Voluntary deductible choice in Dutch health insurance

Master Thesis

Research report

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Summary

Since 2006, the number of insured who chooses to voluntarily increase the deductible in Dutch health insurance has been tripled. This thesis analyzes this choice for all Dutch insured in the years 2006-2013 and identifies characteristics of insured with a voluntary deductible. Additionally, we identify characteristics of switchers (i.e. insured who moved into an insurance plan with voluntary deductible and insured who moved out), and the number and characteristics of insured who possibly made uninformed decisions regarding the voluntary deductible. Our results show that young males, living in zip codes with a high education level and a high average household income are most likely to opt for a voluntary deductible. Moreover, insured with a voluntary deductible have lower healthcare expenditures, on average €1341, than insured without a voluntary deductible. Insured who moved into an insurance plan with a voluntary deductible generally have low health care expenditure in the past while insured who moved out a voluntary deductible plan had generally high healthcare expenditures in the past. This suggests that many insured make informed decisions with regard to the voluntary deductible. However, we also find that, in 7% of all cases, insured with two consecutive years of high healthcare expenditures incurred a financial loss due to choosing a voluntary deductible in the third year. This group consists of a relatively large share of chronically ill, elderly, and insured living in a zip code with a high average household income. This percentage declined over the years, indicating that an increased number of insured made well-informed decisions. The information provided by our study will be useful for policymakers as it provides an overview of which insured opt for a voluntary deductible. Furthermore, it could be used to target information campaigns to these insured who are financially worse off due to the voluntary deductible.

Keywords: voluntary deductible, health insurance, behavioral economics, risk aversion

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1 Introduction

The Dutch health insurance scheme provides insured persons the option to voluntarily increase the deductible. This implies that insured, who are aged 18 or older, can choose to increase their maximum amount of out-of-pocket payments before insurance takes over. In return for this increased financial risk they receive a premium rebate which differs by voluntary deductible level. For policymakers the voluntary deductible is an interesting instrument as it potentially stimulates insured to reduce healthcare expenditures and provides enhanced consumer choice. On the other hand, it may provide an attractive option to insured as well due to the offered premium rebate.

The number of insured who opts for the voluntary deductible is increasing: in 2006 almost 450,000 insured (3.6% of the eligible population) opted for a voluntary deductible whereas in 2013 as many as 1,350,000 insured (9.9% of the eligible population) did so. They can choose between five different levels, ranging from €100 to €500. The decision regarding the voluntary deductible is made under risk as it has to be made before the insured knows what his/hers health state and resulting healthcare expenses will be. Theoretically, a rational, risk-neutral consumer would only opt for a voluntary deductible if a financial gain is expected, i.e. if the premium rebate exceeds expected out-of-pocket expenditures that arise due to the voluntary deductible (Van Kleef et al., 2007). The option may thus be particularly attractive to healthy insured with expected low healthcare expenditures. For example, when someone's expected expenditures are lower than the mandatory deductible, then the expected financial gain from the voluntary deductible is equal to the rebate. Chronically ill people, however, are likely to be financially worse off with a voluntary deductible due to their high expected healthcare expenditures (van Winssen et al., 2014). An important question, therefore, is whether consumers make informed decisions when they choose for a voluntary deductible. An example of an uninformed decision may be when an insured opts for a voluntary deductible while having high healthcare expenditures in the past as well as high expected expenditures in the future. Such a decision would lead to an expected financial loss for the insured.

Previous studies regarding the voluntary deductible focused for example on the theoretical determinants for its uptake (Van Winssen et al., 2015a) and one of these theoretical determinants; the financial profitability of the voluntary deductible for insured (Van Winssen et al., 2015b), but not so much on characterizing insured who opted for a voluntary deductible. Studies that did focus on characteristics had a small sample size of about 800 respondents (De Jong & Brabers, 2016) or focused on another country (Schellhorn, 2001). Our study provides new evidence in this field by studying decisions made by all Dutch insured with regard to the voluntary deductible. The data we use is obtained from Vektis and contains data on all approximately 16 million Dutch insured for eight consecutive years 2006-2013.

