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## **Deus Economicus**

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# DEUS ECONOMICUS

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## Abstract

In recent years there has been an upsurge of interest in religion among economists, but the content of religion has so far been neglected. This paper builds a rational choice model of divine action, in particular of the structure of the divine offer of salvation and rational human response. It considers why God might not save everyone, the pattern of salvation across individuals with different preferences and endowments, and the way religious conversion and revivals are often large and sudden changes. Rational choice analysis to divine human interactions is a contribution to the renewal interdisciplinary conversation between economists and religion scholars.

## 1) INTRODUCTION

In recent years there has been an upsurge of interest in religion among economists. Religion is clearly important - Iannaccone (1998 pp1468-69) points out that 95% of Americans believe in God, and 60% are members of a church, church contributions are around 1% of GDP, and clergy employment is around 1.2% of the population. Less easily measured but probably more important are religious influences on other employment and consumption decisions. The growing economics of religion literature has shed light on many aspects of religion, including the allocation of time to religious activities (Azzi and Ehrenberg 1975; Iannaccone 1990), the organisation of churches (Iannaccone 1992; Ekelund Hebert and Tollison 2002, Barros and Garoupa 2002), free will and predestination (Allen 2000), and the afterlife (Smith 1999; 2002),

In the economics literature a major gap is modelling the content of religion, especially divine action (as noted by Iannaccone 1998 p1490, and Brennan and Waterman 1994 p 174-5). If rational choice tools are as general and powerful as is claimed (for instance Becker 1976 ch 1) then they should apply equally to divine as well as human action. To put it another way, any God an economist would take seriously must be rational in the economists' sense, or at least be able to be modelled this way. If anything we might expect God to be more rational than humans - the perfection of rationality.

The only work in the economics literature along these lines is Brams (1980; 1983) modelling of divine-human interactions. Brams believes economic theory "provides a powerful tool for clarifying key theological concepts" (1983 pvii), and aims to demonstrate this by applying game theoretic tools to the question: "If there existed a superior being who possessed the supernatural qualities of omniscience, omnipotence, immortality and incomprehensibility how would he/she act differently from us, and would these differences be knowable?" (1983 pvii). However these characteristics are defined in ways that are difficult to relate to mainstream theology, for example omnipotence is defined as the ability to continue moving when the opponents in a game must stop plus the ability to delay (1983 p7) and incomprehensibility is defined as the ability to play mixed strategies (1983 p7). Any translation of theology into the language of rational choice economics will involve some stretching, but the definitions chosen limit the applicability of Brams' results.

Turning to the religion literature, divine action is one of the least satisfactory areas of contemporary theology (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 (e.g. Alston 1988) suggest that the analogy with human action offers rich

possibilities for developing our understanding of divine action. 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.

This paper applies rational choice theory to divine action, and in particular the salvation contracting. The first contribution is to build a tractable model of divine action which yields a number of testable predictions. The second contribution is to the philosophy of economics, showing how a rational choice account relates to conventional theological accounts of divine action, and clarifying the issue of the compatibility of a rational choice account with divine and human freedom. Thirdly the analysis highlights some limitations of an economic approach to God, and is a contribution to the renewal of interdisciplinary conversation between economics and theology represented by Oslington (2003) or Schweiker and Matthewes (2004).

## 2) MODEL

### (a) Setup

Consider a household production economy with many individuals  $i=1\dots n$ , each with an endowment of factors of production  $\bar{x}^{ik}$   $k=1\dots q$  and an endowment of time  $t^i$ . Individuals can produce  $j=1\dots m$  commodities using factors and time according to the production functions  $z^j = f(x^{kj}, t^j)$   $k=1\dots q$ . Individuals derive utility from commodities according to  $U^i(z^1\dots z^j\dots z^m)$ . Utility functions are assumed to be increasing, concave and homothetic. Endowments and utility functions differ between individuals.

In equilibrium individuals are exchanging factors, employing labour, allocating time and producing commodities to maximise utility. With equilibrium factor prices  $p$  and wage  $w$ , full income of an individual is  $Y^i = \sum_k x^{ki} p^{ki} + t^i w$  and maximised utility  $U^i(\hat{z})$ .

