# The discounted utility model and social preferences:
# Some alternative formulations to conventional discounting

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## Abstract

This paper considers four patterns of intertemporal choice. First, the time effect, an inverse relation between time preference (TP) and the time implied in the choice. Secondly, the magnitude effect, an inverse relation between TP and the amount implied in the choice. Thirdly, delay/speed-up asymmetry, that is to say, a change in the preferences in function of the framing of the choices. Fourthly, the domain effect, where TPs differ as between health and money. The novel aspect of the paper is the finding that such patterns are present when individuals face intertemporal social choices with respect to money and health which, therefore, could be interpreted as fundamental properties of intertemporal choice. Furthermore, given the time effect, consideration is given to the quantitative form of the discount function. It is found that hyperbolic discounting models provide a better description of the stated preferences than the conventional discounted utility model or the quasi-hyperbolic discounting model. The results provide evidence in support of the hyperbolic social discounting models. © 2002 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

The Samuelson (1937) discounted utility (DU) model, together with its axiomatic derivations, defines individual behaviour with respect to time in normative terms. However, the attitude of individuals in intertemporal choices contradicts the properties of this model. Such an incompatibility between normative hypotheses and observed behaviour is described in the economic literature as an *anomaly* (Loewenstein & Prelec, 1992).

A significant number of anomalies arise when individuals exchange private products over time. Furthermore, there is an extensive theoretical literature (see, for example, Marglin, 1963; Sen, 1960, 1961, 1967; Warr & Wright, 1981) which argues that individual decisions motivated by private or egoistic preferences differ from those that rest on altruistic or social preferences. In this paper we use data obtained from a survey in order to consider whether such anomalies are present when individuals make intertemporal social choices, or if they are confined solely to private choices.

One of these properties consists of time preference (TP) rates falling as the time horizon implied in the choice increases. If we accept this evidence against the conventional discounting model, it becomes necessary to search for models that better describe individual social behaviour.

In this paper, applying the methodology which is typical of analyses carried out by behaviourists – for example, Kirby and Marakovic (1995) and Kirby (1997) – we study whether other forms of the discount function provide a better description of individual social behaviour with respect to both monetary and health exchanges.

With these two objectives in mind, the rest of the paper is organised as follows. In Section 2 we briefly describe the normative properties of the DU model, together with the anomalies that come to light in hypothetical situations of intertemporal choice. The method applied to estimate the TPs and the results of this estimation are considered in Section 3. Section 4 is dedicated to an analysis of the alternative discount formulations. Section 5 closes the paper with a review of the main conclusions.

## 2. Normative and descriptive approximation to individual behaviour in intertemporal choice

According to the DU model of Samuelson (1937), the form of the function that individuals try to maximise must be inferred from the observed behaviour of those individuals, in such a way that