We study the following research questions. First, "What are the specific characteristics of the insured who opt for a voluntary deductible?" To study this we estimate six probit models. In order to see whether these characteristics also predict whether insured opt for higher or lower voluntary deductible levels, we also estimate generalized ordered logit models. Examples of characteristics that are taken into account are sex, age, income, educational level, and past healthcare expenditures. Second, "Which insured altered their choice for a voluntary deductible during our sample years?" For example, which insured switched in a given year from no voluntary deductible to a voluntary deductible, or vice versa? The third research question is: "Which and how many insured made an uninformed decision when opting for a voluntary deductible?" We consider it an uninformed decision when the insured had high healthcare expenditures in *t-1* and *t-2,* and still opts for a voluntary deductible in year *t* where again high healthcare expenditures arise.[1] For research question two and three we provide descriptive analyses to characterize these groups of insured.

Our results indicate that young males, living in zip codes with a high education level and a high average household income are most likely to opt for a voluntary deductible. Healthcare expenditures of insured with a voluntary deductible are typically lower (on average €1341) than of insured without a voluntary deductible. Moreover, the main difference between switchers who move into an insurance plan with voluntary deductible and who move out, are their healthcare expenditures in the past. These are low in case of moving in and high in case of moving out, suggesting that past expenditures are an important determinant for switching. A notable finding on the group of insured who presumably made uninformed decisions was the relatively large share of chronically ill and elderly. The information provided by our study will be useful for policymakers as it provides an overview of which insured opt for a voluntary deductible. Furthermore, the information concerning uninformed decisions could be used to target information campaigns to the insured who are financially worse off due to the voluntary deductible.

The structure of this study is as follows. Chapter 2 contains information on the Dutch healthcare system, followed by a literature review in chapter 3. Chapter 4 discusses the data and provides descriptive statistics, and chapter 5 describes the method for data analysis. The results of the data analysis are presented in chapter 6. Finally, chapter 7 and 8 contain respectively the conclusions and discussion.

[1] By taking into account high healthcare expenditures in three consecutive years the chances of simply having bad luck are decreased

2 Institutional setting

This chapter provides an overview of the Dutch healthcare system. First, we give information on the Dutch healthcare system after the reform in 2006. Then, we introduce the concepts of cost sharing and moral hazard and explain their role in Dutch health insurance.

2.1 The Dutch healthcare system

Healthcare spending accounts for a large share of total expenditures in the Netherlands and continues to increase. In 2013 more than 94 billion euro was spent on healthcare, which is 1.6% more than in 2012. Healthcare spending as a share of the GDP in that year was 15.6% (CBS, 2014). Moreover, this share is expected to double up to 31% in 2040. Reasons for the rapid growth are the use of more, better, and more expensive care. Healthcare costs are also expected to increase due to an aging population in the Netherlands (Van der Horst et al., 2011). Policymakers and politicians are therefore looking for ways to limit healthcare expenditures.

In 2006, a fundamental reform of the Dutch healthcare system came into effect. The philosophy was to introduce more market mechanisms in order to create incentives for a more efficient organization of the healthcare system and to curb the increasing healthcare expenditures. In order to safeguard the public interests, such as quality, affordability, and accessibility of healthcare, the markets are subject to regulation (managed competition). The role of the government became setting the ”rules of the game” and the health insurers, healthcare providers, and consumers became the market players. These market players interact with each other on three different sub-markets: the health insurance market, the healthcare provision market, and the healthcare purchasing market (Schäffer et al., 2010).

At the core of this new system is the Health Insurance Act (*Zorgverzekeringswet, Zvw)*. One of the key characteristics of this act is that health insurers offer the basic health insurance package (Schäffer et al., 2010). The exact coverage of the basic health insurance package is determined by the government each year. All Dutch residents are obligated to enroll in basic health insurance which covers most curative treatments, such as general practitioner (GP) visits, hospital stay, and maternity and obstetric care. Moreover, to ensure competition in the health insurance market, consumers have the right to switch to an alternative policy or health insurer by the end of each calendar year (Maarse & Ter Meulen, 2006). Insurers cannot refuse or end an insurance contract as they have an acceptance obligation, meaning that they are not allowed to reject any applicant (Schut & Varkevisser, 2014). Another consequence of the Health Insurance Act is that all insured pay a nominal premium directly to the health insurer of their choice and an income-related contribution which is deducted from their payroll (Schäfer et al., 2010). The average yearly nominal premiums for

basic health insurance are shown in table 1. Insurers are not allowed to differentiate premiums according to personal characteristics. However, legislation permits them to develop policies with premium rates varying according to the type of plan (Maarse & Ter Meulen, 2006) like an insurance plan with a voluntary deductible which offers the insured a premium rebate (see next section) or complementary insurance. Complementary insurance increases the insurance premium for the insured and decreases the financial risk faced.

