The Public's Preferences For Health Care.

A Danish Survey.

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Foreword

The work presented here represents a smaller part of a larger Danish survey. The survey was launched in 1999 and included an interview of 2000 Danes. The aim of the study was to elicit the public's values and preferences in context of the Danish health care sector. Involved in the project were these authors who undertook a preference analysis based on discrete choice modelling grounded in utility theory. The remaining part of the study was carried out by Annie G. Frandsen, Institute of Political Sciences, who applied methods used in the fields of sociology and political science. The methods are in essence complementary, and the author is referred to the book *Danskernes Ønsker til Sundhedsvæsenet* for a detailed presentation of results and overall conclusions. The book was published in the year 2000 and can be ordered from Odense University Press

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Abstract

Purpose: It is increasingly recognised that the values and preferences of the community can play a valuable role in informing decision making regarding the provision of health care services. Hence, the aim of this study was to disclose preferences for general practitioner services, hospital services and the characteristics of the health care sector in general.

Methods: A random sample of the Danish population was interviewed. 1990 respondents participated in face-to-face interviews in which they were asked to chose between different types of services characterised in terms of various attributes. These stated preferences were analysed using discrete choice modelling also known as conjoint analysis. Respondents were subjected to a total of three pair wise choices between general practitioners characterised by attributes such as travel time to GP, opening hours, average waiting time, out-of-hours services, length of consultation and the extent to which the GP plays an active role in sickness prevention. In addition, three pair wise choices were to be made as to choice of hospital characterised by travel time to hospital, access to accident and emergency, complication rates, waiting time for elective surgery, up-to-date treatment and beds per ward. Additional attributes included in the description of hospitals and GPs were out-of-pocket payments or tax increases. Finally, respondents were asked to make three pair wise choices between health care system A and health care system B, described in terms of surrogate attributes representing different degrees of freedom of choice, equity and solidarity.

Results: The analysis indicated that security in access to treatment irrespective of ailment is not an overriding priority, but is valued similarly to freedom of choice. Moreover, an openness towards the concept of introducing user charges of a smaller magnitude demonstrated that individuals are willing to compromise relative equity in access to health care in order to avoid a tax increase.

Generally there was a willingness to invest in the health care sector at the expense of private consumption. The relatively high weight on attributes concerning primary and

secondary preventive measures suggests that individuals may be willing to invest in the future at the cost present health care facilities.

Conclusion: Significant coefficient estimates indicate that respondents can respond to discrete choices involving multiple attributes in a consistent manner, thus making it possible to estimate the extent to which one attribute is traded off against another. Results demonstrate that not only health outcomes but also non-health outcomes influence the public's valuations of health care systems.

1. Introduction

The values and preferences of the public can play a valuable role in informing decision making regarding the provision of health care services. Hence, the aim of this study was to disclose preferences for general practitioner services, hospital services and the characteristics of the health care sector in general.

Different techniques can be used to elicit preferences. Approaches such as standard gamble (Drummond *et al*, 1997) have been applied to elicit values of health states, further willingness to pay (WTP) techniques have been used for the purpose of measuring individuals' monetary valuation of health care (Diener *et al*, 1998). Another method which could be used to elicit preferences, and which is the method applied in this study is called *conjoint analysis*. In this method, individuals are asked to chose between different combinations of attributes describing the good being evaluated. Preferences are measured using ranking, rating or discrete choice settings. By including a cost attribute in the choice description it further becomes possible to determine WTP estimates. For a more detailed description of the method see Train (1986) and Cramer (1991).

Previously, the traditional areas for applying conjoint analysis has been transport economics and market research (see for example Beggs, 1981), but in the last decade the method has been introduced within in the field of health economics. Examples are measurement of preferences for treatment (Ryan, 1999), screening programmes (Chakraborty *et al*, 1993; Ryan & Farrar,1995; Gyrd-Hansen, 2000,) and the measurement of WTP for a reduction in the time spent on waiting lists (Propper, 1991).

In this paper we present the results of a study based on discrete choice settings where alternative health care systems, hospitals and general practices are presented. The aim

of the analysis is to elicit relative preferences for attributes describing health as well as non-health outcomes.

