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1 Introduction

One of the most common health problems of aged people is dementia which refers to an acquired syndrome of decline in memory and at least one other cognitive function (e.g., apraxia, aphasia, agnosia) sufficient to affect daily life of an alert person (Hafner and Meier, 1996). There may be many causes of dementia of which Alzheimer’s disease (AD) is the most frequent. About 70 percent of all cases of dementia are due to AD (Geldmacher and Whitehouse, 1996; Gutzwiller, 1999). The outstanding pathologic feature of AD is the disappearance of nerve cells in the cerebral cortex and ultimately death.

At its onset, Alzheimer’s disease is marked by simple forgetfulness, especially of recent events or directions to familiar places. People with AD may experience personality changes, such as poor impulse control and judgment, distrust, increased stubbornness, and restlessness. The initial changes are often subtle which makes it difficult to diagnose AD in its early stages. Even physicians experienced in dealing with dementing illnesses cannot diagnose Alzheimer's disease with 100 percent certainty (Carr et al., 1997; O'Connor et al., 1988; Hoffman 1982). A definite diagnosis of AD can only be reached through a brain autopsy after the death of the patient (Ludin, 1999). The next stage of the disease is characterized by greater difficulty in doing things that require planning, decision-making, and judgment. Social withdrawal begins. Eventually, people with Alzheimer's disease cannot do simple tasks of daily life such as eating, bathing, and using the toilet. They may have a hard time recognizing all but their closest daily companions. Communication of all kinds becomes difficult. Withdrawal from family members begins. In the final stages, patients become bedridden, and are unable to recognize themselves or their closest family members. They may make small, purposeless movements and communicate only by screaming occasionally. A vegetative state may ensue (Carr et al., 1997). Death often results from pneumonia and from complications of immobility. Although there is much variability, the average survival time is 8 to 10 years after dementia onset (Geldmacher and Whitehouse, 1996).

The chronic debilitating nature of AD makes it one of the most costly diseases. In the United States Alzheimer’s disease is the third most expensive disease with costs to society approaching US$ 100 billion annually (Schumock, 1998; Meek et al., 1998). Only heart diseases and cancer entail even higher cost. For Switzerland total costs of AD amount to CHF 3.2 billion (US$ 2 billion at exchange rate October 2000: US$ 1 = CHF 1.70) per year (Volz et al., 2000). It is the patient’s family and her relatives which bear the greatest part of this cost since they spend numerous hours per week providing informal care to an AD patient.

These indirect costs make up about 43 percent of total cost for Switzerland (ca. CHF 1.4 billion annually; see Volz et al., 2000). International studies even get shares of indirect cost which amount from 50 percent up to two thirds of total cost (Ernst and Hay, 1997).

Looking at annual costs per AD patient, estimated values differ between US$ 20,000 and US$ 65,000 but most studies arrive at an amount of about US$ 50,000 per year and patient (Ernst and Hay 1997; Souêtre et al., 1999). The figures for Switzerland also lie in this region. Annual costs for patients still living at home amount to CHF 60,000 (US$ 35,000) whereas costs for institutionalized patients reach about CHF 75,000 (US$ 44,000) per year. Only about a fifth of these costs are covered by the health insurer. The bigger remaining part has to be paid by the patient or her family and relatives (Volz et al., 2000).

The most consistent and significant risk factor associated with AD is increasing age. The rates for dementia double about every five years over the age of 60 (Wettstein, 1999b). While the incidence at the age of 65 years is about 0.5 percent per year, it rises to nearly 8 percent per year at the age of 85 years (Mayeux and Sano, 1999; Hebert et al., 1995). Other risk factors for AD appear to be genetic (Lautenschlager et al., 1999). For example, there is an increased risk for AD in individuals with affected relatives. Additionally, women seem to be at increased risk, too (Lautenschlager et al., 1996). Besides these genetic risk factors, there is evidence that environmental factors influence AD expression (Raiha et al., 1996; White et al., 1996).

In Switzerland about 50,000 to 60,000 people are affected by Alzheimer's disease (Volz et al., 2000; Wettstein, 1999b). Because surviving for 8 to 10 years is common, prevalence increases with age. While in the age category 65 to 70 years only 1 to 2 percent suffer from AD, this figure will rise to around 30 percent for people aged 90 years or more (Gutzwiller, 1999; Wettstein, 1999b). The average prevalence rate in Switzerland is about 8.6 percent for people aged 65 years or older (Gutzwiller, 1999). International studies present even higher figures. In a study by Hebert et al. (1995) prevalence increases from 3 percent at the age of 65 years to 47 percent after the age of 85 years.

This dependency on age will lead to an intensification of the problem of dementia and especially Alzheimer's disease in the near future. Increased life expectancy and aging populations will result in an increased incidence of AD. Projections estimate that the number of AD patients will more than double in the next 40 years. For the US, Meek et al. (1998) estimate the prevalence of AD to increase from 4 million affected persons in 1998 to about 9 million in 2040. For Switzerland, Wettstein (1999b) expects the number of demented patients to rise from about 72,000 to about 140,000 during the next 40 years. Table 1-1 summarizes some facts about AD in Switzerland.

Table 1-1: Overview of some facts about AD in Switzerland for the year 2000

Cost of AD per year		
Total cost:	CHF 3.2 billion	
Direct (indirect) costs:	CHF 1.8 billion (1.4 billion)	Direct costs are expenditure (e.g., physician services, hospital care, nursing home care, medications etc), whereas indirect costs represent resources used that do not involve expenditure (e.g., value of lost productivity, unpaid informal care, etc.).
Total cost per patient:	CHF 60,000 (at home) CHF 75,000 (in institution)	The biggest part of these costs is borne by the patient's family; the health insurance reimburses CHF 12,000–15,000 (20 percent) per year.
Numbers of AD patients		
Year 2000:	50,000-60,000	In the next 40 years the number of AD patients is expected to double due to increased life expectancy and aging populations.
Year 2040:	100,000-120,000	
Prevalence rate		
Age 65+:	8.6 percent	The prevalence rate measures the occurrence of AD for different age groups.
Age 65-70:	1-2 percent	
Age 90+:	30-50 percent	
Incidence rate		
Age 65:	0.5 percent	The incidence rate measures newly diagnosed cases for different age groups per year.
Age 85:	8 percent	

To inform the population on AD and to develop guidelines for decision-makers in Switzerland, the 'Alzheimer Forum' was founded in 1998. The Alzheimer Forum is a Swiss association of interest groups involved with AD, e.g., medical experts, pharmaceutical firms, caregivers, people with family members suffering from AD, insurers and health economists. Most of these groups demand that more action be taken. An early detection program of AD is regarded as necessary, rendering existing drugs more effective in slowing the deterioration of AD. In addition, it is criticized that compared with other costly diseases (e.g., AIDS and cancer) less research money is spent on AD. Last but not least, more public help is asked for to improve the situation of informal caregivers.

However, all these claims clash with the pressure to reduce health care costs most industrialized countries are experiencing. New treatments and health programs have to be justified based on an economic evaluation as well. While most economic studies deal with the costs of AD, none to date focus on the benefits of AD intervention programs. In this study we investigate whether claims for more intervention regarding AD can be justified economically. We estimate benefits and costs of three health care intervention programs aiming at releasing the burden of AD patients and/or their caregivers. These three programs are described in section 2. We evaluate these programs by using the contingent valuation (CV) method which is the standard procedure to elicit consumer preferences. However, elicited willingness-to-pay

(WTP) values differ substantially depending on the chosen elicitation technique. Therefore, we discuss in section 3 possible biases caused by the design and execution of a survey and present three elicitation techniques (dichotomous choice, dissonance-minimizing and payment card format) which we apply simultaneously for the three AD programs. The estimation methods used to compute the WTP values for the different programs are shown in section 4. The data base is reported in section 5 where the variables for the estimation are also defined. Section 6 shows the results while the variations of the WTP values are discussed in section 7. In section 8 a cost-benefit analysis for each of the three AD programs is conducted to identify whether a program should be implemented from an economic perspective. The final section concludes with a summary of the results and develops a guideline on how to execute a CV study for health programs.

2 Programs

Alzheimer’s disease (AD) is one of society’s costliest diseases and it puts a heavy strain on patients and their caregivers. The demographic change in industrialized countries is expected to aggravate the situation substantially in the near future. Despite the fact that AD can not be cured until now, there are nevertheless several possibilities to ease the burden for AD patients and/or their caregivers. We elicit the preferences of the Swiss population for three possible health care programs dealing with AD. The first program tries to ease some of the strain on informal caregivers. In a second program we focus on early detection of AD which is required for existing therapies to be effective. In the last program research for curing AD will be intensified. The next three subsections describe these programs in more detail and show how they were presented to the respondents in the questionnaire.

2.1 Program ‘care’ – helping caregivers

Patients suffering from AD need an intensive care due to the loss of independence during the progression of the illness. Informal (unpaid) caregivers provide the bulk of long-term care to people suffering from AD (Fox, 1997; Souêtre et al., 1999). In general these informal caregivers are spouses or other relatives (mostly female) of the patient (Cavallo and Fattore, 1997; Rice et al., 1993). In Switzerland nearly 60 percent of all AD patients receive informal care at their homes (Volz et al., 2000).

The caregiving for demented persons is very time intensive and is often associated with chronic strains affecting physical and psychological health of informal caregivers (Meek et al., 1998). Caregivers of demented patients are more likely to suffer from somatic symptoms covering the spectrum of exhaustion, aching limbs, and heart and stomach complaints than caregivers of elderly people. Caring for demented relatives is therefore a great burden for caregivers and it is often too much for them to cope with (Grässel, 1998; Wilz et al., 1999).

To elicit willingness-to-pay (WTP) for ‘care’, a scenario in which informal caregivers get a training in caring for demented patients is built. Additionally, informal caregivers have the possibility to engage a professional nurse for a few weeks per year for free. The program was described as follows:

> *“As you already know, more than half of the patients suffering from Alzheimer's disease are cared for by their relatives. This care is very time-consuming and caregivers are often at their limits.*
>
> *A possible support program could now be introduced to ease the burden of the caregivers of patients with Alzheimer's disease. During a two-day course*

professional nursing staff will train the informal caregivers. In addition, a professional nurse can be engaged for a few weeks per year allowing informal caregivers to relax and recover during this time. The costs of such a support program are financed by taxes (health insurance premiums, respectively).”

2.2 Program ‘diagnosis’ – detecting AD early

The aim of the program ‘diagnosis’ is to elicit willingness-to-pay (WTP) values for an early detection of Alzheimer's disease. While no current therapy can reverse the progressive cognitive decline caused by AD, several pharmacological and psycho-social treatments exist which may delay the proceeding of the illness (Small et al., 1997; Khachaturian et al., 1998; Bertoli and Stähelin, 1999; Mayeux and Sano, 1999). For these treatments to be effective an early diagnosis of AD is important (Callahan et al., 1995). However, diagnosing AD is a relatively difficult task since there is still no validated test available. Currently, a first diagnostic tool is a screening interview with patients and their relatives, which inquires into personal details, family contact, and health state. Additionally, a brief quantified screen of cognitive function such as the Mini-Mental State Examination (MMSE, cf. Folstein et al., 1975) is generally used. If this first examination results in signs pointing at a possible dementia, a more comprehensive neuropsychological assessment conducted by specialists is needed (O'Connor et al., 1988; Small et al., 1997; Forster, 1999; Inglin, 1999; Ludin, 1999; van Crevel et al., 1999). In general it is difficult to detect dementia at an early stage since the symptoms often are confounded with cognitive changes related to the normal aging process or other causes (e.g. depression). There is evidence that physicians often fail to correctly apply a diagnosis of dementia, making a positive diagnosis when the disease is not present or failing to recognize it when it is (Hoffman, 1982; O'Connor et al., 1988; Callahan et al., 1995; Ross et al., 1997).

To elicit WTP for an early diagnosis of AD we designed a scenario consisting of a routine dementia screening test. Such a routine test is currently not reimbursed by Swiss sick funds. Therefore, respondents were asked if they would be willing to pay a higher health insurance premium if such an early diagnosis program was reimbursed by the health insurers in the future. The program was described as follows:

“A program for an early diagnosis of Alzheimer's disease may look as follows: At the age of 65 years or older, people may have the possibility to take part in a yearly office-based dementia screening test. There they have to answer questions in a routine diagnostic investigation with regard to their cognitive functions like

concentration and memory. If there are signs for Alzheimer's disease a more comprehensive assessment will take place to check if the diagnosis is true.

Such a screen test is able to identify Alzheimer's disease in an early stage in 70 out of 100 cases. For those patients a medical treatment is applied which can delay the progression of the disease for about six months. These medications do not have any side effects. On the other hand, there is also the possibility that Alzheimer's disease is diagnosed even if the patient is healthy. However, this happens in only 20 out of 100 cases."

2.3 Program 'research' – search for a cure of AD

A third program focuses on research into curing Alzheimer's disease. Intensive research all over the world has led to an increasing understanding of the primary factors causing AD (Schenk et al., 1999; Vassar et al., 1999; Näslund et al., 2000). But despite this knowledge, there exists no causal therapy for AD to date (Martin, 1999). Existing therapies mainly focus on delaying the progress of the disease (Bertoli and Stähelin, 1999; Mayeux and Sano, 1999; Wettstein, 1999a).

Our scenario asked respondents for their WTP to intensify research on AD at Swiss universities. The scenario was described as follows:

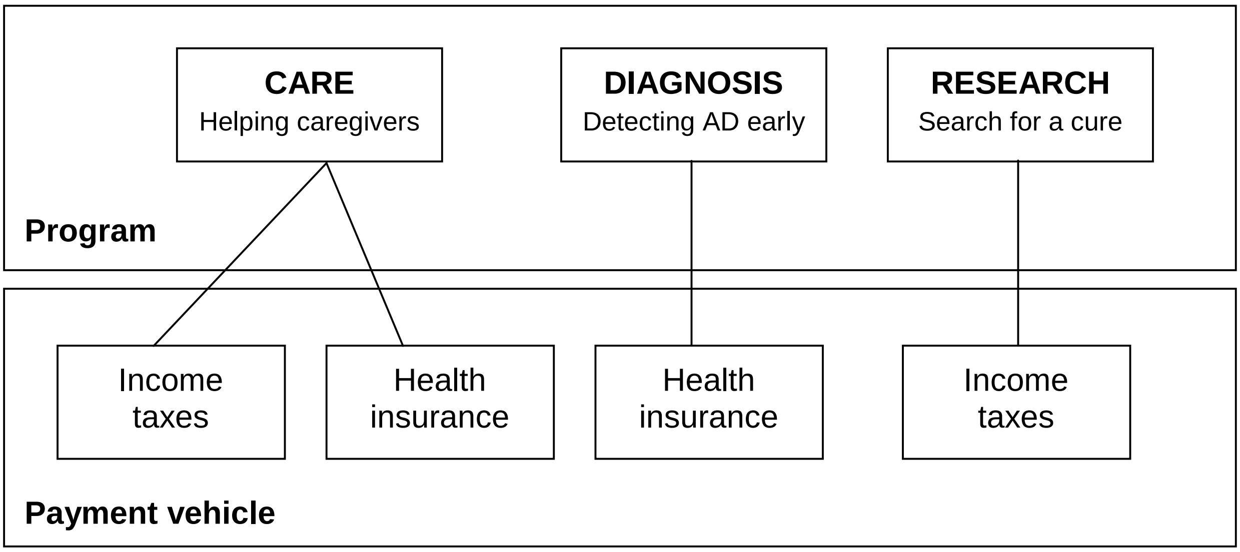
"Up to now Alzheimer's disease cannot be cured because of lack of knowledge about the disease. This hinders the development of a cure in the near future. Intensified research would raise the probability of a future cure of Alzheimer's disease.

Now imagine that the Federal Council and the parliament consider to support university research on Alzheimer's disease with tax money. This financial support would increase the probability of finding a possible cure for Alzheimer's disease in the next twenty years."

2.4 Financing of the programs

None of these programs is implemented in Switzerland yet. So respondents have to decide whether they are willing to pay higher taxes or health insurance premiums to get a certain program implemented. Obviously a research program will be financed with tax money. It is also reasonable to finance the program for early detection of AD by including it among the mandatory benefits of health insurance and thereby raising insurance premiums. For the program 'care', however, income taxes and health insurance premiums seem both to be plausible financing methods which leads us to the decision to elicit preferences separately for a care program financed by taxes as well as by health insurance premiums. Figure 2-1 gives an overview of the three programs and their payment vehicles.

Figure 2-1: Overview of the programs and their payment vehicles



3 Elicitation Methods

Contingent valuation (CV) studies simulate a market for a nonmarketed good. The objective is to elicit the maximum amount a nonpriced good is worth to the respondent by using either continuous or discrete contingent valuation formats. These two approaches (sections 3.1 and 3.2) and their possible biases (section 3.3) will be explained shortly. For further discussion see, e.g., Johannesson (1996) and Mitchell and Carson (1989). The final section presents three elicitation techniques chosen in this study to elicit willingness to pay (WTP) values for the programs ‘care’, ‘diagnosis’ and ‘research’.

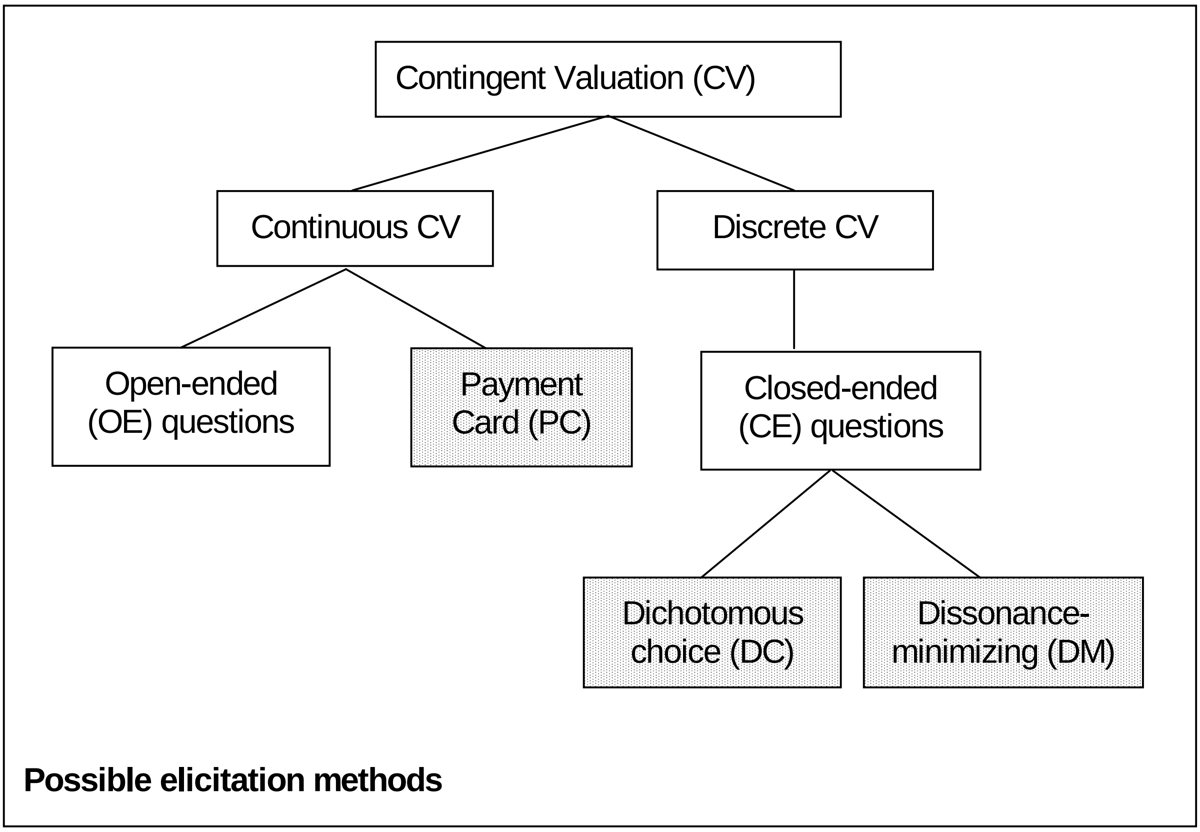
3.1 Continuous contingent valuation format

The two main approaches to elicit WTP values by using a continuous contingent valuation format are open-ended (OE) questions and the payment card (PC) format (see Figure 3-1). In OE questions respondents are simply asked to name their value for a nonmarketed good. However, this task is criticized as being too difficult for respondents and leading to a large number of nonresponses or protest zero responses (Johannesson et al., 1991). Therefore, usually some kind of aid is used to make it easier for the respondent to answer the valuation question. One aid is the PC format which tries to increase the response rate by confronting the respondent with an ordered sequence of bids where she has to choose her maximum WTP. However, the PC format is vulnerable to biases associated with the price ranges used, since the bids which the respondent has to choose from can affect her valuation. The advantage of the continuous contingent valuation format is that maximum WTP can be elicited directly.

3.2 Discrete contingent valuation format

The main approach to elicit WTP values by using a discrete contingent valuation format are closed-ended (CE) questions (see Figure 3-1). In CE questions respondents are only asked whether or not they would pay a single price out of a range of predetermined prices. This approach is most similar to market transactions where people are accustomed to deciding whether or not to buy a good at a specific price. Therefore, it is a very popular elicitation technique for CV surveys. By varying the price in different subsamples the proportion of respondents who are willing to pay the price can be calculated, and by multiplying this proportion by the number of respondents, a demand curve for the good can be estimated. However, CE questions too have drawbacks. Maximum WTP is not elicited directly, but only as a discrete indicator. Therefore, many more responses are required for the same level of statistical precision than for the continuous contingent valuation format. This makes the CE questions a rather inefficient method. In addition, for the calculation of WTP values, assumptions about the valuation function are required. Furthermore, respondents often have only a yes/no response alternative as in the so-called dichotomous choice (DC) method. However, studies imply that this method leads to WTP values which exceed those derived in experimental or real-life markets by far (Champ et al., 1997). One possible explanation for the overestimation of WTP values using the DC method is the presence of yea-saying, i.e. respondents seem to express their support for a program regardless of price. The dissonance-minimizing (DM) format avoids possible yea-saying by allowing respondents to support a program regardless of price.

Figure 3-1: Overview of the elicitation methods



3.3 Biases in contingent valuation studies

The ideal in a CV survey is to get the respondents to make hypothetical choices in the same way they would if faced with an actual decision situation. However, systematic errors can occur in the design as well as in the execution of a CV survey. Therefore, the possibility of biases in CV studies is large. Some of these biases overestimate, others underestimate WTP. Mitchell and Carson (1989) give a good overview of potential biases and of the ways in which they can and should be taken into account in a CV study.

In our AD study we focus on the following potential biases which concern the design of the CV survey as well as the chosen elicitation technique: yea-saying, protest answers, question ordering bias, payment vehicle bias, embedding effect, warm glow effect and information bias.

3.3.1 Yea-saying

Respondents seem to have the tendency to answer with yes when responding to discrete CV questions in order to express their motivations instead of giving their true preferences (Kanninen, 1995; Blamey et al., 1999). Elicitation techniques with only a yes/no response alternative, i.e. the DC format, may provoke yea-saying, since respondents are not allowed to express their support for the program regardless of price. Yea-saying might explain why WTP values elicited using a DC format exceed those using other elicitation formats by far. Therefore, by giving respondents the possibility to express their support for the program regardless of price, yea-saying may be avoided.

3.3.2 Protest answers

Some respondents may answer with no or refuse to answer at all, because they oppose the payment vehicle, i.e. the use of a levy, but not the program itself (Blamey et al., 1999). As in the case of yea-saying, elicitation techniques with only a yes/no response alternative, seem to provoke protest answers. Depending on how these protest answers are treated, substantial differences in estimated WTP can occur. Most studies remove all protest answers from the sample which produces much higher estimates of WTP (Ready et al., 1996). Therefore, by capturing respondents who support the program but oppose the payment vehicle and giving them follow-up questions concerning their WTP for the program, protest answers might be avoided. Another possible source for protest answers could be respondents' ambivalence over trade-offs between money and changes in levels of a good (Ready et al., 1995). If respondents are ambivalent they might answer with 'no' even if they care for the good. Especially the DC format gives respondents no opportunity to express ambivalence and might provoke a higher amount of nonresponses and protest answers. Therefore, by allowing respondents to make less of a commitment, i.e. by giving more than only two possible responses, protest answers might be avoided. In addition, efficiency is increased since a larger usable sample size can be received.

3.3.3 Question ordering bias

If multiple CV questions are asked, the order in which the questions are presented may matter. Boyle et al. (1993) suggest that question ordering may be important when information bias is present and respondents are unfamiliar with the commodity being valued. By changing the order of the questions for a subsample it can be tested for question ordering bias. In our study respondents receive two valuation questions. By changing the question order of these programs for a subsample and comparing the elicited WTP values, question ordering bias can be examined.

3.3.4 Payment vehicle bias

Reluctance against direct questioning is widespread. It is believed that respondents may not take their answers seriously because the questions are of hypothetical character. In addition, respondents may have incentives to behave strategically, which can produce both higher and lower valuations than the true one. If respondents believe that they have to pay less than the amount they state, they have incentives to overbid and vice versa. However, studies show that strategic behavior seems to be a small problem in CV surveys. On the other hand, binary CV questions seem to give respondents incentives to state a true valuation (Johannesson, 1996). Nevertheless, we test for strategic behavior by using two different payment vehicles, income taxes and health insurance premiums for program ‘care’. If respondents behave strategically, assuming we can control for all other biases (i.e. protest answers), estimated WTP may differ, since income taxes could provoke free-riding, resulting in higher stated WTP values.

3.3.5 Embedding effect

Researchers often include several CV questions in a single survey because collecting primary data is expensive. However, possible correlation between the responses can occur, i.e. respondents do not differentiate between the scales of a program (Poe et al., 1997). In our study, the programs ‘diagnosis’ and ‘research’ may be linked, since early detection makes an effective use of a new cure resulting from increased research more likely. To avoid biases resulting from possible correlation of the two programs, we do not combine CV questions of these two programs, but use a split-sample survey.

