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The discounted utility versus a hyperbolic discounting model

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Various studies in the time preference literature have acknowledged that their results, particularly with respect to the impact of delay on implied discount rates, have been at odds with the discounted utility model. However, there has been little systematic examination of alternative discounting models. This study establishes whether individuals value future health benefits in line with the traditional discounted utility model by testing the assumption of stationarity and *in addition* investigates how well an alternative (hyperbolic) discounting model explains individual responses. Data were collected by postal questionnaire in Scotland, England and Wales. Two different questionnaires containing six open-ended intertemporal questions were used: one concerning own health and another concerning others' health. The assumption of stationarity is tested by regressing the implied discount rates, estimated assuming the discounted utility model, on period of delay, starting point and individuals' characteristics. Specific functional forms of the discounted utility model and the hyperbolic model are then fitted for the whole sample and for groups of respondents. The goodness of fit of these functional forms are assessed and compared. The results show that the period of delay and the starting point are statistically significant predictors of implied discount rates. The hyperbolic model fits the data better than the discounted utility model in the majority of cases. There is thus evidence against the discounted utility model and in favour of hyperbolic discounting models.

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I. INTRODUCTION

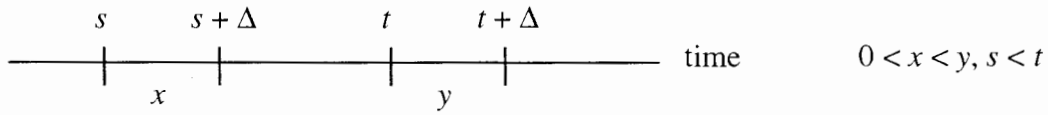
A number of studies have examined intertemporal preferences for future health effects. [1-14] These studies have been undertaken in the context of the traditional discounted utility model, that is, they have generally assumed that individual intertemporal preferences are characterised by constant timing aversion. There is little empirical support for the discounted utility model. Loewenstein and Prelec[15] identify a number of common preference patterns at odds with the model. They describe these as the absolute magnitude effect; the gain-loss asymmetry; and the delay-speedup asymmetry; and the common difference effect. The discounted utility model assumes that the discount rate applied will not be related to the magnitude of the event which is subject to discounting, nor to whether the event represents a gain or loss, nor to whether it is being brought forward or delayed. The common difference effect refers to the impact on choice between two delayed outcomes of a change in the delay applied equally to both outcomes. The discounted utility model assumes that the choice depends only on the absolute interval between the two outcomes. Given the increasing evidence indicating that individuals do not appear to apply the discounted utility model[2-5,9-11,13-14] it is now appropriate to give some consideration to alternatives.

Using data on intertemporal preferences for non-fatal changes in own and others' health this paper first tests one of the key axioms of the discounted utility model, namely stationarity. The discounted utility model is then compared with an alternative model of intertemporal choice, namely the hyperbolic discounting model. The hyperbolic model allows for decreasing timing aversion. The paper is primarily empirical. For a discussion of normative issues see Bleichrodt and Gafni.[16] Although intertemporal preferences are elicited for both own and others' health the comparison of these two types of preferences is not the main aim of the paper. This is done elsewhere.[17]

II. STATIONARITY AND THE COMMON DIFFERENCE EFFECT

One of the key axioms of the discounted utility model is stationarity. It refers to the assumption that preference between two outcomes depends only on the absolute time interval separating them. So individuals who prefer receiving £100 after 1 month to

receiving £110 after 2 months should also prefer receiving £100 after 12 months to receiving £110 after 13 months. However, in practice preferences between two delayed outcomes often switch when both delays are incremented by a given constant amount. Loewenstein and Prelec[15] refer to this as the common difference effect. In the example individuals would prefer £110 after 13 months to £100 in 12 months if the common difference effect applies.