2. Theory

Conjoint analysis is a method based on random utility theory that is used to elicit preferences and willingness to pay (WTP). In random utility theory the utility of the good being evaluated is considered as being composed of a deterministic part which is interpreted as an indirect utility function and a random part which is assumed to consist of unobservable factors influencing utility. This random element measures errors in the dependent variable and/or model specification errors. The simple random utility model is as follows:

$$U = V + \varepsilon$$

It is assumed that individuals maximize utility. If we also assume that the parameters of the indirect utility function are linear, we reach the following:

$$V = \beta' X$$

where X is a vector of variables describing the attributes of the alternatives and β is a vector of parameters describing the different attributes' influence on the utility-level.

A linear additive utility function is assumed, where the utility of the good is a function of all characteristics:

$$V = \alpha + \sum_1^n \beta_i \cdot A_o$$

where V is the cumulative utility function, α is a constant and β_i (i=1,....,n) is a vector of coefficients related to the good characteristics A_i.

Using conjoint analysis implies that different hypothetical scenarios are presented to

the respondent, each describing different levels of the attributes that characterize the good being evaluated. By giving the attributes different values it becomes possible to determine their relative importance. Further it is possible to measure, how much an individual is willing to give up of one attribute to be able to receive more of another (i.e., the marginal rate of substitution (MRS)). The marginal rates of substitution between the different attributes are determined by β_i/β_j. Finally, it becomes possible to estimate the total explained utility (V) for different combinations of attributes, thereby being able to determine the combination the public would prefer most. Conjoint analysis involves five steps: (1) Identifying attributes that may influence preferences. (2) Assigning relevant value to the attributes . (3) Choosing a sample of scenarios. In principle the set of scenarios should include all possible outcome combinations given the levels and characteristics chosen, but experimental designs are used in order to reduce the set of scenarios necessary for unbiased estimations. (4) Measuring preferences by using either ranking, rating, or discrete choice. (5) Analysing data using regression techniques. The different steps are explained in more detail in the following.

3. Method/Setting

In the present analysis we were interested in measuring the relative preferences for basic values such as equity in access to treatment, freedom to choose place of treatment, security in the availability of treatment, and quality in the process and outcome of treatment. Hence, effort was made at including attributes that reflect some dimension of these values.

3.1. Choice of attributes - health care sector

Table 1 lists the attributes that were included in the description of health care systems. The first attribute in table 1, stating that the public health care system will seek to offer new treatments irrespective of costs incurred, reflects security in the availability of

treatment irrespective of ailment. Freedom of choice is represented by two attributes: freedom to choose amongst alternative public hospitals and increased freedom to choose outside the system by seeking subsidised treatment in the private sector. Respondents are also asked to trade-off increases in tax with introduction of user charges, which implicitly asks the respondents to make a choice between relative equity in access and absolute equity in access. In addition, attributes describing preventive measures are included: a focus on screening programmes for secondary prevention and a focus on primary prevention of life style related diseases. The quality dimension is not included in this part of the analysis. Since quality primarily relates to treatment processes and treatment outcomes, the importance of this value is measured in the context of the hospital sector and general practice.

Table 1 Example of two health care systems the respondents could choose between (this is one card out of 25 possible)

Attributes:	*Health care system A*	*Health care system B*
In the future new treatments become available. The public health care system tries to offer all possible treatments irrespective of costs incurred	Yes	No, some very expensive treatments are not offered
More screening programmes are introduced with the aim of detecting diseases early and improving survival.	No	Yes
There is free choice of public hospital	No	Yes
Treatment in private hospitals is subsidised.	No	No
There is focus on preventive measures to reduce the incidence of life-style related diseases	Yes	Yes
Extra tax payment per year (DKK)	0 DKK	5,000 DKK
Maximum out–of-pocket payment per year for health care services (DKK)	0 DKK	2,500 DKK

All of the attributes presented in table 1, apart from those related to payment, are dichotomous variables. Values in the range of 0 DKK to 10,000 DKK per year were

assigned to ‘extra tax payment per year (DKK)’, and ‘maximum out–of-pocket payment per year for healthcare services (DKK)’. The choice of level of payments are generally based on what levels are deemed realistic in the given choice contexts. Moreover, it was important that the range of payment was such that respondents took account of these values when making their choices. In the analysis we assume that marginal utility of an increase in payment of 1 DKK remains constant within the price range applied. It is not possible to test for other functional forms on the basis of the data set.

3.2. Choice of attributes - hospital

In this part of the study aspects of relative and absolute equity in access to treatment are again considered by including tax and out-of-pocket payments in the description of alternative hospitals. However, in a given scenario only one payment vehicle is chosen, i.e. payment is described *either* as a tax increase *or* a user charge. Further, in the measurement of preferences for the hospital sector, we considered values such as security in access to treatment (proxied by travel time, direct access to accident and emergency and length of waiting lists), security in receiving up-to-date treatment as well as quality in treatment.