3.3.6 Warm glow effect

The warm glow effect is a related problem to the embedding effect. Studies show that stated WTP often do not vary with the size of the program. Respondents seem not to express their valuation for a good, but some kind of general approval. In our study, the program ‘diagnosis’ can stop deterioration of Alzheimer's disease (AD) for a period of six months, whereas the program 'research' may increase the chance of finding a cure for AD. Therefore, WTP for the programs 'diagnosis' and 'research' should differ (Kahneman and Knetsch, 1992).

3.3.7 Information bias

Crucial for a CV survey is the information respondents have regarding the hypothetical commodity. Since the commodity being valued is normally a nonmarketed good, respondents may not be very familiar with it. If estimated WTP is insensitive to familiarity with the commodity being valued, then it should not depend whether informed or uninformed respondents value the commodity. However, studies show that responses to risk-income choices differ, whereas responses to risk-risk tradeoffs may be more stable, suggesting that persons who are unfamiliar with a disease cannot give valid and reliable answers to WTP questions (Viscusi et al., 1991; Krupnick and Cropper, 1992). Therefore, we give respondents some information about Alzheimer's disease (AD) and check whether they have or had experiences with AD, before asking the valuation questions. If values between informed and uninformed respondents differ significantly, information bias may be a problem.

Table 3-1: Overview of possible biases in CV studies

Bias	Description	Possible Solution
Yea-saying:	Respondents have a tendency to answer with yes in order to express their motivation for a program instead of giving true preferences. Elicited WTPs are too high.	Allow respondents to express support for a program regardless of price.
Protest answers:	Respondents answer with no or refuse to answer at all because they oppose the payment vehicle or are ambivalent. If protest answers are removed from the sample, higher WTPs may result.	Allow respondents to express support for a program regardless of payment vehicle and to express ambivalence by making less of a commitment.
Question ordering bias:	The order in which WTP questions are presented may matter.	If more than one WTP question is elicited, change order of the questions.
Payment vehicle bias:	Different payment vehicles may cause strategic behavior.	Design WTP question with different payment vehicles.
Embedding effect:	Respondents may not differentiate between the scales of a program.	Use split-sample survey and differ scales of a program. Compare with full sample survey.
Warm glow effect:	WTP may not vary with the size of a program, because respondents do not reveal preferences but general approval.	Differ size of a program.
Information bias:	Respondents may not be familiar with the commodity being valued.	Give respondents information and make scenario as realistic as possible.

3.4 Chosen elicitation techniques

Different elicitation techniques elicit different results, because they vary in their familiarity to respondents and in their potential for biasing WTP values. The researcher faces trade-offs in constructing a hypothetical program which is familiar to the respondents and reducing possible biases. Therefore, choosing the appropriate elicitation technique is crucial since it can influence the absolute magnitude of welfare estimates and finally the outcome of cost-benefit analysis (Boyle et al., 1996 and Ready et al., 1996).

To elicit WTP values for the three programs concerned with problems associated with Alzheimer's disease, three different elicitation techniques are applied: the dichotomous choice (DC) format, the dissonance-minimizing (DM) format and the payment card (PC) format (see Figure 3-1). The DC question is called 'take-it-or-leave-it' or 'referendum'. The referendum format is a dichotomous choice question with the payment vehicle posed as a referendum vote. The DM format is very similar to the DC format, but it tries to avoid yea-saying by allowing respondents to express support for a program without having to commit money (Blamey et al., 1999), whereas the PC format tries to improve efficiency (Welsh and Poe, 1998). In the following discussion these three methods are explained and it is shown how they are applied for the program 'care'.

3.4.1 Dichotomous choice (DC) format

In the DC question each respondent is given only one price out of a range of predetermined prices. Respondents determine whether their WTP is higher or lower than the price offered. To avoid possible yea-saying we give respondents the possibility to show their support for the program regardless of price by asking whether they support the program described at all. In addition, instead of using the usual yes/no response alternative, a third choice (don't know) is given. Respondents who answer their bid question with 'don't know' will be treated as no-responses. This 'trichotomous' choice format might reduce possible nonresponses or protest zero answers as well as yea-saying.

An application of our DC version is shown for the program 'care' which elicits WTP values for an ease of burden of informal caregivers of AD patients. First respondents are asked:

> *"Do you approve of a support program for informal caregivers of AD patients to be funded by an increase in income taxes?"*

Respondents who answer with yes, are then asked the WTP question:

> *"Are you willing to pay CHF … per year for a support program for informal caregivers of AD patients, to be funded by an increase in income taxes?"*

The respondents are randomly divided into seven subsamples in which the price for the program is varied between CHF 25 and 600 (CHF 25, 60, 120, 180, 240, 360, 600; exchange rate October 2000: US$ 1= CHF 1.70).

In the DC question WTP values are not elicited directly. It is only known whether or not respondents are willing to pay the offered price, whereas their maximum WTP might be higher or lower. Therefore, the DC format elicits only a discrete indicator of the maximum amount respondents are willing to pay. In chapter 4 we will discuss different approaches which calculate WTP values for discrete choice surveys.

3.4.2 Dissonance-minimizing (DM) format

In the DM format each respondent again has to value only one price out of a range of predetermined prices, while the prices are the same as in the DC question. But by following Blamey et al. (1999) respondents are given five possible statements which distinguish respondents who support the program from those who oppose it totally. This should reduce possible yea-saying. In addition, the DM format tests for respondents who protest against the payment vehicle but would otherwise support the program.

Again, an application of the DM format is shown for the program ‘care’. Respondents are asked:

“Which of the following five statements most closely resembles your view?”

(1) I support the care program with an increase in income taxes of CHF …

(2) I support the care program and the use of income taxes but it is not worth CHF … to me.

(3) I support the care program and the use of income taxes but I cannot afford CHF …

(4) I support the care program but not if it requires increasing income taxes.

(5) I oppose the care program regardless of whether it costs me anything.

In the calculation of WTP, respondents who choose statement 1 will be treated as yes-responses, whereas those who support the program but are not willing to pay the price offered (statements 2 and 3) will be treated as no-responses, as well as statement 5. To test for possible protest answers against the payment vehicle respondents who choose statement 4 are given three more statements:

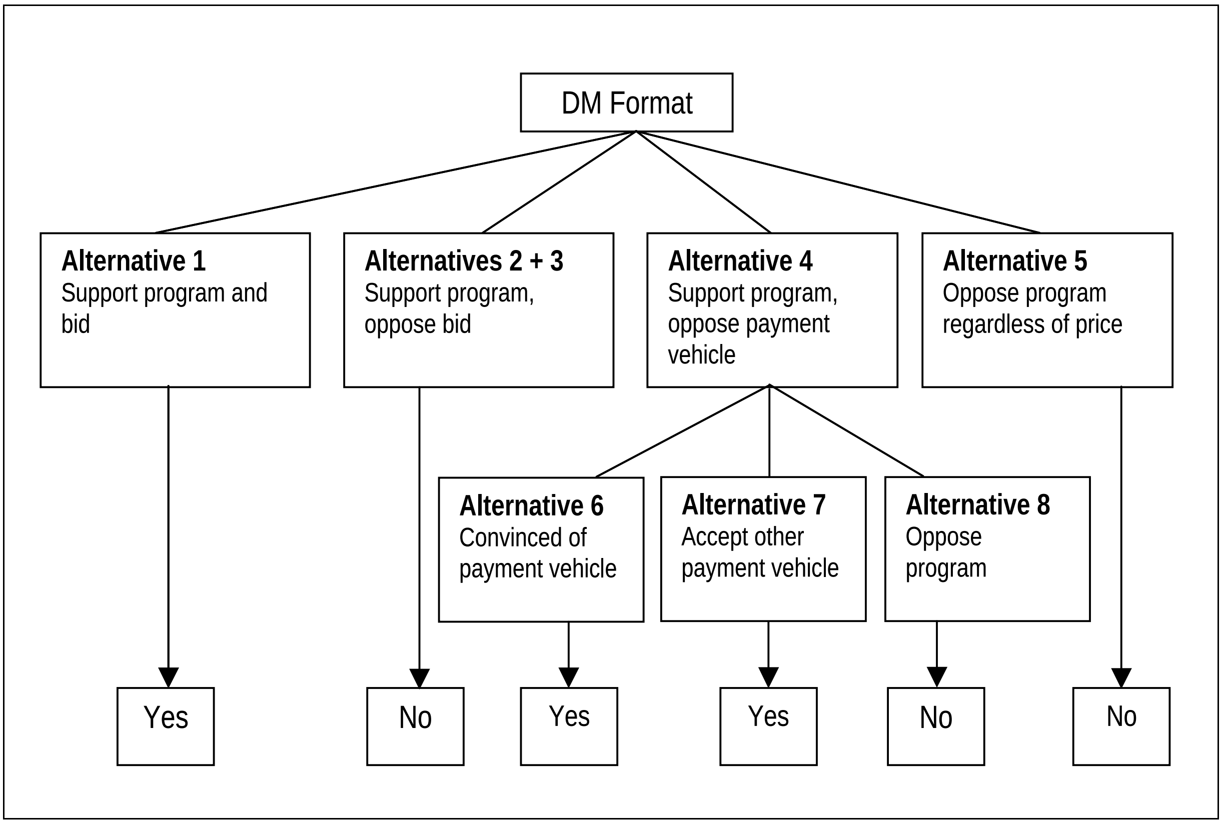
(6) I would pay CHF … for the care program if I could be convinced that the government doesn’t have enough public funds to pay for it.

(7) I would pay CHF … for the care program if an alternative acceptable way of collecting the money could be found.

(8) I cannot afford to pay anything for the care program.

Respondents who choose statements 6 or 7 are treated as yes-responses in the calculation of WTP values, whereas statement 8 belongs to no-responses. Figure 3-2 presents an overview of the DM format.

Figure 3-2: Overview of the DM format



In the DC question we do not test for possible protest answers against the payment vehicle. If protest answers occur the number of no-responses or nonresponses should be significantly higher in the DC than in the DM format. As for the DC format, maximum WTP values are not elicited directly, but must be estimated (see chapter 4).

3.4.3 Payment card (PC) format

In addition to the DC and DM format, the PC format is applied where respondents are confronted with an ordered sequence of bids. But instead of only choosing the maximum amount they are willing to pay as in the traditional PC format, respondents value each price. The bids are the same as in the DC and DM questions, except for an additional bid at the upper tail (e.g. CHF 700 for the program 'care'). In addition, instead of a yes/no response alternative, respondents are allowed to choose between five different responses: yes; rather yes; don't know; rather no; no. This gives respondents the possibility to express a level of voting certainty, since it seems that respondents have a distribution of possible WTP values rather than a single point estimate of the value for a good (Welsh and Poe, 1998). When the price threshold falls at or below the lower end of the respondent's range of WTP values, then the respondent would be very certain to vote yes, whereas at very high amounts the respondent might be very certain to vote no. The respondent's WTP then lies somewhere in between the maximum amount she would vote for and the lowest amount she would not vote for. Furthermore, respondents have the possibility to express ambivalence, since they are allowed to make less of a commitment by saying 'rather yes' or 'rather no' than 'yes' or 'no' for sure. Therefore, possible protest answers may be avoided increasing the usable sample size.

Again, an application of the PC format is shown for the program 'care'. As in our DC version, respondents are first asked whether they support the program at all:

> *"Do you approve of a support program for informal caregivers of AD patients to be funded by an increase in income taxes?"*

Respondents who answer with yes are then asked:

> *"Would you vote for this program if it would cost you these amounts in CHF per year, to be funded by an increase in income taxes?*
> *(Please circle one answer for each amount to show how you would vote!)"*

Increase in income taxes					
CHF 25	Yes	Rather Yes	Don't Know	Rather No	No
CHF 60	Yes	Rather Yes	Don't Know	Rather No	No
CHF 120	Yes	Rather Yes	Don't Know	Rather No	No
CHF 180	Yes	Rather Yes	Don't Know	Rather No	No
CHF 240	Yes	Rather Yes	Don't Know	Rather No	No
CHF 360	Yes	Rather Yes	Don't Know	Rather No	No
CHF 600	Yes	Rather Yes	Don't Know	Rather No	No
CHF 700	Yes	Rather Yes	Don't Know	Rather No	No

Since the PC format elicits respondent's maximum WTP in form of intervals rather than point estimates, it requires the estimation of WTP values, too. However, contrary to the DC and DM format it is more efficient, since it provides more statistical information per observation. In addition, it avoids many problems associated with assuming a mathematical formulation of the valuation function (see chapter 4).

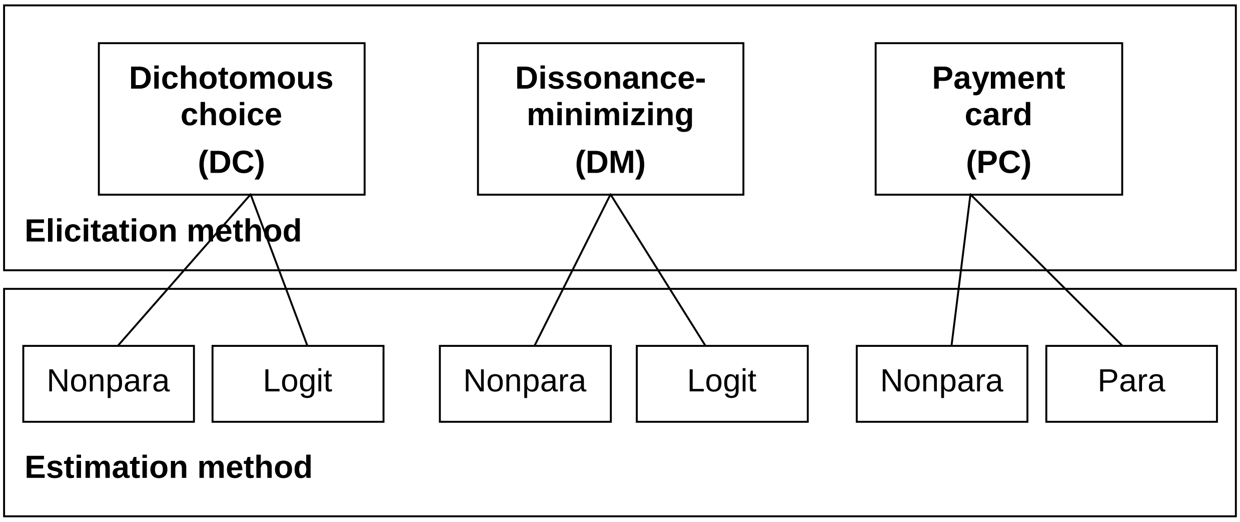
4 Estimation Methods

This chapter focuses on the estimation methods we are using for the three elicitation techniques. Whereas the payment card (PC) method elicits maximum willingness to pay (WTP) more or less directly, discrete CV surveys like the dichotomous choice (DC) and the dissonance-minimizing (DM) format only obtain a discrete indicator instead of a direct measure of maximum WTP.

Therefore, in order to obtain WTP values for discrete CV surveys, a statistical model has to be introduced that links the CV responses to the price (bid) which respondents faced in the survey. This can be done either by using regression analysis or nonparametric methods (see e.g., Mitchell and Carson, 1989; Johannesson, 1996). In regression analysis, the discrete answer (yes or no) to the CV question is the dependent variable, while the bid together with other variables of interest are used as explanatory variables. The most common approach is logistic regression (Bishop and Heberlein, 1979; Hanemann, 1984). Another approach is to obtain WTP values directly from the parameters of a probit equation (Cameron and James, 1987). Since the probit regression assumes normally distributed WTP values which seem more likely to be distributed log-normally, the probit regression is not very often used. However, for all these methods WTP values depend crucially on the assumptions made on the functional relationship between the bid and the probability of accepting the bid. In nonparametric analysis this problem is avoided, since mean WTP is estimated by simply using the proportion of yes answers at each of the different bid levels (Kriström, 1990). In section 4.1 we discuss how we estimate WTP values for the discrete CV format.

For the PC format, where we elicited WTP values in form of intervals rather than point estimates, we apply nonparametric as well as parametric approaches (see section 4.2). In the nonparametric approach, average WTP values are estimated by simply setting individual WTP values at the interval midpoints, whereas in a simplistic parametric approach these midpoints are used as the dependent variable in a maximum likelihood (ML) regression. However, setting the WTP values at interval midpoints may bias results. Therefore, a maximum bounded likelihood model is applied where the dependent variable is measured on intervals of a continuous scale (Cameron and Huppert, 1989; Welsh and Poe, 1998). Figure 4-1 summarizes the elicitation and estimation methods we have chosen in our survey.

Figure 4-1: Overview of the elicitation and estimation methods



4.1 Estimation methods for the discrete CV (DC and DM)

4.1.1 Logistic regression analysis

The simplest and most commonly used regression analysis is to fit a logistic regression curve to the percentage of respondents willing to pay each of the randomly assigned prices (Bishop and Heberlein, 1979). A respondent will accept the offered price *T*, if WTP ≥ *T*. WTP is assumed to be a random variable. The probability of accepting the bid (= probability of yes) is:

$$\Pr(yes) = \Pr(WTP \geq T) = 1 - G_{WTP}(T), \qquad (4\text{-}1)$$

where $G_{WTP}(T)$ is the cumulative distribution function of the random WTP variable. By assuming a distribution for WTP, the valuation function can be estimated. Bishop and Heberlein (1979) simply regress the logarithm on the odds that the respondent will accept *T* on the logarithm of *T*. Instead of only using the bid, income and other variables of interest are often used as additional explanatory variables (Johansson, 1987).

Hanemann (1984) reconsiders the Bishop and Heberlein approach and integrates the discrete choice question into economic theory by using the random utility maximization model. According to Hanemann's utility difference model, individuals are assumed to have utility functions including income *y* and other individual characteristics *s* which may influence preferences. In addition, we assume that the individual derives utility from the introduction of an AD program aiming at improving the health states of AD patients and/or their informal caregivers. Therefore, the variable *h* is introduced, where h^1 stands for the situation where the proposed AD program is introduced, whereas h^0 represents the status quo. We assume h^1 is preferred to h^0.

While the individual knows its utility function completely, some components are unobservable to the researcher and therefore utility is treated as a random variable. These unobservable components generate the stochastic structure of the model. The utility function is then given by:

$$u(h, y; s) = v(h, y; s) + \varepsilon, \tag{4-2}$$

where utility is treated as a random variable with a parametric probability distribution with mean $v(h, y; s)$ and a stochastic component ε which is independently and identically distributed with zero mean.

A respondent will agree to pay higher income taxes or higher insurance premiums T for the realization of the AD program, if the difference in utility from paying the price T and being in situation h^1 (realization of AD program) is non-negative:

$$v(h^1, y - T; s) + \varepsilon_1 \geq v(h^0, y; s) + \varepsilon_0 . \tag{4-3}$$

Since for the researcher the response is a random variable, the probability of a yes answer is defined as:

$$\Pr(yes) = \Pr\{v(h^1, y - T; s) + \varepsilon_1 \geq v(h^0, y; s) + \varepsilon_0\}. \tag{4-4}$$

Defining $\Delta v = v(h^1, y - T; s) - v(h^0, y; s)$ and $\eta = \varepsilon_0 - \varepsilon_1$ with $F\eta(.)$ denoting the cumulative distribution function of η, the probability of acceptance can be defined as:

$$\Pr(yes) = F\eta(\Delta v). \tag{4-5}$$

For calculation of expected WTP, assumptions about the distribution of the random variable η and the functional form of the difference in indirect utility Δv are necessary. Assuming a logistic distribution of the random variable η and a linear indirect utility function v in income y, the probability of a yes answer can be written as:

$$\Pr(yes) = F\eta(\Delta v) = (1 + e^{-\Delta v})^{-1} = (1 + e^{-\alpha + \beta T})^{-1}, \tag{4-6}$$

where $\Delta v = v_1 - v_0 = \alpha_1 + \beta(y - T) - \alpha_0 - \beta y = \alpha - \beta T$, $\alpha = \alpha_1 - \alpha_0$ is a constant and β the marginal utility of income. For simplicity the household characteristics s are omitted. With increasing price T the utility difference and therefore the probability of a yes answer decrease. By comparing equation (4-6) with equation (4-1) it can be seen that the fitting of the discrete response model can be interpreted as estimating the parameters of the distribution function $G_{WTP}(T)$ itself. Therefore, the probability of acceptance can be written in two equivalent ways:

$$\Pr(yes) = F\eta(\Delta v(T)) = 1 - G_{WTP}(T), \tag{4-7}$$

and it makes no difference whether we assume a distribution for η or whether we assume a distribution for WTP directly.

Note that in the linear specification of the utility function of equation (4-6), income effects do not appear. Therefore, often a logarithmic specification of the utility difference model is used where income is included, though Hanemann (1984) showed that a logarithmic specification is not strictly compatible with the utility difference model. However, empirical studies show that a logarithmic specification outperforms the linear logit model derived from the utility difference model (Park et al., 1991). A possible specification where income effects occur and which is compatible with the utility difference model is:

$$v(h, y; s) = \alpha_j + \beta \ln y, \tag{4-8}$$

with j = 0,1. The difference in indirect utility is then:

$$\Delta v = \alpha + \beta \ln(y - T) - \beta \ln y = \alpha + \beta \ln\left(1 - \frac{T}{y}\right) \approx \alpha - \beta \frac{T}{y}, \tag{4-9}$$

with $\alpha = \alpha_1 - \alpha_0$ (Hanemann, 1984). The two models represented by equations (4-6) and (4-9) are special versions of the following Box-Cox utility function:

$$v(h, y, s) = \alpha_j + \beta\left[\frac{y^\lambda - 1}{\lambda}\right], \tag{4-10}$$

with λ = 1 for the linear and λ = 0 for the nonlinear model (Hanemann and Kanninen, 1996). By setting λ between 0 and 1, other specifications are possible where income effects do occur.

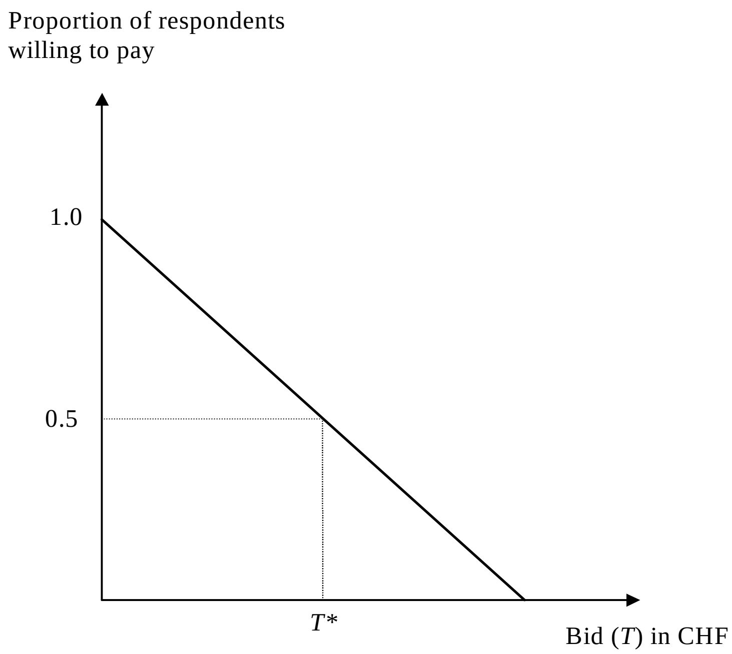
Once the statistical models have been estimated, the question arises how one might derive useful measures of WTP. Two welfare measures are common, mean and median WTP. The mean WTP is the area below the valuation or survival function which is shown in Figure 4-2. For the linear utility model of the DC and DM format, mean WTP is given by integrating the logistic function from zero to infinity:

$$E(WTP) = \int_0^\infty F\eta(\Delta v(T))\,dT = \int_0^\infty (1 - G_{WTP}(T))\,dT = -(1/\beta)\ln(1 + e^\alpha). \tag{4-11}$$

It is assumed that WTP can take only non-negative values which seems appropriate in the case of Alzheimer’s disease.

Rather than integrating out to infinity, the upper limit of integration is often set at the highest bid amount used in the survey (Park et al., 1991). However, the mean is very sensitive towards assumptions about the highest bid, i.e. about the truncation of the upper limit of integration. If some respondents answer yes to the highest bid in the study, then assumptions about the maximum WTP have to be made. The larger the number of individuals who answer yes to the highest bid, the greater the uncertainty about the maximum amount of WTP. Therefore, it is extremely important to obtain information about the whole distribution of WTP (see section 7.5). This is usually done by carrying out a pilot study.

Figure 4-2: Valuation function



The median T^* is the value of WTP where the probability of acceptance is 0.5, i.e. 50 percent of the respondents accept the AD program and are willing to pay T^* (situation h^1), whereas the other 50 percent oppose to pay T^* and accept the status quo h^0 (see Figure 4-2).

For the utility difference model the median WTP is given by:

$$\Pr\left(v\left(h^1, y - T^*; s\right) + \varepsilon_1 \geq v\left(h^0, y; s\right) + \varepsilon_0\right) = 0.5, \tag{4-12}$$

which for the logistic function of the linear utility model can be rewritten as:

$$\ln\left[\Pr/\left(1 - \Pr\right)\right] = \alpha - \beta T^*, \tag{4-13}$$

and by setting Pr = 0.5 the median WTP can be calculated as:

$$\text{median WTP} = T^* = \alpha / \beta. \tag{4-14}$$

Both welfare measures have advantages and disadvantages and it is not clear which one is more appropriate to use in aggregating discrete CV results. The mean is very sensitive to assumptions about the distribution, to skewness and to outliers in the data whereas the median is more robust. However, since WTP values are usually skewed, the median seems not to be able to reflect the distribution of WTP values properly. Therefore, CV studies usually report both welfare measures. We will go into further discussion about which welfare measure to choose in section 7.1.

4.1.2 Nonparametric method

The nonparametric method needs no distribution assumptions and is therefore robust against distribution misspecification. In addition, it is extremely simple to compute. The proportion of yes answers at each bid level is calculated. If the proportion of yes answers increases at any bid level, the mean of the proportion of yes answers at two or more bid levels are estimated until a non-increasing proportion of yes answers is obtained.