Year	2006	2007	2008	2009	2010	2011	2012	2013
Average premium	€1,060	€1,147	€ 1,094	€ 1,110	€ 1,145	€ 1,262	€ 1,287	€1,280

Table 1. Average yearly nominal premium (Vektis, 2013)

2.1.1 Cost sharing and moral hazard

In order to curb the increasing healthcare expenditures, cost sharing methods are introduced in Dutch health insurance. Cost sharing methods only apply to insured aged 18 or older and shift a part of the healthcare costs to the insured. These copayments make them more sensitive to differences in the true cost of treatments and discourage moral hazard (Folland et al., 2010). Moral hazard is the economic term for the change in health behavior and healthcare consumption caused by insurance (Zweifel & Manning, 2000). Due to insurance, the price of a treatment is often cheaper than the market price (and sometimes even zero) and consequently insured tend to overconsume healthcare.

Examples of cost sharing methods applied in the Netherlands are the no-claim refund, the mandatory deductible, and the voluntary deductible. Under the no-claim refund scheme, every insured pays a certain amount – €255 in 2006 and 2007 – upfront. If the insured spends less than €255 on healthcare during a year, then the insurer returns the remaining part to the insured. As of January 2008, this scheme was replaced by the mandatory deductible, implying that insured pay the first incurred healthcare expenditures out-of-pocket until a predetermined level. All healthcare expenditures that exceed this level are reimbursed by the health insurer. Table 2 shows the development of the mandatory deductible over the years. Not all types of medical care are subject to the deductible. For example, GP and maternity care are directly reimbursed by the insurer (for further information see table 8 in the appendix).

Year	2008	2009	2010	2011	2012	2013
Mandatory deductible	€ 150	€ 155	€ 160	€ 170	€ 220	€ 350

Table 2. Mandatory deductible levels (NZa, 2008; NZa, 2013).

Additionally, insured can opt for a voluntary deductible which provides them with the option to influence their level of health insurance coverage. The voluntary deductible is charged on top of the no-claim or the mandatory deductible and consists of five alternative levels, namely €100, €200, €300, €400, or €500. In 2013, almost 10% of the insured (aged 18 or older) opted for a voluntary deductible and 64% of them opted for the legal maximum of €500 (Vektis, 2013). As a result, they faced the maximum amount of out-of-pocket payments of €850 before the insurer took over. In exchange for the financial risk increase, the insured receives a rebate on their nominal premium (Schut & Varkevisser, 2014). The average yearly premium rebates offered in the market are shown in table 3.[2]

Voluntary deductible	2006	2007	2008	2009	2010	2011	2012	2013
€100	€42	€44	€41	€42	€44	€44	€45	€45
€200	€80	€85	€84	€84	€86	€86	€87	€88
€300	€117	€123	€121	€121	€126	€127	€129	€131
€400	€152	€162	€163	€162	€166	€168	€174	€175
€500	€186	€200	€202	€205	€210	€219	€229	€230

Table 3. Average yearly premium rebates in the market (NZa, 2008; NZa, 2013).

About 32% of the Dutch population was already familiar with the possibility to voluntarily increase the deductible before the introduction Health Insurance Act in 2006. These individuals were the so-called privately insured, which comprises about of people in the higher income brackets. They were offered a range of coverage options of which the most important was the choice for a deductible. The remaining 68% of the population was covered via mandatory insurance schemes. For these schemes no deductibles applied (Van Vliet, 2004).

The possibility of choosing higher deductible levels in return for a lower premium offers additional incentives for cautious utilization of healthcare because full prices of treatment have to be paid longer than with only the mandatory deductible (Schellhorn, 2001). Insured, therefore, have an incentive to reduce healthcare utilization to reduce out-of-pocket payments. However, not all insured will be able to limit their healthcare expenditures to such an extent that they benefit from a voluntary deductible. Elderly, chronically ill, and disabled, who are responsible for the largest share of healthcare expenditures in the Netherlands, have a strong need for medical care. Consequently, they are often forced to pay the full mandatory deductible by necessity. These groups therefore

[2] Since insurance companies are free to determine the rebates they offer, the rebates offered by the different insurance companies may deviate from the rebates presented in table 3.

have little opportunity to benefit from the voluntary deductible. The voluntary deductible is thus most likely to be chosen by relatively healthy insured with low expected expenditures.

3 Literature review

This chapter provides a review of existing literature on theoretical determinants of voluntary deductible uptake. Section 3.2 discusses previous studies that made an attempt to identify characteristics of insured with a voluntary deductible. The chapter concludes with hypotheses.