Table 2 Example of two hospitals the respondents should choose between (this is one card out of 25 possible)

Attributes	*Hospital A*	*Hospital B*
Travel time to hospital when driving by car	35 minutes	35 minutes
Admission to accident and emergency	Open for everyone	A referral from the emergency doctor is required
Average waiting time for non-acute surgery	6 months	3 months
Frequency of treatment without complications	lower than average	higher than average
Introduction of up-to-date treatment regimes has priority	No	Yes
The patient is primarily attended by the same physician	Yes	Yes
Number of beds per ward	4	4
Out–of-pocket payment per hospitalisation (DKK) ***Or*** Extra tax payment per year (DKK)	0 DKK 0 DKK	5,000 DKK 2,500 DKK

Quality is represented by the attributes 'frequency of treatment without complications', describing an aspect of quality in treatment outcome, and 'the patient is primarily attended by the same physician' reflecting a dimension of quality in the treatment process, whereas 'number of beds per ward' relates to the quality of the setting. The attribute 'travel time to hospital when driving by car' has several facets: in addition to symbolising security in access, this variable also symbolises quality in relation to the treatment process, in addition to including an aspect of geographical equity.

Travel time to hospital when driving by car was given the values 15, 35 or 60 minutes, whereas average waiting time for non-acute surgery could be either 3, 6 or 9 months, and number of beds per ward could be 2, 4 or 8. Finally tax increase and out-of-

pocket payments had values ranging from 0 DKK to 10,000 DKK. The remaining variables were dichotomous.

3.3. Choice of attributes - general practice

Table 3 presents the attributes included when describing general practice. Travel time to general practice, opening hours, type of emergency service, waiting time for consultation and ample time for consultation are all variables reflecting quality in the treatment process. That the GP prioritises supplementary training involves a quality aspect as well as a dimension of security in up-to-date treatment. In addition, time preference is measured by way of the variable 'the GP plays an active role in preventing lifestyle related diseases'. Finally, aspects of relative and absolute equity in access were included through the payment attributes. However, as in the case of the hospital sector analysis, payment was described *either* as a tax increase *or* as a user charge.

Table 3 Example of two general practices the respondents should choose between (this is one card out of 25 possible)

Attributes:	*Practice A*	*Practice B*
Travel time to general practice	10 minutes	10 minutes
Opening hours	8 til 18 5 days a week	9 til 16 5 days a week
The GP is coupled to an emergency service based on:	consultation in the emergency centre	home visits
The GP prioritises supplementary training	No	Yes
Waiting time for (non-acute) consultation	1 day	7 days
Ample time is allowed for each consultation	Yes	No
The GP plays an active role in preventing lifestyle related diseases	No	No
Extra out–of-pocket payment per contact (DKK) ***Or*** Extra tax payment per year (DKK)	0 DKK 0 DKK	150 DKK 1,000 DKK

The tax payment values lie in the range 0 DKK to 4,000 DKK whereas out-of-pocket payments could take values between 0 DKK and 500 DKK. Travel time to general practice was either 10, 20 or 30 minutes and waiting time for a (non-acute) consultation was given the values 1, 3 or 7 days. As shown in Table 3 the remaining variables were dichotomous.

3.4. Selection of scenarios

Given the number of attributes and the number of possible outcomes per attribute, the total number of possible combinations is exceedingly high, necessitating a systematic reduction in number of scenarios applied. Such a reduction in the number of scenarios was accomplished by establishing a 'fractional factorial design', where interactions among attributes are assumed to be insignificant. The computer package SPEED 2.1

(Bradley, 1991) was used for this purpose.

To reduce the number of choices faced by the respondent, a block design was used, where not all respondents were asked to choose between the same scenarios. Earlier studies (Ryan & Hughes, 1997) have shown that it is possible to use 12 to 13 choice situations per respondent. In this study, however, the respondent was asked to choose between nine choice situations in total: three pair wise choices regarding the health care sector, hospital sector and general practice, respectively. The large sample size made the use of the limited number of scenarios possible. To ease the respondents' task of choosing amongst the scenarios, alternatives A and B only differed on 4 attributes.