This procedure is explained briefly by following Kriström (1990). For each subsample i ($i = 1, 2, \ldots, m$) k_i people can be observed accepting the price T_i and one can compute the proportions $\hat{\pi}_i = k_i / n_i$, where n_i is the number of individuals of the subsample i. This computed sequence of proportions $\hat{\pi} = (\hat{\pi}_1, \hat{\pi}_2, ..., \hat{\pi}_m)$, where $\hat{\pi}_1$ corresponds to the lowest bid T_1 should be a monotone nonincreasing sequence. If the sequence is not monotonic, i.e. $\hat{\pi}_i < \hat{\pi}_{i+1}$, then the proportions $\hat{\pi}_i$ and $\hat{\pi}_{i+1}$ are replaced by $(k_i + k_{i+1})/(n_i + n_{i+1})$. This procedure is repeated until the sequence is monotonic. The two proportions $\hat{\pi}_i$ and $\hat{\pi}_{i+1}$ become identical. Finally, by selecting an interpolation rule (e.g. linear interpolation) between the m estimates of the probability of yes, one obtains the valuation function or the so-called empirical survival function and welfare measures can be derived (see Figure 4-2). Again, mean WTP is given by the area below the valuation function, whereas median WTP is the value where the probability of acceptance is 0.5.

4.2 Estimation methods for payment card (PC)

In the PC format, respondents are confronted with an ordered sequence of bids where they choose the maximum amount they are willing to pay. Contrary to the DC and DM format, maximum WTP is elicited directly. Following Welsh and Poe (1998) we expand the applied PC format beyond the traditional PC format by letting respondents value each price and allowing them to express uncertainty. Therefore, additional thresholds and likelihood of voting yes are included and WTP responses are elicited in form of intervals instead of point valuations. T_L is defined as the maximum amount that the respondent would vote for and T_U to be the lowest amount that she would switch (i.e. rather yes). WTP then lies somewhere in the switching interval [T_L, T_U] where individual WTP values are estimated by using nonparametric as well as parametric models (Cameron and Huppert, 1989). In the simplistic nonparametric approach, average WTP values are estimated by simply determining individual

WTP values by the interval midpoints between T_L and T_U. For example, a respondent saying yes to the amount of CHF 60 and switching to rather yes for the next bid of CHF 120 is given a WTP of CHF 90.

In the parametric model, where a functional relationship between the WTP values and the characteristics of respondents or the public good are estimated, two different approaches are applied. First, the interval midpoints are used as the dependent variable in a maximum likelihood (ML) regression. Since the distribution of WTP values is often skewed, the lognormal distribution is chosen as:

$$\ln WTP = x'\beta + u\,, \tag{4-15}$$

where x are the characteristics of a respondent or the public good and u is normally distributed with zero mean and standard deviation σ.

However, by setting the expected WTP values equal to the interval midpoints, biased WTP values may result. Therefore, the second approach uses a multiple bounded likelihood model where WTP becomes a random variable as in the DC and DM format (Welsh and Poe, 1998). The probability that a respondent will vote yes, is:

$$\Pr(yes) = \Pr(WTP \geq T_L) = 1 - G_{WTP}(T_L)\,, \tag{4-16}$$

which is the same as equation (4-1). The probability that WTP falls between any two price thresholds is $G_{WTP}(T_U) - G_{WTP}(T_L)$, resulting in the corresponding log-likelihood function for all n respondents:

$$\ln(L) = \sum_{i=1}^{n} \ln\left[G_{WTP}(T_{Ui}) - G_{WTP}(T_{Li})\right]. \tag{4-17}$$

By using the estimated values of β and σ the fitted values of lnWTP (according to equation (4-15)) and the welfare measures can be calculated.

5 Data

In this section we present how the survey was conducted. In section 5.1 we describe how the sample is structured and how the data was gathered. Section 5.2 then shows the definition of the variables, their expected influence on willingness-to-pay (WTP), and their descriptive statistics.

5.1 Sample structure and data collection

At the end of 1999 two pretests were conducted. The first pretest ascertained in 16 interviews that the respondents did understand the questions asked. About 50 people were interviewed in the second pretest which focused on the range of the bids used in the WTP questions. For this reason the dichotomous choice questions were followed by an open-ended question to check for respondents' maximum willingness-to-pay. While the respondents had no problems in understanding the questionnaire, it turned out that the bids initially used were generally too high. For this reason the range of the bids was reduced in the final questionnaire.

In February and March 2000, 1,240 personal interviews with individuals aged 18 and older were conducted via telephone. The sample was randomly chosen from the population of the German part of Switzerland. It is representative for this population with regard to age and sex. Besides questions regarding WTP for the three programs, the questionnaire also covered information and familiarity with Alzheimer's disease and general socioeconomic characteristics.

The whole sample was divided into two main samples. While both main samples include WTP questions about the program 'care', they differ with respect to the second program evaluated. Questionnaire 1 elicits the WTP for the two programs 'diagnosis' and 'care', whereas questionnaire 2 investigates the programs 'research' and 'care'. This separation of the programs 'diagnosis' and 'research' was undertaken to avoid bias resulting from a potential embedding effect (Poe et al., 1997). Furthermore this partition allows us to test for the existence of a possible warm glow effect (see section 7.6).

Both main samples are again subdivided into three splitsamples according to the following elicitation techniques: dichotomous choice (DC), dissonance minimizing (DM), and payment card (PC). In the DC and DM method, respondents are confronted with only one single bid and therefore a further subdivision of the samples is necessary. In this case we used seven different bids which resulted in 28 subsamples for the DC and DM method (2*2*7). In the payment card (PC) method a respondent has to value all bids and therefore there was no need to subdivide these samples further. However, the PC sample of questionnaire 1 was split to test for question ordering bias, leaving three subsamples for the PC method. The whole sample therefore consists of 31 splitsamples, each containing 40 individuals. The sample structure is shown in Table 5-1.

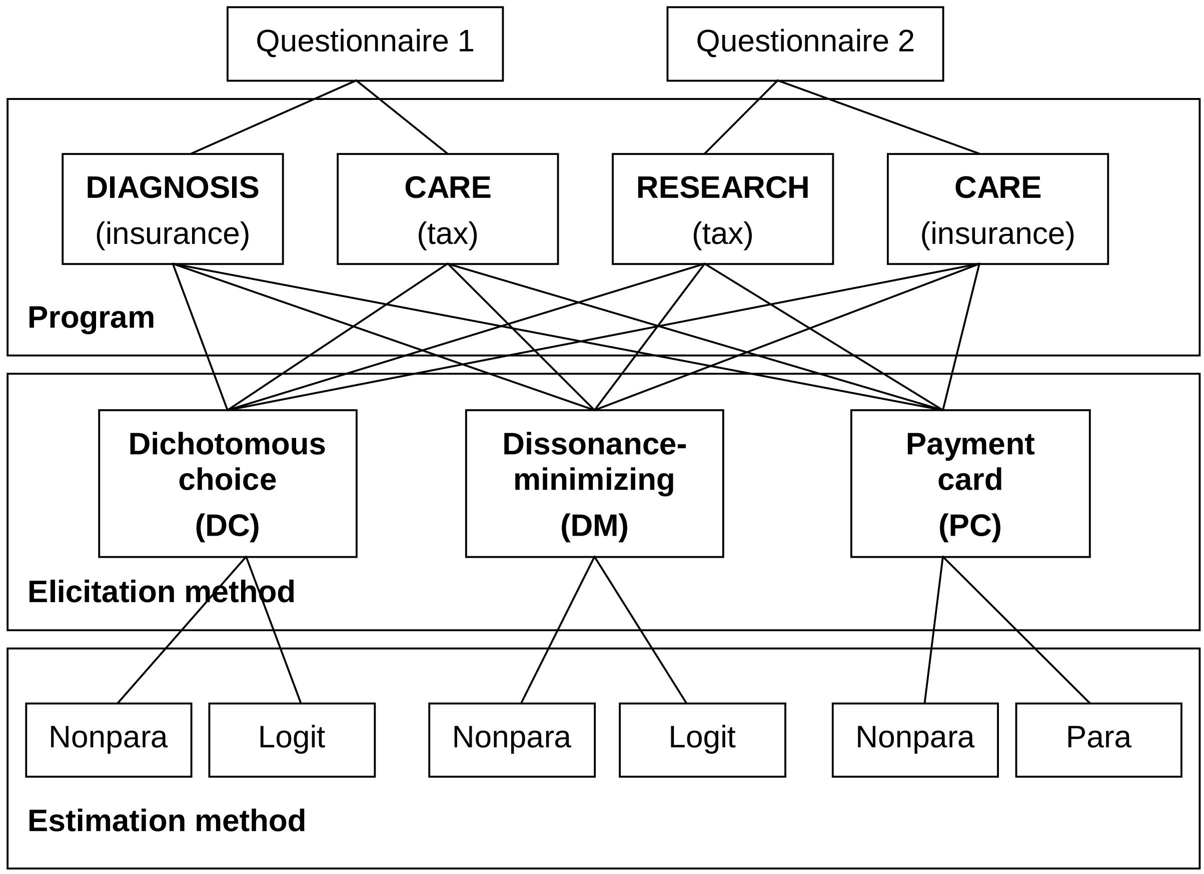
Table 5-1: Sample structure of the questionnaire

	Questionnaire 1				Questionnaire 2		
Programs	'diagnosis' (1) and 'care' (3a)[a]				'research' (2) and 'care' (3b)[a]		
Elicitation method	DC	DM	PC		DC	DM	PC
Question order	(1) (3a)	(1) (3a)	(1) (3a)	(3a) (1)	(2) (3b)	(2) (3b)	(2) (3b)
Subsamples	7	7	1	1	7	7	1
Number of individuals	280	280	40	40	280	280	40
Total Subsamples	16				15		
Total Individuals	640				600		

[a] (3a): program financed with taxes; (3b): program financed with insurance premiums.

We conclude this section with Figure 5-1 which presents the full survey design. It shows the connection of the sample structure, the three programs (see section 2), the elicitation techniques (see section 3), and the estimation methods (see section 4).

Figure 5-1: Survey design



5.2 Descriptive statistics

Table 5-2 shows the definitions of the variables which will be used in our econometric estimations (see section 6). There are two dependent variables (*YES_TO_BID* and *WTP*) which are defined as binary variables or in discrete intervals according to the elicitation method used. Most of the explanatory variables are defined as dummy variables except the bid presented to the respondent and the variables for age and income which are defined using discrete intervals. Also shown in Table 5-2 are the expected signs in the econometric estimations, i.e. the expected influence an explanatory variable will have on WTP or the probability of saying yes to a presented bid. We expect that *BID* itself will have a negative impact on the probability of saying yes, i.e. the higher the offered bid the less likely respondents will accept it. Looking at the socioeconomic variables the direction is not always clear and the influence may also be of different strength for the three programs. *AGE* should have a positive connection with the dependent variable since the risk of getting AD rises with age. Therefore the presented programs should ceteris paribus be more important for older people. The same should hold for women. Generally, women are at a higher risk of getting AD than men. Furthermore, most informal caregivers are women. That is why we expect *WOMAN* to have a positive impact on the dependent variables. We also assume a positive relationship for the variables *INFO* and *RELATIVE* since both of them show the familiarity of the respondent with AD. The four variables *ALONE, CHILD*, *SIBLINGS*, and *PARENT* show the family background of the respondents. While the expected signs for *ALONE* and *CHILD* are not clear we think that having sisters and/or brothers negatively affects the valuation of the programs since there are more possible caregivers within the family. Contrarily, we assume *PARENT* to have a positive sign because if the parents are still alive they are at risk of getting AD in the near future. The influence of living in a big city (*PLACE*) on the dependent variable is unclear while education may have a positive effect (*EDU_LOW* and *EDU_HIGH*). This could be the case if well educated respondents are aware of their higher life expectancy. The income variables (*INCOME* and *LN_INCOME*) should obviously have a positive sign since higher income groups also have a higher ability to pay. *CURABLE*, finally, is only used in the program ‘research’ and is expected to have a positive influence on the dependent variable because respondents believing in the eventual success of AD research are assumed to have a higher valuation for the research program.

Table 5-2: Definition of variables and expected signs

Variable	Description	Type	Expected sign
YES_TO_BID	Has respondent accepted the offered bid? 1 = yes, 0 = no. Dependent variable in the parametric DC and DM models.	Dummy	
WTP	Stated willingness-to-pay (WTP). Dependent variable in the parametric PC model.	Discrete	
BID	Bid offered in the DC and DM model. CHF per month for the diagnosis and the care with insurance program. CHF per year for the care with taxes and the research program.	Discrete	-
AGE	Respondent's age. Measured in years.	Discrete	+
WOMAN	Respondent's sex: 1 = woman, 0 = man.	Dummy	+
INFO	Is respondent informed about Alzheimer's disease (AD) or related diseases? 1 = yes, 0 = no. Respondents were asked different questions about AD and related diseases to capture their degree of information.	Dummy	+
RELATIVE	Does respondent have a near relative (parents, grandparents, sisters or brothers) affected by AD? 1 = yes, 0 = no.	Dummy	+
CHILD	Does respondent have children? 1 = yes, 0 = no.	Dummy	+/-
ALONE	Does respondent live alone? 1 = yes, 0 = no.	Dummy	+/-
SIBLINGS	Does respondent have sisters or brothers? 1 = yes, 0 = no.	Dummy	-
PARENT	Are respondent's parents alive? 1 = yes, at least one; 0 = none.	Dummy	+
PLACE	Does respondent live in a large village/city? 1 = yes, 0 = no.	Dummy	+/-
EDU_LOW	Respondent's education: 1 = only mandatory school, 0 = else.	Dummy	-
EDU_HIGH	Respondent's education: 1 = at least college education, 0 =else.	Dummy	+
INCOME	Income per household member (in CHF 1000 per month).	Discrete	+
LN_INCOME	Natural logarithm of *INCOME*.	Continuous	+
CURABLE	Does respondent think that AD will be curable within 20 years? 1 = yes, 0 = no. Only used in the research program.	Dummy	+

In Table 5-3 descriptive statistics with regard to the socioeconomic characteristics are reported (for possible correlations between the variables, see Table 10-1 in the appendix). Since the sample is representative with respect to age and sex, the means for *AGE* and *WOMAN* display nearly the corresponding values for the Swiss population in general. The variable *INFO* shows that knowledge about Alzheimer's disease is widespread. Nearly a third of all respondents are very well informed about the disease, whereas only 17 percent have made direct experiences with AD having (or having had) a close relative suffering from AD (*RELATIVE*).

Table 5-3: Descriptive statistics of the full sample

Variable	Average	Median	Std. Deviation	Minimum	Maximum	Observations
AGE	47.12	44.00	16.55	18.00	96.00	*N* = 1180
WOMAN	0.50	1.00	0.50	0.00	1.00	*N* = 1180
INFO	0.30	0.00	0.46	0.00	1.00	*N* = 1180
RELATIVE	0.17	0.00	0.38	0.00	1.00	*N* = 1180
CHILD	0.67	1.00	0.47	0.00	1.00	*N* = 1175
ALONE	0.20	0.00	0.40	0.00	1.00	*N* = 1174
SIBLINGS	0.91	1.00	0.28	0.00	1.00	*N* = 1174
PARENT	0.69	1.00	0.46	0.00	1.00	*N* = 1174
PLACE	0.37	0.00	0.48	0.00	1.00	*N* = 1159
EDU_LOW	0.13	0.00	0.33	0.00	1.00	*N* = 1174
EDU_HIGH	0.21	0.00	0.40	0.00	1.00	*N* = 1174
INCOME (1,000 CHF)	2.968	2.500	1.741	0.250	13.000	*N* = 787
LN_INCOME	0.92	0.92	0.59	-1.39	2.56	*N* = 787

The variables *CHILD*, *ALONE*, *SIBLINGS*, and *PARENT* give some insight on the family background of the respondents. About two thirds have children of their own and almost the same percentage has parents who are still alive. 90 percent indicate that they have at least one brother or sister and only one fifth lives alone.

With respect to the remaining socioeconomic variables one can see that about one third lives in big cities (*PLACE*) and that there are minorities who are well educated (20 percent, see *EDU_HIGH*) or have a low education level (13 percent, see *EDU_LOW*), respectively. Regarding *INCOME*, it should be noted that with a monthly income of about CHF 3,000, the sampled individuals are below the average for the Swiss population which is about CHF 3,900 per month and person (Bundesamt für Statistik, 2000). Since only about two thirds of all respondents gave information about their income, a selection effect is likely to cause this deviation.

6 Results

In this chapter we present the results for the three programs. We calculate several WTPs for every program due to the different elicitation (DC, DM, and PC) and estimation methods (parametric and nonparametric) used. In section 6.1 we present the detailed results of the tax financed care program. The summarized results of the diagnosis and the research program are shown in sections 6.2 and 6.3.

6.1 Program 'care' with taxes

The following results refer to the tax financed care program. A comparison with an insurance financed care program follows in section 7.4, where we focus on the effect of the payment vehicle on WTP.

6.1.1 Data

We construct three subsamples for both the DC and the DM elicitation techniques (see Figure 6-1). All observations with respondents answering the bid question are considered in subsample DC1 (DM1). DC2 (DM2) covers respondents for which, in addition to the bid question, full information about socioeconomic characteristics (without income) are available. Finally, in DC3 (DM3) all respondents giving additional information about their household income are included. The number of valid observations varies between 280 and 185 for the DC and between 270 and 161 observations for the DM format. Since many respondents refused to declare their income, the DC3 (DM3) subsample is the smallest. 40 observations were gathered for the PC format.

Figure 6-1: Care with taxes - subsamples of the DC and the DM elicitation format

DC (DM)	280 (280) interviews
DC1 (DM1)	280 (270) valid to bid question
DC2 (DM2)	274 (261) with socioeconomic information
DC3 (DM3)	185 (161) with income information

Table 6-1 presents descriptive statistics of the samples collected with the three elicitation techniques (DC, DM and PC). To test whether the subsamples differ, we applied an independent-samples t-test. When looking within an elicitation technique (DC or DM) the means of the variables do not differ. However, there are some differences between the three elicitation techniques. Compared to the DC format, a smaller fraction of the DM respondents did accept the bid. Possible explanations for this difference will be discussed in section 7.2.

Furthermore, the means of some other variables (*INFO*, *PARENT*, *ALONE*, and *EDU_HIGH*) differ slightly. Overall, there are only small variations in the variables and no signs can be found of possible selection effects.

Table 6-1: Care with taxes - means of the variables (standard deviation)[a]

Elicitation technique		DC			DM		PC
Subsample	DC1	DC2	DC3	DM1	DM2	DM3	PC
YES_TO_BID	0.536	0.540	0.546	0.441	0.448	0.441	-
	(0.500)	(0.499)	(0.499)	(0.497)	(0.498)	(0.498)	-
BID	201.618	200.905	206.664	225.296	224.464	234.813	-
	(188.774)	(188.488)	(186.275)	(184.723)	(183.828)	(185.181)	-
AGE	46.525	46.610	45.919	47.089	47.088	47.398	49.200
	(16.101)	(16.169)	(16.528)	(16.681)	(16.645)	(16.128)	(20.654)
WOMAN	0.518	0.522	0.535	0.544	0.536	0.503	0.500
	(0.501)	(0.500)	(0.500)	(0.499)	(0.500)	(0.502)	(0.506)
INFO	0.293	0.296	0.308	0.330	0.333	0.391	0.250
	(0.456)	(0.457)	(0.463)	(0.471)	(0.472)	(0.490)	(0.439)
RELATIVE	0.186	0.183	0.205	0.159	0.161	0.174	0.175
	(0.390)	(0.387)	(0.405)	(0.367)	(0.368)	(0.380)	(0.385)
CHILD	0.627	0.631	0.632	0.665	0.663	0.671	0.539
	(0.484)	(0.483)	(0.484)	(0.473)	(0.474)	(0.471)	(0.505)
ALONE	0.184	0.179	0.189	0.219	0.222	0.236	0.410
	(0.388)	(0.384)	(0.393)	(0.415)	(0.417)	(0.426)	(0.498)
SIBLINGS	0.918	0.920	0.930	0.907	0.904	0.907	0.949
	(0.276)	(0.272)	(0.256)	(0.290)	(0.295)	(0.292)	(0.224)
PARENT	0.721	0.715	0.735	0.652	0.655	0.665	0.615
	(0.449)	(0.452)	(0.443)	(0.477)	(0.476)	(0.474)	(0.493)
PLACE	0.390	0.394	0.378	0.407	0.410	0.453	0.368
	(0.489)	(0.490)	(0.486)	(0.492)	(0.493)	(0.499)	(0.490)
EDU_LOW	0.104	0.102	0.108	0.122	0.115	0.093	0.128
	(0.305)	(0.304)	(0.311)	(0.328)	(0.320)	(0.292)	(0.339)
EDU_HIGH	0.225	0.230	0.232	0.248	0.257	0.298	0.128
	(0.418)	(0.422)	(0.424)	(0.433)	(0.438)	(0.459)	(0.339)
INCOME	-	-	2.947	-	-	3.114	-
	-	-	(1.831)	-	-	(1.775)	-
LN_INCOME	-	-	0.870	-	-	0.990	-
	-	-	(0.708)	-	-	(0.557)	-
N	280	274	185	270	261	161	40

[a] Means are calculated with the available number of observations.

6.1.2 Dichotomous choice (DC) format

Before the bid question is posed, respondents are asked whether they support the care program at all. Only those supporting the program are then asked the bid question. Therefore two variants are calculated differing in how no-respondents to the preceding question are treated: variant ‘with no’ and variant ‘only yes’.

In the variant ‘with no’ we suppose that no-respondents to the preceding question would have answered with no to their bid question, too. The advantage of this method is that all interviews can be considered in the statistical analysis. However, no-respondents actually did not answer the bid question. The estimation results of the logistic DC model are shown in Table 6-2. All independent variables except *BID* are measured as deviations from their mean. In the first equation E_1, where *BID* serves as the only explanatory variable, both *BID* and *INTERCEPT* are highly significant and of expected signs. Mean WTP (calculated for a maximum bid of CHF 600) is about CHF 285 per year.

Including socioeconomic information (equation E_3) does not change the significance of *INTERCEPT* and *BID*, and yields nearly the same mean WTP. Of the socioeconomic variables, only *SIBLINGS* is significant at the 5 percent level, i.e. the probability of accepting the bid diminishes with a person having siblings. This corresponds to our expectations. However, the likelihood-ratio (LR) test shows that there is no significant difference between equations E_2 and E_3. Therefore, including socioeconomic information is not preferable to the equation which uses only *BID* as explanatory variable.

Further estimations are run for the subsample DC3 consisting of observations with income information. Though Hanemann (1984) proved that there exists no linear utility model where income effects occur (see section 4.1), we include personal income (*INCOME*) as well as the logarithm of personal income (*LN_INCOME*) in equations E_6 and E_7. *INTERCEPT* and *BID* are again statistically highly significant and of expected signs. Contrary to *INCOME* in E_6, the logarithm of income (*LN_INCOME*) is significant at the 5 percent level in E_7. Thus, as is shown in several empirical studies (e.g., Park et al., 1991), the logarithmic specification outperforms the linear logit model. In addition, we estimated a model including income effects (not shown) which is compatible to the utility difference model (see equation (4-9)). However, results are too extreme to be realistic and we conclude that this specification is not appropriate to reflect respondents’ underlying preferences in a CV study.

Mean WTPs of subsample DC3 are slightly higher than those resulting from the larger subsamples DC1 and DC2. However, the LR tests show no significant differences between equation E_4 and the three equations including socioeconomic and income information (E_5 – E_7). Therefore, E_1 with a mean WTP of CHF 285 is regarded as a representative equation for the DC ‘with no’ variant.

Table 6-2: Care with taxes - coefficients of the logistic DC-model 'with no' (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	0.858***	0.851***	0.934***	0.786***	0.848***	0.830***	0.796***
	(4.292)	(4.216)	(4.395)	(3.149)	(3.177)	(3.096)	(2.936)
BID	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(-4.469)	(-4.288)	(-4.436)	(-3.006)	(-3.015)	(-2.908)	(-2.703)
AGE			-0.006		-0.006	-0.010	-0.013
			(-0.510)		(-0.426)	(-0.665)	(-0.846)
WOMAN			0.364		0.518	0.526	0.535
			(1.319)		(1.489)	(1.509)	(1.522)
INFO			0.166		0.421	0.428	0.428
			(0.559)		(1.157)	(1.175)	(1.165)
RELATIVE			0.504		0.153	0.187	0.244
			(1.445)		(0.380)	(0.464)	(0.598)
CHILD			0.011		-0.353	-0.225	-0.120
			(0.035)		(-0.937)	(-0.569)	(-0.302)
ALONE			-0.038		-0.024	-0.104	-0.183
			(-0.102)		(-0.054)	(-0.227)	(-0.401)
SIBLINGS			-1.079*		-0.290	-0.331	-0.341
			(-2.001)		(-0.452)	(-0.513)	(-0.523)
PARENT			0.023		-0.092	-0.116	-0.122
			(0.054)		(-0.179)	(-0.225)	(-0.235)
PLACE			0.376		0.536	0.526	0.563
			(1.363)		(1.570)	(1.536)	(1.628)
EDU__LOW			-0.535		-1.047	-0.938	-0.917
			(-1.149)		(-1.815)	(-1.604)	(-1.579)
EDU__HIGH			0.429		0.104	-0.027	-0.129
			(1.258)		(0.251)	(-0.063)	(-0.297)
INCOME						0.114	
						(1.107)	
LN_INCOME							0.531*
							(2.004)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	280	274	274	185	185	185	185
Log-likelihood	-182.286	-178.932	-171.469	-122.637	-115.880	-115.253	-113.798
Goodness of fit							
Pseudo R^2	0.05	0.05	0.09	0.04	0.09	0.10	0.11
LR test							
E_j vs. E_0	22.16***	20.21***	35.14***	9.63***	23.14*	24.39*	27.30*
E_j vs. E_2			14.93				
E_j vs. E_4					13.51	14.77	17.68
E_j vs. E_5						1.25	1.25
WTP in CHF p.a.							
Mean (Bid_{max}=600)	285	289	287	300	299	300	302
Median	266	274	272	301	299	301	306

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

In the variant 'only yes', no-respondents from the preceding question are not considered in the statistical analysis. The advantage of this method is that only observations of persons who answered the bid question are used. However, this biases WTPs upwards due to the overrepresentation of people supporting the program. To represent average WTP, estimated WTP values have to be corrected (Welsh and Poe, 1998).