Stationarity:

$(x, s) \succcurlyeq (y, t)$ and $(x, s + \Delta) \succcurlyeq (y, t + \Delta)$

Common difference effect:

$(x, s) \succcurlyeq (y, t)$ and $(x, s + \Delta) \preccurlyeq (y, t + \Delta)$

where $\succcurlyeq$ means 'at least as preferred as'. The common difference effect implies that discount rates should decrease as a function of the time delay over which they are estimated. This is called decreasing timing aversion. Decreasing timing aversion has been observed in numerous studies both outside and inside the health field. Apart from stating that this pattern is at odds with the discounted utility model research in the health field has not considered alternative discounting models. In the area of economic psychology a few studies have examined alternative discounting models which allow for decreasing timing aversion[18-26]. The most common model is the hyperbolic discounting model. This model has been examined on humans, rats and pigeons. The studies involving humans focussed on monetary benefits. All studies conclude that the hyperbolic discounting model fits the data better than the discounted utility model. Another potential alternative model is the proportional discounting model.[27] This model has been applied in the environmental area but has not been tested empirically.

III. DISCOUNTING MODELS

Discounting models can be compared in terms of their discount factor ($a(t)$). The discount factor is the fraction by which the future event (at time t) should be multiplied in order to yield the present value implied by the discount function. The discounted utility model can be expressed as follows:

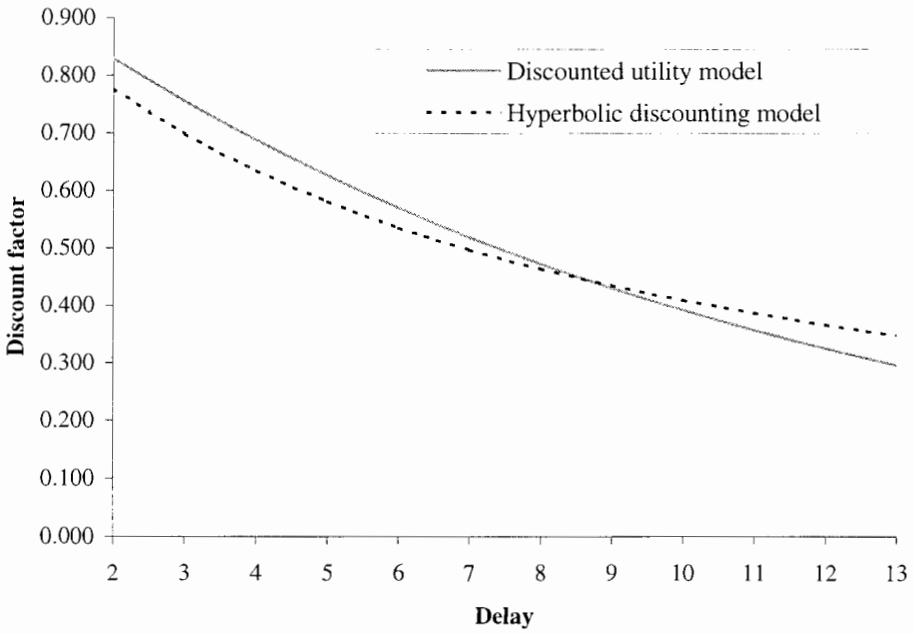
$$a(t) = (1+r)^{-t}, \qquad r > 0, t \geq 0 \qquad (1)$$

A model which allows for decreasing time aversion is the *hyperbolic discount curve* as discussed by Ainslie[28]:

$$a(t) = (1 + kt)^{-1} \qquad t \geq 0, k \geq 0 \qquad (3)$$

The larger the k parameter the steeper the discounting of future effects. When fitted to the same data hyperbolic functions tend to be steeper at short delays than discounted utility models but flatter at long delays. Figure 1 shows two functional forms of the discounted utility model and the hyperbolic discounting model fitted later on in this paper. It can be seen in this figure that the hyperbolic function is flatter at long delays.

Figure 1. Functional forms



IV. QUESTIONNAIRE DESIGN

Stated preference methods (open-ended questions) are used to elicit intertemporal preferences for non-fatal changes in own and others' health. Each question asks the respondent to imagine being ill at a point in the future and offers the opportunity for this spell of ill health to be delayed (as a result of treatment). Individuals have to identify a maximum number of days of future ill health at which it would still be worthwhile receiving this treatment (see Appendix 1 for an example). A similar context is used for others' health. The question was formulated in terms of a group middle-aged patients rather than in terms of an individual patient. Their approximate age was stated because time preference is expected to be a function of age.