3.5. How should preferences be measured?

Preferences may be elicited based on choices made in actual or hypothetical markets. To determine preferences for market goods, data on actual behaviour can be used in conjoint analysis. However, in the context of health care services a hypothetical choice setting must be applied. A hypothetical setting opens up for several methods of eliciting preferences. Respondents could be asked to rank or rate several alternatives, or simply state which alternative they prefer. In the ranking method, the respondent is asked to rank three or more scenarios. When rating is applied the respondent is asked to indicate his strength of preferences for different hypothetical scenarios on a numerical scale. This can be done for all possibilities at once or for pair wise choices. Finally, one could ask the respondent to make a discrete choice,

by selecting the scenario - out of a group of scenarios - he perceives as being most attractive.

The choice of question technique is determined by considering the trade-off between complexity and the amount of information received from the answers given. To ask the

respondent to rate different scenarios is a demanding task, because it involves a precise evaluation of preferences. However, if the respondent manages the task, the information elicited would be very accurate. In this study, the more simple technique discrete pairwise choices is used. We chose this technique because it is a relatively simple task for the respondents to undertake, and best resembles choice tasks made in daily life - thus minimising the level of abstraction.

3.6. Analytical model

A linear additive utility function is assumed. Hence, a rise in the value of one attribute gives a proportional rise or proportional fall in total utility. Further, it is assumed that the utility associated with one attribute is not affected by the utility experienced from another attribute. A basic model describing the utility associated with a given health care system, hospital or general practice relative to an alternative option could therefore be described as:

$$\Delta U = \beta_1 * \Delta x_1 + \beta_2 * \Delta x_2 + \beta_3 * \Delta x_3 + \beta_4 * \Delta x_4 + \beta_5 * \Delta x_5 + \varepsilon + \mu$$

where five attributes are included as explanatory variables. $\Delta x_1,....,\Delta x_5$ represent the differences in attribute values between alternative A and alternative B, $\beta_1,.....,\beta_5$ are the attribute specific weights we wish to measure, and ΔU is the change in utility as a result of choosing alternative B instead of alternative A. The error term ε is the random error term, including random variation across discrete choices, and μ is the random variation across respondents.

In the equation above the utility of alternative A is defined to be zero, which implies that $\Delta U>0$ if B generates higher utility than A, and $\Delta U<0$ if B generates lower utility. It is assumed that the individual would choose alternative B if $\Delta U>0$ only.

The dependent variable is binary, since it is the choice rather than the difference in utility that is observed. Therefore, logit or probit models must be used when analysing the data. Since respondents were asked to perform *3* pairwise choices within each sub-analysis, we cannot be sure that variations across discrete choices are random. Some correlation may exist across the discrete choices made by one individual. Hence, it was necessary to apply a random effect probit model in the analysis. LIMDEP 7.0 (Greene, 1995) was used for estimation purposes.

3.7. Further hypotheses to be tested

Up to now we have only discussed the "main models", in which relative weights for attributes are elicited. The results of these models will disclose the relative preferences of the average individual. In order to see whether subgroups in the population have different preference structures, we analysed the effect of including socio economic variables (gender, age, income, level of education etc) in the model by way of interaction variables. We also included variables that could proxy past and future use of health care services (number of contacts with the health care system within the past year; self-rated health status; age) with the purpose of identifying to which extent preferences are motivated by self interest.

3.8. Sample

A random sample of the Danish population was interviewed. 1991 respondents participated in face-to-face interviews in which they were asked to select between different types of services characterised in terms of various attributes. A response rate of 69% was obtained. The sample was representative of the Danish population with regard to age distribution ($p<<0.001$), gender ($p<<0.001$), education level ($p<<0.001$) and the resident (county) of the respondent ($p<<0.001$).

4. Results

4.1. Health care sector

Attributes listed in table 1 were included as explanatory variables in the random effect probit model. Two additional exogenous dummy variables were included representing attitudes towards a tax increase and introduction of user charges *per se*. These variables are labelled 'tax increase versus no tax increase', and 'out-of-pocket payment versus no out-of-pocket payment', and were included on the assumption that the disutility associated with a payment consists of two dimensions: a principle attitude towards the concept of a tax increase/introduction of user charges irrespective of the magnitude of the payment involved *in addition to* the marginal disutility associated with an increase in the amount paid. The variables are constructed as dummy variables with the value of 1 if the alternative includes a tax increase, or a user charge, respectively.

Table 4 presents the results of the health care sector model. The attributes and their relative weighting are listed. As it appears, all attributes were significant, i.e., all attributes appear to have influence on the choice of card A or B.