3.1 Theoretical determinants

The voluntary nature of the deductible allows this option to only be chosen by those who expect to gain from it. Theoretically, a rational, risk-neutral consumer who does not face transaction costs would only take a voluntary deductible if a financial gain is expected, i.e. if the premium rebate exceeds expected out-of-pocket expenditures that arise due to the voluntary deductible. The expected healthcare expenditures of a consumer are defined as the product of the losses – costs of healthcare that have to be paid out-of-pocket – and the probabilities that losses occur (Van Kleef et al., 2007). The premium rebate depends on the chosen voluntary deductible level and varies over the years (table 3). These amounts represent the maximum financial gain that can be obtained from opting for a voluntary deductible. Since this increased over the years, opting for the voluntary deductible potentially became more attractive (assuming the mandatory deductible and expected healthcare expenditures remain unchanged). There are three underlying assumptions in this theory: consumers are rational, consumer are risk neutral, and expected financial gain determines whether or not a voluntary deductible is opted for. In this section, all three assumptions are discussed.

One determinant for voluntary deductible uptake is its expected financial gain. Van Winssen et al. (2015b) studied profitability in retrospect for groups of insured. Their results indicate that a voluntary deductible is more likely to be profitable for males, young insured, healthy insured, and insured with few healthcare expenditures in the past. This suggests that when insured are rational and risk neutral, these groups would opt for a voluntary deductible. Moreover, Van Winssen et al. (2014) showed that rational behavior would suggest that about 48% of the population would have to opt for a voluntary deductible of €500 in 2014. Still, only 11% of the Dutch insured opted for one. Similar results are found by Van Kleef et al. (2007), showing that a substantial number of Swiss insured did not choose a deductible in 2003 even though it would have yielded them a financial gain. This suggests that expected financial gain is not the only determinant in the decision to opt for a voluntary deductible.

Besides, consumers may not always make rational decisions. Still, the suggestion that consumers are rational is one of the key assumptions made in the economic analysis of health insurance coverage. It indicates that individuals optimally evaluate costs and benefits of their health insurance options based on stable preferences and that the consumers choose the option that benefits him/her the most in the end, subject to their wealth and income constraints (Baicker et al., 2012). The assumption of rationality of decision-making is often defended by the argument that people will learn to make correct decisions (Tversky & Kahneman, 1986). One learning tool is feedback, which implies that consumers learn from their mistakes and improve their decision-making abilities over time through trial-and-error (Klayman, 1988). Hence, when an insured made an uninformed decision regarding the voluntary deductible and was consequently financially worse off, he/she will not make that same decision next time.

Findings from behavioral economics, however, show that actual behavior does not always correspond with the rational consumer assumption. This explains why people sometimes make suboptimal decisions regarding voluntary deductibles. Examples of why actual behavior deviates from rational behavior are choice overload and misperceptions of risk (Baicker et al., 2012). Both are applicable to the decision whether or not to opt for a voluntary deductible. For example, when people give too much weight to small probabilities they might overestimate the probabilities of needing healthcare, resulting in not opting for a voluntary deductible even though this would be profitable. Moreover, choice overload implies that with an extensive number of options in a choice set, e.g. an insurance plan, people can become overwhelmed and demotivated to choose anything (Iyengar & Lepper, 2000). These behavioral biases may explain the high percentage of insured who should have opted for a voluntary deductible, as this would yielded them a financial gain, but did not. Additionally, a study by Reed et al. (2009) showed that consumers have limited knowledge about deductible plans. For instance, people do not know which medical services are exempt from the deductible. In our case, this would mean that consumers are not able to determine whether the choice of a voluntary deductible is financially profitable or not.

Another reason why actual behavior may deviate from the rational consumer assumption is time inconsistency. People with time-inconsistent preferences may be myopic (Baicker et al., 2012). Decisions to opt for a voluntary deductible may, therefore, be largely based on the short-term benefits of the premium rebate despite the possibility of unfavorable consequences in the future. Relieving short-term liquidity constraints is also distinguished by Van Winssen et al. (2015a) as a stimulating determinant for voluntary deductible uptake. Liquidity constraints could however also have the opposite effects. Individuals may fear to encounter liquidity problems when they may not

be able to pay the deductible amount when healthcare costs arise (Van Winssen et al., 2015a).[3] This effect may be strengthened by an increasing mandatory deductible level; the higher the mandatory deductible, the larger the total amount of out-of-pocket payments that insured will have to pay. This could be a reason for insured to not opt for a voluntary deductible. But also the effect of an increasing mandatory deductible level can go both ways. When the mandatory deductible level increases, a larger proportion of the insured's healthcare expenses falls within the mandatory deductible. Hence, a voluntary deductible may become financially beneficial for more people (assuming the premium rebate for the voluntary deductible stays the same). For example from 2012 to 2013, the mandatory deductible increased from €220 to €350 and hence the number of insured whose expenses do not exceed the mandatory deductible is likely to be higher (van Winssen et al., 2014). Following this reasoning, an increase of the mandatory deductible may lead to an increase in voluntary deductible uptake.