Two different years are chosen for the initial point at which ill health will be experienced if treatment is not received. The periods of delay chosen range from two to thirteen years from the starting point. Each subject is asked six questions: three with a starting point two years in the future; and three with a starting point three years in the future. Each questionnaire contains three different delays for each starting point: a short term delay (2-5 years); a medium term delay (6-9 years); and a long term delay (10-13 years). Also the difference between the short and medium term delay and between the medium and long term delay is not the same in any questionnaire (for each starting point). The purpose of this somewhat complex design is to collect data for a wide range of delays and to ensure that the questions do not appear to conform to any pattern in case respondents think that they are expected to respond in a certain way. The four versions of the questionnaire are shown in Table 1.

Table 1. The Four versions of the questionnaire

Starting point	Years before delayed ill health			
	I	II	III	IV
2 years	2	3	4	5
2 years	7	9	6	8
2 years	10	11	12	13
3 years	3	5	2	4
3 years	6	7	8	9
3 years	10	11	12	13

The health state selected is based on the Euroqol descriptive system which is comprised of five dimensions: mobility; self-care; usual activities; pain/discomfort; and anxiety/depression. Each dimension has three severity levels. Individual's intertemporal preferences are expected to differ according to the severity of the selected health state. Individuals might have a tendency to minimise duration for very serious health states and maximise delay for very minor health states. The aim is to select a health state that is not too severe but is generally regarded as serious enough. The following health state is selected: no problems in walking about; no problems with self-care; some problems with performing usual activities; moderate pain or discomfort; and not anxious or depressed. The tariff for this Euroqol state (11221) is 0.773 assuming a one month duration.[29]

V. METHODS

Testing stationarity

As described above, all subjects were asked six questions with two starting points. With respect to three questions individuals were asked to imagine being ill *two* years from now and with respect to the other three questions they were asked to imagine being ill *three* years from now (so s is either two or three years). The period of delay offered ($t - s$) ranges from two to thirteen years. These data permit a test of stationarity. Implied discount rates are estimated from the intertemporal responses assuming the discounted utility model (r in equation (1)). If the preference condition of stationarity holds individual's implied discount rates should neither be a function of s nor $t - s$, that is, $\delta r/\delta s = 0$ and $\delta r/\delta (t - s) = 0$. In other words, the importance of a fixed difference ($t - s$) in the timing of the two benefits does not change as the timing of these benefits is moved into the future (or as s increases). If on the other hand individuals are decreasing timing averse, less importance is attached to $t - s$ the further into the future the timing of the future benefits is moved and $\delta r/\delta s < 0$ and $\delta r/\delta (t - s) < 0$. Stationarity can thus be tested by regressing the implied discount rates on s and $t - s$.

Other factors included are: the age of the respondent (Dummy variables for the age groups 30-43, 44-63, ≥64); their gender (Female); whether or not they currently

smoked cigarettes (Smoker); whether their long-term health was fair or poor rather than good (Health); and whether or not they had been educated beyond secondary school level (Education).

There is a clear multilevel structure because there are six observations per respondent. This clustering of observations has implications for the nature of the regression analysis. The use of OLS can underestimate standard errors and thus overestimate the statistical significance of explanatory variables. Multilevel analysis takes the multilevel structure of the data into account by analysing variation which occurs at the higher level (i.e. variation amongst respondents) separately from variation at the level of the responses.[30]

The two level model including random coefficients can be expressed as follows:

$$y_{ij} = \left(\alpha + \beta x_{ij}\right) + \left(\mu_j + v_j x_{ij} + \varepsilon_{ij}\right) \quad (4)$$

In this equation μ_j, v_j and ε_{ij} are random quantities. The respondent-level random variables μ_j and v_j are the departures of the j-th respondent's actual intercept from the overall mean value α and from the actual slope from the overall mean value β respectively. These are thus level two residuals. The observation-level random variable ε_{ij} is the observation-level residual for the i-th observation in the j-th respondent and measures random variation across observations. Restrictive Iterative Generalized Least Squares (RIGLS) estimation[30] within the MLn software is used. All hypothesised variables are included in the initial model. Variables with a t-values lower than 1.96 (5% level) are excluded.