Now introduce God who has a utility function  $U^G(z^1\dots z^i\dots z^n)$  which registers God's satisfaction with the choices of the  $i=1\dots n$  individuals. This divine utility function is assumed to be known to all individuals, consistent with the Christian doctrine of revelation<sup>1</sup>. For simplicity it is assumed to be separable, allowing us to focus on God's valuation of the bundle of a representative individual  $U^G(z^i)$ . It is assumed to be concave, but not necessarily increasing in each commodity. God desires that humans enjoy the good things of creation, represented by  $U^G(z^i)$  being increasing in these good

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<sup>1</sup> The nature of religious knowledge and its acquisition are complex issues in the philosophy of religious. Some insightful comments from an economic perspective are offered by Montgomery (1996).

things, but some commodities will be frowned upon by God (the reader can compose his or her own examples) with  $U^G(z^i)$  decreasing in these<sup>2</sup>. The important point for the analysis is that divine and human valuations of bundles diverge, following the Christian doctrine of the fall.

The God of the Christian scriptures is not merely a passive observer of human choices, but intervenes in human affairs offering salvation to those who repent and have faith. Faith cannot be observed, but is indicated by individuals conforming their choices to God's will as expressed in the divine utility function. 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:

$$(1) U^G(z^i) \geq \theta.$$

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 may include these.

The human problem is whether to rearrange one's life to take advantage of the offer of salvation. Let the best commodity bundle for individual  $i$  which satisfies the salvation constraint  $U^G(z^i) \geq \theta$  be denoted  $\tilde{z}^i$ . 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:

$$(2) U^i(s) \geq U^i(\hat{z}^i) - U^i(\tilde{z}^i).$$

Examples of unconstrained and constrained bundles are given in figure 1. The unconstrained bundle  $\hat{z}^i$  is the point of tangency between the budget constraint  $px^i + wt^i \leq p\bar{x}^i + wt^i$  and indifference curve  $U^i(z^i)$ , in the usual fashion. The constrained bundle must satisfy  $U^G(x^i) \geq \theta$  as well as the budget constraint. Figure 1 shows a linear salvation constraint where commodity 2 is positively valued by God, and commodity 1 is frowned upon, so the bundle must lie on or below  $U^G(x^i) = \theta$  if the individual is to attain salvation. The constrained bundle is marked  $\tilde{z}^i$  and generates utility  $U^i(\tilde{z}^i)$ . The individual then compares the opportunity cost of salvation with the value of salvation in (2) and chooses accordingly.

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<sup>2</sup> The form of God's utility function is left open here. It may be possible through revealed preference analysis to gain some information about God's preferences. If the Christian scriptures are regarded as a record of divine activity then we have data on divine choices in many different situations.

The divine problem has two parts. First, God must set the optimal salvation threshold. The number of individuals saved is decreasing in  $\theta$ , but the consumption reallocations of these saved towards what God prefers is increasing in  $\theta$ , so a rational maximizing God will have to balance these effects<sup>3</sup>. In calculating optimal  $\theta$  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. Jesus' sacrifice 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  $C$ . The sacrifice will be worthwhile for God if

$$(3) U^G(\tilde{z}^1 \dots \tilde{z}^n) - U^G(z^1 \dots z^n) > C$$

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

### **(b) 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 rearrangement of bundles and hence no utility benefits for God to balance the lump sum cost  $C$ . This cannot be an equilibrium. On the other hand setting  $\theta=\infty$  would mean no individuals choose  $s$ , and no rearrangements, and this cannot be an equilibrium. Thus  $\theta$  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, and this is consistent with both the scriptures and observation.

### **(c) Who is Saved?**

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

Endowments of factors and time also differ randomly between individuals. Those with low incomes are more likely to choose salvation because their opportunity cost of salvation is less than high income individuals. In figure 1 the income consumption path for the unconstrained individual is

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<sup>3</sup> Note that God in the model does not care directly about souls saved but about the actions of individuals.

flatter than the divine salvation constraint, implying the difference between unconstrained and constrained utility increases with income, as shown in figure 2. Unless this is so the salvation constraint cannot bind, no individuals will be saved, and the model is degenerate. Figure 3 shows the relationship implied by figure 2 between the probability of salvation and full income for an individual with preferences randomly drawn from the set of possible preferences<sup>4</sup>. God here is a God of the poor, as suggested by certain strands of Christian theology, but not exclusively so because both preferences as well as endowments are randomly distributed<sup>5</sup>.