Other determinants in the decision to opt for a deductible are identified by Van Winssen et al. (2015a) and are risk attitude and status quo bias. A person's attitude towards risk can be described as risk averse, risk neutral, or risk seeking. Risk aversion implies that an individual is unwilling to take risks or want to avoid risks as much as possible. Hartog et al. (2002) analyzed risk aversion in view of several individual characteristics. One of their findings suggests that risk aversion declines with increasing income. Also education level reduces risk aversion, in particular for university education relative to lower educational levels. And finally, they found that women have a substantially higher degree of risk aversion than men. In case of the decision regarding the voluntary deductible, which can be seen as taking a risk because the outcome is uncertain, these results suggest that individuals with higher income and/or higher education are more inclined to opt for a deductible. Similarly, men may be more likely to opt for a deductible than women.

Furthermore, voluntary deductible uptake is also likely to be affected by the status quo bias. This bias refers to individuals' tendency of 'doing nothing or maintaining one's current or previous decision' (Samuelson & Zeckhauser, 1988). According to Ritov and Baron (1992), there are two claims embedded in the status quo bias. Both are considered as determinants for voluntary deductible uptake by Van Winssen et al. (2015a). The first claim is that individuals prefer to keep the current state, and the second that individuals are reluctant to take action to change this state. They are respectively called ambiguity aversion and omission bias. They explain why an insured with an insurance plan without a voluntary deductible does not switch to an insurance plan with a voluntary deductible in the next year (or vice versa), even if this would be financially beneficial. A potentially underlying factor of omission bias is transaction costs. This refers to the time and effort that it takes

[3] Since 2012, most insurers allow spread payments of the deductible (NZa, 2014). However, some of them do not offer this possibility when the insured opted for a voluntary deductible.

to choose a plan with or without a voluntary deductible. These transactions costs can be saved by insured by renewing their current plan (Van Winssen et al., 2015a). Another type of costs that can be avoided by renewing the current insurance plan is switching costs, which include costs of closing the new contracted and learning new procedures for dealing with claims (Schlesinger & Von der Schulenburg, 1991).

The decision to opt for a voluntary deductible is also likely to be affected by information sources. It is a decision made under risk, because the choice for the insurance policy is made before knowing what his health state and resulting medical expenses will be (Manning & Marquis, 1996). Individuals are thus faced with uncertainty and will, therefore, seek for information (Bearden & Etzel, 1982).

Insurance plans are typically perceived as complex products, in case consumers often choose to use the advice of others (Noel, 2009). In other words, consumers may use reference groups as an information source. These are defined as a person or group of people that significantly influences an individual's behavior because of the high value that consumers place on word of mouth communication (Bearden & Etzel, 1982; Noel, 2009). Another information source is market information, for instance in the form of advertising (Conchar et al., 2004). Messages in the media like news reports also provide consumers with information and may thus affect their decision-making behavior. There are thus several information sources that may affect decisions made regarding the voluntary deductible and they are likely to be accumulated over time. This may have changed the decisions made over time. First, additional information sources may have increased the number of insured who are familiar with the option to voluntarily increase their deductible and hence, contributes to an increased uptake. Secondly, information influence reduces search time (Noel, 2009) and consumers may, therefore, be more inclined to switch between insurance plans. Thirdly, it may have changed decisions made over time by providing more means for insured to make informed decisions.

3.2 Empirical literature

There are numerous possible determinants for voluntary deductible uptake and reasons for suboptimal decisions made by individuals. However, evidence that links these theoretical suggestions to actual decision-making behavior of insured regarding the voluntary deductible is limited. Only two studies make, to our knowledge, an attempt to identify the characteristics of insured with a voluntary deductible, namely De Jong & Brabers (2016) and Schellhorn (2001).