First the whole sample is used for the regression analysis. It is expected that there will be a considerable amount of heterogeneity with respect to implied discount rates. Respondents may have positive, negative or zero implied discount rates. The sample is therefore split by six different categories of respondents: (i) majority of responses imply positive discount rates and none imply negative discount rates; (ii) majority of responses imply negative discount rates and none imply positive discount rates; (iii) majority of responses imply zero discount rates; (iv) half of the responses imply positive discount rates and half zero discount rates; (v) half of the responses imply

negative discount rates and half zero discount rates; and (vi) responses imply both positive and negative rates and possibly zero discount rates. Whether the assumption of stationarity holds may depend on the category of respondents examined. The assumption of stationarity is therefore tested for each of these categories numbers permitting.

Selecting specific functional forms

Nonlinear Least Squares Regression in Limdep[31] is used to select the optimal values for r and k in the models. A nonlinear regression model is one for which the first-order conditions for least squares estimation of the parameters are nonlinear functions of the parameters.[32] Thus, nonlinearity is defined in terms of the techniques needed to estimate the parameters, not the shape of the regression function. Since there are only six observations per respondent functional forms cannot be selected on an individual basis. Functional forms are therefore selected on a group basis. One limitation of the nonlinear regression model in Limdep is that it is not designed to take into account the multilevel structure of the data.

Functional forms of the discounted utility model and the hyperbolic discounting model are first fitted for the whole sample excluding observations of zero days because a discount factor cannot be estimated for these responses. These responses indicate that the treatment is only worthwhile if it cures the respondents completely. It could be argued that the responses are an expression of preferences regarding the treatment rather than an expression of intertemporal preferences. The fit of the functional forms for the whole sample are expected to be poor because of the expected heterogeneity of the discount factors. Functional forms are therefore fitted for the following groups of respondents:

1. Functional forms may differ according to the starting point (s). Functional forms for a starting point of 20 days of ill health in 2 years might differ from functional forms for a starting point of 25 days of ill health in 3 years from now. The sample is therefore split according to the starting point offered in the questions.
2. Functional forms may differ according to the size of the initial discount factor (the discount factor for the shortest delay. The shortest delay varies across the four types of questionnaire. For each type of the questionnaire the shortest delay is

chosen and the corresponding discount factors are divided into two groups depending on their discount factor.

3. Functional forms might differ according to version of the questionnaire since the four versions of the questionnaires vary in terms of the period of delay offered..

Some respondents may be increasing timing averse. Fitting functional forms of models representing constant or decreasing timing aversion to these observations will results in a poor goodness of fit. Some respondents may also have negative discount rates. Intertemporal preferences for these groups of people are expected to differ from the rest of the sample. The sample is therefore reduced by excluding all these respondents.

Testing the goodness of fit

To test the goodness of fit of each equation the proportion of variance accounted for by each equation (R^2) is estimated. It has to be noted that the R-squared is not bounded in [0, 1] because Ordinary Least Squares is not used. The R-squared is compared for the functional forms of the discounted utility model and the hyperbolic model.

VI. DATA

Postal questionnaires were sent to individuals living in urban and rural areas in Scotland, England and Wales (960 questionnaires with respect to own health and 960 questionnaires with respect to others' health). In order to facilitate a good response rate electoral wards were selected with a high percentage of home ownership (using 1991 Census data). The sample is therefore not representative for the UK population but representativeness is not of primary importance since the aim of the study is to explore the nature of individuals' time preferences and not to identify mean or median population discount rates.

Data are also collected on year of birth, gender, perception of current long-term health, how many cigarettes per day they smoke, and education. In the case of own health 157 usable responses (where the respondent answered at least some of the time preference questions) were received and 148 in the case of others' health.

Respectively five and eight questionnaires were returned by the Post Office. The response rate is therefore 16.4% and 15.5% respectively. Appendix 2 shows some descriptive statistics of the sample. The two samples appear to be very similar with respect to the individual's characteristics. The null hypothesis that distribution of respondents across categories for each of the individual's characteristics is independent of whether the questions concerned own or others' health is accepted for all characteristics apart from self-rated health. A larger percentage of individuals responding to the questions concerning others' health rate their health as fair or poor.