Table 6-3: Care with taxes - coefficients of the logistic DC-model ‘only yes’ (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	1.365***	1.372***	1.528***	1.192***	1.267***	1.267***	1.211***
	(5.951)	(5.902)	(6.045)	(4.298)	(4.248)	(4.248)	(3.996)
BID	-0.004***	-0.004***	-0.004***	-0.003***	-0.003***	-0.003***	-0.003***
	(-5.015)	(-4.847)	(-4.983)	(-3.293)	(-3.189)	(-3.189)	(-2.812)
AGE			-0.017		-0.011	-0.016	-0.019
			(-1.206)		(-0.679)	(-0.950)	(-1.094)
WOMAN			0.522		0.617	0.618	0.638
			(1.655)		(1.626)	(1.620)	(1.658)
INFO			0.233		0.426	0.440	0.466
			(0.680)		(1.057)	(1.085)	(1.138)
RELATIVE			0.901*		0.436	0.475	0.516
			(2.052)		(0.908)	(0.988)	(1.060)
CHILD			0.224		-0.282	-0.157	-0.089
			(0.637)		(-0.661)	(-0.356)	(-0.200)
ALONE			-0.042		-0.090	-0.290	-0.364
			(-0.098)		(-0.188)	(-0.575)	(-0.726)
SIBLINGS			-1.026		-0.270	-0.307	-0.330
			(-1.686)		(-0.383)	(-0.433)	(-0.458)
PARENT			-0.450		-0.270	-0.314	-0.321
			(-0.919)		(-0.466)	(-0.537)	(-0.545)
PLACE			0.488		0.485	0.472	0.532
			(1.532)		(1.276)	(1.234)	(1.374)
EDU__LOW			-0.675		-1.002	-0.836	-0.809
			(-1.334)		(-1.651)	(-1.351)	(-1.313)
EDU__HIGH			0.593		0.213	0.057	-0.029
			(1.492)		(0.462)	(0.120)	(-0.061)
INCOME						0.153	
						(1.325)	
LN_INCOME							0.616*
							(2.063)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	245	239	239	164	164	164	164
Log-likelihood	-149.447	-145.716	-136.178	-103.465	-97.001	-96.080	-94.790
Goodness of fit							
Pseudo R^2	0.09	0.08	0.14	0.05	0.11	0.12	0.13
LR test							
E_j vs. E_0	28.30***	26.17***	45.24***	11.54***	24.46*	26.31*	28.89***
E_j vs. E_2			19.08				
E_j vs. E_4					12.93	14.77	17.35
E_j vs. E_5						1.84	4.42*
WTP in CHF p.a.[a]							
Mean (Bid_{max}=600)	286	291	292	298	301	303	305
Median	307	317	315	346	349	356	369

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.
[a] Corrected by a factor of 0.875 (=245/280) to represent average Swiss population.

Table 6-3 shows that *INTERCEPT* and *BID* are always highly significant and of expected signs. There are again no significant differences (LR tests) between the equations including only *BID* and those considering also socioeconomic and income information. Therefore, E_1 is chosen as the representative equation. Since this sample consists of only yes-responses to the preceding question, i.e. 245 respondents out of 280 (= 87.5 percent), WTPs are multiplied by a factor of 0.875 to represent average Swiss population. The resulting mean WTP amounts to

CHF 286 (= CHF 327 * 0.875) and is about the same as that of the ‘with no’ variant (CHF 285).

In addition to the logistic estimation a nonparametric estimation is applied. The bids and the corresponding probabilities of accepting the bid are represented in Figure 6-2. The survival function of the ‘only yes’ variant lies above that of the ‘with no’ variant due to the exclusion of the no-responses. Mean WTP corresponds to the area below the survival function. For the ‘with no’ variant it amounts to CHF 288. For the ‘only yes’ variant a mean WTP of CHF 326 is elicited, which after correcting for the no-responses amounts to CHF 285 (= CHF 326 * 0.875). Thus, WTP values elicited with a nonparametric estimation method correspond to those calculated with the logistic estimation method.

Figure 6-2: Care with taxes - nonparametric DC model: probabilities of accepting the bid

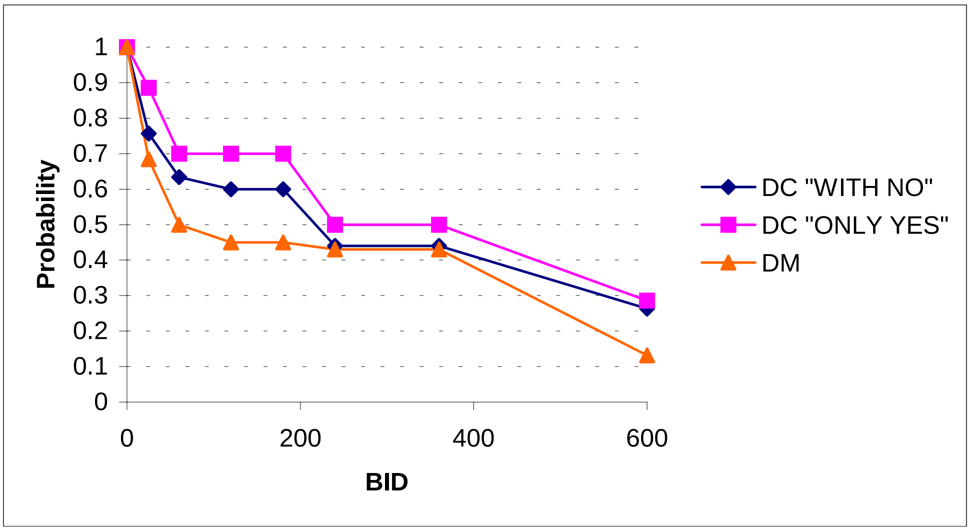


Table 6-4 summarizes the results of the DC format for the program ‘care’ with taxes. There is only a small variation in the WTPs. The estimation method seems not to have a substantial impact on the calculated values. On average, mean WTP for a tax financed care program is thus about CHF 286 per year.

Table 6-4: Care with taxes - overview of mean WTPs (CHF p.a.) calculated with the DC model

	‘with no’		‘only yes’	
	Logit	**Nonpara**	**Logit**	**Nonpara**
Representative	285	288	286	285
Range	285 – 302	-	286 - 305	-

6.1.3 Dissonance minimizing (DM) format

The DM format is designed to reduce possible yea-saying and to control for respondents who protest against the payment vehicle but otherwise would support the program. The estimation results for the logistic DM model are reported in Table 6-5. *INTERCEPT* and *BID* are significant and of expected signs in the first three equations ($E_1 – E_3$) which are estimated using the two larger subsamples DM1 and DM2. Of the socioeconomic variables only *EDU_HIGH* is significant (at the 5 percent level). Better educated people have a higher probability of accepting the bid. However, according to the LR test (E_3 vs. E_2), including socioeconomic information does not improve the model. The estimation results for the small subsample DM3 including income information are less clear. Contrary to *BID*, *INTERCEPT* is never significant. The logarithm of the income (*LN_INCOME*) is significant and according to the LR test (E_7 vs. E_5), including income information does improve the model significantly at the 5 percent level. However, there is no difference between using only *BID* as explanatory variable or the full specification, since the LR test of equations E_7 vs. E_4 is not significant. Therefore, E_1 with a mean WTP of CHF 229 per year is chosen as the representative equation.

Table 6-5: Care with taxes - coefficients of the logistic DM-model (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	0.466*	0.484*	0.572***	0.292	0.337	0.365	0.418
	(2.323)	(2.372)	(2.636)	(1.121)	(1.209)	(1.286)	(1.448)
BID	-0.003***	-0.003***	-0.004***	-0.002**	-0.003**	-0.003***	-0.003***
	(-4.253)	(-4.123)	(-4.332)	(-2.492)	(-2.568)	(-2.648)	(-2.848)
AGE			-0.001		0.005	-0.0002	-0.006
			(-0.062)		(0.316)	(-0.013)	(-0.354)
WOMAN			0.096		0.077	0.154	0.187
			(0.330)		(0.202)	(0.398)	(0.477)
INFO			-0.311		-0.484	-0.486	-0.476
			(-1.056)		(-1.337)	(-1.330)	(-1.287)
RELATIVE			0.316		-0.066	0.004	0.023
			(0.839)		(-0.141)	(0.009)	(0.048)
CHILD			0.221		0.169	0.456	0.562
			(0.663)		(0.403)	(0.992)	(1.208)
ALONE			-0.160		0.032	-0.317	-0.400
			(-0.459)		(0.076)	(-0.660)	(-0.851)
SIBLINGS			0.582		0.916	0.955	0.942
			(1.248)		(1.436)	(1.475)	(1.457)
PARENT			0.227		0.303	0.214	0.102
			(0.571)		(0.610)	(0.422)	(0.193)
PLACE			-0.290		-0.157	-0.101	-0.188
			(-1.134)		(-0.425)	(-0.270)	(-0.501)
EDU__LOW			-0.813		-0.811	-0.742	-0.732
			(-1.708)		(-1.202)	(-1.088)	(-1.061)
EDU__HIGH			0.670*		0.763	0.624	0.590
			(2.046)		(1.833)	(1.466)	(1.384)
INCOME						0.210	
						(1.593)	
LN_INCOME							0.983*
							(2.293)
Subsample	DM1	DM2	DM2	DM3	DM3	DM3	DM3
N	270	261	261	161	161	161	161
Log-likelihood	-174.859	-169.821	-162.520	-107.131	-101.611	-100.255	-98.695
Goodness of fit							
Pseudo R^2	0.06	0.05	0.09	0.03	0.08	0.09	0.11
LR test							
E_j vs. E_0	20.78***	19.38***	33.98***	6.68**	17.72	20.44	23.56*
E_j vs. E_2			14.60				
E_j vs. E_4					11.04	13.75	16.87
E_j vs. E_5						2.71	5.83*
WTP in CHF p.a.							
Mean (Bid_{max}=600)	229	234	228	242	237	236	231
Median	142	150	154	126	129	133	137

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

Mean WTP calculated using a nonparametric estimation method amounts to CHF 243 which is slightly higher. Table 6-6 summarizes the results for the DM method for the program ‘care’ with taxes. There is a slight variation in the WTPs. Contrary to the DC method, the estimation method seems to influence results. The nonparametric estimation method elicits higher WTPs than the logit estimation. On average, mean WTP for a tax financed care program is about CHF 236 per year.

Table 6-6: Care with taxes - overview of mean WTPs (CHF p.a.) calculated with the DM model

	Logit	Nonpara
Representative	229	243
Range	228 - 242	-

6.1.4 Payment card (PC) format

In the PC format individuals have to state their WTP directly. To allow respondents to express their level of voting certainty, five possible responses are given. We consider two variants for the calculation of WTP values for the PC format: The more conservative variant considers only the definite 'yes'-answers as yes-responses, whereas the second variant also includes the 'rather yes'-answers.

In the nonparametric estimation model a respondent's WTP is set equal to the midpoint of the interval between the highest amount to which she says 'yes' (or 'rather yes') and the next higher amount. Thus, mean WTP calculated with the 'yes' variant is lower. Mean WTP amounts to CHF 57 for the 'yes' variant and to CHF 83 for the 'rather yes' variant (see Table 6-7 for details).

Table 6-7: Care with taxes - answers to the PC format

Proposed Amount (CHF)	WTP lies in range (CHF)	Midpoint = WTP (CHF)	'yes'-model			'rather yes'-model		
			Frequency of 'yes'	Frequency of 'no'	People switching	Frequency of 'rather yes'	Frequency of 'no'	People switching
0	0-0 [a]	0	35	5	5	35	5	5
25	0-25	12.5	23	17	12	27	13	8
60	25-60	42.5	13	27	10	17	23	10
120	60-120	90	6	34	7	9	31	8
180	120-180	150	3	37	3	6	34	3
240	180-240	210	0	40	3	2	38	4
360	240-360	300	0	40	0	1	39	1
600	360-600	480	0	40	0	0	40	1
N					40			40
Mean WTP in CHF p.a.					57			83

[a] Refused program at all.

We next refer to the parametric PC models which are estimated using the midpoints of the intervals as the dependent variable and the socioeconomic information as independent variables. The goodness of fit of the 'yes' subsample is low since none of the socioeconomic variables are significant (see column one in Table 6-8). In the 'rather yes' subsample

EDU_HIGH is statistically significant, but the socioeconomic information does not improve the model according to the LR test either (see column three in Table 6-8).

In addition, we apply interval estimation to determine individual WTP values (see section 4.2). According to the LR tests, including socioeconomic information does not improve the model in both samples (see columns two and four in Table 6-8). Furthermore, results are very similar to the midpoint estimations. Depending on the certainty level of respondents, mean WTPs vary between CHF 58 and 86.

Table 6-8: Care with taxes - coefficients of the parametric PC model (t value)

Subsample	'yes'		'rather yes'	
Regressor variable	**Midpoints estimates**	**Interval estimates**	**Midpoints estimates**	**Interval estimates**
INTERCEPT	1.424	0.229	1.668	0.614
	(0.809)	(0.096)	(0.926)	(0.265)
AGE	0.011	0.013	0.0004	0.002
	(0.699)	(0.724)	(0.026)	(0.110)
WOMAN	-0.063	-0.030	0.214	0.238
	(-0.166)	(-0.068)	(0.551)	(0.558)
INFO	0.033	0.104	-0.220	-0.234
	(0.085)	(0.236)	(-0.562)	(-0.550)
RELATIVE	0.373	0.493	0.581	0.598
	(0.853)	(0.993)	(1.296)	(1.240)
CHILD	-0.271	-0.356	-0.393	-0.396
	(-0.528)	(-0.591)	(-0.749)	(-0.691)
ALONE	-0.361	-0.386	-0.065	-0.063
	(-0.862)	(-0.793)	(-0.153)	(-0.134)
SIBLINGS	2.219	3.322	2.598	3.554
	(1.704)	(1.696)	(1.948)	(1.845)
PARENT	-0.400	-0.489	-0.740	-0.739
	(-0.735)	(-0.753)	(-1.327)	(-1.248)
PLACE	0.539	0.598	0.672	0.652
	(1.499)	(1.435)	(1.824)	(1.660)
EDU__LOW	-0.961	-1.200	0.037	0.039
	(-1.846)	(-1.747)	(0.069)	(0.068)
EDU__HIGH	0.251	0.279	1.076*	1.097*
	(0.504)	(0.503)	(2.115)	(2.037)
σ	0.877***	0.918***	0.898***	0.910***
	(8.124)	(6.183)	(8.124)	(6.711)
N	33	33	33	33
Log-likelihood	-42.488	-46.498	-43.268	-52.493
LR test	9.37	9.78	11.28	11.20
WTP in CHF p.a.[a]				
Mean	58	58	86	84

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.
[a] Corrected by a factor of 0.868 (=33/38) to represent average Swiss population.

6.1.5 Overview of the tax financed care program

The estimated WTP values for the tax financed care program are summarized in Table 6-9. Our results that WTP values depend on the elicitation technique confirm former findings of e.g., Welsh and Poe (1998). The PC method yields amounts which are two to five times lower than results from the discrete CV method (DC and DM). However, a test for validity of the

WTP amounts is not possible, since our scenarios are only hypothetical and hence a financial commitment is not observable. Therefore, we are not able to determine which of the estimated WTP values is the true one. From a conservative point of view the implementation of a program is worthwhile as long as the program’s benefit (WTP), computed with the lowest value (PC method) exceeds its costs. In section 8 we conduct cost-benefit analyses to identify whether a program should be implemented.

Table 6-9: Summary of ‘care’ with taxes – WTP, CHF p.a.

			Mean		Median	
			Representative	Range	Representative	Range
DC	Logit	‘with no’	285	285-302	266	266-306
		‘only yes’	286	286-305	307	307-369
	Nonpara	‘with no’	288	-	218	-
		‘only yes’	285	-	240-360[a]	-
DM	Logit		229	228-242	142	126-154
	Nonpara		243	-	60	-
PC	Para	‘yes’	58	-	-	-
		‘rather yes’	84	84-86	-	-
	Nonpara	‘yes’	57	-	-	-
		‘rather yes’	83	-	-	-

[a] The valuation function is horizontal for a probability of answering with yes of 0.5.

6.2 *Program ‘diagnosis’*

We next present the main results of the insurance financed diagnosis program. For more details see appendix 10.2.

6.2.1 Data

Again, we construct three subsamples for both the DC and the DM elicitation techniques (see Figure 6-3) and one subsample for the PC format. The number of valid observations varies between 279 and 184 for the DC, and between 271 and 162 observations for the DM format. The PC subsample consists of 40 observations.

Figure 6-3: Diagnosis - subsamples of the DC and the DM elicitation format

DC (DM)	280 (280) interviews
DC1 (DM1)	279 (271) valid answers to bid question
DC2 (DM2)	273 (262) with socioeconomic information
DC3 (DM3)	184 (162) with income information

Results of the descriptive statistics are similar to those of the care program. When looking within an elicitation technique the means of the variables do not differ. However, there are slight differences for some socioeconomic variables between the three elicitation methods. Again, no signs can be found for possible selection effects.

6.2.2 Dichotomous choice (DC) format

Table 6-10 presents WTP results of the logistic DC model of the ‘with no’ as well as ‘only yes’ variants. Estimation results are shown in appendix 10.2. Contrary to the program ‘care’, *INTERCEPT* of the ‘with no’ variant is never significantly different from zero. This is due to the high amount of respondents opposing the program. 45 percent did not support the diagnosis program at all and therefore were not asked a bid question. This high amount of no-answers causes problems in fitting a logistic model. Therefore, calculated WTPs (especially mean values) must be interpreted with caution. This problem seems to be avoided by using the ‘only yes’ variant. However, calculated WTPs are too high to be credible for the existing opposal rate. Again, including socioeconomic and income information does not improve the model. Therefore, E_1 is chosen as the representative equation and mean WTPs (calculated for a maximum bid of CHF 600 per year) are CHF 164 for the ‘with no’ variant and CHF 169 for the ‘only yes’ variant.

Table 6-10: Diagnosis – WTP of the logistic DC-model, CHF p.a.[a]

	Equation						
	E_1	E_2	E_3	E_4	E_5	E_6	E_7
‘with no’[b]							
Mean (Bid_{max}=600[b])	164	164	161	192	190	190	190
Median	3	9	20	26	72	81	93
‘only yes’							
Mean (Bid_{max}=600[c])	169	170	169	198	202	206	206
Median	175	179	176	263	279	317	312

[a] For detailed results see Table 10-3 and Table 10-4.
[b] Nonsignificant *INTERCEPT* variable. Results have to be interpreted with caution.
[c] Elicited as increase in monthly insurance premium, i.e. Bid_{max} per month = CHF 50.

For the nonparametric DC model, mean WTP amounts to CHF 168 for the ‘with no’ variant and to CHF 170 for the ‘only yes’ variant. Table 6-11 summarizes the results. There is little variation in the WTPs. On average, mean WTP for the diagnosis program is thus about CHF 167 per year.

Table 6-11: Diagnosis - overview of mean WTPs (CHF p.a.) calculated with the DC model

	‘with no’		‘only yes’	
	Logit	**Nonpara**	**Logit**	**Nonpara**
Representative	164	168	169	170
Range	161-192	-	169-206	-

6.2.3 Dissonance minimizing (DM) format

Due to the high number of respondents who opposed to the diagnosis program, it was again not possible to fit the logistic model. *INTERCEPT* is never statistically significant. Calculated mean WTPs thus have to be interpreted with caution. Contrary to the DC format, including socioeconomic information improves the model. Therefore, E_3 with an estimated mean WTP of CHF 167 (see Table 6-12) is chosen as the representative equation.

Table 6-12: Diagnosis - WTP of the logistic DM model, CHF p.a.[a,b]

	Equation						
	E_1	E_2	E_3	E_4	E_5	E_6	E_7
Mean (Bid_{max}=600)	175	176	167	171	156	155	153
Median	48	45	50	11	14	18	26

[a] For detailed results see Table 10-5.
[b] Nonsignificant *INTERCEPT* variable. Results have to be interpreted with caution.

Mean WTP resulting from the nonparametric DM model amounts to CHF 180 per year. Table 6-13 summarizes the results of the DM format for the program ‘diagnosis’. There is a slight variation in WTPs. As was observed in the program ‘care’, the estimation method seems to influence results for the DM format. The nonparametric estimation method elicits higher WTP values than the logit estimation. On average, mean WTP for the diagnosis program is about CHF 173 per year.

Table 6-13: Diagnosis - overview of the WTPs (CHF p.a.) calculated with the DM model

	Logit	**Nonpara**
Representative	167	180
Range	153 – 176	-

6.2.4 Payment card (PC) format

WTP values calculated for the nonparametric PC model amount to CHF 53 for the ‘yes’ subsample and to CHF 64 for the ‘rather yes’ subsample. Results for the parametric PC model are presented in Table 6-14. Depending on the voting certainty, mean WTPs vary between CHF 56 and CHF 68 per year.

Table 6-14: Diagnosis with insurance – mean WTP of the parametric PC model, CHF p.a.[a]

Subsample	‘yes’			‘rather yes’		
	Midpoint estimates		Interval estimates	Midpoint estimates		Interval estimates
	Nonpara	MLE	MLE	Nonpara	MLE	MLE
Mean WTP	53	60	56	64	68	65

[a] For detailed results see Table 10-6.

6.2.5 Overview of the insurance financed diagnosis program

The estimated WTP values for the insurance financed diagnosis program are summarized in Table 6-15. Again, the PC method yields the lowest mean WTP values, whereas the amounts for the DC and DM format are similar. However, because of the high opposition rate for this program, we believe that mean WTP elicited with the discrete CV method (DC and DM) are generally too high.

Table 6-15: Summary of ‘diagnosis’ with insurance – WTP, CHF p.a.

			Mean		Median	
			Representative	Range	Representative	Range
DC	Logit	‘with no’[a]	164	161-192	3	3-93
		‘only yes’	169	169-206	175	175-317
	Nonpara	‘with no’	168	-	46	-
		‘only yes’	170	-	180	-
DM	Logit[a]		167	153-176	50	11-50
	Nonpara		180	-	38	-
PC	Para	‘yes’	56	56-60	-	-
		‘rather yes’	65	65-68	-	-
	Nonpara	‘yes’	53	-	-	-
		‘rather yes’	64	-	-	-

[a] Nonsignificant *INTERCEPT* or *BID* variable. Results have to be interpreted with caution.

6.3 Program ‘research’

We next present the main results for the tax financed research program. For more details see appendix 10.3.

6.3.1 Data

As with the other two programs, we construct three subsamples for both the DC and DM elicitation techniques (see Figure 6-4) and one subsample for the PC format. The number of valid observations varies between 277 and 198 for the DC and between 270 and 179 observations for the DM format. The PC subsample consists of 40 observations.

Figure 6-4: Research - subsamples of the DC and the DM elicitation format

DC (DM)	280 (280) interviews
DC1 (DM1)	277 (270) valid answers of bid question
DC2 (DM2)	271 (262) with socioeconomic information
DC3 (DM3)	198 (179) with income information

Again, results of the descriptive statistics are similar to the other two programs. When looking within an elicitation technique the means of the variables do not differ. However, compared to the DC format a smaller fraction of respondents did accept the bid in the DM format. Furthermore, there are slight differences for some socioeconomic variables between the three elicitation methods. But again no signs can be found for selection effects. Contrary to the other two programs, an additional variable is introduced in the program ‘research’. To elicit respondents’ judgment on possible research success, we ask whether they believe that AD will be curable within 20 years. The variable *CURABLE* is set equal to one for ‘yes’ and ‘rather yes’ responses and equal to zero in the remaining cases. We expect the probability of accepting the research program to increase with *CURABLE*.

6.3.2 Dichotomous choice (DC) format

Table 6-16 presents WTP results of the logistic DC model of the ‘with no’ as well as ‘only yes’ variants. Estimation results are shown in appendix 10.3. The dependent variables (except for *BID*) are measured as deviation from their mean. For all specifications *INTERCEPT* and *BID* are significant and of expected signs. Furthermore, including socioeconomic and income information improves results of the ‘with no’ variant. Of the explanatory variables *RELATIVE*, *CURABLE*, and *INCOME* are statistically significant. Respondents having (or having had) a relative suffering from AD (*RELATIVE*), those thinking that AD will be curable within 20 years (*CURABLE*) and those with higher income (*INCOME*) have a higher probability of accepting their bid. However, in the ‘only yes’ version *RELATIVE* and

CURABLE are of lower significance and including socioeconomic and income information does improve the statistical model in only one case. Therefore, E_6 is chosen as the representative equation for the 'with no' variant while for the 'only yes' variant it is E_1. The resulting mean WTP values amount to CHF 201 and to CHF 190, respectively.

Table 6-16: Research – WTP of the logistic DC-model 'with no' and 'only yes', CHF p.a.[a]

	Equation						
	E_1	E_2	E_3	E_4	E_5	E_6	E_7
'with no'							
Mean (Bid_{max}=400)	189	193	192	209	203	201	201
Median	175	185	184	217	204	201	202
'only yes'							
Mean (Bid_{max}=400)	190	195	195	210	209	209	209
Median	220	226	217	242	229	228	229

[a] For detailed results see Table 10-8 and Table 10-9.

Mean WTP resulting from the nonparametric DC model amounts to CHF 187 for both subsamples. Table 6-17 summarizes the results. There is only little variation in the mean WTPs calculated with the DC model. On average, mean WTP for the research program is about CHF 191 per year.