De Jong & Brabers (2016) conducted a study based on responses of a healthcare consumer panel to identify characteristics of insured with a voluntary deductible. Their study covered the years 2012-2016 and the sample size varied between 684 and 851 respondents over these years. The results indicated that mainly men, young, and high educated individuals with a relatively high income opt for a voluntary deductible. This corresponds with the earlier mentioned studies of Hartog et al. (2002), who stated that risk aversion falls with higher incomes, higher education, and being a man, and the study of Van Winssen et al. (2015b) who indicated that males and young insured are likely to financially benefit from a voluntary deductible. The high-income characteristic also corresponds to the results of Schellhorn (2001) who studied deductible choice in Switzerland and found that having a higher income significantly increases the probability to take a higher deductible. Moreover, they show that the probability to take a higher deductible decreases with age, explained by the suggestion that people might become more risk averse or more aware of potential health problems as they grow older. Furthermore, De Jong & Brabers (2016) found that the number of insured who opted for a voluntary deductible who perceived their own health as very good or excellent increased.

3.3 Hypotheses

Following the studies in the previous sections, we expect the effect of male, education level, and household income on voluntary deductible choice to be positive. Moreover, since insured with high healthcare expenditures are unlikely to benefit from the deductible we expect that age, healthcare expenditures in the past, and the indicators of a chronic condition (Diagnostic Cost Group (DCG) and Pharmaceutical Cost Group (PCG)) negatively affect voluntary deductible choice. Table 4 summarizes our hypotheses.

Variable	Expected effect
Male	+
DCG	-
PCG	-
Healthcare expenditures (in the past)	-
Age	-
Education level	+
Household income	+

Table 4. Hypothesized effects

For the second research question, which concerns the characteristics of insured who altered their choice for a voluntary deductible, we expect to find similar characteristics as for research question one. This is because switchers are part of the total group of the insured with a voluntary deductible in at least one of the studied years. Moreover, a conceivable motive for altering the choice for a voluntary deductible would be either high or low healthcare expenditures in the past. We, therefore, expect to find a difference in healthcare expenditures in the past between insured who moved into an insurance plan with voluntary deductible and insured who moved out.

For the third research question, concerning uninformed decisions made, we expect to see an increase in the share of informed decisions made regarding the voluntary deductible over time. Firstly, people are likely to learn from their mistakes. Another reason is an increase in the number of insured with a very good or excellent self-assessed health opting for a voluntary deductible found by De Jong & Brabers (2016), implying that there is an increasing number of insured for whom it is an informed decision to opt for a voluntary deductible. Additionally, an increasing number of information sources may also enable insured to make better-informed decisions.

4 Data and descriptive statistics

This chapter describes the data of this study. Next, we show how voluntary deductible uptake evolved over time, which is followed by descriptive statistics of the total population and the group of insured with a voluntary deductible.

4.1 Data

A panel data set obtained from Vektis is used for the empirical analysis. Vektis is an organization that collects and analyses data on costs and quality of the Dutch healthcare sector. The data set we use contains administrative individual-level information on more than 16 million Dutch insured for each of the eight years in the period 2006-2013. More specifically, it includes for each individual the variables voluntary deductible level, male, DCG, PCG, healthcare expenditures, age, and a four-digit zip code. The healthcare expenditures are divided into 22 cost categories. For our analyses, we selected the cost categories that are subject to the deductible as these are relevant for examining the decisions made regarding the voluntary deductible (table 8 in the appendix).

The four-digit zip codes that are available in the data set are used to link data from Statistics Netherlands (CBS), obtained via the CBS Statline database, on the level of education, average household income, and share of western and nonwestern immigrants in the insured's neighborhood. Furthermore, data on "low socioeconomic neighborhoods", which is obtained via a report provided

by the CBS[4] commissioned by the ministry of Housing, Neighborhoods, and Integration, and is linked by making use of the four-digit zip codes. Low socioeconomic neighborhoods are neighborhoods that receive extra attention in order to eliminate social inequalities (CBS, 2010).

We started with a sample of 147,453,574 observations. Since the focus of this study is on the decisions made by individuals aged 18 or older because the (voluntary) deductible is only applicable to them, we removed the data on individuals under the age of 18 (24,893,499 observations). Moreover, there were missing or impossible voluntary deductible values (respectively 17,422,652 and 2,805), like €165 and €650, and inaccurate DCG values (360,312) which we excluded as well.[5] The variables we use for the empirical analysis are voluntary deductible choice, male, DCG, PCG, healthcare expenditures in two previous years, age, and the variables linked on zip code basis. Since Stata excludes cases in which there are missing values for any of the variables in the model, we explicitly excluded these cases (33,780,760 observations) from the data.[6] About 4 million of this is due to a limited amount of zip codes covered by the added CBS data compared to the Vektis data.[7] Due to missing healthcare expenditures data in two previous years, this step also removed all 24 million observations from years 2006 and 2007. After all these manipulations, the data set consists of 70,993,546 observations, divided over six years (2008-2013).