VII. RESULTS

Testing stationarity

Table 2 shows the regression results for the full sample excluding the respondents who thought the treatment would only be worthwhile if it cured them completely. About two thirds of the respondents (96 out of 157 in the case of own health and 97 out of 148 in the case of others' health) gave responses consistent with a positive discount rate (category (i)). The regression analysis can only be repeated for category (i) since the number of respondents in the other categories is too small. Since the implied discount rates for category (i) have a non normal distribution they were transformed by taking the logarithm of the implied discount rates. For the purposes of this paper the negative coefficients on the Delay variable $(t - s)$ and the dummy variable for starting point (s) and their very large t-statistics are of greatest relevance. These findings hold true for the full sample as well as for the category (i) sample and for own as well as others' health. This is strong evidence against stationarity. The negative coefficients indicate that there is evidence of decreasing timing aversion. The longer the period of delay the lower the implied discount rate. It is therefore likely that the hyperbolic discounting model, which allows for decreasing timing aversion, will fit the data better.

The significant t-values in the random part of the model indicate that multilevel analysis should be used. The size of the level one variance compared to the total variance at level two suggests that the majority of variation exists across individuals. Individuals vary greatly with respect to their time preferences but vary much less in their responses to different periods of delay.

Table 2. Regression results for implied discount rates

	Full sample		Category (i)	
	Own health	Others' health	Own health	Others' health
	b (t-value)	b (t-value)	b (t-value)	b (t-value)
Fixed effects				
Intercept	0.109 (2.68)	0.096 (2.39)	-0.866 (7.32)	- 0.893 (7.11)
Delay ($t - s$)	-0.009 (4.86)	- 0.007 (4.64)	-0.043 (12.74)	- 0.036 (15.18)
Starting point (s)	-0.035 (6.19)	- 0.017 (4.06)	-0.138 (12.25)	- 0.108 (10.44)
Age 30-43	0.032 (1.00)	0.021 (0.58)	0.136 (1.28)	0.065 (0.57)
Age 44-63	0.025 (0.76)	0.025 (0.75)	0.224 (2.19)	0.176 (1.63)
Age > 63	0.049 (1.00)	0.049 (1.37)	0.316 (2.91)	0.274 (2.40)
Female	0.012 (0.59)	- 0.038 (1.89)	-0.033 (0.61)	- 0.095 (1.76)
Health	0.032 (1.21)	0.038 (1.69)	0.154 (2.22)	0.031 (0.53)
Smoker	0.005 (0.17)	- 0.015 (0.52)	-0.087 (1.18)	- 0.013 (0.17)
Education	0.006 (0.30)	0.015 (0.66)	0.028 (0.46)	0.098 (1.55)
Random effects				
Level 1:				
$\sigma^2(\varepsilon_{ij})$	0.0070 (17.00)	0.0038 (17.27)	0.0175 (13.59)	0.0150 (13.72)
Level 2:				
$\sigma^2(\mu_j)$	0.0563 (7.51)	0.0477 (7.83)	0.1048 (5.80)	0.0956 (5.89)
σ^2(Delay)	0.0004 (7.17)	0.0003 (7.50)	0.0008 (4.94)	0.0003 (3.88)
$\sigma(\mu_j$, Delay)	-0.0044 (6.67)	- 0.0031 (6.89)	-0.0062 (4.19)	- 0.0032 (3.38)
Log-likelihood	- 1234.21	- 1662.93	- 276.53	- 387.99
n	855	858	553	563

Selecting specific functional forms

Table 3 shows the estimated values for r and k for own health. For the full sample the implied discount rate is equal to 0.019. The estimated value for k is 0.021. The values for r and k vary depending on the starting point, the size of the initial discount factor and the type of questionnaire. Some of the implied discount rates are negative. This might be a result of category (ii) respondents being over represented in that group. This is confirmed by the results for the reduced sample. The variation in r and k values is much less for the reduced sample. Table 4 shows the estimated values of r and k for others' health. The values for r and k are almost identical for the full

sample. Again, the values for r and k vary depending on the starting point, the size of the initial discount factor and the type of questionnaire.