Table 4 Health care sector - regression results

Attribute	Weight (coefficient)	p-value
The public health care system tries to offer all possible treatments irrespective of costs incurred	0.36	0,0000
More screening programmes are introduced with the aim of detecting diseases early and improving survival.	0.382	0,0000
There is free choice of public hospital	0.308	0,0000
Treatment in private hospitals receives a is subsidised	0.366	0,0000
There is focus on preventive measures to reduce the incidence of life-style related diseases	0.372	0,0000
Extra tax payment per year (DKK)	-0.00006	0.0001
Out–of-pocket payment per year for health care services (DKK)	-0.0000837	0,0000
Tax increase versus no tax increase	-0.309	0,0000
Out-of-pocket payment versus no out-of-pocket payment	-0.185	0.0002
n =1975 LogL=-3329.6 McFadden=0.055 Correct prediction=0.71		

Results indicate coefficient signs that cohere with ex ante hypotheses. That the public health care system seeks to introduce all new treatments available is associated with a positive weight (0.360) implying that utility is increased. All other characteristics, with the exception of attributes involving payment, exhibit similar positive weights, indicating that one attribute is not significantly more important than the other.

Attributes that involve payment are associated with disutility on two dimensions: a disutility associated with payment as a concept, and disutility associated with the extent of payment. Results indicate that respondents are more positively inclined when

presented with the concept of introducing out-of-pocket payments (-0.185), than they are towards the notion of a tax increase (-0.309). However, the marginal disutility associated with a specific incremental increase in tax generates less disutility (-0.00006 per DKK), than a similar rise in out-of-pocket payments
(-0.0000837 per DKK).

We tested for socioeconomic factors to elicit whether any subgroups in the population may have different preferences for the health care system. The results can be verified in table 5, where a '+' indicates a statistically significant positive effect, and a '÷' signifies a statistically significant negative effect. If no '+' and '÷' is reported, the person characteristic had no significant effect on preferences. Self-rated health was shown to have influence on the positive weight associated with the public health care system introducing all new treatments available and on the perceived importance of introducing preventive measures to reduce the incidence of life-style related diseases. A lower self-reported health produces a higher weight on both variables. In addition, age correlated negatively with the level of utility derived from introducing public screening programmes and over 65 year olds did not put as large an emphasis on the importance of free choice of hospital. Females were found to be more negatively inclined towards introducing public subsidisation of treatment in private hospitals.

As would be expected, a higher income reduced the disutility associated with an increase in payments towards the health care system irrespective of payment vehicle, whereas the negative attitude towards introducing out-of-pocket payments *per se*, was larger amongst women.

Table 5. Interaction variables in the health care system model

Attribute	Person characteristic	Interaction variable Attribute * person characteristic
The public health care system tries to offer all treatment possibilities irrespective of cost.	*Assessment of own health* Age Age^2 <40 years of age >65 years of age Sex (female=1)	+
More screening programmes are introduced with the aim of detecting diseases early and improving survival.	Assessment of own health *Age* Sex (female=1)	÷
There is free choice of public hospital	Number of hospital visits <40 years of age *>65 years of age* Sex (female=1)	÷
Treatment in private hospitals is subsidised	Number of hospital visits >40 years f age <65 years of age *Sex (female=1)*	÷
There is focus on preventive measures to reduce the incidence of life-style related diseases	*Assessment of own health* Age Sex (female=1)	+
Extra tax payment per year (DKK)	*Income*	+[a]
Out–of-pocket payment per contact (DKK)	Assessment of own health Number of hospital visits Consumption of other health care services *Indcome* Age Age^2	+
Tax increase versus no tax increase	<40 years of age >65 years of age Sex	
Out-of-pocket payment versus no out-of-pocket payment	<40 years of age >65 years of age *Sex*	÷[b]

[a] $p<0.0619$; [b] 0.0653. For the rest of the marked results $p<0.02$[1]

1 According to Lovell (1983) the significance criteria should be a function of number of canididate variables (k) and number of variables (r) which remain in the reduced model: $p<(r/k)*0,05$. Here r=16 og k=40.

4.2. Hospital

Table 6 lists the results of the hospital model. Results show that free admission to emergency wards are amongst the important attributes of the health care sector, with a positive weight of 0.813, whereas frequency of treatment without complications (higher than average versus lower than average) is deemed less important (0.189). Looking at the relative size of the remaining descriptive attributes shows that introduction of up-to-date treatment is valued as important as being attended primarily by one physician. Approximately equivalent scores are obtained by a reduction in travel time of a little over an hour[2] or reducing the number of beds per ward by two[3].