Across time, salvation would become more attractive in bad economic times as the opportunity cost of salvation falls. Thus the model predicts religious revivals will typically occur during economic downturns<sup>6</sup>.

#### **(d) Conversion and Apostasy**

Consider an individual with an income close to  $Y^0$  in figure 2, 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. 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.

#### **(e) Moderating Effect of Salvation**

A saved individual's life is predicted to be more stable than an unsaved individual's 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.

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<sup>4</sup> Varying 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 in figure 1 would be downward sloping with salvation above it. This implies the gap between unconstrained and constrained utility falls as income rises, so higher income individuals would be more likely to be saved. So a harsh God 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.

<sup>5</sup> The model in Azzi and Ehrenberg (1975 p36) predicts a positive relationship between income and demand for religious commodities, flowing from their assumption that religious commodities are normal goods. The empirical support offered in the paper and elsewhere is mixed. Iannaccone (1998 p1472-4) finds no clear relationship between income and church attendance, although church attendance may not be a good indicator of salvation. A weak relationship would be consistent with the complicating effect of randomness in utility functions on the income-salvation relationship.

<sup>6</sup> An extension of the model which considered the age of the individual would predict that the likelihood of accepting the salvation contract increases with age as the opportunity cost of rearrangements to obtain salvation decreases as death approaches, and the afterlife portion of the  $s$  remains the same.

#### **(f) 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 inputs into commodities God prefers be consumed, so that unsaved individuals will substitute away from commodities God values to those God frowns upon.

### **3) LIMITATIONS OF ECONOMIC MODELLING**

The analysis raises some issues for rational choice modelling of divine action:

#### **(a) Free Will and Determinism**

A difficulty with applying rational choice tools to God is that mainstream Christian theology holds God to be omnipotent, making the specification of constraints awkward. The present model gets around this difficulty by having God interact with individuals whose preferences are respected, consistent with the Christian doctrine of free will.

However this creates another difficulty because Christian theology also holds that God is omniscient, and moreover has created humans with their utility functions. If this is so then why would God not create utility functions which match God's, generating maximum possible divine utility without the need for salvation contracts.

The analysis thus raises in a particularly sharp way the question of whether humans have free will in any meaningful sense, and can reasonably held responsible by God for their choices<sup>7</sup>. It is not an easy issue, and one which theologians have grappled with for centuries. Standard accounts of the problem (e.g. Zagzebski 1991) take freedom to be the ability of an agent to choose otherwise, and point out the logical incompatibility of this with prior knowledge of the agent's choice by an infallible agent such as God. However this is not the only possible view of freedom – another view (e.g. Wolf 1990) is that freedom is choosing for good reasons. In our rational choice account of action preferences in conjunction with agent rationality constitute good reasons, and so the knowledge of or creation of these by God facilitates rather than negates human freedom. Predictability of the agents choice is perfectly consistent with freedom. And if free humans are also responsible for their choices. The issue is not clear-cut, but is one that all economic modelling of divine and human choices has to deal with.

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<sup>7</sup> It is a general problem with the theory of rational choice, as discussed by Allen (2000).



**(b) Beliefs and Intentions**

Christian theology suggests that God cares not just about observed behaviour, but the beliefs and intentions of agents. The model of salvation in this paper bypasses this issue, but more sophisticated ways of dealing with beliefs and intentions within rational choice models are needed.

**(c) Scarcity**

All commodities in the model of this paper are scarce, but Christian theology seems to envisage immaterial commodities not subject to scarcity. Robert Fogel (1999) recently introduced the idea of spiritual capital to economics to deal with this issue, and Klamer (2004) the concept of non-scarce common goods. Modelling of divine human interactions would be enriched by considering such commodities.

**(d) Conversion**

Another difficulty is that conversion is portrayed in mainstream Christian theology as a radical change, which does not sit easily with the economist's usual insistence on fixed preferences. Conversion seems to be something more radical even than the discontinuous switch from the unconstrained to the constrained bundles portrayed in this paper.