Testing the goodness of fit

Table 3 and 4 also show the goodness of fit for all the functional forms. With respect to own health functional forms of the hyperbolic model fit the data better in all cases. When the full sample is split by starting point or size of initial discount factor or type of questionnaire the goodness of fit improves in some case but is worse in other cases. As expected the goodness of fit for the reduced sample is better. Splitting the reduced sample by starting point or size of initial discount factor or type of questionnaire improves the fit of the models in all but one case. With respect to others' health the results are mixed for the full sample. The goodness of fit of the functional forms of the discounted utility model and hyperbolic model appear to be very similar. The difference between functional forms of the discounted utility model and hyperbolic models can be minimal when considering a relatively narrow range of delays and when the estimated values for r and k are small. In some cases the goodness of fit of the discounted utility model is slightly better but the differences in goodness of fit are minimal. However, the hyperbolic models fits the data better in all cases when examining the reduced sample.

Table 3. Selected functional forms and their goodness of fit for own health

	Full sample					*Reduced sample*				
	N	r	R^2	k	R^2	N	r	R^2	k	R^2
	879	0.019	0.00056	0.021	0.00068	413	0.098	0.03433	0.144	0.13984
Split by starting point										
- starting point 2 years	441	0.023	0.00017	0.026	0.00024	207	0.113	0.03837	0.173	0.17896
- starting point 3 years	438	0.016	0.00155	0.017	0.00178	413	0.098	0.03433	0.144	0.13984
Split by initial discount factor										
- low discount factor*	469	0.086	-0.17023	0.129	-0.09641	148	0.137	-0.04662	0.222	0.15769
- high discount factor**	429	-0.019	-0.00516	-0.018	-0.00537	294	0.120	0.00912	0.188	0.16796
Split by type of questionnaire										
- type I	265	0.042	0.00959	0.049	0.01129	123	0.103	0.06715	0.149	0.18766
- type II	185	0.061	-0.03896	0.080	-0.01863	102	0.099	0.13823	0.144	0.19429
- type III	229	-0.006	-0.00038	-0.005	-0.00038	122	0.113	-0.02460	0.179	0.11669
- type IV	212	0.007	0.00353	0.008	0.00347	66	0.075	0.26437	0.104	0.30800

* Low discount factors: < 0.68 (I); < 0.51 (II); < 0.84 (III & IV)

** High discount factors: ≥ 0.68 (I); ≥ 0.51 (II); ≥ 0.84 (III & IV)

Table 4. Selected functional forms and their goodness of fit for others' health

	Full sample					*Reduced sample*				
	N	r	R^2	k	R^2	N	r	R^2	k	R^2
	877	0.003	0.00021	0.003	0.00021	445	0.099	0.07976	0.147	0.18674
Split by starting point										
- starting point 2 years	440	0.010	0.00046	0.010	0.00046	224	0.110	0.09402	0.168	0.21383
- starting point 3 years	437	-0.003	-0.00058	-0.028	-0.00059	221	0.089	0.07294	0.128	0.16928
Split by initial discount factor										
- low discount factor*	420	0.103	-0.06307	0.158	-0.00924	301	0.128	0.04973	0.204	0.22675
- high discount factor**	465	-0.038	-0.01027	-0.030	-0.01215	147	0.0586	0.39446	0.076	0.44030
Split by type of questionnaire										
- type I	200	0.019	0.00937	0.020	0.00910	90	0.114	0.02101	0.169	0.12266
- type II	280	-0.026	0.00153	-0.024	0.00157	114	0.105	0.12982	0.157	0.18434
- type III	192	0.016	0.00167	0.017	0.00167	132	0.092	0.15526	0.136	0.28488
- type IV	205	0.027	0.00420	0.030	0.00404	109	0.091	0.00347	0.135	0.13806

* Low discount factors: < 0.88 (I); < 0.72 (II); < 0.77 (III); < 0.64 (IV)