Table 6-17: Research - overview of mean WTPs (CHF p.a.) calculated with the DC model

	'with no'		'only yes'	
	Logit	Nonpara	Logit	Nonpara
Representative	201	187	190	187
Range	189-208	-	190 - 210	-

6.3.3 Dissonance minimizing (DM) format

Contrary to the results of the DC model, *INTERCEPT* and *CURABLE* are not significant anymore (see appendix Table 10-10). The LR tests indicate that including socioeconomic and income information does improve the model. Therefore, E_6 with mean WTP of CHF 177 is chosen as the representative equation (see Table 6-18).

Table 6-18: Research - WTP of the logistic DM model, CHF p.a.[a,b]

	Equation						
	E_1	E_2	E_3	E_4	E_5	E_6	E_7
Mean (Bid_{max}=400)	170	173	170	172	174	177	175
Median	112	117	114	118	129	140	134

[a] For detailed results see Table 10-10.
[b] Nonsignificant *INTERCEPT* variable. Results have to be interpreted with caution.

Mean WTP resulting from the nonparametric DM model amounts to CHF 171. Table 6-19 summarizes the results of the DM format. Again, there is only little variation in the mean WTP values. On average, mean WTP for the research program amounts to CHF 174.

Table 6-19: Research - overview of the mean WTPs (CHF p.a.) calculated with the DM model

	Logit	Nonpara
Representative	177	171
Range	170 – 177	-

6.3.4 Payment card (PC) format

Mean WTP values resulting from the nonparametric PC model amount to CHF 100 for the ‘yes’ subsample and to CHF 120 for the ‘rather yes’ subsample. The estimation results for the parametric PC model are presented in Table 6-20. Depending on the certainty level of respondents, mean WTPs vary between CHF 99 and CHF 128.

Table 6-20: Research with taxes – mean WTP of the parametric PC model, CHF p.a.[a]

Subsample	‘yes’			‘rather yes’		
	Midpoint estimates		Interval estimates	Midpoint estimates		Interval estimates
	Nonpara	MLE	MLE	Nonpara	MLE	MLE
Mean WTP	100	99	102	120	117	128

[a] For detailed results see Table 10-11.

6.3.5 Overview of the research program

The estimated WTP values for the tax financed research program are summarized in Table 6-21. Again, the PC method yields the lowest WTP values. However, the difference to the other two elicitation techniques is smaller than in the programs ‘care’ and ‘diagnosis’. Furthermore, the DM method elicits smaller WTP values than the DC method.

Table 6-21: Summary of 'research' with taxes – WTP, CHF p.a.

			Mean		Median	
			Representative	Range	Representative	Range
DC	Logit	'with no'	201	189-209	201	175-217
		'only yes'	190	190-210	220	220-242
	Nonpara	'with no'	187	-	95-141[a]	-
		'only yes'	187	-	252	-
DM	Logit[b]		177	170-177	140	112-140
	Nonpara		171	-	142	-
PC	Para	'yes'	102	99-102	-	-
		'rather yes'	128	117-128	-	-
	Nonpara	'yes'	100	-	-	-
		'rather yes'	120	-	-	-

[a] The valuation function is horizontal for a probability of answering with yes of 0.5.
[b] Nonsignificant *INTERCEPT* or *BID* variable. Results have to be interpreted with caution.

7 Variation in WTP values

Contingent valuation (CV) studies are often criticized as being too hypothetical and therefore eliciting wrong WTP values. Especially the discrete CV method is regarded as being inappropriate. It is true that there are still many unsolved problems in this respect. For example, it is not clear which welfare measure should be favored. This is of great significance since results differ if either mean or median WTP is chosen (see section 7.1). Furthermore, WTP values depend substantially on the chosen elicitation technique. The PC method, for example, elicits WTP values, which are two to five times smaller than WTPs of the DC method. A possible explanation could be found in the design of the DC method. By giving respondents only a yes/no response alternative, yea-saying and protest answers may be provoked. In section 7.2 we examine whether the DM method, which is designed to avoid yea-saying and to control for protest answers, elicits smaller WTP values than the DC method. Another drawback for CV studies is that there is enormous potential for manipulating results. Therefore, we test for question ordering and payment vehicle bias in sections 7.3 and 7.4. Furthermore, we analyze in section 7.5 whether and how changing the maximum bid influences mean WTP values of discrete CV studies. In sections 7.6 and 7.7 we examine whether warm glow or information bias is present.

7.1 Mean versus median WTP

Two welfare measures are possible, mean and median WTP. Since WTP values are elicited more or less directly in the PC format, mean WTP is usually calculated. However, in discrete CV studies WTP values have to be estimated and it is not clear whether mean or median WTP is more appropriate. Both have advantages and disadvantages. The mean is very sensitive to assumptions about the valuation function, to skewness in the distribution and to outliers in the data, whereas the median is more robust. However, since WTP values are usually skewed, the median seems not to be able to reflect the distribution of WTP values properly.

Until now we mainly compared mean WTP values of the three programs. This was done to allow comparability of the different elicitation techniques since for the PC format usually mean WTP is calculated. However, the DC and DM methods are formulated as referendums and therefore median WTP seems to be more appropriate to value a single program. In a referendum a program is accepted if the majority supports it. Regarding a discrete CV study a program is approved if median WTP exceeds the program’s cost per capita (for further details of the median voter theorem, see Mueller, 1989, ch.5). Such an evaluation of a single program will be conducted in section 8 where cost-benefit analyses of the three programs are presented.

This section investigates how mean and median WTP differ for the DC and DM format. Table 7-1 shows that mean WTP generally exceeds median WTP. In addition, in most cases the DM format elicits lower mean and median WTP values than the DC format. This difference is higher for the median. For example, for the program ‘care’ with taxes, median WTP of the logistic DC ‘with no’ method is almost twice as high as median WTP of the DM method, whereas for mean WTP this difference amounts to 25 percent. However, this is not always true for the program ‘diagnosis’ where the DC ‘with no’ method elicits smaller mean and median WTPs than the DM method. One explanation could be that nearly half of the respondents in the DC format oppose this program (see section 7.2). Looking at the two welfare measures clearly shows that the choice of the elicitation technique matters more if median WTP is used.

Table 7-1: Mean versus median WTP, in CHF p.a.

Program and Elicitation method	Mean WTP		Median WTP	
Care with taxes	Logit	Nonpara	Logit	Nonpara
DC (with no)	285	288	266	218
DM	229	243	142	60
Diagnosis				
DC (with no)	164[a]	168	3[a]	46
DM	167[a]	180	50[a]	38
Research				
DC (with no)	201	187	201	95-141[b]
DM	177[a]	171	140[a]	142

[a] Nonsignificant *INTERCEPT* or *BID* variable. Results have to be interpreted with caution.
[b] The valuation function is horizontal for a probability of answering with yes of 0.5.

7.2 Yea-saying and protest answers

The DC method is the standard procedure to elicit WTP values by using a discrete contingent valuation format. However, skepticism against this approach is increasing since estimated WTP values exceed those derived in experimental or real-life markets by far (e.g. Champ et al., 1997). One possible explanation for the overestimation of WTP values is the design of the dichotomous choice question. By giving respondents only two alternatives (yes/no) yea-saying may be provoked. If respondents are only allowed to accept or oppose the bid offered, they may have incentives to accept the bid in order to express their support for the program (Blamey et al., 1999).

To test for possible yea-saying we compare the DC with the DM method which allows respondents to support a program regardless of price. However, we ask the DC respondents in a preceding question to the WTP question whether they support the described program at all, in order to separate the motivation for the program and the offered bid. Therefore, we already may reduce possible yea-saying in the DC format, since respondents are allowed to express their support for the program. In addition, respondents are given a third answer alternative (I don’t know) allowing them to make less of a commitment, which may also reduce possible yea-saying.

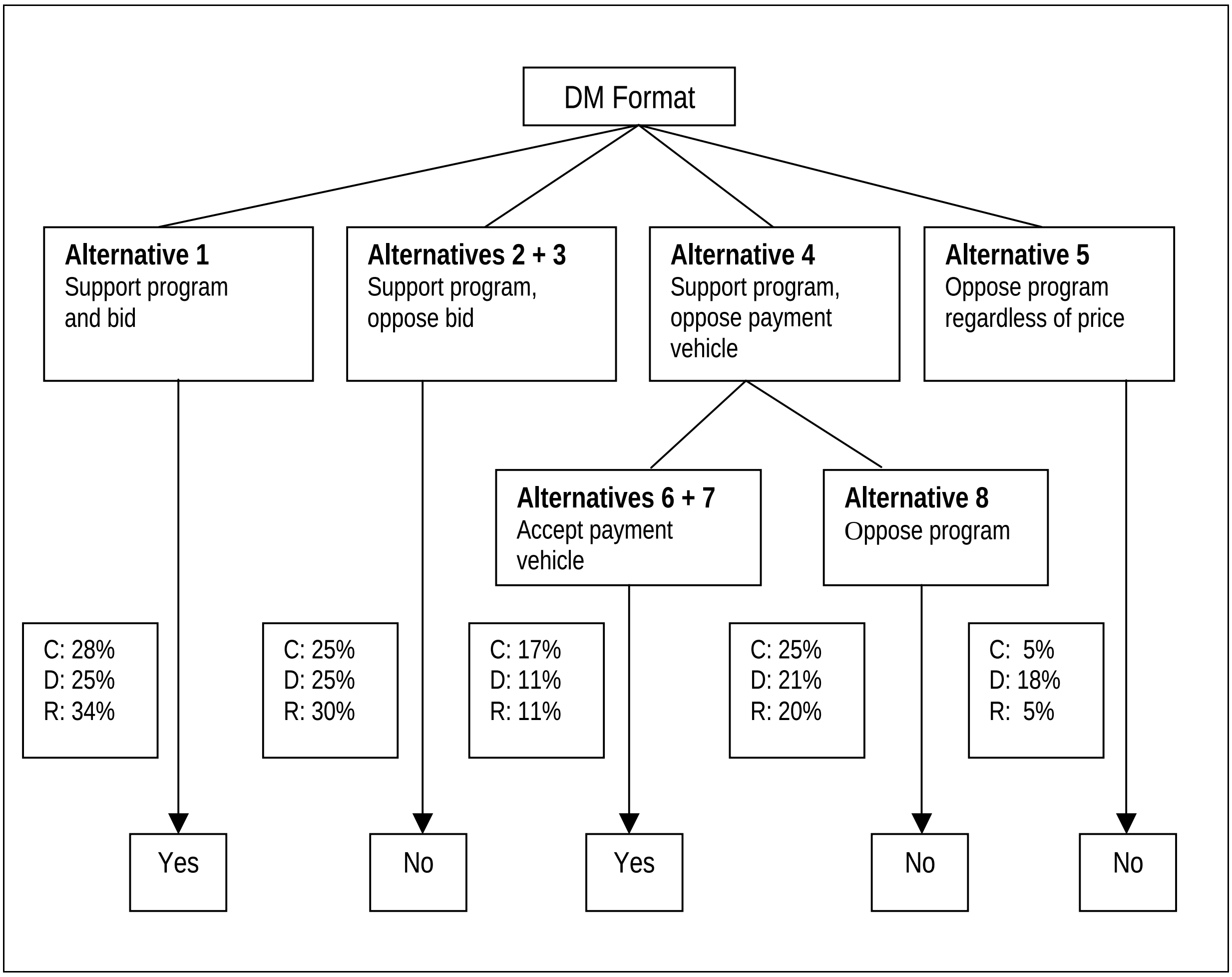
Besides yea-saying, the DM method is designed to avoid possible protest answers to the payment vehicle by allowing the respondents to support the program but to oppose the payment vehicle. Depending on how these protest answers are treated in the DC method (i.e. if they are all removed from the sample) estimated WTP values might increase (Ready et al., 1996). However, since our respondents are given a third answer alternative (I don’t know) allowing them to make less of a commitment, not only yea-saying but protest answers may also be reduced. Therefore, yea-saying and protest answers may be less of a problem in our DC method, resulting in smaller estimated WTP values than usually observed.

Comparing the results of the DC and DM format for the three programs shows that the DC method (with no) elicits higher mean WTP values for both estimation methods (logistic and nonparametric) for the program ‘care’ (with taxes) as well as the program ‘research’ (see Table 7-1). For the program ‘care’ mean WTPs of the DC method exceed mean WTPs of the DM model by 19 to 25 percent. For the program ‘research’ the DC format elicits mean WTP which is greater by CHF 24 (14 percent) for the logistic and CHF 16 (9 percent) for the nonparametric method than mean WTP of the DM method. However, this difference with respect to the elicitation method is only statistically significant for the care program. For the program ‘diagnosis’ results are different. Mean WTPs of the logistic as well as nonparametric DC model are slightly smaller than corresponding mean WTPs of the DM model. A possible explanation may be found in the small support for the program ‘diagnosis’. Only 54 percent of the DC respondents support this program in the question preceding the bid question. Therefore, yea-saying may not be a problem in this program.

Looking at median WTP the DC model (with no) elicits higher values than the DM model in most cases, too. Whereas for the program ‘care’ with taxes, median WTP values of the DC model exceed those of the DM model by nearly two to four times depending on the estimation method (logit or nonparametric), the results of the other two programs are ambiguous. For the program ‘diagnosis’ (program ‘research’) the logistic estimation method elicits median WTP values which are smaller (greater) for the DC model than for the DM model. However, in the nonparametric estimation, median WTP of the DC model is greater (smaller) than median WTP of the DM model. We conclude that generally the DC method elicits higher mean and median WTP values than the DM method.

Let us examine in Figure 7-1 how respondents choose the five response alternatives of the DM format. Between 25 and 34 percent support the corresponding program and accept their bid (alternative 1), whereas 5 to 18 percent oppose the program regardless of price (alternative 5). As in the DC format the opposition against the program ‘diagnosis’ (18 percent) is highest. Of interest is how the DM respondents choose one of the three additional response alternatives (alternatives 2, 3 and 4) which allow them to support the program but oppose the bid or the payment vehicle. 68 out of 270 respondents (25 percent) of the program ‘care’ choose alternative 2 or 3 (i.e. support the program but oppose the bid), whereas in the program ‘diagnosis’ (program ‘research’) 69 out of 271 respondents (82 out of 270 respondents) choose one of these two alternatives and therefore are treated as no-responses.

Figure 7-1: Chosen response alternatives of the DM format



C: program ‘care’; D: program ‘diagnosis’; R: program ‘research’.

A second goal of the DM model is avoiding protest answers against the payment vehicle by allowing respondents to support the program but oppose the payment vehicle (alternative 4). In the program ‘care’ 114 respondents (42 percent) choose this alternative and in a follow-up question 46 respondents (17 percent) are assigned to yes-responses, because they can be convinced to accept the proposed payment vehicle or an alternative. In the program ‘diagnosis’ 84 respondents (32 percent) oppose the payment vehicle and 29 respondents (11 percent) can be convinced to support the program in the follow-up question, whereas in the program ‘research’, 82 respondents (31 percent) oppose the payment vehicle and 29 of them (11 percent) can be convinced to support the program.

Between 57 and 67 percent of the DM respondents choose one of the alternatives which allow them to support the program but oppose the bid or payment vehicle (alternatives 2, 3 or 4). Therefore, with the DM format the researcher can gain much more information about respondents’ preferences than with the DC format. However, in the DC format, yea-saying and protest answers may be reduced with a question preceding the WTP question as well. Unfortunately, we are not able do identify whether respondents answering the preceding question with no (13 percent in the care program, 46 (20) percent in the diagnosis (research) program, respectively) oppose the program or the payment vehicle. Since we treat all of them as no-responses, estimated WTP values of the DC format may be biased down. Therefore, screening respondents for their preferences is preferred to a method that simply asks in a question preceding the bid question whether respondents support the program at all.

7.3 Question order

To test whether the order in which questions are presented matters, we changed the order of the program ‘diagnosis’ and ‘care’ (with taxes) for the payment card (PC) method. 40 respondents are first given a WTP question of the program ‘diagnosis’ followed by a WTP question of the program ‘care’, whereas 40 other respondents are first confronted with the WTP question of the program ‘care’ followed by the program ‘diagnosis’. Table 7-2 shows mean WTP values of the nonparametric midpoint interval estimation. If the program ‘diagnosis’ is presented first, mean WTP values are smaller for both programs (columns one and three) than if the WTP question of the care program is asked first (columns two and four). For the ‘rather yes’ version, mean WTP of the program ‘diagnosis’ is CHF 64 if the WTP question of this program is asked first. If it is asked after the WTP question of the program ‘care’, mean WTP amounts to CHF 76. For the program ‘care’ this difference is greater. If the WTP question of the care program is asked after the program ‘diagnosis’, mean WTP is CHF 83. However, if the care program is presented first, mean WTP amounts to CHF 157. An explanation for this result could be the fact that for the program 'diagnosis', the sequence of bids is presented as monthly insurance premiums (CHF 2, 5, 10, 15, 20, 30, 50 and 75), whereas for the care program yearly income taxes (CHF 25, 60, 120, 180, 240, 360, 600 and 700) are used. The bids of the program 'diagnosis' are of a much smaller amount than those of the program 'care', which may cause an anchoring effect (Mitchell and Carson, 1989, p.115). Therefore, presenting first the program 'diagnosis' may bias down stated WTP for both programs. Contrarily, presenting first the program 'care' with the higher yearly bid amounts may bias up stated WTP for both programs.

To avoid biases caused by other WTP questions, we recommend asking only one WTP question in a survey. However, if more than one WTP question is posed, the results should be carefully tested for question ordering bias as well as anchoring effects.

Table 7-2: Mean WTP depending on the question order, in CHF p.a.[a]

	Diagnosis → Care 'yes'	**Care → Diagnosis** 'yes'	**Diagnosis → Care** 'rather yes'	**Care → Diagnosis** 'rather yes'
Program 'diagnosis'	53	73	64	76
Program 'care' with taxes	57	137	83	157

[a] Values calculated with the nonparametric midpoint interval method.

7.4 Payment vehicle

To test whether WTP values depend on the chosen payment vehicle, the program 'care' is designed with income taxes as well as insurance premiums as payment vehicle. If the payment vehicle matters, the WTP results will differ. We expect that income taxes may provoke free-riding, resulting in higher WTP values than insurance premiums which may be perceived more as a private (out of pocket) payment. However, this is not expected for the DM format, since respondents are allowed to protest against the payment vehicle.

Table 7-3 shows that the WTP results of the DM format are indeed very similar (mean WTP of CHF 229 with taxes compared to CHF 228 with insurance premiums), whereas in the DC format mean WTP for the tax financed program is higher (CHF 285) than mean WTP for the insurance financed program (CHF 264). However, this is not so clear for the PC format where the question order of the program 'care' (tax financed) and the program 'diagnosis' are changed (see section 7.3). If the WTP question of the program 'care' is asked after the WTP question of the program 'diagnosis', much smaller WTP values for the 'yes' and 'rather yes' versions are elicited (CHF 57 and 83, columns three and four) than if the WTP question of the program 'care' is asked first (CHF 137 and 157, columns five and six). The WTP values elicited with the insurance financed care program are in between these values (CHF 114 and

131, columns nine and ten). Unfortunately, the care program financed by monthly insurance premiums (bid amounts of CHF 2, 5, 10, 15, 20, 30, 50 and 75) is presented after the WTP question of the research program which is financed by yearly taxes (with bid amounts CHF 25, 50, 100, 150, 200, 300, 400 and 500). The different bid amounts of the preceding WTP question (program 'diagnosis' or 'research') seem to bias stated WTP of the care program. Unfortunately, this is true for the DC and the DM format as well, since the care program is preceded by one of the other two programs ('diagnosis' or 'research'). Therefore, we are not able to properly examine the effect of the payment vehicle on stated WTP. This confirms again how great the potential for biases is, if more than one WTP value is elicited in the same survey.

Table 7-3: Mean WTP depending on the payment vehicle, in CHF p.a.

Care with taxes						Care with insurance			
DC	DM	PC[a]				DC	DM	PC	
		Diagnosis → Care		Care → Diagnosis				Research → Care	
		'yes'	'rather yes'	'yes'	'rather yes'			'yes'	'rather yes'
285	229	57	83	137	157	264	228	114	131

[a] The question order of the program 'care' (tax financed) and program 'diagnosis' are changed (see section 7.3). In the first two columns of the PC format, the program 'care' is introduced after the WTP question of program 'diagnosis', whereas in the following two columns the WTP question of program 'care' is asked first.

7.5 Representation of the valuation function

Mean WTP of the discrete contingent valuation format depends crucially on the representation of the whole valuation function. Ideally a bid vector should be used that covers the whole distribution of WTP. Otherwise, mean WTP is open to manipulation by selecting the right end of the valuation function. However, in the DC model of the program 'care' (tax financed) 29 percent of the respondents say yes to the highest bid of CHF 600 per year, whereas in the DM model this amount reduces to 13 percent. In the DC (DM) format of the program 'diagnosis' 16 (11) percent accept the highest bid of CHF 50 per month, whereas in the DC (DM) format of the program 'research', a high amount of 33 (30) percent still accepts the highest bid of CHF 400 per year (see Table 7-4).

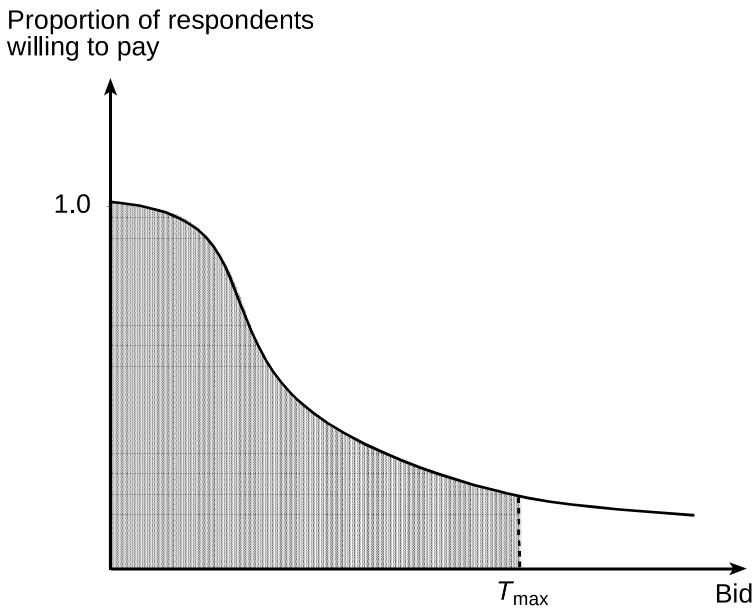
Table 7-4: Yes-responses to the highest bid

Care with taxes		Diagnosis		Research	
DC	DM	DC	DM	DC	DM
26%	13%	16%	11%	33%	30%

The problem of an undetermined right end tail is shown in Figure 7-2. Since mean WTP is the area below the valuation function, it is very sensitive to assumptions about the highest bid

T_{max}. This truncation of the valuation function diminishes mean WTP (shaded area). The larger the number of respondents who answer with yes to T_{max}, the greater the uncertainty about mean WTP.

Figure 7-2: Valuation function and mean WTP



For the logistic estimation we choose two different bid values T_{max} for the right end of the valuation function: the highest bid used in the survey and a T_{max} of infinite. For the left end non-negative WTP values are assumed. The last column of Table 7-5 presents the differences between estimated mean WTP values for the two different T_{max} values in percent. For the logistic DC model, mean WTP values increase by 12 to 32 percent depending on the program, whereas for the logistic DM model mean WTPs differ between 13 and 42 percent.

Table 7-5: Mean WTP values for the logistic estimation depending on T_{max} in CHF p.a.

Program and Elicitation method			
Care with taxes	T_{max} = 600	T_{max} = infinite	Total increase
DC (with no)	285	375	32%
DM	229	290	27%
Diagnosis[a]	T_{max} = 50	T_{max} = infinite	
DC (with no)	164	200	22%
DM	167	188	13%
Research	T_{max} = 400	T_{max} = infinite	
DC (with no)	201	226	12%
DM	177	252	42%

[a] The bid amounts for the program ‘diagnosis’ represent monthly insurance premiums.

For the nonparametric method the T_{max} values vary with the elicitation method as well as the program. Contrary to the logistic valuation function, no distribution assumptions are made except for the linear interpolation between the different estimates of the probability of yes responses. The minimum bid at which all respondents would say no is calculated by linearly connecting the last two bids (e.g. CHF 350 and CHF 600 for the tax financed care program) and prolonging this line to the horizontal axis. For the DC model of the program 'care' this line cuts the horizontal axis at the bid value of CHF 957, whereas for the DM model the minimum bid where all respondents would say no is set at CHF 704. For the left end of the valuation function two methods are used to represent the proportion of yes responses for the bid of zero. First, the proportion of yes responses for the bid of zero is set at one. Second, it is set at the same amount which was elicited for the lowest bid (e.g. CHF 25 for the tax financed care program). However, since mean WTP values do not vary much for these two methods, only the results for the first method are shown in Table 7-6. Again, the last column shows the difference between the two bid values in percent. Whereas this difference is small for the tax financed care program (16 percent for the DC and 2 percent for the DM format), it becomes more pronounced for the other two programs. Mean WTP for the program 'diagnosis' increases by 45 (8) percent for the DC (DM) format, whereas mean WTP for the program 'research' increases by 65 (88) percent depending on the elicitation technique.

Table 7-6: Mean WTP values for the nonparametric estimation depending on T_{max} in CHF p.a. (in parentheses T_{max} for the DM model)

Program and Elicitation method			
Care with taxes	T_{max} = 600	T_{max} = 957 (704)	Total increase
DC (with no)	288	335	16%
DM	243	249	2%
Diagnosis[a]	T_{max} = 50	T_{max} =130 (72)	
DC (with no)	168	244	45%
DM	180	195	8%
Research	T_{max} = 400	T_{max} = 1'127 (1'400)	
DC (with no)	187	308	65%
DM	171	321	88%

[a] The bid amounts for the program 'diagnosis' represent monthly insurance premiums.

Our results show that the potential for manipulating mean WTP values is indeed great. Therefore, the assumptions about the tails of the valuation function have to be communicated openly and results should be tested in sensitivity analysis.