**(e) Church**

The communal dimension of the Christian faith is missing from the model. The recent economics of religion literature has modeled church as a club good (e.g. Iannaccone, 1992) but deliberately avoided the salvation implications of church participation.

#### **4) CONCLUSION**

This paper has applied rational choice tools to the content of religion, and in particular to divine action in offering salvation and human response. Although a very simple model, it generates a number of testable predictions consistent with casual observation of religious behaviour. It also offers a challenge to empirical researchers to formally test these predictions as better data on the economic dimensions of religious behaviour becomes available.

Applying rational choice tools to God is a way of exploring the limits of economic analysis; its strengths, weaknesses and explanatory domain. It is hoped that modelling divine action in this way will 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.

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Figure 1 – Salvation Constraint

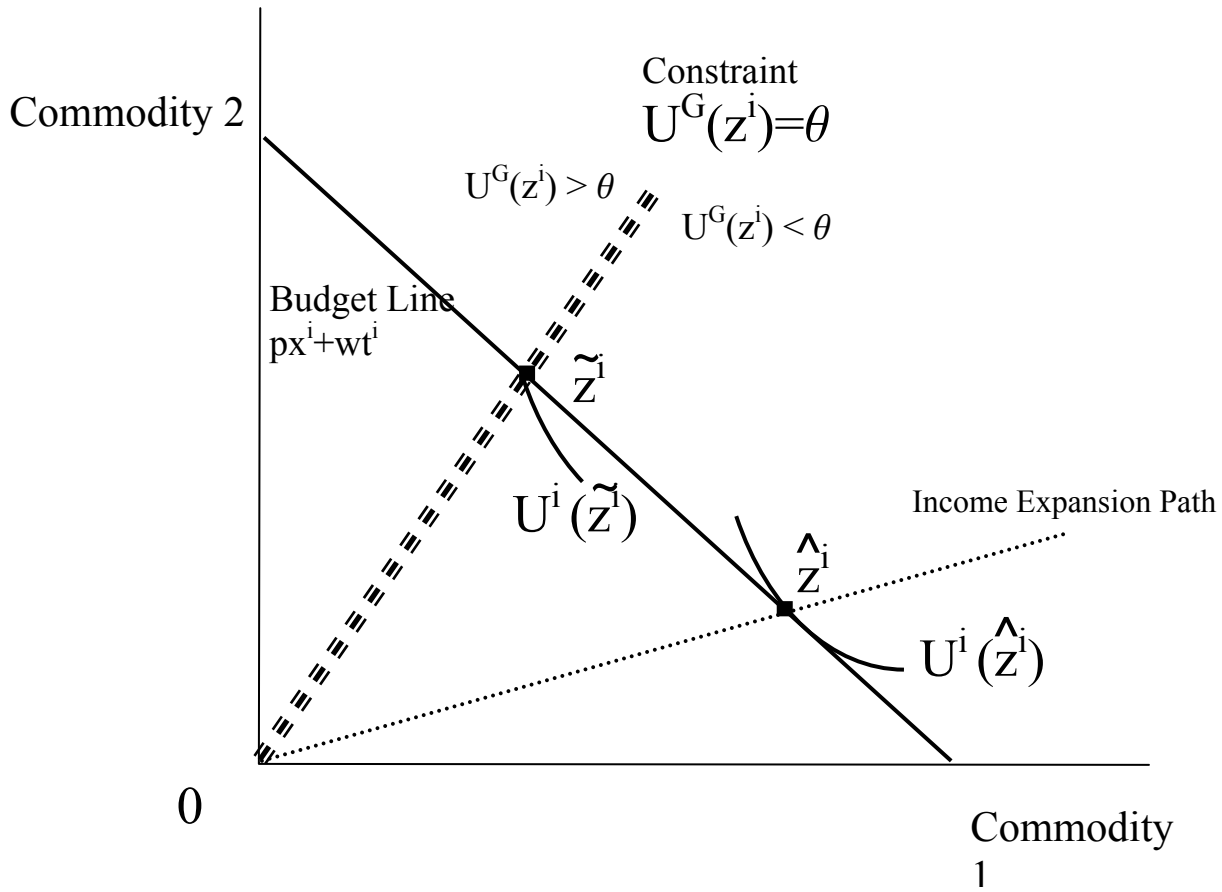


Figure 2 –Income and the Salvation Constraint

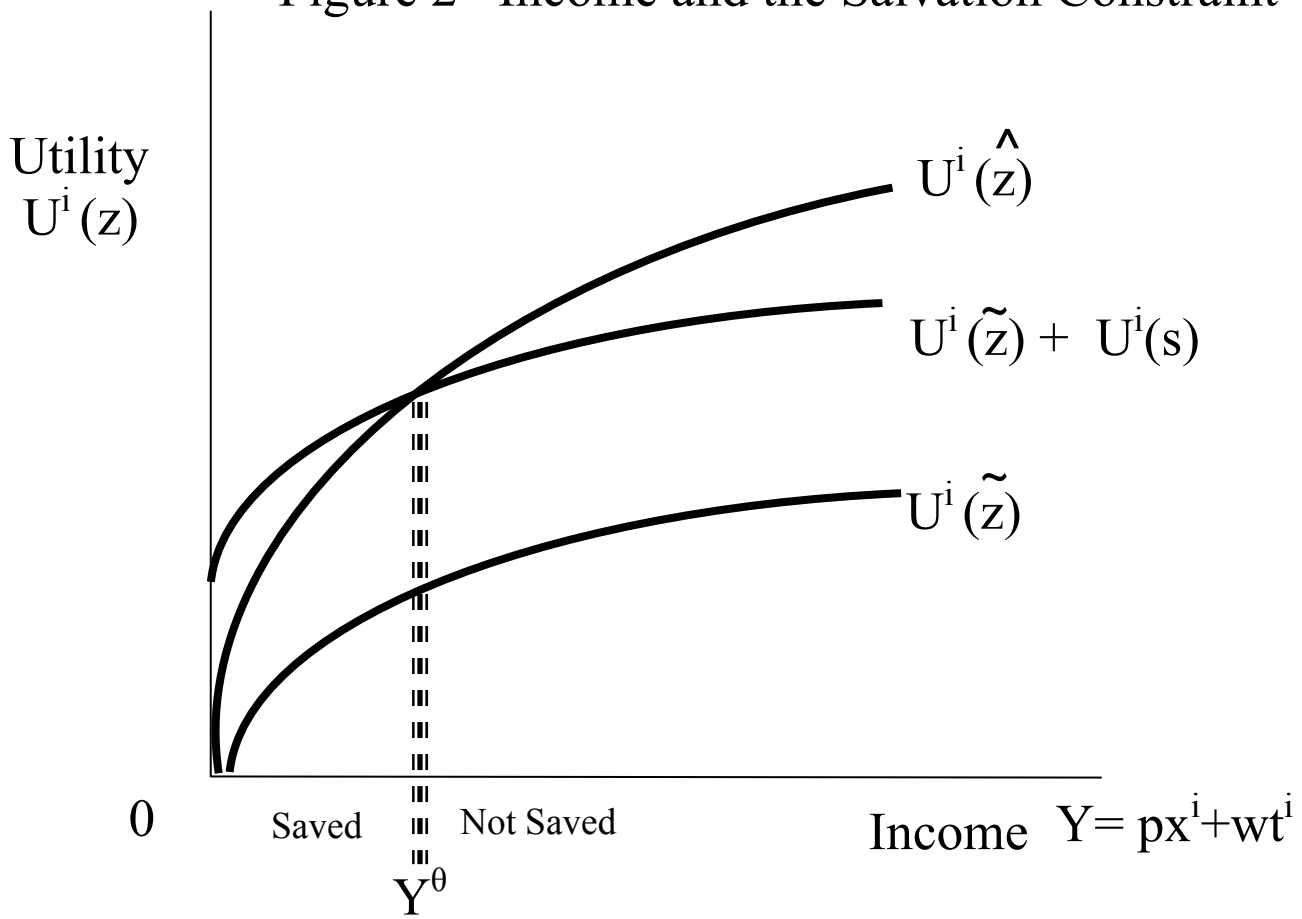


Figure 3 – Income and the Salvation Decision