** High discount factors: ≥ 0.88 (I); ≥ 0.72 (II); ≥ 0.77 (III); ≥ 0.64 (IV)

VIII. CONCLUSION

This paper tested one of the key assumptions of the discounted utility model namely stationarity. The results show that this assumption does not hold and that there is evidence of decreasing timing aversion. An alternative model which allows for decreasing timing aversion (the hyperbolic model) was then investigated for the whole sample and for different groups of respondents. The hyperbolic model fits the data better than the discounted utility model. However, even for the hyperbolic model the goodness of fit was poor. Studies in the area of economic psychology report R^2 in the order of 0.98[18-22]. These studies however fit functional forms for each individual based on a small number of observations. For statistical reasons this analysis was not repeated (minimum number of observations should be thirty). It indicates however that a potential way to improve the goodness of fit of the functional forms would be to introduce random effects for individuals. It is not clear if and how this can be introduced in non-linear regression models.

Another area for future research is to examine two-parameter models. For instance, a possible two-parameter model proposed by Loewenstein and Prelec [13] is the following hyperbolic model:

$$a(t) = (1 + kt)^{-s} \qquad t \geq 0, k \geq 0 \qquad (3)$$

Here s modifies the form of the hyperbola so that when s is less than 1.0, it flattens the curve causing it to level off as t increases. Given that the addition of a free parameter will generally improve the fit of a model to data simple comparisons of the proportion of variance accounted for will no longer be sufficient and other goodness of fit measures need to be identified. The goodness of fit measure used in this paper is quite a crude measure anyhow and the existing research is likely to benefit from using alternative goodness of fit measures. Finally, other alternative discounting models such as the proportional discounting models will be investigated.

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Appendix 1. Example

Imagine the following ill-health: You have some problems with performing your usual activities (e.g. work, study, housework, family or leisure activities) and you have moderate pain or discomfort. You have no problems in walking about, nor with washing and dressing yourself and you are not anxious or depressed.

Imagine that you will be ill, as described above, starting ***two*** years from now for ***twenty*** days. There is a minor one-off treatment available that will postpone this spell of ill-health to a point further in the future. For instance, the treatment could have the following effects: your period of ill-health would start ***nine*** years from now instead of ***two*** years from now; and you would then be ill for ***thirty*** days instead of ***twenty*** days.

You might think this treatment is a good idea: the advantage of postponing the ill-health outweighs the disadvantage of being ill for a longer period. Or you might think the treatment is not worthwhile: you do value the postponement but the advantage of this is outweighed by the disadvantage of being ill for a longer period; or you might simply prefer to be ill two years from now instead of nine years from now. Imagine again that you will be ill starting 2 years from now for 20 days and treatment is again available that will postpone this spell of ill-health.

We will now ask you to state the maximum number of days of ill-health that would still make the treatment worthwhile for you. For example, say that the treatment can postpone the period of ill-health to ***6*** years in the future. If the number of days of ill-health in that year would be zero everyone would probably choose the treatment. As the number of days of ill-health in that year increases individuals would at some point no longer prefer to be treated. What we are interested in is the ***maximum number*** of days of ill-health at which you would still choose to be treated.

If the ill-health would then start ***4*** years from now what is the maximum number of days of ill-health that would still make the treatment worthwhile?

Appendix 2. Descriptive statistics

		Own health		Chi square		Others' health	
		n	%	χ^2	p value	n	%
Gender	Male	77	49.0	0.408	0.523	78	52.7
	Female	80	51.0			70	47.3
Health	Good	127	80.9	6.377	0.041	102	68.9
	Fair	24	15.3			38	25.7
	Poor	5	3.2			8	5.4
	Missing value	1	0.6			0	0.0
Smoke	None	134	85.4	0.137	0.934	126	85.1
	1-5	8	5.1			7	4.7
	6+	14	8.9			15	10.1
	Missing value	1	0.6			0	0.0
Education	Secondary school	48	30.6	0.615	0.921	43	29.1
	Other professional or technical qualification	57	36.3			57	38.5
	University degree	48	30.6			47	31.8
	Missing value	4	2.5			1	0.7
		Mean	Range			Mean	Range
Age		48.67	19 – 90	55.108	0.750	52.40	19 – 86
	Missing value	n=0				n=4	