4.2 Voluntary deductible uptake

Since 2006, the uptake of the voluntary deductible has been increasing (figure 1). In 2013, 10% of the insured (aged 18 or older opted) opted for a deductible whereas in 2006 almost 4% did. The uptake increase is mainly caused by the higher uptake of the voluntary deductible level €500 which has increased by five percentage points (i.e. from 1% to 6%). The other levels' uptake only slightly increased, varying between an increase of 0.07 and 0.51 percentage points (see table 9 in the appendix).

[4] CBS (2010)

[5] The sample we derived at this point is used to generate descriptive analyses in order to include as much information as possible. The final step is only made for estimating the models (section 5.1 and 5.2).

[6] Descriptive statistics show that the observations we removed from the data (of 2008-2013) have specific characteristics. Most important is that on average 16% had a voluntary deductible. Compared to the total population, a lower share of insured were classified in a DCG (4%) or PCG (14%), and a high share of the insured were aged 18-27 (39%) or had a high income (28%). Perhaps this group consists of a large share of foreign students.

[7] 4850 zip codes were covered in the Vektis data set, whereas 4043 and 4038 zip codes were covered by respectively the income data and the ethnicity data. The data on education covered 4024 zip codes.

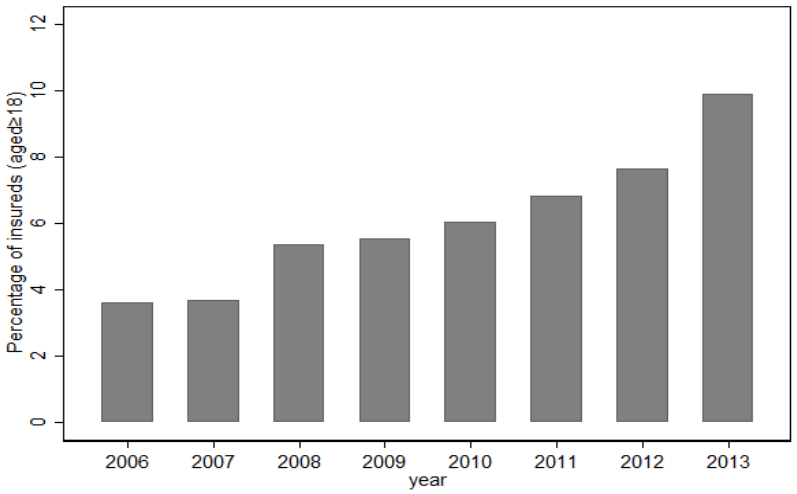

Figure 1. Voluntary deductible uptake

Figure 2 presents the distribution of the chosen voluntary deductible levels, provided that the chosen level is larger than €0. The share of people that opted for the maximum deductible level has grown substantially, from 38% in 2006 to 65% in 2013.

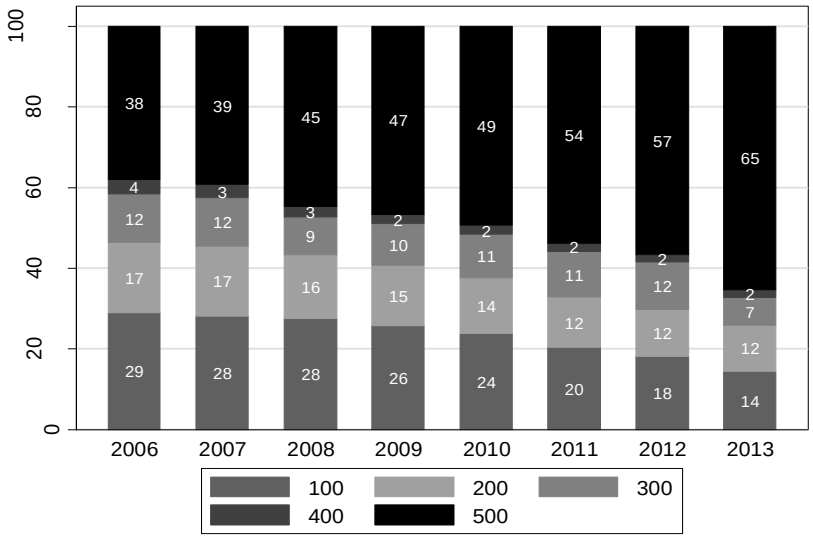

Figure 2. Distribution of insured by chosen voluntary deductible level (in percentages)

4.3 Descriptive statistics

Table 10 and 11 in the appendix provide respectively a description of all variables and summary statistics (mean, minimum, and maximum over the period 2006-2013) of the dependent and independent variables used in the empirical analysis. The sample consists of 13-14 million individuals per year.