7.6 Warm glow effect

The theory of 'warm glow' was developed by Andreoni (1989 and 1990) who described a model in which people contribute to a public good for two reasons. First, they simply demand more of the public good. This motive is called ‘altruism’. Second, people get a benefit from the gift per se, which is called ‘warm glow’ of giving. This theory was further developed by several researchers (see e.g., Bernasconi, 1996; Chilton and Hutchinson, 1999) and a ‘warm glow’ effect has shown to be existent in several laboratory experiments (Andreoni, 1995a; Andreoni, 1995b; Palfrey and Prisbrey, 1997).

Soon it became evident that the ‘warm glow’ effect could also play a role in the answers of contingent valuation surveys, too. Kahneman and Knetsch (1992) argued that contingent valuation responses reflect the willingness-to-pay for the moral satisfaction of contributing to public goods, but not the economic value of these goods. Although Smith (1992) pointed to several misspecifications in the study of Kahneman and Knetsch, the question remains whether the CV method measures underlying preferences. If, for instance, people give charitable contributions mainly for the pleasure of giving, then it is also plausible that they give generous answers to CV questions asking them to evaluate health programs with public good character (Diamond and Hausman, 1993).

Indeed, in CV surveys dealing with environmental resources, stated WTP was roughly the same for different sized scenarios (Diamond et al., 1993). These findings are consistent with a ‘warm glow’ interpretation of a situation in which the degree of ‘warm glow’ does not vary much with the differences in scenarios. Diamond and Hausman (1993) finally concluded that standard CV questionnaires do not generate a description of preferences but rather elicit responses that generally express concern about the covered topic. Mitchell and Carson (1989) have a less pessimistic view with regard to such a ‘symbolic bias’ as they call it. They think that problems like these may be circumvented using a thoroughly designed CV questionnaire.

In the health care sector there currently exist no CV studies dealing with the ‘warm glow’ effect (Klose, 1999). There may be similar effects here, since health care programs usually include a public good component. Therefore, it is possible that respondents to CV surveys may state a WTP expressing general concern about, e.g., a disease rather than their underlying preferences with regard to the presented program.

In our study the three programs deal with different topics of Alzheimer's disease. Respondents were asked to value only two programs, either the programs ‘diagnosis’ and ‘care’ or the programs ‘research’ and ‘care’ (see Table 5-1). The care program hereby always was presented as the second program (for question order effects, see section 7.3). So it is to be expected that the care program will evoke a different WTP than the other two programs, since people realize that the second program differs from the first asked and thus adapt their valuation. To detect a possible ‘warm glow’ effect, we therefore must compare the programs 'diagnosis' and 'research' which were asked first. If the WTPs of those two programs do not differ this could indeed indicate such an effect to be present. Table 7-7 shows that WTPs for the two programs do differ. WTP for the program 'research' is generally higher than for the diagnosis program. Only when using mean values of the DM method results are not clear.

Table 7-7: Representative WTP values for programs 'diagnosis' and 'research' (CHF p.a.)

			Diagnosis		Research	
Elicitation and Estimation method			Mean WTP	Median WTP	Mean WTP	Median WTP
DC	Logit	'with no'	164[a]	3[a]	201	201
	Nonpara	'with no'	168	46	187	95-141[b]
DM	Logit		167[a]	50[a]	177[a]	140[a]
	Nonpara		180	33	171	142
PC	Para	'yes'	56		102	
		'rather yes'	65		128	
	Nonpara	'yes'	53		100	
		'rather yes'	64		120	

[a] Nonsignificant *INTERCEPT* or *BID* variable. Results have to be interpreted with caution.
[b] The valuation function is horizontal for a probability of answering with yes of 0.5.

The clearest difference in WTPs of the two programs is seen in the PC method where WTP for the research program is almost twice as high as for the program 'diagnosis'. This also corresponds with the observation that only about 50 percent of all respondents supported the program 'diagnosis', whereas only 20 percent opposed the research program in the question preceding the bid question. People do value those two programs differently and stated mean WTP does not seem to reflect a substantial 'warm glow' effect.

7.7 Information bias

To test for possible information bias we check with five questions whether respondents have some knowledge about Alzheimer's disease (AD), e.g., knowledge about similar diseases, determinants of the high cost of AD, whether it is curable, etc. (see questions I1 to I5 of the questionnaire in the appendix 10.5.1). The dummy variable *INFO* takes on a value of one if respondents are well informed. In addition, we check whether respondents have or have had experiences with AD. Again, a dummy variable (*RELATIVE*) takes on a value of one, if respondents are experienced.

The estimation results show that *INFO* is statistically significant only in one case. The probability of accepting the bid for the DC 'only yes' version of the insurance financed care program is higher, if respondents are informed about AD. However, in all other estimations *INFO* is not significant, suggesting that the kind of information we check for is not relevant for stated WTP.

The variable *RELATIVE* is statistically significant and of expected positive sign in more cases. The probability of accepting the bid depends on the respondents' experience with AD for the program 'research' (DC, both variants) as well as for the program 'diagnosis' (DM). In addition, for the PC version stated WTP of the research program is higher for experienced respondents. This suggests that information bias regarding the AD experience level may be a problem. If only concerned respondents are asked, a higher WTP value is elicited than if the sample is chosen randomly.

8 Cost-benefit analysis

In this chapter we focus on political implications resulting from our analysis. For this reason a cost-benefit analysis for each of the three AD programs is conducted to identify whether a program’s benefits exceed its cost. A positive net social benefit indicates that a program is worthwhile. A cost-benefit analysis can be carried out on a societal level where benefits (measured as WTP) and cost first are projected to the complete population and then are compared to each other. Another possibility is to use the median voter theorem (Mueller, 1989, ch.5) which leads to a cost-benefit analysis on an individual level since median WTP of the program is compared to cost per capita. If a net benefit results the program is expected to be successful in a referendum since at least 50 percent of the voters exhibit higher benefits than cost. Until now, the problems of eliciting benefits have been emphasized. However, the calculation of cost often is a difficult task as well. Assumptions are necessary about how many people will make use of the program. The more people to use the program, the higher the costs. To circumvent this problem one can compute a break-even point indicating the maximal usage up to which a program still is worthwhile.

8.1 Cost benefit analysis for the program ‘care’

The program ‘care’ consists of a two-day course in which professional nursing staff will train informal caregivers. In addition, a professional nurse can be engaged for a few weeks per year allowing informal caregivers to take time off. Such courses for informal caregivers already exist in Switzerland in the cities of Zurich and Basel. According to the health department of the city of Zurich, the costs for such a course amount to maximally CHF 2,500 (US$ 1,470) per patient. Concerning the engagement of a professional nurse, we follow the guidelines of the Swiss nurses association according to which a professional caregiver of AD patients earns a monthly income (including social security contributions) of about CHF 6,800 (about US$ 4,000). The costs per AD patient of the program ‘care’ (consisting of a two-day course for informal caregivers and the hiring of a professional nurse for four weeks) therefore sum up to about CHF 9,300 (US$ 5,470).

In Switzerland, 32,000 AD patients are cared for by informal caregivers at patients’ homes. Therefore, if all of these patients were to take advantage of the care program, maximum possible costs of CHF 298 million (US$ 175 million) would arise. This scenario is very unlikely to happen. However, it is extremely difficult to predict which proportion of the relatives of these 32,000 patients will make use of the program ‘care’. Therefore, Table 8-1 calculates net benefits using maximum possible costs (column three) as well as the break-even point showing the maximum number of patients which can be enrolled in the program so that costs equal benefits (column four). Since results do not differ much depending on the estimation method, we only present results from the parametric estimation method.

Table 8-1: Cost-benefit analysis for program ‘care’ with taxes

Elicitation method	WTP per capita (CHF p.a.)	Total WTP[a] (million CHF p.a.)	Net benefit using maximum costs (million CHF p.a.)	Break-even point[b]
Mean				
DC ‘with no’	285	1,568	1,270	168,548
DM	229	1,260	962	135,430
PC ‘yes’	58	319	21	34,301
PC ‘rather yes’	84	462	164	49,677
Median				
DC ‘with no’	266	1,463	1,165	157,312
DM	142	781	483	83,978

[a] Computed for the Swiss population of 18 years and older (about 5.5 million).
[b] Maximum number of patients guaranteeing more benefits than costs.

It can be clearly seen that the choice of the elicitation technique affects results in a substantial way. While the DC and DM method always lead to a considerable positive net benefit, the PC method yields significantly smaller values. For the ‘yes’ variant the social net benefit is close to zero when using maximum possible costs. However, it is more realistic to assume that not all patients will enroll in the care program, increasing net benefits. Therefore, the realization of the program ‘care’ always results in a positive net benefit regardless of the elicitation method and, from a societal point of view, its implementation should be recommended.

8.2 Cost benefit analysis for the program ‘diagnosis’

The program for an early diagnosis of Alzheimer's disease is described as an office-based dementia screening test. It is based on a routine diagnostic investigation with regard to cognitive functions like concentration and memory. If, after this routine investigation, persons are suspected of having AD, a more comprehensive assessment takes place to check whether the diagnosis is true. Such diagnostic tests for dementia already exist and they are relatively cheap. According to the health department of the city of Zurich average costs of such an interview based routine screening are about CHF 75 (US$ 44) per patient. If a more comprehensive assessment becomes necessary, additional costs of CHF 2,000 (US$ 1,180) arise. The average incidence of AD for a population aged 65 years and older is about 2.34 percent (see Hebert et al., 1995) resulting in 25,600 new cases per year for Switzerland. Therefore, we assume that the suspicion rate – calling for the more comprehensive assessment – will not be higher than 5 percent of all persons enrolled in this screening program.

Again the question arises how many people would make use of the program ‘diagnosis’. Maximum costs occur if the whole population aged 65 years and older (about 1 million people in Switzerland) were to enroll. Therefore, our benchmark scenario consists of a participation rate of 100 percent and a suspicion rate of 5 percent. Table 8-2 (column three) shows the social net benefit resulting from this scenario. The net benefit is positive for all but one (Median, DC ‘with no’) elicitation techniques. Median WTP in the DC ‘with no’ method is computed using statistically non-significant estimation coefficients which leads to this very low value (see section 6.2). Therefore, the values for this method have to be treated with caution. The sensitivity of the results is shown in columns four to six of Table 8-2, where different suspicion rates are applied. At a suspicion rate of 5 percent the net benefits stay positive up to a usage rate of 157 percent at least (always with the exception of median WTP in DC ‘with no’). Doubling the suspicion rate to 10 percent does still allow a usage rate of 100 percent in every case. Even quadrupling the suspicion rate to 20 percent leaves usage rates below 58 percent profitable from a societal point of view. Since it is not to be expected that every second senior citizen will make use of the diagnosis program or that a suspicion rate of 20 percent will happen, the implementation of the program ‘diagnosis’ generally should be recommended.

Table 8-2: Cost-benefit analysis for program ‘diagnosis’

Elicitation method	WTP per capita (CHF p.a.)	Total WTP[a] (million CHF p.a.)	Net benefit participation: 100% suspicion rate : 5% (million CHF p.a.)	Break-even usage rate[b] according to suspicion rate (% of Swiss population aged 65years and older)		
Mean				**5%**	**10%**	**20%**
DC ‘with no’	164	902	727	515%	328%	190%
DM	167	919	744	525%	334%	193%
PC ‘yes’	56	308	133	176%	112%	65%
PC ‘rather yes’	65	358	183	204%	130%	75%
Median						
DC ‘with no’	3	17	-158	9%	6%	3%
DM	50	275	100	157%	100%	58%

[a] Computed for the Swiss population of 18 years and older (about 5.5 million).
[b] Maximally possible enrollees guaranteeing more benefits than costs.

But even if the cost-benefit ratio is favorable from a societal point of view there is no guarantee that the program would win a referendum. 46 percent of the DC respondents opposed the program ‘diagnosis’ in general. Though WTP of the other 54 percent still outweighs the costs of implementation, a referendum would only succeed – assuming everyone votes – if median WTP is higher than cost per capita. Table 8-3 shows median WTP values and highest possible costs per capita of the program ‘diagnosis’. Using the DM values, a suspicion rate higher than 10 percent could already lead to a failure of the program in a referendum. However, arguing with more realistic, lower usage rates will reduce implementation costs to an amount where the program would be accepted by the median voter. Looking at the DC values, the program ‘diagnosis’ would never pass a referendum.

Table 8-3: Benefits and costs of program ‘diagnosis’ for a referendum

Elicitation method	Median WTP per capita (CHF p.a.)	Maximum implementation cost per capita[a] according to suspicion rate (CHF p.a.)				
		2%	5%	10%	15%	20%
DC ‘with no’	3	21	32	50	68	86
DM	50	21	32	50	68	86

[a] Based on a usage rate of 100%.

8.3 Cost benefit analysis for the program ‘research’

In the program ‘research’ universities are supported with tax money in their search of a cure for Alzheimer's disease. The program differs from the other two programs ‘care’ and ‘diagnosis’, since people do not take advantage of the program directly. They are rather willing to pay in advance to improve the chances of an uncertain future benefit. Cost-benefit analysis for this program therefore can be conducted very easily. If willingness-to-pay per capita is projected to the entire Swiss population this yields the yearly maximum amount of tax money to be spent for AD research. Table 8-4 shows that this amount again differs substantially with regard to the elicitation technique. When looking at the mean values the range of this maximum amount lies between CHF 560 million and CHF 1.1 billion. Using median values on the other hand results in a variation of values between CHF 770 million to CHF 1,1 billion (DC and DM method).

Table 8-4: Benefits for program ‘research’

Elicitation method	WTP per capita (CHF p.a.)	Total WTP[a] (million CHF p.a.)
Mean		
DC ‘with no’	189	1,106
DM	170	974
PC ‘yes’	91	561
PC ‘rather yes’	112	704
Median		
DC ‘with no’	175	1,106
DM	114	770

[a] Computed for the Swiss population of 18 years and older (about 5.5 million).

In a direct democracy like Switzerland, a political program is usually designed in such a way that a majority is likely to result in a referendum. For the program ‘research’ to pass such a referendum one has to look at the lowest median value which would result in CHF 770 million per year (DM). A research program supporting AD research of universities with less than CHF 770 million per year therefore is likely to win a referendum, assuming everyone takes part in the referendum. However, these results have to be treated with caution. Respondents may not have been fully aware of having to pay the amount each year. Compared with total health care expenditure of about CHF 40 billion per year, the elicited values make up 1.5 to 3 percent which we find rather high. An additional problem may be that AD is treated as an isolated topic. Respondents may not have considered expenditures for research on other diseases (like e.g., cancer or AIDS) but spent their whole budget for research on AD. This could again cause higher WTP values.

8.4 Political implications

From a societal point of view, all three programs generate a positive net benefit (under reasonable assumptions). Therefore, implementation of each program can be recommended. However, the question arises whether all three programs could be implemented together. Since we elicited respondents’ WTP for each program separately, our data does not allow us to answer this question. When implementing only a single program one therefore has to decide which of the three should be chosen. The program ‘care’ generally generates the highest net benefits and its implementation seems to be most worthwhile. However, since costs are high as well, net benefits of the PC method are smaller than net benefits of the program ‘diagnosis’. Regarding the program ‘research’, benefits lie in the same range as for the program ‘diagnosis’. Since nearly 50 percent of respondents opposed the diagnosis program but only about 20 percent the research program, we conclude that the latter is more likely to win a possible referendum. Therefore, based on comparison of social costs and benefits, the ranking of the three programs seems to be ‘care’, ‘research’, and ‘diagnosis’.

One major drawback of the CV method is that WTP for a commodity is usually elicited isolated from other commodities. Our study focuses only on AD and does not consider other diseases. Therefore, results have to be treated with caution when AD competes with other diseases in the political process. In this case WTP questions have to be adjusted.

9 Conclusions

The aim of our study is to analyze methodological problems in applying the contingent valuation (CV) method to measure people's values for the outcome of health programs. Our main results are summarized in section 9.1. These findings contribute to the development of an economic standard procedure for the evaluation of health programs based on a CV survey. In section 9.2 we present a guideline on how to execute a CV study. However, we will not dive into how to ask a question or what questions should be asked. Interested readers are referred to, e.g., Mitchell and Carson (1989) or Fischhoff and Furby (1988). Instead, we will focus on the choice of the elicitation technique and estimation method.

9.1 Summary

Many industrialized countries are concerned with increasing health care expenditure which is likely to increase due to the growing prevalence of costly diseases such as Alzheimer’s disease (AD). Pressure is growing to justify health care expenditure based on an economic evaluation. One approach is the contingent valuation method which assesses a monetary value of the benefits of a nonpriced commodity. In a survey, people are asked for their willingness-to-pay (WTP) for this commodity. After all, there is still widespread reluctance against valuing health effects in monetary terms. However, without a monetary evaluation a comparison of benefits with costs is not possible and nothing can be said whether a health program or treatment should be implemented or not.

Two main approaches of eliciting WTP values in a CV study are possible: a discrete and a continuous CV format. In environmental economics these two methods have been widely tested. One of the most famous applications of the CV method is the estimation of the damages caused by the Exxon Valdez oil spill in Alaska in 1989. The National Oceanic and Atmospheric Administration (NOAA), which was directed to write regulations governing damage assessment, asked a panel of experts to analyze whether the contingent valuation method is a reliable approach. The NOAA panel concluded that CV studies could produce estimates which were reliable enough if certain guidelines are met. For example, the panel recommended that applications of the CV method should utilize the referendum (discrete choice, DC) format, which belongs to the discrete CV methods (Portney, 1994). However, the DC format is increasingly being criticized of eliciting too high WTP values. Therefore, the support for the payment card (PC) format, which elicits WTP values directly by using a continuous CV format, is growing. Looking at the field of health economics, this debate regarding different elicitation techniques has only just begun (Klose, 1999).

In our study we apply the discrete as well as the continuous CV format, the DC and the PC format. In addition, we use the dissonance-minimizing (DM) format, which gives respondents more than only a yes/no response alternative as in the DC format. The DM format screens respondents for their preferences. Specifically, by allowing respondents to support a program regardless of price and allowing them to protest against the payment vehicle, less biases, and therefore lower WTP values are expected than with the DC format (Blamey et al., 1999).

Our focus is on Alzheimer's disease, which is a prevalent, devastating, and costly disease. In the coming decades, as the population segment older than 85 years increases, the economic burden of AD is likely to become even more pronounced. We investigate whether three programs against AD should be implemented from a societal point of view. The program 'care' tries to ease some of the strain of informal caregivers. The program 'diagnosis' focuses on early detection of AD, which is required for existing therapies to be effective. The program 'research' intensifies the search for a cure against AD.

Let us first summarize the results of the discrete CV elicitation formats, i.e. the DC and DM format. They confirm that the DC format elicits higher mean and especially median WTP values than the DM format. This is true even though we use a modified DC format. We allow respondents to express their general support for a program in a preceding question to the WTP question. In addition, we give a third answer alternative (don't know) permitting respondents to make less of a commitment. Contrary to the DM format, this modification of the DC format does not allow to complete identification of respondents' preferences, since, e.g., we do not know whether a respondent opposes the program itself or the payment vehicle. In addition, the preceding question to the WTP question causes some problems about how to treat no-responses. This is aggravated if many respondents oppose a program. If only yes-responses are used in the estimation, much higher median WTP values are elicited, even if they are corrected by the number of no-responses to represent average population. For the program 'diagnosis', e.g., which is opposed by nearly half of the respondents, the logistic estimation elicits a median WTP of CHF 175 per year, if only yes-responses are considered (see Table 6-15). In contrast, for the DC 'with no' method a median close to zero results. The same is true for the DM format, where a low median WTP of CHF 50 is elicited. However, the coefficients of the constant or the bid variable, which are used to compute median WTP, are statistically insignificant for the DC 'with no' as well as the DM format. This implies that the logit model of the discrete CV format is unsuitable, if a program is opposed by a large number of people. However, these low values are confirmed by the nonparametric method which elicits median WTPs between CHF 39 and CHF 46 for the DC ‘with no’ and the DM format, respectively.

All in all, we conclude that a discrete elicitation technique, which allows screening respondents for their preferences, is preferred to the yes/no response format. However, all approaches of the discrete CV format need strong assumptions about the form of the valuation function, increasing the potential for manipulating WTP values (see Table 7-5 and Table 7-6). This is less of a problem if the question is posed as a referendum, where WTP of the median voter is relevant to examine whether a program should be implemented or not. Median WTP does not depend on assumptions about the tails of the valuation function and is, therefore, more robust than mean WTP.

Contrary to the DC and DM format, the PC format does not need to make any assumptions about the valuation function, since mean WTP values are elicited more or less directly. Regarding the design of the PC format, we use a modified version. Instead of choosing the maximum WTP out of an ordered sequence of bids, respondents have to value each bid. In addition, respondents are given five different responses (yes, rather yes, don’t know, rather no, no) allowing them to express a level of voting certainty. This permits us to elicit WTP values depending on respondents’ certainty that they would pay the price. However, the sequence of bids may provoke biased results. Unfortunately, we did not test for range bias. Therefore, our PC results have to be interpreted with caution. Furthermore, the PC format needs assumptions about respondents’ maximum WTP values, since they are elicited in form of intervals rather than point estimates and, therefore, they have to be calculated. In a nonfunctional as well as a functional estimation approach we simply set the WTP values at interval midpoints, which may bias results. Therefore, in a third approach we apply a maximum bounded likelihood model where the dependent variable is measured on intervals of a continuous scale. However, our results do not differ much, though other studies received quite different results depending on the chosen approach (e.g., Cameron and Huppert, 1989; Welsh and Poe, 1998).

For all three programs the PC method elicits the lowest WTP values. But even for these values a positive net benefit results when they are compared to the costs. From a societal point of view each of the three programs can be implemented. However, it is not clear whether all three programs could be implemented together. The program ‘care’ generally generates the highest net benefits and its implementation seems most worthwhile, followed by the programs ‘research’ and ‘diagnosis’.

9.2 Guideline for a contingent valuation study

Performing a CV study is a difficult task. Its design as well as implementation pose various problems, making a careful scrutiny necessary. In Table 9-1 we summarize how to conduct a CV study by focusing on the choice of the elicitation technique as well as estimation method. First, we suggest eliciting only one WTP question in a questionnaire, despite the large potential cost savings when eliciting benefits of several programs in the same survey. However, asking more than one WTP question may provoke question ordering bias as well as anchoring effects (see section 7.3). Second, a pretest should be conducted where maximum WTP is elicited in an open-ended question. To avoid a high number of respondents saying yes to this amount, we suggest to choose a maximum bid for the survey which exceeds this value by approximately 20 percent. Further, we have some indication that information bias may be present. To test for possible information bias the sample should consist of randomly chosen individuals, which are checked for their information about the evaluated good. If information bias is present, this knowledge might help to decide whether information campaigns, e.g., concerning AD patients' need for intensive care, should be promoted. Regarding the elicitation technique, the discrete as well as continuous CV format should be applied to test results for their robustness. For the discrete CV format we recommend an approach which gives more than only a yes/no response alternative, allowing to screen respondents for their preferences. Specifically, the design should focus on avoiding yea-saying and protest answers against the payment vehicle. The dissonance-minimizing (DM) format seems to be suitable. Furthermore, we suggest eliciting mean and median WTP values in a parametric as well as nonparametric estimation and to test mean WTP values for their sensitivity concerning the tails of the valuation function. For the continuous CV format we favor a modified PC format, tested for possible range bias, which allows respondents to express their preferences more accurately. Instead of asking only for the maximum WTP, the level of voting certainty for each bid should be elicited. Again, we regard it as best to apply a parametric as well as a nonparametric estimation.

Table 9-1: Guideline for a contingent valuation (CV) study

1. Only one WTP question: Give respondents only one WTP question to avoid question ordering as well as anchoring effect.
2. Conduct Pretest: Conduct a pretest where WTP is elicited in an open-ended question. For the survey, increase the resulting maximum WTP by 20 percent.
3. Random sample: Use a random sample and check for respondents' information concerning the good which is being evaluated.
4. Discrete and continuous CV format: Apply a discrete CV format (e.g. dissonance-minimizing (DM) format) and a continuous CV format (e.g. payment card (PC) format).
5. Screen respondents: Screen respondents for their preferences by giving them more than only a yes/no response alternative. Specifically, avoid yea-saying and protest answers against the payment vehicle in the discrete CV format.
6. Parametric and nonparametric estimation: Apply a parametric as well as a nonparametric approach to test results for their robustness.
7. Range bias and representation of the valuation function: The PC format should be tested for range bias, whereas when applying the discrete CV format, the influence of different tails of the valuation function on mean WTP should be checked.
8. Mean and median WTP: Calculate both mean and median WTP.

The literature on cost-benefit analyses in health care is increasing. Our study contributes to solving the puzzle of how to perform contingent valuation studies in this area. Therefore, our findings should help to derive a standard procedure for evaluating health care programs economically. Performed in the right way, such an economic evaluation is meant to be an important aid for the process of political decision-making in the health care sector.

10 Appendix

10.1 Correlation matrix

Table 10-1: Correlation matrix for the independent variables

	AGE	*WOMAN*	*INFO*	*RELATIVE*	*CHILD*	*ALONE*	*SIBLINGS*	*PARENT*	*PLACE*	*EDU_LOW*	*EDU_HIGH*	*INCOME*
AGE	1.000											
WOMAN	0.035	1.000										
INFO	0.009	-0.017	1.000									
RELATIVE	0.201*	0.083*	0.091*	1.000								
CHILD	0.343*	0.124*	-0.009	0.141*	1.000							
ALONE	0.220*	-0.009	-0.026	-0.007	-0.270*	1.000						
SIBLINGS	-0.091*	0.018	-0.015	0.020	0.004	-0.035	1.000					
PARENT	-0.692*	-0.041	-0.038	-0.179*	-0.147*	-0.209*	0.079*	1.000				
PLACE	0.090*	0.013	0.050	-0.002	-0.096*	0.138*	-0.047	-0.066*	1.000			
EDU_LOW	0.197*	0.162*	-0.060*	0.035	0.086*	0.069*	0.031	-0.193*	-0.033	1.000		
EDU_HIGH	-0.079*	-0.234*	0.172*	-0.025	-0.071*	0.010	-0.019	0.092*	0.075*	-0.195*	1.000	
INCOME	-0.210*	-0.168*	0.111*	0.001	-0.008	-0.343*	0.019	0.228*	-0.052	-0.248*	0.258*	1.000

* Correlation is significant at the 0.05 level (2-tailed).

