary conversation between economics and theology, to the enrichment of both. Such interdisciplinary conversation between other sciences (such as cosmology and evolutionary biology) and theology has been extremely fruitful in recent decades.

Second, applying rational choice tools to God is a way of exploring the limits of economic analysis; its strengths, weaknesses and explanatory domain. For instance the model highlights the inability of a simple rational choice approach to deal with human sin, which is something deeper than particular consumption choices. Sin has intentional and relational dimensions which are very hard to incorporate into existing economic models. Conversion is similarly problematic. My hope is that struggling with difficult topics like salvation will enrich economic modelling.

Third, it can contribute to theology. Divine action is one of the least satisfactory areas of contemporary theology (see for instance Saunders 2002), perhaps because theologians have been reluctant to draw on the insights of economics and other social sciences which study action. Recent discussions in the philosophy of religion (Alston 1988; 1990) suggest the analogy with human action offers rich possibilities for developing our understanding of divine action.

References

Alston, W. P. (1988). "Divine Action and Human Action" in *Divine Action* edited by T. Morris. Ithaca, Cornell University Press.

Alston, W. P. (1990). "How to Think About Divine Action" in *Divine Action* edited by B. Hebblethwaite and E. Henderson. Edinburgh, T&T Clark.

Britton, A. (2003). "Introducing Religion into Economic Theory." *Journal of the UK Association of Christian Economists* 32: 27-36.

Britton, A. and P. Sedgwick (2003) *Economic Theory and Christian Belief* Peter Lang Publishers, Bern.

Cooper, B. (2004). "On Modelling Church Growth." *Journal of the Association of Christian Economists UK* 33(March): 1-12.

Iannaccone, L. (1998). "Introduction to the Economics of Religion." *Journal of Economic Literature* 36(3): 1465-95.

Montgomery, J. D. (1996). "Contemplations on the Economic Approach to Religious Behaviour." *American Economic Review* 86(2): 443-7.

Oslington, P., Ed. (2003). *Economics and Religion*. International Library of Critical Writings in Economics Cheltenham, Edward Elgar 2 volumes.

Saunders, N. (2002). *Divine Action and Modern Science*, Cambridge University Press.

Smith, I. (1999). "A Model of the Message of the Book of Revelation." *Journal of the UK Association of Christian Economists* 28: 1-14.

Smith, I. (2004). "Modelling Faith." *Journal of the UK Association of Christian Economists* 34: 1-15.
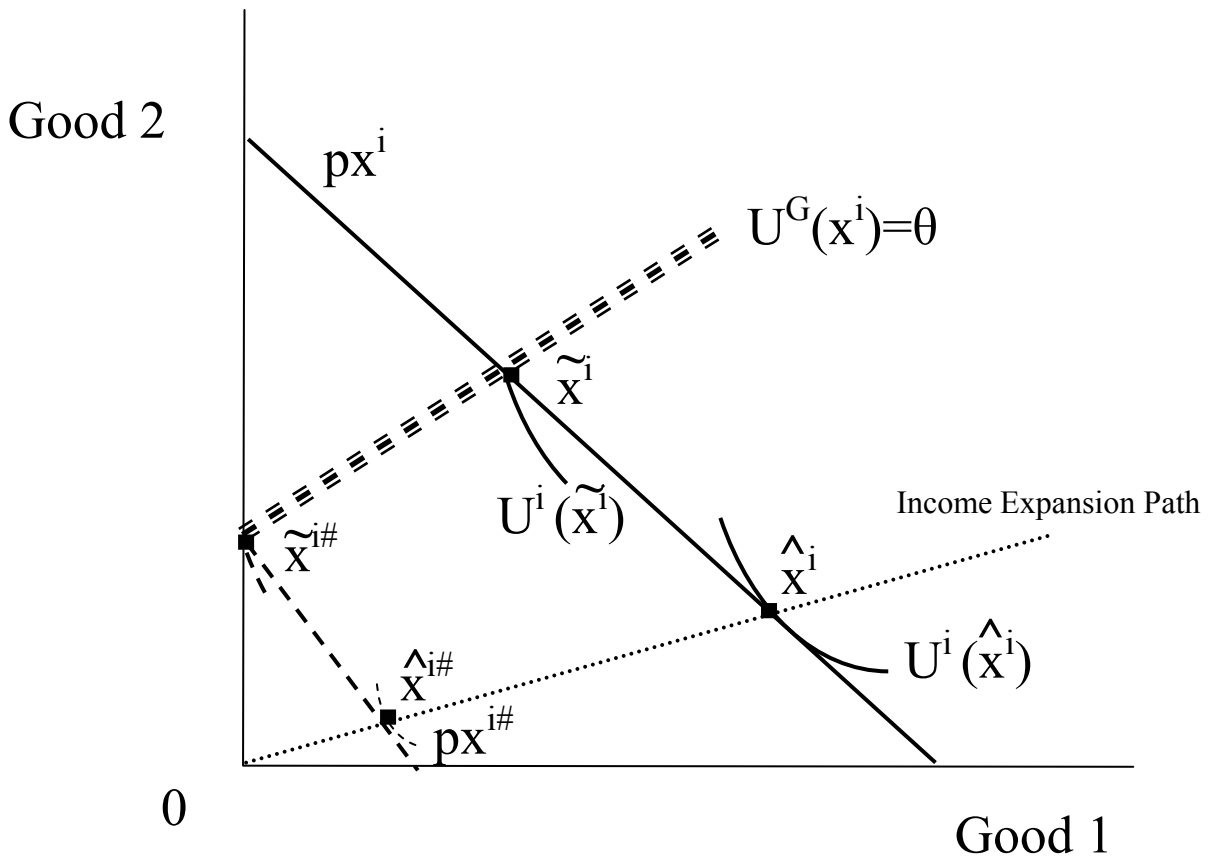
Figure 1 – Salvation Constrained Bundles