2 0.00742*67 minutes = 0.497

3 0.203*2=0.406

Table 6. Hospital - regression results

Attribute	Weight (coefficient)	p-value
Travel time to hospital when driving by car (per minute)	-0.00742	0.0000
Admission to accident and emergency does not require referral	0.813	0.0000
Average waiting time for non-acute surgery (per month)	-0.158	0.0000
Frequency of treatment without complications (higher than the average in contrast to lower than the average).	0.189	0.0000
Introduction of up-to-date treatment regimes has priority	0.493	0.0000
The patient is primarily attended by one physician	0.494	0.0000
Number of beds per ward (per bed removed)	-0.203	0.0000
Extra tax payment per year (per DKK)[a]	insignificant	
Tax increase versus no tax increase	-1.019	0.0000
Out–of-pocket payment per hospitalisation (per DKK)[b]	insignificant	
Out-of-pocket payment versus no out-of-pocket payment	-1.437	0.0000
n = 1976 LogL = -2488.6 McFadden = 0.01969 Correct prediction =0.76		

[a] $p<0.8955$ [b] $p<0.1566$ This Table list the results of the reduced model, where these two variables are excluded.

In this analysis respondents were presented with payments in the form of a tax increase *or* an out-of-pocket expense. The results show that responses were unaffected by the

amount charged, instead respondents seemed to react to the concept of a tax increase *or* introducing user charges. The negative utility associated with paying per se was greater in the context of user charges (-1.437).

Table 7. Interaction variables in the hospital model

Attribute	Person characteristic	Interaction variable Attribute * person characteristic
Travel time to hospital when driving by car (per minute)	Number of hospital/out-patient clinic visits Assessment of own health Age Age^2	
Admission to accident and emergency does not require referral	The respondent has children living at home	
Average waiting time for non-acute surgery (per month)	Assessment of own health >65 years of age	
Frequency of treatment without complications (higher than average)	Age *Sex* (Female=1)	+ +[a]
Introduction of up-to-date treatment regimes has priority	Age Sex (Female=1)	
The patient is primarily attended by one physician	*Age* *Sex* (Female=1)	+ +[a]
Number of beds per ward (per bed removed)	Age Sex (Female=1)	
Tax raise versus no tax raise	*<40 years of age* >65 years of age Sex	+
Out-of-pocket payment versus no out-of-pocket payment	<40 years of age >65 years of age Sex	

[a] $p<0.063$; $p<0.041$. The remaining results are highly significant ($p<0.017$[4]).

The effect of socio economic factors were analysed and results are reported in table 7.

Results show that women found a decrease in the rate of complications more important

4 According to Lovell (1983) signficance criteria is a function of number of candidate variables (k) and number of variables (r) which remain in the reduced model: $p<(r/k)*0.05$. Her er r=12 og k=35.

than men. Moreover, women derive relatively more utility from being attended primarily by one physician, as do older populations. Looking at attitudes towards the notion of a tax increase, the younger generations (<40 years) are more positively inclined.

4.3. General practice

Table 8 reports the results of the general practitioner model, which indicates that an important variable is that ample time is allowed for a consultation. Moreover, that the GP prioritises supplementary training is also deemed important. Opening hours are judged as less important and is given a weight equivalent to home visits out-of-hours. Also, similar weights are given to a reduction in travel time to GP of 15 minutes[5] or a 3-day reduction in waiting time for a non-acute consultation[6].

Table 8 General practice - regression results

5 0.015*15 minutes=0.225

6 0.076*3 days=0.228

Attribute	Weight (coefficient)	p-value
Travel time to general practice (per minute)	-0.015	0.0000
Longer opening hours	0.22	0.0000
The GP is couples with an emergency service based on consultation at home rather than at an emergency centre	0.218	0.0001
The GP prioritises supplementary training	0.393	0.0000
Waiting time for non acute consultation (per day)	-0.076	0.0000
Ample time is allowed for each consultation	0.574	0.0000
The GP plays an active role in preventing lifestyle related diseases	0.269	0.0000
Extra tax payment per year (per DKK)	-0.00023	0.0000
Out–of-pocket payment per contact (per DKK)	-0.0022	0.0000
Tax increase versus no tax increase	-0.442	0.0000
Out-of-pocket payment versus no out-of-pocket payment	-0.364	0.0002
n =1899 LogL=-3273.3 McFadden =0.130 Correct prediction =0.70		

There was a negative utility associated with payment *per se*, with the disutility associated with a tax increase *per se* being slightly higher than for introduction of user charges. Marginal disutility associated with the paid amount, was however significantly higher when the context was out-of-pocket payment.