10.2 Detail diagnosis

Table 10-2: Diagnosis - means of the variables (standard deviation)[a]

Elicitation technique	DC			DM			PC
Subsample	DC1	DC2	DC3	DM1	DM2	DM3	PC
YES_TO_BID	0.330	0.330	0.359	0.354	0.355	0.333	-
	(0.471)	(0.471)	(0.481)	(0.479)	(0.479)	(0.473)	
BID	18.412	18.388	18.978	18.757	18.687	19.543	-
	(15.185)	(15.153)	(14.925)	(15.401)	(15.327)	(15.433)	
AGE	46.462	46.546	45.821	47.221	47.073	47.370	49.200
	(16.096)	(16.164)	(16.519)	(16.623)	(16.521)	(15.925)	(20.655)
WOMAN	0.516	0.520	0.533	0.550	0.538	0.506	0.500
	(0.501)	(0.501)	(0.500)	(0.498)	(0.500)	(0.502)	(0.506)
INFO	0.294	0.297	0.310	0.328	0.332	0.389	0.250
	(0.456)	(0.458)	(0.464)	(0.471)	(0.472)	(0.489)	(0.439)
RELATIVE	0.186	0.183	0.207	0.159	0.160	0.173	0.175
	(0.390)	(0.388)	(0.406)	(0.366)	(0.368)	(0.379)	(0.385)
CHILD	0.626	0.630	0.630	0.663	0.660	0.667	0.539
	(0.485)	(0.484)	(0.484)	(0.474)	(0.475)	(0.473)	(0.505)
ALONE	0.184	0.180	0.190	0.226	0.229	0.247	0.410
	(0.388)	(0.385)	(0.394)	(0.419)	(0.421)	(0.433)	(0.498)
SIBLINGS	0.917	0.919	0.929	0.907	0.905	0.907	0.949
	(0.276)	(0.273)	(0.257)	(0.290)	(0.294)	(0.291)	(0.224)
PARENT	0.724	0.718	0.739	0.644	0.649	0.654	0.615
	(0.448)	(0.451)	(0.440)	(0.480)	(0.478)	(0.477)	(0.493)
PLACE	0.388	0.392	0.375	0.408	0.408	0.451	0.368
	(0.488)	(0.489)	(0.485)	(0.492)	(0.493)	(0.499)	(0.489)
EDU_LOW	0.104	0.103	0.109	0.126	0.118	0.099	0.128
	(0.306)	(0.304)	(0.312)	(0.332)	(0.324)	(0.299)	(0.339)
EDU_HIGH	0.226	0.231	0.234	0.247	0.256	0.296	0.128
	(0.419)	(0.422)	(0.424)	(0.432)	(0.437)	(0.458)	(0.339)
INCOME	-	-	2.947	-	-	3.145	-
			(1.836)			(1.805)	
LN_INCOME	-	-	0.869	-	-	0.996	-
			(0.710)			(0.564)	
N	279	273	184	271	273	184	40

[a] Calculated with the available number of observations.

Table 10-3: Diagnosis - coefficients of the logistic DC-model 'with no' (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	-0.012	-0.031	-0.066	-0.062	-0.153	-0.169	-0.187
	(-0.058)	(-0.151)	(-0.311)	(-0.249)	(-0.581)	(-0.635)	(-0.698)
BID	-0.042***	-0.041***	-0.041***	-0.029*	-0.026*	-0.025*	-0.024
	(-4.005)	(-3.872)	(-3.725)	(-2.481)	(-2.115)	(-2.046)	(-1.95)
AGE			-0.01		-0.006	-0.008	-0.008
			(-0.797)		(-0.385)	(-0.506)	(-0.537)
WOMAN			0.01		-0.071	-0.073	-0.075
			(0.037)		(-0.201)	(-0.207)	(-0.214)
INFO			0.381		0.199	0.21	0.206
			(1.238)		(0.55)	(0.58)	(0.568)
RELATIVE			-0.163		-0.161	-0.14	-0.125
			(-0.443)		(-0.392)	(-0.34)	(-0.302)
CHILD			-0.214		-0.487	-0.41	-0.387
			(-0.667)		(-1.31)	(-1.049)	(-0.987)
ALONE			0.294		0	-0.051	-0.075
			(0.756)		(-0.001)	(-0.125)	(-0.163)
SIBLINGS			-0.427		-0.196	-0.215	-0.212
			(-0.87)		(-0.308)	(-0.336)	(-0.332)
PARENT			-0.217		-0.435	-0.453	-0.454
			(-0.496)		(-0.82)	(-0.857)	(-0.859)
PLACE			-0.153		-0.329	-0.333	-0.317
			(-0.528)		(-0.949)	(-0.959)	(-0.912)
EDU__LOW			0.44		0.168	0.23	0.224
			(0.946)		(0.303)	(0.41)	(0.401)
EDU__HIGH			-0.685		-0.713	-0.797	-0.81
			(-1.812)		(-1.584)	(-1.689)	(-1.738)
INCOME						0.066	
						(0.624)	
LN_INCOME							0.221
							(0.808)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	279	273	273	184	184	184	184
Log-likelihood	-167.198	-164.086	-159.131	-116.684	-112.841	-112.649	-112.509
Goodness of fit							
Pseudo R2	0.05	0.05	0.08	0.03	0.06	0.06	0.06
LR test							
E_j vs. E_0	19.38***	17.96***	27.87**	6.81**	14.50	14.88	15.16
E_j vs. E_2			9.91				
E_j vs. E_4					7.69	8.07	8.35
E_j vs. E_5						0.38	7.69
WTP in CHF p.a.							
Mean (Bid_{max}=600[a])	164	164	161	192	190	190	190
Median	3	9	20	26	72	81	93

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

[a] Asked as increase in monthly insurance premium, i.e. Bid_{max} per month = CHF 50.

Table 10-4: Diagnosis - coefficients of the logistic DC-model 'only yes' (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	1.176***	1.178***	1.263***	1.16***	1.167**	1.108**	1.109**
	(4.31)	(4.239)	(4.257)	(3.374)	(3.108)	(2.904)	(2.903)
BID	-0.044***	-0.043***	-0.046***	-0.029*	-0.028	-0.023	-0.023
	(-3.544)	(-3.366)	(-3.382)	(-2.002)	(-1.668)	(-1.37)	(-1.39)
AGE			-0.012		-0.01	-0.017	-0.017
			(-0.657)		(-0.455)	(-0.763)	(-0.724)
WOMAN			0.474		0.417	0.299	0.333
			(1.2)		(0.823)	(0.575)	(0.644)
INFO			0.014		-0.356	-0.287	-0.324
			(0.033)		(-0.708)	(-0.564)	(-0.638)
RELATIVE			0.388		-0.033	0.064	0.03
			(0.687)		(-0.051)	(0.099)	(0.047)
CHILD			-0.125		-0.418	-0.033	-0.1
			(-0.28)		(-0.789)	(-0.053)	(-0.166)
ALONE			-0.311		-0.313	-0.395	-0.398
			(-0.619)		(-0.499)	(-0.625)	(-0.627)
SIBLINGS			0.074		0.51	0.52	0.503
			(0.118)		(0.69)	(0.696)	(0.673)
PARENT			-0.722		-0.529	-0.56	-0.569
			(-1.133)		(-0.699)	(-0.725)	(-0.739)
PLACE			-0.026		-0.379	-0.348	-0.286
			(-0.065)		(-0.763)	(-0.694)	(-0.562)
EDU__LOW			0.117		-0.445	-0.138	-0.212
			(0.185)		(-0.593)	(-0.174)	(-0.27)
EDU__HIGH			-0.436		-0.181	-0.415	-0.355
			(-0.9)		(-0.275)	(-0.601)	(-0.523)
INCOME						0.235	
						(1.305)	
LN_INCOME							0.464
							(1.14)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	152	147	147	101	101	101	101
Log-likelihood	-94.933	-91.888	-88.949	-63.123	-60.677	-59.783	-60.024
Goodness of fit							
Pseudo R2	0.07	0.06	0.09	0.03	0.07	0.08	0.08
LR test							
E_j vs. E_0	14.06***	12.54***	18.42	4.10*	8.99	10.78	10.30
E_j vs. E_2			5.88				
E_j vs. E_4					4.89	6.68	6.20
E_j vs. E_5						1.79	1.31
WTP in CHF p.a.							
Mean (Bid_{max}=600 [a])[b]	169	170	169	198	202	206	206
Median	175	179	176	263	279	317	312

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

[a] Asked as increase in monthly insurance premium, i.e. Bid_{max} per month = CHF 50.

[b] Corrected for non-representative sample by factor 0.545 (= 152/279).

Table 10-5: Diagnosis - coefficients of the logistic DM model (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	0.185	0.169	0.216	0.036	0.059	0.076	0.112
	(0.897)	(0.808)	(0.96)	(0.133)	(0.192)	(0.242)	(0.357)
BID	-0.046***	-0.045***	-0.052***	-0.041**	-0.049***	-0.05***	-0.053***
	(-4.417)	(-4.262)	(-4.386)	(-3.09)	(-3.208)	(-3.236)	(-3.36)
AGE			0.005		0.008	0.003	0
			(0.403)		(0.463)	(0.162)	(-0.006)
WOMAN			0.318		-0.065	0.042	0.034
			(1.031)		(-0.157)	(0.098)	(0.081)
INFO			-0.494		-0.581	-0.609	-0.595
			(-1.552)		(-1.419)	(-1.46)	(-1.424)
RELATIVE			0.843*		0.717	0.807	0.8
			(2.168)		(1.429)	(1.588)	(1.571)
CHILD			-0.89*		-0.95*	-0.654	-0.678
			(-2.544)		(-2.128)	(-1.382)	(-1.439)
ALONE			-0.311		0.088	-0.34	-0.303
			(-0.859)		(0.199)	(-0.673)	(-0.618)
SIBLINGS			-0.061		0.61	0.593	0.557
			(-0.129)		(0.897)	(0.884)	(0.834)
PARENT			0.131		0.088	0.027	-0.049
			(0.314)		(0.163)	(0.05)	(-0.088)
PLACE			0.242		0.453	0.55	0.462
			(0.805)		(1.138)	(1.357)	(1.15)
EDU__LOW			0.176		-1.359	-1.269	-1.299
			(0.378)		(-1.586)	(-1.468)	(-1.501)
EDU__HIGH			0.929**		0.517	0.384	0.397
			(2.709)		(1.137)	(0.828)	(0.858)
INCOME						0.239	
						(1.792)	
LN_INCOME							0.798
							(1.863)
Subsample	DM1	DM2	DM2	DM3	DM3	DM3	DM3
N	271	262	262	162	162	162	162
Log-likelihood	-164.117	-159.313	-148.248	-97.422	-87.252	-85.554	-85.373
Goodness of fit							
Pseudo R2	0.07	0.07	0.13	0.06	0.15	0.17	0.17
LR test							
E_j vs. E_0	24.08***	22.22***	44.35***	11.39***	31.73**	35.12***	35.48***
E_j vs. E_2			22.13*				
E_j vs. E_4					20.34*	23.74*	24.10*
E_j vs. E_5						3.40	3.76
WTP in CHF p.a.							
Mean (Bid_{max}=600 [a])	175	176	167	171	156	155	153
Median	48	45	50	11	14	18	26

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

[a] Asked as increase in monthly insurance premium, i.e. Bid_{max} per month = CHF 50.

Table 10-6: Diagnosis with insurance - coefficients of the parametric PC model (t value)

Subsample	'yes'		'rather yes'	
Regressor variable	**Midpoints estimates**	**Interval estimates**	**Midpoints estimates**	**Interval estimates**
INTERCEPT	-0.137	-0.125	1.609	1.590
	(-0.097)	(-0.097)	(1.467)	(1.488)
AGE	0.025	0.028	-0.001	0.002
	(0.893)	(1.110)	(-0.027)	(0.075)
WOMAN	-0.406	-0.393	-0.215	-0.247
	(-0.883)	(-0.943)	(-0.602)	(-0.710)
INFO	-0.444	-0.517	-0.002	-0.061
	(-0.970)	(-1.235)	(-0.006)	(-0.175)
RELATIVE	0.900	0.838	0.386	0.382
	(1.577)	(1.607)	(0.872)	(0.880)
CHILD	0.178	0.088	0.500	0.467
	(0.251)	(0.134)	(0.908)	(0.854)
ALONE	-0.282	-0.303	0.019	-0.029
	(-0.601)	(-0.710)	(0.052)	(-0.082)
SIBLINGS[a]	-	-	-	-
PARENT	1.093	1.083	0.387	0.365
	(1.205)	(1.313)	(0.550)	(0.532)
PLACE	-0.438	-0.079	-0.421	-0.393
	(-0.089)	(-0.176)	(-1.104)	(-1.059)
EDU__LOW	-0.197	-0.386	-0.528	-0.637
	(-0.257)	(-0.549)	(-0.889)	(-1.083)
EDU__HIGH	0.248	0.161	0.421	0.400
	(0.330)	(0.234)	(0.721)	(0.705)
σ	0.819***	0.718***	0.636***	0.591***
	(6.633)	(6.295)	(6.633)	(6.068)
N	22	22	22	22
Log-likelihood	-26.823	-35.217	-21.259	-32.429
LR test	8.55	9.23	6.22	6.37
WTP in CHF p.a.[b]				
Mean	60	56	68	65
Median	43	43	55	55

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

[a] *SIBLINGS* is dropped from the regression due to collinearity.

[b] Due to the nonresponse of 2 individuals, only 38 observations are used for calculation of WTPs. The no-responses of the prededed WTP question are dropped from the regression; to respresent average WTP values per year of the Swiss population, WTP values are corrected by a factor of 0.579 (=22/38).

10.3 Detail Research

Table 10-7: Research - means of the variables (standard deviation)[a]

Elicitation technique		DC			DM		PC
Subsample	**DC1**	**DC2**	**DC3**	**DM1**	**DM2**	**DM3**	**PC**
YES_TO_BID	0.502	0.513	0.566	0.448	0.454	0.458	-
	(0.501)	(0.501)	(0.497)	(0.498)	(0.499)	(0.500)	
BID	174.820	175.369	167.929	174.444	173.855	168.156	-
	(125.920)	(126.527)	(130.746)	(125.546)	(124.736)	(123.496)	
AGE	48.220	48.118	48.354	47.478	47.386	47.212	48.875
	(16.128)	(16.099)	(16.527)	(16.600)	(16.417)	(16.415)	(19.043)
WOMAN	0.549	0.546	0.561	0.578	0.576	0.570	0.525
	(0.499)	(0.499)	(0.498)	(0.495)	(0.495)	(0.497)	(0.506)
INFO	0.271	0.277	0.283	0.304	0.305	0.307	0.375
	(0.445)	(0.448)	(0.452)	(0.461)	(0.461)	(0.463)	(0.490)
RELATIVE	0.163	0.162	0.187	0.178	0.176	0.190	0.150
	(0.370)	(0.370)	(0.391)	(0.383)	(0.381)	(0.393)	(0.362)
CHILD	0.710	0.709	0.717	0.696	0.699	0.698	0.725
	(0.455)	(0.455)	(0.452)	(0.461)	(0.460)	(0.460)	(0.452)
ALONE	0.174	0.170	0.162	0.207	0.210	0.240	0.125
	(0.380)	(0.376)	(0.369)	(0.406)	(0.408)	(0.428)	(0.335)
SIBLINGS	0.923	0.923	0.904	0.885	0.886	0.877	0.975
	(0.267)	(0.268)	(0.295)	(0.319)	(0.319)	(0.329)	(0.158)
PARENT	0.679	0.675	0.657	0.714	0.714	0.726	0.625
	(0.468)	(0.469)	(0.476)	(0.453)	(0.453)	(0.447)	(0.490)
PLACE	0.338	0.343	0.343	0.373	0.370	0.391	0.375
	(0.474)	(0.476)	(0.476)	(0.484)	(0.484)	(0.489)	(0.490)
EDU_LOW	0.136	0.133	0.136	0.160	0.153	0.151	0.200
	(0.343)	(0.340)	(0.344)	(0.367)	(0.360)	(0.359)	(0.405)
CURABLE	0.455	0.450	0.460	0.541	0.546	0.531	0.350
	(0.500)	(0.500)	(0.500)	(0.500)	(0.499)	(0.501)	(0.483)
EDU_HIGH	0.147	0.148	0.141	0.167	0.168	0.184	0.275
	(0.354)	(0.355)	(0.349)	(0.374)	(0.375)	(0.389)	(0.452)
INCOME	-	-	2.759	-	-	2.924	-
			(1.491)			(1.885)	
LN_INCOME	-	-	0.888	-	-	0.886	-
			(0.505)			(0.627)	
N	277	271	198	270	262	179	40

[a] Calculated with the available number of observations.

Table 10-8: Research - coefficients of the logistic DC-model 'with no' (t value)

	Equation						
Regressor variable	E_1	E_2	E_3	E_4	E_5	E_6	E_7
INTERCEPT	0.809***	0.883***	1.111***	1.233***	1.509***	1.553***	1.524***
	(3.745)	(4.016)	(4.556)	(4.789)	(5.187)	(5.212)	(5.18)
BID	-0.005***	-0.005***	-0.006***	-0.006***	-0.007***	-0.008***	-0.008***
	(-4.463)	(-4.556)	(-5.083)	(-4.669)	(-5.068)	(-5.124)	(-5.076)
AGE			-0.001		-0.014	-0.014	-0.015
			(-0.072)		(-0.907)	(-0.949)	(-1.019)
WOMAN			0.015		0.139	0.213	0.184
			(0.052)		(0.385)	(0.572)	(0.499)
INFO			0.296		0.33	0.332	0.299
			(0.958)		(0.849)	(0.835)	(0.757)
RELATIVE			1.1**		1.191**	1.225*	1.199*
			(2.797)		(2.559)	(2.558)	(2.532)
CHILD			0.155		0.164	0.531	0.418
			(0.459)		(0.379)	(1.133)	(0.912)
ALONE			0.013		0.066	-0.567	-0.323
			(0.033)		(0.134)	(-0.971)	(-0.591)
SIBLINGS			-0.212		0.292	0.24	0.302
			(-0.407)		(0.508)	(0.404)	(0.515)
PARENT			0.192		0.108	0.144	0.16
			(0.46)		(0.211)	(0.275)	(0.308)
PLACE			0.058		0.287	0.254	0.273
			(0.198)		(0.751)	(0.657)	(0.711)
EDU__LOW			-0.215		0.096	0.292	0.245
			(-0.517)		(0.186)	(0.546)	(0.463)
EDU__HIGH			0.749		0.656	0.568	0.67
			(1.858)		(1.307)	(1.143)	(1.348)
CURABLE			0.902***		1.171***	1.154***	1.153***
			(3.229)		(3.351)	(3.254)	(3.272)
INCOME						0.35*	
						(2.235)	
LN_INCOME							0.75
							(1.808)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	277	271	271	198	198	198	198
Log-likelihood	-181.187	-176.454	-163.55	-123.376	-110.90	-108.26	-109.27
Goodness of fit							
Pseudo R2	0.06	0.06	0.13	0.09	0.18	0.20	0.19
LR test							
E_j vs. E_0	21.63***	22.60***	48.40***	24.31***	49.27***	54.54***	52.52***
E_j vs. E_2			25.81*				
E_j vs. E_4					24.96*	30.23**	28.21**
E_j vs. E_5						5.27*	3.25
WTP in CHF p.a.							
Mean (Bid_{max}=400)	189	193	192	209	203	201	201
Median	175	185	184	217	204	201	202

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

Table 10-9: Research - coefficients of the logistic DC model 'only yes' (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	1.522***	1.645***	1.918***	1.97***	2.383***	2.406***	2.392***
	(5.756)	(6.004)	(6.107)	(6.032)	(6.171)	(6.154)	(6.157)
BID	-0.006***	-0.006***	-0.007***	-0.007***	-0.009***	-0.009***	-0.009***
	(-4.736)	(-4.908)	(-5.161)	(-4.809)	(-4.937)	(-4.898)	(-4.898)
AGE			0.012		0.005	0.003	0.003
			(0.806)		(0.268)	(0.141)	(0.153)
WOMAN			0.243		0.32	0.337	0.316
			(0.693)		(0.717)	(0.747)	(0.702)
INFO			0.286		0.537	0.586	0.55
			(0.766)		(1.102)	(1.178)	(1.113)
RELATIVE			1.066*		1.406*	1.417*	1.411*
			(2.322)		(2.448)	(2.424)	(2.425)
CHILD			0.046		-0.154	0.167	0.068
			(0.114)		(-0.28)	(0.281)	(0.118)
ALONE			0.2		-0.018	-0.463	-0.323
			(0.422)		(-0.031)	(-0.681)	(-0.494)
SIBLINGS			0.012		0.44	0.341	0.406
			(0.02)		(0.663)	(0.504)	(0.605)
PARENT			0.431		0.589	0.635	0.659
			(0.901)		(0.966)	(1.018)	(1.06)
PLACE			0.032		0.454	0.415	0.434
			(0.092)		(0.95)	(0.862)	(0.905)
EDU__LOW			-0.457		0.016	0.155	0.128
			(-0.971)		(0.027)	(0.253)	(0.211)
EDU__HIGH			0.893		0.885	0.797	0.883
			(1.741)		(1.322)	(1.222)	(1.351)
CURABLE			0.651*		1.118**	1.099**	1.106**
			(2.019)		(2.689)	(2.63)	(2.655)
INCOME						0.258	
						(1.413)	
LN_INCOME							0.592
							(1.23)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	222	218	218	165	165	165	165
Log-likelihood	-134.502	-129.470	-121.16	-90.531	-80.14	-79.10	-79.40
Goodness of fit							
Pseudo R2	0.08	0.09	0.15	0.13	0.23	0.24	0.23
LR test							
E_j vs. E_0	24.47***	26.54***	43.16***	26.11***	46.88***	48.97***	48.37***
E_j vs. E_2			16.61				
E_j vs. E_4					20.77	22.87*	22.26
E_j vs. E_5						2.09	1.49
WTP in CHF p.a.							
Mean (Bid_{max}=400)[a]	190	195	195	210	209	209	209
Median	220	226	217	242	229	228	229

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

[a] Corrected for non-representative sample by factor 0.801 (= 222/277).

Table 10-10: Research - coefficients of the logistic DM-model (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	0.397	0.401	0.423	0.424	0.5	0.567	0.538
	(1.866)	(1.854)	(1.829)	(1.639)	(1.771)	(1.945)	(1.875)
BID	-0.004***	-0.003***	-0.004***	-0.004**	-0.004**	-0.004**	-0.004**
	(-3.416)	(-3.251)	(-3.292)	(-2.77)	(-2.723)	(-2.783)	(-2.789)
AGE			0.018		0.026	0.016	0.016
			(1.399)		(1.716)	(1.001)	(0.986)
WOMAN			0.312		-0.127	0.059	-0.03
			(1.066)		(-0.369)	(0.166)	(-0.086)
INFO			-0.414		-0.196	-0.303	-0.25
			(-1.342)		(-0.522)	(-0.777)	(-0.653)
RELATIVE			-0.312		-0.246	-0.31	-0.292
			(-0.856)		(-0.582)	(-0.702)	(-0.675)
CHILD			-0.54		-0.68	-0.385	-0.449
			(-1.477)		(-1.55)	(-0.85)	(-0.987)
ALONE			-1.315**		-1.271**	-2.167***	-1.701**
			(-3.119)		(-2.569)	(-3.536)	(-3.116)
SIBLINGS			-0.556		-0.741	-0.86	-0.742
			(-1.309)		(-1.453)	(-1.628)	(-1.439)
PARENT			-0.402		-0.328	-0.778	-0.579
			(-0.985)		(-0.646)	(-1.397)	(-1.083)
PLACE			0.085		0.006	0.221	0.153
			(0.297)		(0.017)	(0.626)	(0.44)
EDU__LOW			-1.011*		-0.974	-0.563	-0.622
			(-2.457)		(-1.9)	(-1.032)	(-1.135)
EDU__HIGH			-0.052		-0.267	-0.637	-0.455
			(-0.137)		(-0.606)	(-1.369)	(-1.009)
CURABLE			0.488		0.344	0.265	0.275
			(1.793)		(1.049)	(0.785)	(0.824)
INCOME						0.373**	
						(2.809)	
LN_INCOME							0.724*
							(1.981)
Subsample	DM1	DM2	DM2	DM3	DM3	DM3	DM3
N	270	262	262	179	179	179	179
Log-likelihood	-179.509	-174.926	-162.44	-119.376	-111.20	-106.90	-109.13
Goodness of fit							
Pseudo R2	0.03	0.03	0.10	0.03	0.10	0.13	0.12
LR test							
E_j vs. E_0	12.37***	11.16***	36.12***	8.14**	24.48*	33.10**	28.63*
E_j vs. E_2			24.97*				
E_j vs. E_4					16.34	24.96*	20.50
E_j vs. E_5						8.61**	4.15*
WTP in CHF p.a.							
Mean (Bid_{max}=400)	170	173	170	172	174	177	175
Median	112	117	114	118	129	140	134

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

Table 10-11: Research with taxes - coefficients of the parametric PC model (t value)

Subsample	'yes'		'rather yes'	
Regressor variable	**Midpoints estimates**	**Interval estimates**	**Midpoints estimates**	**Interval estimates**
INTERCEPT	1.708	1.551	2.399*	2.115*
	(1.755)	(1.597)	(2.440)	(2.062)
AGE	-0.002	-0.002	-0.010	-0.010
	(-0.118)	(-0.150)	(-0.647)	(-0.636)
WOMAN	-1.839***	-1.943***	-1.371***	-1.625***
	(-4.463)	(-4.466)	(-3.294)	(-3.535)
INFO	0.423	0.370	0.389	0.412
	(1.141)	(1.021)	(1.037)	(1.024)
RELATIVE	2.411***	2.526***	2.062***	2.226***
	(4.078)	(4.047)	(3.452)	(3.489)
CHILD	2.281***	2.411***	1.984***	2.140***
	(4.538)	(4.348)	(3.907)	(3.745)
ALONE	1.812***	1.815***	1.326**	1.369*
	(3.645)	(3.514)	(2.640)	(2.522)
SIBLINGS	-1.570	-1.515	-1.058	-0.984
	(-1.865)	(-1.821)	(-1.245)	(-1.127)
PARENT	2.072***	2.104***	1.593**	1.728**
	(3.937)	(4.048)	(2.996)	(3.107)
PLACE	0.431	0.428	0.504	0.584
	(1.399)	(1.434)	(1.621)	(1.805)
EDU__LOW	1.041*	1.158*	0.721	0.859
	(2.323)	(2.431)	(1.592)	(1.779)
EDU__HIGH	0.876*	0.908**	0.844*	0.871*
	(2.489)	(2.584)	(2.372)	(2.359)
CURABLE	1.222***	1.356***	1.141**	1.189**
	(3.296)	(3.439)	(3.046)	(3.076)
σ	0.672***	0.620***	0.679***	0.658***
	(7.616)	(6.036)	(7.616)	(6.366)
N	29	29	29	29
Log-likelihood	-29.624	-40.324	-29.922	-43.651
LR test	30.71**	31.81**	25.95*	27.64**
WTP in CHF[a]				
Mean	99	102	117	128
Median	79	84	93	103

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%

[a] The no-responses of the preceded WTP question are dropped from the regression; to represent average WTP values of the Swiss population, WTP values are corrected by a factor of 0.725 (=29/40).