Good 2

px^i

$U^G(x^i)=\theta$

$\tilde{x}^i$

$U^i(\tilde{x}^i)$

Income Expansion Path

$\tilde{x}^{i\#}$

$\hat{x}^i$

$U^i(\hat{x}^i)$

$\hat{x}^{i\#}$

$px^{i\#}$

0

Good 1

Figure 2 –Income and the Salvation Constraint

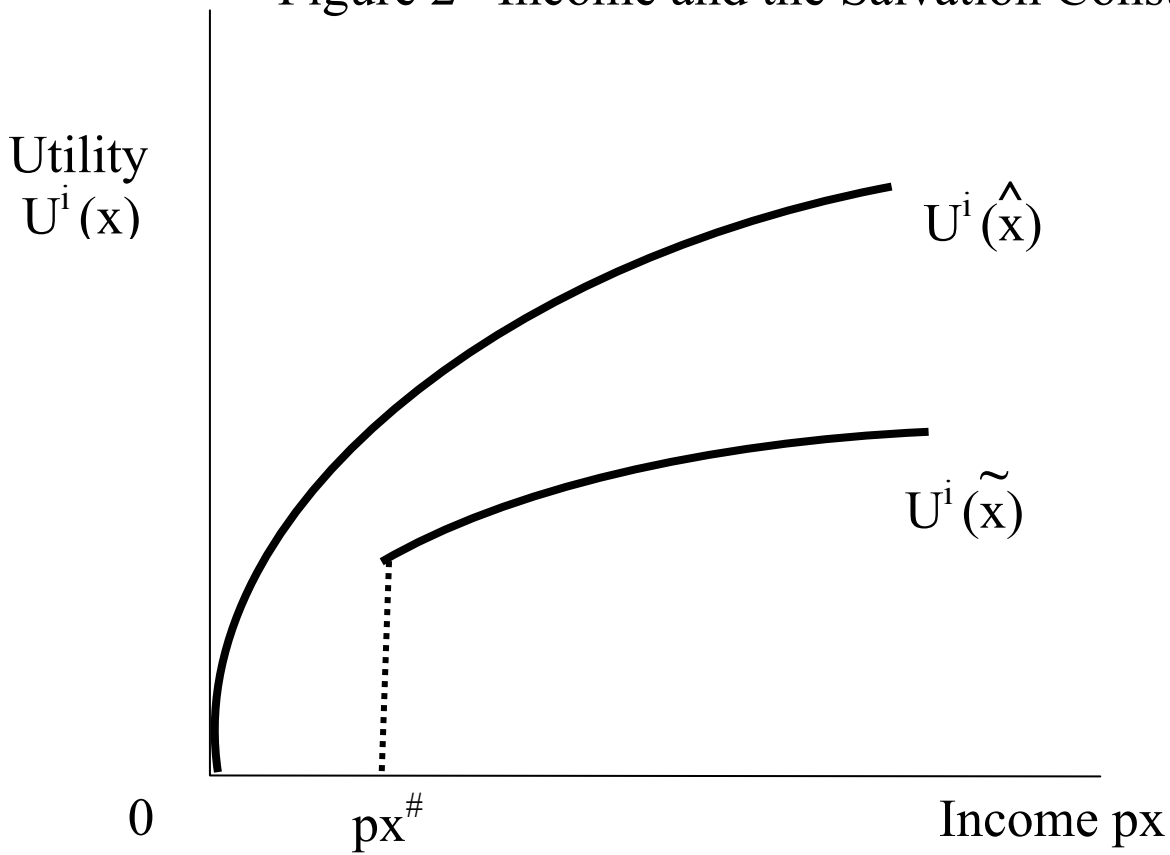Utility
$U^i(x)$

$U^i(\hat{x})$

$U^i(\tilde{x})$

0      $px^{\#}$ Income px

Figure 3 – Income and the Salvation Decision

Utility
$U^i(x)$

$U^i(\hat{x}) - U^i(\tilde{x})$

$U^i(s)$

0      $px^{\#}$ px^{*} Income px

Salvation   *Individual chooses*   *Individual rejects*
unaffordable   *salvation*   *salvation*