We tested for the influence of socio economic factors, see table 9. In the context of general practitioner preferences frequently varied with personal

characteristics. Attitude towards travel time to the GP is a direct function of perceived health status. The worse an individual perceives his own health, the greater the disutility derived from a longer travel time. Surprisingly, number of visits to the GP within the recent year was negatively correlated with the disutility associated with long travel. The absolute effect of this interaction variable was, however, minor. Another interesting result was that the value put on supplementary training is a direct function of the respondent's own level of education. The higher the level of education the more focus on supplementary training amongst GPs. Moreover, women find that the GPs role in preventing life-style related diseases relatively less important as compared to men. The disutility associated with the extent of user charges was affected by self-rated health status. The worse the health status, the greater the disutility experienced in connection with an increase in user charges. Attitude towards introduction of user charges per se was more negative amongst the younger generation and less so amongst women.

Table 9. Interaction variables in the model for general practice

Attribute	Person characteristic	Interaction variable Attribute * person characteristic
Travel time to general practice (per minute)	*Number of visits in general practice Assessment of own health* Age Age^2	+ ÷
Longer opening hours	*Number of visits in general practice* *> 65 years of age*	(÷[a]) ÷[a]
The GP is coupled with an emergency service based on home visits rather than visits to the emergency centre.	Number of contacts with emergency doctor	
The GP prioritises supplementary training.	*The respondent is high educated*	+
Waiting time for non-acute consulation (per day)	Age Sex (Female=1)	÷[a]
Ample time is allowed for each consultation	Age Sex (Female=1)	
The GP plays an active role in preventing lifestyle related diseases	Age *Sex (Female=1)* *Assessment of own health*	÷ (+)
Extra tax payment per year (per DKK)	Income	
Out-of-pocket payment per contact (per DKK)	Number of visits in general practice *Assessment of own health* Age Age^2 Income	÷[a]
Tax increase versus no tax increase	<40 years of age >65 years of age Sex (Female=1)	
Out-of-pocket payment versus no out-of-pocket payment	*<40 years of age* >65 years of age *Sex (Female=1)*	÷ +[a]

[a] 0.082>p>0.027[7] (21/38*0.05)

7 According to Lovell (1983) significance criteria should be a function of number of initial candidate variables (k) and the number of variables that remains in the reduced model (r) : p<(r/k)*0,05. Here: r=21 og k=38.

5. Discussion

Model results illustrated that all exogenous variables had a significant impact on preferences. The signs of the coefficients accord with ex ante hypotheses, which indicates that conjoint analysis may be an appropriate tool in eliciting preferences. Nevertheless, the results presented here should be interpreted with caution since relative preferences are based on model estimates, and are elicited indirectly. The conjoint analysis presented here was part of a larger survey which mostly consisted of direct questions regarding individuals' preferences for the Danish health care system. Some of the direct questions posed focussed on attributes similar to those included in the conjoint analysis. Hence, it was possible to - in part - validate some of the results of the conjoint analysis, and results were encouraging. It should be noted, however, that discrepancies in answers based on direct questioning and conjoint analysis does not necessarily invalidate conjoint analysis, since indirect questions based on trade-offs between attributes may well disclose preferences that are closer to the truth. Direct questioning has the advantage of being simple, but such questions may well be biased by what is deemed "right" and "wrong" answers. Also, it is "costless" to express strong values, since respondents are not required to trade-off attributes.

Having reported the results of the models in the previous section, and

discussed the relative weighting of the attributes, we will now seek to draw some overall conclusions from the results.

Looking initially at the relative weights elicited in the health care sector model, the results indicate that freedom to choose place of treatment and security in access to treatment are valued equally highly. Moreover, the higher negative disutility associated with a tax increase per se relative to the principle attitude towards user charges illustrates a tendency towards compromising relative equity in access. From the coefficients of the payment attributes we can calculate to which extent respondents are willing to accept user charges in order to avoid any increase in tax. The result[8] is that the average respondent would prefer out-of-pocket payments up to a maximum of 1,480 DKK annually. If the maximum annual charge is increased beyond this amount, individuals would be willing to pay1.40 DKK in tax in order to avoid an increase in maximum user charge of 1 DKK. These results imply that for large annual user charges individuals will exchange preferences for absolute equity with preferences for relative equity. This results is strengthened by the fact that individuals when questioned directly preferred the existing Danish health care system, which is partly based on user charges, to a health care system which is purely publicly financed.