10.4 Detail care with insurance

Table 10-12: Care with insurance - Coefficients of the logistic DC-model 'only yes' (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	1.251***	1.316***	1.483***	1.829***	1.953***	2.003***	1.977***
	(5.461)	(5.620)	(5.779)	(6.288)	(6.201)	(6.216)	(6.202)
BID	-0.049***	-0.051***	-0.059***	-0.070***	-0.076***	-0.078***	-0.077***
	(-4.969)	(-5.107)	(-5.226)	(-5.528)	(-5.342)	(-5.367)	(-5.343)
AGE			0.006		0.003	0.002	0.001
			(0.419)		(0.183	(0.115)	(0.080)
WOMAN			-0.539*		-0.662*	-0.649	-0.667*
			(-1.713)		(-1.660)	(-1.614)	(1.660)
INFO			0.669*		0.090	0.109	0.079
			(1.889)		(0.213)	(0.255)	(0.185)
RELATIVE			0.684		0.551	0.553	0.534
			(1.565)		(1.099)	(1.084)	(1.051)
CHILD			0.262		0.380	0.652	0.590
			(0.709)		(0.812)	(1.304)	(1.196)
ALONE			0.272		0.502	0.006	0.172
			(0.608)		(0.887)	(0.009)	(0.277)
SIBLINGS			-0.121		0.574	0.600	0.635
			(-0.209)		(0.905)	(0.916)	(0.979)
PARENT			0.601		0.189	0.153	0.190
			(1.279)		(0.324)	(0.256)	(0.321)
PLACE			0.047		0.185	0.146	0.156
			(0.144)		(0.454)	(0.355)	(0.379)
EDU__LOW			0.832*		0.337	0.466	0.470
			(1.704)		(0.563)	(0.767)	(0.771)
EDU__HIGH			0.731		0.621	0.568	0.667
			(1.583)		(1.062)	(0.994)	(1.147)
INCOME						0.271	
						(1.534)	
LN_INCOME							0.623
							(1.374)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	238	233	233	174	174	174	174
Log-likelihood	-147.342	-142.638	-134.897	-94.381	-90.496	-89.267	-89.556
Goodness of fit							
Pseudo R2	0.09	0.10	0.15	0.18	0.21	0.22	0.22
LR test							
E_j vs. E_0	28.50***	30.48***	45.96***	40.15***	47.92***	50.37***	49.80***
E_j vs. E_2			15.48				
E_j vs. E_4					7.77	10.23	9.65
E_j vs. E_5						2.46	1.88
WTP in CHF p.a.							
Mean (Bid_{max}=50)	300	300	300	312	312	300	312
Median	300	312	300	312	312	312	312

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

Table 10-13: Care with insurance - Coefficients of the logistic DC-model 'with no' (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	0.837***	0.885***	0.970***	1.400***	1.511***	1.551***	1.525***
	(4.128)	(4.294)	(4.434)	(5.530)	(5.518)	(5.563)	(5.533)
BID	-0.046***	-0.047***	-0.052***	-0.066***	-0.071***	-0.073***	-0.072***
	(-5.015)	(-5.122)	(-5.179)	(-5.616)	(-5.496)	(-5.561)	(-5.520)
AGE			-0.005		-0.002	-0.003	-0.003
			(-0.409)		(-0.102)	(-0.170)	(-0.194)
WOMAN			-0.391		-0.576	-0.550	-0.565
			(-1.401)		(-1.615)	(-1.525)	(-1.572)
INFO			0.388		0.067	0.066	0.042
			(1.281)		(0.178)	(0.172)	(0.111)
RELATIVE			0.523		0.481	0.480	0.469
			(1.371)		(1.069)	(1.053)	(1.035)
CHILD			0.262		0.347	0.583	0.501
			(0.791)		(0.824)	(1.293)	(1.130)
ALONE			-0.003		0.530	0.112	0.286
			(-0.007)		(1.042)	(0.193)	(0.517)
SIBLINGS			-0.405		0.327	0.357	0.374
			(-0.781)		(0.559)	(0.597)	(0.631)
PARENT			0.350		0.0003	-0.015	0.007
			(0.850)		(0.001)	(-0.028)	(0.014)
PLACE			0.145		0.460	0.439	0.449
			(0.500)		(1.215)	(1.152)	(1.182)
EDU__LOW			0.361		-0.205	-0.094	-0.121
			(0.882)		(-0.401)	(-0.181)	(-0.233)
EDU__HIGH			0.460		0.384	0.347	0.418
			(1.174)		(0.757)	(0.698)	(0.830)
INCOME						0.243	
						(1.524)	
LN_INCOME							0.478
							(1.154)
Subsample	DC1	DC2	DC2	DC3	DC3	DC3	DC3
N	278	272	272	198	198	198	198
Log-likelihood	-177.958	-173.018	-167.536	-115.115	-110.798	-109.607	-110.134
Goodness of fit							
Pseudo R2	0.08	0.08	0.11	0.15	0.19	0.19	0.19
LR test							
E_j vs. E_0	29.47***	31.02***	41.99***	41.81***	50.44***	52.82***	51.77***
E_j vs. E_2			10.97				
E_j vs. E_4					8.63	11.02	9.96
E_j vs. E_5						2.38	1.33
WTP in CHF p.a.							
Mean (Bid_{max}=50)	264	264	252	264	264	264	264
Median	216	228	228	252	252	252	252

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

Table 10-14: Care with insurance - Coefficients of the logistic DM-model (t value)

	Equation						
Regressor variable	**E_1**	**E_2**	**E_3**	**E_4**	**E_5**	**E_6**	**E_7**
INTERCEPT	0.551***	0.513**	0.529**	0.633***	0.675***	0.683***	0.679***
	(2.742)	(2.518)	(2.501)	(2.596)	(2.637)	(2.647)	(2.649)
BID	-0.042***	-0.041***	-0.043***	-0.042***	-0.046***	-0.046***	-0.046***
	(-4.532)	(-4.303)	(-4.276)	(-3.680)	(-3.684)	(-3.701)	(-3.708)
AGE			0.007		-0.005	-0.013	-0.011
			(0.523)		(-0.324)	(-0.847)	(-0.696)
WOMAN			-0.150		-0.480	-0.372	-0.429
			(-0.523)		(-1.395)	(-1.062)	(-1.234)
INFO			0.312		0.039	-0.042	-0.003
			(1.030)		(0.105)	(-0.112)	(-0.008)
RELATIVE			-0.231		0.086	0.042	0.059
			(-0.638)		(0.205)	(0.099)	(0.139)
CHILD			-0.766**		-0.670	-0.466	-0.540
			(-2.097)		(-1.541)	(-1.043)	(-1.203)
ALONE			-0.151		-0.197	-0.727	-0.419
			(-0.391)		(-0.423)	(-1.318)	(-0.822)
SIBLINGS			-0.669		-0.663	-0.707	-0.657
			(-1.552)		(-1.303)	(-1.369)	(-1.284)
PARENT			0.220		-0.084	-0.374	-0.220
			(0.545)		(-0.167)	(-0.697)	(-0.422)
PLACE			-0.324		-0.177	-0.049	-0.104
			(-1.130)		(-0.519)	(-0.141)	(-0.300)
EDU__LOW			-0.543		-0.560	-0.279	-0.377
			(-1.391)		(-1.161)	(-0.554)	(-0.743)
EDU__HIGH			0.038		-0.074	-0.339	-0.192
			(0.098)		(-0.165)	(-0.718)	(-0.415)
INCOME						0.246*	
						(1.921)	
LN_INCOME							0.399
							(1.133)
Subsample	DM1	DM2	DM2	DM3	DM3	DM3	DM3
N	274	264	264	181	181	181	181
Log-likelihood	-176.510	-170.764	-163.307	-117.374	-111.487	-109.538	-110.843
Goodness of fit							
Pseudo R2	0.06	0.06	0.10	0.06	0.11	0.13	0.11
LR test							
E_j vs. E_0	23.96***	21.48***	35.79***	15.72***	27.50***	31.39***	28.79***
E_j vs. E_2			14.32				
E_j vs. E_4					11.77	15.67	13.06
E_j vs. E_5						3.90**	1.29
WTP in CHF p.a.							
Mean (Bid_{max}=50)	228	228	228	240	240	240	240
Median	156	156	144	180	180	180	180

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%.

Table 10-15: Care with insurance - coefficients of the parametric PC model (t value)

Subsample	'yes'		'rather yes'	
Regressor variable	**Midpoints estimates**	**Interval estimates**	**Midpoints estimates**	**Interval estimates**
INTERCEPT	3.407**	3.038*	3.250**	2.824*
	(2.578)	(2.546)	(2.758)	(2.525)
AGE	-0.001	0.002	0.002	0.006
	(-0.035)	(0.146)	(0.113)	(0.413)
WOMAN	0.235	0.152	0.527	0.441
	(0.512)	(0.362)	(1.286)	(1.125)
INFO	-0.238	-0.227	-0.526	-0.516
	(-0.516)	(-0.540)	(-1.277)	(-1.313)
RELATIVE	0.347	0.276	-0.042	0.011
	(0.530)	(0.461)	(-0.072)	(0.019)
CHILD	-0.127	0.003	-0.014	0.035
	(-0.217)	(0.005)	(-0.027)	(0.070)
ALONE	0.156	0.246	0.032	0.065
	(0.227)	(0.395)	(0.053)	(0.112)
SIBLINGS	-2.708*	-2.432*	-2.360*	-2.247*
	(-2.272)	(-2.265)	(-2.221)	(-2.238)
PARENT	0.744	0.764	0.582	0.720
	(1.360)	(1.532)	(1.193)	(1.528)
PLACE	-0.024	0.019	-0.124	-0.030
	(-0.057)	(0.049)	(-0.325)	(-0.083)
EDU__LOW	0.831	0.721	0.599	0.654
	(1.382)	(1.319)	(1.116)	(1.271)
EDU__HIGH	0.931	0.802	1.074*	1.018*
	(1.801)	(1.702)	(2.329)	(2.314)
σ	1.062***	0.947***	0.947***	0.884***
	(8.367)	(8.071)	(8.367)	(7.853)
N	35	35	35	35
Log-likelihood	-51.780	-64.893	-47.770	-62.221
LR test	9.63	9.37	11.42	11.78
WTP in CHF[a]				
Mean	119	109	132	126
Median	68	70	84	85

*,**,*** Coefficient different from zero with an error probability of 5%, 1%, 0.1%

[a] The no-responses of the preceded WTP question are dropped from the regression; to represent average WTP values of the Swiss population, WTP values are corrected by a factor of 0.875 (=35/40).

10.5 Questionnaires

10.5.1 Questionnaire for programs ‘diagnosis’ and ‘care’ with taxes (DC method), full version

Questionnaire on Alzheimer's disease

Alzheimer’s disease is one of the most common health problems of aged people. It is the main cause of a decline in brain functions which is called dementia.

I1: Do you know of any other diseases which are related to high age?

1 ....

2 ....

3 ....

4 I don’t know

First let us give you some information on Alzheimer's disease. The disease progresses slowly and results in death after two to twenty years. The average duration is about 8 years.

At the beginning of the disease persons keep forgetting things. Later on, persons have trouble naming everyday things. They have great difficulties in doing things that require planning, decision-making, and judgment. Social withdrawal begins. In the final stages the patients cannot perform simple tasks of daily life (such as eating or bathing) and will even cease to recognize close family members.

I2: Alzheimer's disease is one of the most expensive diseases in Switzerland. Do you know why this is so?

1 ....

2 ....

3 ....

4 ....

5 ....

6 I don’t know

It is the need of intensive care that makes Alzheimer's disease such a costly disease. Alzheimer's disease costs society about CHF 3.5 billion per year. The costs per patient are about CHF 75'000 per year. In Switzerland about 60,000 people suffer from Alzheimer’s disease. The risk of getting Alzheimer's disease is strongly related to age. While in the age category 65 to 70 years only 1 to 2 percent suffer from Alzheimer's disease it is about a fourth of the people aged 85 years or more. Because of increased life expectancy and aging populations, the number of patients suffering from Alzheimer's disease will rise to about 100,000 in the next 20 years.

I3: Do you know who bears these costs?

1 ....

2 ....

3 ....

4 ....

5 ....

6 I don’t know

Generally only a small part of costs is covered by health insurance. The biggest part is paid out of pocket by the patient herself or her relatives, respectively. Even the patient’s old age pension and her private savings can be used to cover costs. If this is still not enough to cover all costs, the local municipality is obliged to take over the remaining part.

I4: Patients suffering from Alzheimer's disease need intensive care. What percentage do you think receives informal care from their relatives at home?

.... %

About 60 percent of all patients suffering from Alzheimer's disease are cared for informally at their homes. Caring for such a patient is extremely burdensome and time intensive. Most informal caregivers are women who care for their spouses or relatives in addition to their usual duties. This results in a high physical and psychological burden, and since patients need care day and night, informal caregivers have to renounce spare time, holidays, and even quiet nights. The burden for caregivers is often too much for them to cope with, resulting in ailing health on their part.

I5: Is Alzheimer's disease curable?

1 Yes, it is curable.

2 No, it is not curable.

3 It is partly curable

4 I don’t know

To date Alzheimer's disease is not curable. But there are treatments for early detection of Alzheimer's disease. Unfortunately, there is no diagnosis which is 100 percent certain. Pharmacological therapies exist which may delay the proceeding of the illness up to six months. For these treatments to be effective an early diagnosis of AD is necessary. Besides, medical treatment exists that can alleviate particular symptoms of Alzheimer's disease.

Question 1

Do you (or did you) know anybody suffering from Alzheimer's disease?

1 Yes

2 No → go to question 3

Question 2

How are you (or were you) related to this person?

1 Spouse

2 Parent

3 Grandparent

4 Other relative

5 Friend

6 Acquaintance

7 Other

Question 3

In the following few questions we are interested in your opinion on two different programs dealing with Alzheimer's disease. A first program aims at improving early detection of Alzheimer's disease.

A program for an early diagnosis of Alzheimer's disease may look as follows: At the age of 65 years or older people will have the possibility to take part in a yearly office-based dementia screening test. They will be asked questions in a routine diagnostic investigation with regard to their cognitive functions like concentration and memory. If there are signs for Alzheimer's disease a more comprehensive assessment will take place to check whether the diagnosis is true.

Such a screen test is able to identify Alzheimer’s disease in an early stage in 70 out of 100 cases. For those patients a medical treatment is applied which can delay the progression of the disease for up to six months. The medication has no side effects. There is the possibility that Alzheimer's disease is diagnosed, even if the patient is healthy. However, this happens in only 20 out of 100 cases.

Now imagine the Federal Council and the sick funds consider including such a diagnosis program among the mandatory benefits of social health insurance.

Would you basically support the idea to include such a diagnosis program which will allow the application of an early medication therapy delaying the disease for up to six months, among the mandatory benefits of social health insurance?

1 Yes

2 No → go to question 5

3 I don't know → go to question 5

Question 4

Would you be willing to pay … CHF per month (that is ... CHF per year) for a diagnosis program for Alzheimer's disease, to be funded by an increase in health insurance premiums? Please consider that you cannot use this money for other purposes anymore!

1 Yes

2 No

3 I don't know

Question 5

As you already know, more than half of the patients suffering from Alzheimer's disease are cared for by their relatives. This care is very time intensive and caregivers are often at their limits.

A possible support program could now be introduced to ease the burden of the caregivers of patients with Alzheimer's disease. During a two-day course professional nursing staff would train the informal caregivers. In addition, a professional nurse can be engaged for a few weeks per year, allowing informal caregivers to relax and recover during this time. The costs of such a support program would be financed by taxes.

Do you think such a support program for informal caregivers is a good idea?

1 Yes

2 No → go to question 7

3 I don't know → go to question 7

Question 6

Are you willing to pay … CHF per year for a support program for informal caregivers of Alzheimer's disease patients, to be funded by an increase in income taxes? Please consider that you cannot use this money for any other purposes.

1 Yes

2 No

3 I don't know

To conclude this questionnaire we have some questions about your person.

Question 7

Gender?

1 Male

2 Female

Question 8

In which year were you born?

....

Question 9

What is your marital status?

1 Single

2 Married

3 Separated or divorced

4 Widowed

Question 10

How many children do you have?

0 No children

1 One child

2 Two children

3 Three children

4 Four children and more

Question 11

How many persons are living in your household including you?

1 One

2 Two

3 Three

4 Four and more

Question 12

How many brothers and sisters do you have?

0 Zero

1 One

2 Two

3 Three

4 Four and more

Question 13

Are your parents still alive?

1 No

2 Yes, but only father or mother

3 Yes, both

Question 14

What is your nationality?

....

Question 15

In which canton do you live?

....

Question 16

How big is your place of residence?

1 Village with less than 5,000 inhabitants

2 Bigger village with 5,000 to 10,000 inhabitants

3 City with more than 10,000 inhabitants

Question 17

What was the last school you visited?

1 Primary school

2 Secondary school

3 College

4 High school

5 University

Question 18

How would you describe your professional status?

1 Retired

2 Student

3 Working at home

4 Employed

5 Self-employed

6 Unemployed

If you do not work, → go to Question 20.

Question19

Do you work full-time or part-time?

1 Full-time (90% and more)

2 Part-time (50% to 90%)

3 Part-time (less than 50%)

Question 20

About how high is the monthly income of your household? This is the amount of money all members of your household earn each month.

1 Less than CHF 1,001.-

2 CHF 1,001 to CHF 2,000

3 CHF 2,001 to CHF 3,000

4 CHF 3,001 to CHF 4,000

5 CHF 4,001 to CHF 5,000

6 CHF 5,001 to CHF 6,000

7 CHF 6,001 to CHF 7,000

8 CHF 7,001 to CHF 8,000

9 CHF 8,001 to CHF 9,000

10 CHF 9,001 to CHF 10,000

11 CHF 10,001 to CHF 11,000

12 CHF 11,001 to CHF 12,000

13 More than CHF 12,000

Question 21

At the very end we have two more questions regarding the whole questionnaire.

Did you have any difficulties in answering the questions?

1 Yes → go to Question 22

2 No

Question 22

With which questions did you have difficulties and why?

....

....

....

....

10.5.2 Questionnaire for programs 'diagnosis' and 'care' with taxes (DM method), short version

Question 3

In the following few questions we are interested in your opinion on two different programs dealing with Alzheimer's disease. A first program aims at improving early detection of Alzheimer's disease.

A program for an early diagnosis of Alzheimer's disease may look as follows: At the age of 65 years or older people will have the possibility to take part in a yearly office-based dementia screening test. They will be asked questions in a routine diagnostic investigation with regard to their cognitive functions like concentration and memory. If there are signs for Alzheimer's disease a more comprehensive assessment will take place to check whether the diagnosis is true.

Such a screen test is able to identify Alzheimer's disease in an early stage in 70 out of 100 cases. For those patients a medical treatment is applied which can delay the progression of the disease for up to six months. The medication has no side effects. There is the possibility that Alzheimer's disease is diagnosed, even if the patient is healthy. However, this happens in only 20 out of 100 cases.

Now imagine the Federal Council and the sick funds consider including such a diagnosis program among the mandatory benefits of social health insurance.

There are five possible answers. Please mark the one which reflects your opinion best.

(1) I support the diagnosis program with an increase of health insurance premiums of CHF … per month.

(2) I support the diagnosis program and the use of health insurance premiums, but it is not worth CHF … per month to me.

(3) I support the diagnosis program and the use of health insurance premiums, but I cannot afford CHF … per month.

(4) I support the diagnosis program but only if it does not require increasing health insurance premiums.

(5) I oppose the diagnosis program regardless of whether it costs me anything or not.

If you have chosen answer 1, 2, 3, or 5 → go to question 5

Question 4

Please mark which of the following statements best reflects your personal opinion.

(1) I would pay CHF … more health insurance premiums per month for a diagnosis program if I could be convinced that the government doesn't have enough public funds to pay for it.

(2) I would pay CHF … per month for a diagnosis program if an alternative acceptable way of collecting the money could be found.

(3) I cannot afford to pay anything for a diagnosis program.

Question 5

As you already know, more than half of the patients suffering from Alzheimer's disease are cared for by their relatives. This care is very time-consuming and caregivers are often at their limits.

A possible support program could now be introduced to ease the burden of the caregivers of patients with Alzheimer's disease. During a two-day course professional nursing staff would train the informal caregivers. Additionally, a professional nurse can be hired for a few weeks per year, allowing informal caregivers to relax and recover during this time. The costs of such a support program would be financed by taxes.

There are five possible answers. Please mark the one which best reflects your opinion.

(1) I support the program for informal caregivers with an increase of income taxes of CHF … per year.

(2) I support the program for informal caregivers and the use of income taxes, but it is not worth CHF … per year to me.

(3) I support the program for informal caregivers and the use of income taxes, but I cannot afford CHF … per year.

(4) I support the program for informal caregivers but not if it requires increasing income taxes.

(5) I oppose the program for informal caregivers regardless of whether it costs me anything.

If you have chosen answer 1, 2, 3, or 5 → go to question 7

Question 6

Please mark which of the following statements reflects your personal opinion best.

(1) I would pay CHF … more taxes per year for a support program of informal caregivers if I could be convinced that the government doesn't have enough public funds to pay for it.
(2) I would pay CHF … per year for a support program for informal caregivers if an alternative acceptable way of collecting the money could be found.
(3) I cannot afford to pay anything for a support program of informal caregivers.

10.5.3 Questionnaire for programs 'research' and 'care' with insurance (PC method), short version

Question 3

In the following few questions we are interested in your opinion on two different programs dealing with Alzheimer's disease. A first program aims at intensifying research on Alzheimer's disease.

Until now Alzheimer's disease cannot be cured because of lack of knowledge about the disease. This hinders the development of a cure in the near future. Intensified research would raise the probability of a future cure for Alzheimer's disease.

Now imagine that the Federal Council and the parliament consider to support university research on Alzheimer's disease with tax money. Due to this financial support the probability of a possible cure of Alzheimer's disease in the next twenty years will raise.

Do you basically support the idea of using tax money to intensify research on Alzheimer's disease?

1 Yes
2 No → go to question 5
3 I don't know → go to question 5

Question 4

Would you support such a research program on Alzheimer's disease, if your yearly income taxes were to increase by the following amounts? Please consider that you cannot use this money for other purposes anymore!

Increase of yearly tax amount					
CHF 25	Yes	Rather Yes	Don't Know	Rather No	No
CHF 50	Yes	Rather Yes	Don't Know	Rather No	No
CHF 100	Yes	Rather Yes	Don't Know	Rather No	No
CHF 150	Yes	Rather Yes	Don't Know	Rather No	No
CHF 200	Yes	Rather Yes	Don't Know	Rather No	No
CHF 300	Yes	Rather Yes	Don't Know	Rather No	No
CHF 400	Yes	Rather Yes	Don't Know	Rather No	No
CHF 500	Yes	Rather Yes	Don't Know	Rather No	No

Question 5

Do you think Alzheimer's disease will be curable in 20 years?

1 Yes
2 Rather yes
3 I don't know
4 Rather no
5 No

Question 6

As you already know, more than half the patients suffering from Alzheimer's disease are cared for by their relatives. This care is very time-consuming and caregivers are often at their limits.

A possible support program could now be introduced to ease the burden of the caregivers of patients with Alzheimer's disease. During a two-day course professional nursing staff would train the informal caregivers. Additionally, a professional nurse can be hired for a few weeks per year, allowing informal caregivers to relax and recover during this time. The costs for such a support program would be financed by health insurance premiums.

Do you think such a program is a good idea?

1 Yes

2 No

3 I don't know

Question 7

Would you support such a program for informal caregivers of Alzheimer's disease patients, if your monthly health insurance premium were increased by the following amounts? Please consider that you cannot use this money for other purposes anymore!

Increase of monthly insurance premium					
CHF 2	Yes	Rather Yes	Don't Know	Rather No	No
CHF 5	Yes	Rather Yes	Don't Know	Rather No	No
CHF 10	Yes	Rather Yes	Don't Know	Rather No	No
CHF 15	Yes	Rather Yes	Don't Know	Rather No	No
CHF 20	Yes	Rather Yes	Don't Know	Rather No	No
CHF 30	Yes	Rather Yes	Don't Know	Rather No	No
CHF 50	Yes	Rather Yes	Don't Know	Rather No	No
CHF 75	Yes	Rather Yes	Don't Know	Rather No	No

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12 List of abbreviations

AD	Alzheimer’s disease
CE	closed-ended
CHF	Swiss Francs, exchange rate October 2000: US$ 1 = CHF 1.70
CV	contingent valuation
DC	dichotomous choice
DM	dissonance-minimizing
LR	likelihood-ratio
ML	maximum likelihood
OE	open-ended
OLS	ordinary least squares
PC	payment card
WTP	willingness-to-pay