In addition, the relatively high positive weight on the enforcement of primary and secondary preventive measures, suggests that individuals are

8 Calculated in the following manner: (-0.309+0.185)/-0.0000836

willing to invest in future health at the expense of current treatment.

The magnitude of the coefficient that measures the negative attitude towards a tax increase *per se* is not large relative to the remaining attributes in the model, indicating that the average individual in most cases will be willing to pay for an improvement on one of the attributes. Hence, there is a willingness to forego private consumption in order to increase the quality of the health care system in general.

However, if we look at the results of the hospital model, the same willingness to pay cannot be seen. The negative weight attached to paying per se is higher than the positive utility associated with each of the remaining attributes. Thus, a willingness-to-pay towards improving the hospital sector requires an improvement on 2-3 attributes. The results further illustrate that accessibility (direct access to accident and emergency) is valued very highly. In comparing quality attributes it is interesting to see that quality in the treatment process (primarily attended by one physician; one bed less per ward) generates the same value as quality in outcome (reduction in frequency of complications). The relative importance of being attended by one physician is supported by the results obtained through direct questions regarding quality in health care. Further, a comparison of the coefficient associated with a reduction in travel time to hospital and the weight attached to prioritisation of up-to-date treatment, shows that the representative individual is willing to travel up to over an

hour[9] in order to obtain up-to date treatment.

In the general practitioner model, the quality aspect "ample time for consultation" turned out to be the most important quality dimension. In second place came security in receiving up-to-date treatment proxied by the variable "The GP prioritises supplementary training", the importance of which was highly correlated with individuals own educational background. That the GP plays an active role in preventing lifestyle related disease was ranked third most important. When respondents earlier in the study were asked to rank these three attributes directly according to importance, the ranking was identical to that obtained thorough conjoint analysis. The relative weights associated with payment mode and extent of payment in the general practitioner model makes it possible to find levels of tax increases and out-of pocket expenses for which the average individual is indifferent, see table 10.

Table 10. Payment mode and extent of payment which produce same level of disutility.

Tax increase (annual)	User charge per consulation
0 DKK	35.70 DKK
100 DKK	46.10 DKK
500 DKK	87.80 DKK
1000 DKK	140.00 DKK

The table should be interpreted such that the average individual is

9 Calculated in the following fashion: 0.493/0.00742

indifferent between an annual tax increase of 500 DKK and being charged 87.80 DKK per consultation.

By estimating the marginal rate of substitution between travel time and user charge, the willingness to pay for a decrease in travel time can be determined. The result is a willingness-to-pay of 6,70 DKK[10] per minute equivalent to accepting a user charge of approximately 100 DKK if travel time is reduced by 15 minutes. However, a willingness-to-pay for a reduction in travel time is only prevalent if travel time exceeds 25 minutes[11].

When including variables that indicate past and possibly future use of health care services (number of contact with the health care system within the past year; self-rated health status; age) results indicated that self interest may play a role in a few contexts. A poorer self-rated health increased the valuation of introduction of new treatments irrespective of costs, and increased the disutility associated with user charges in the context of general practitioner services.

10 0.015/0.0022

11 Estimated by 0.0364/0.015

6. Conclusion

The analysis indicated that security in access to treatment irrespective of ailment is not an overriding priority, but is valued similarly to freedom of choice. Moreover, an openness towards the concept of introducing user charges to a smaller degree demonstrated that individuals are willing to compromise relative equity in access to health care in order to avoid a tax increase. Generally there was a willingness to invest in the health care sector at the expense of private consumption. The relatively high weight on attributes concerning primary and secondary preventive measures suggests that individuals may be willing to invest in the future at the cost present health care facilities.

In the hospital sector direct access to accident and emergency was very highly valued, as was contact with one physician. Also, there was a willingness to travel in order to obtain up-to-date treatment. In the context of general practitioners the most important attribute was that practitioners spend ample time on each consultation.

Significant coefficient estimates indicate that respondents can respond to discrete choices involving multiple attributes in a consistent manner, thus

making it possible to estimate the extent to which one attribute is traded off against another. Results demonstrate that not only health outcomes but also non-health outcomes influence the public's valuations of health care systems.

7. References

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