4.3.1 Male

The proportion of males and females in the total sample is fairly equally distributed in all years, with on average 49% males and 51% females. In the group of insured with a voluntary deductible, this distribution is quite different with on average 62% males and 38% females. Males thus more often opt for a voluntary deductible than females.

4.3.2 DCG and PCG

The variables DCG and PCG are both proxies for health status and are derived from respectively a set of hospital diagnoses and pharmaceutical use of an insured in the preceding year (Schut & Varkevisser, 2014). An insured classified in a DCG or PCG he/she has respectively a chronic condition or is a chronic user of pharmaceuticals. On average 7% of the total population is in a DCG[8] and on average 27% is in a PCG. Of the insured with a voluntary deductible, every year about 8% is classified in a PCG. For DCG this is lower, but still, on average 2% of the insured with a voluntary deductible is classified in a DCG. Since the healthcare expenditures of these insured are generally quite high this is unexpected, especially because their expenditures will continue to be high due to the chronic nature of their disease or pharmaceutical use. 90% these insured with a DCG and 75% of these insured with a PCG are financially worse off by opting for a voluntary deductible.

4.3.3 Healthcare expenditures

The healthcare expenditures subject to the deductible are unequally distributed in the total population as the median is €344 while the mean is €2027. Approximately 16% of the insured have zero healthcare expenses while others have expenditures up to €2.25 million. For the empirical analyses, we constructed three healthcare expenditure categories, which include information on the rebate and mandatory deductible level. The first category includes insured with healthcare expenditures lower than the mandatory deductible, and the second includes insured whose healthcare expenditures exceed the mandatory deductible but are lower than the mandatory plus the rebate[9]. Insured are included in the third category if they have high healthcare expenditures; exceeding the mandatory deductible plus rebate. This classification helps distinguishing insured persons who were, or could have been, worse/better off due to opting for a voluntary deductible. The first category contains on average 43% of the insured, the second 10%, and the third 47% (table

[8] Until 2009 this is about 3%, while from 2010 onwards it became about 11%. This is because of change in the DCG-model used to determine whether an insured is in a DCG or not. Since 2010 they use a model with an extended number of DCGs. Therefore, also less severe patients are in a DCG since then, resulting in a larger number of insured in a DCG and on average lower healthcare expenditures in this group.

[9] The rebate used here is the one corresponding to the chosen voluntary deductible level, or in case the insured has no voluntary deductible, the rebate of the maximum voluntary deductible (€500).

5). In other words, on average (over the years 2006-2013) 53% of the Dutch insured should have opted for a voluntary deductible of €500 as it would have yielded them a financial gain. However, on average only 6% actually did so.

	2006	2007	2008	2009	2010	2011	2012	2013	Average
1 (%)	50.89	48.51	38.47	38.01	37.41	39.09	43.01	50.53	43.17
2 (%)	8.66	8.64	11.24	11.20	10.95	10.18	9.46	7.58	9.74
3 (%)	40.46	42.86	50.29	50.79	51.63	50.73	47.53	41.89	47.09

Table 5. Total population divided over expenditure categories

On average, the expenditures of insured with a voluntary deductible are €1341 lower of insured without voluntary deductible. The higher the voluntary deductible level chosen, the lower the average expenditures of these insured (figure 8 in appendix). About 29% of the insured with a voluntary deductible had no healthcare expenditures, which is substantially higher than the 16% of the total population. In 75% of the cases, opting for a voluntary deductible resulted in a financial gain for the insured of on average €147 (i.e. they fell in category 1 or 2). The other 25% of the cases were thus financially worse off. This group lost on average €129 due to opting for the voluntary deductible.

4.3.4 Age

The ages of the insured vary between a range of 18 and 115 years old, with a mean age of 48 years. For the empirical analysis, the variable age is used as a categorical variable, representing 10-year age groups starting from 18. This allows us to easily distinguish between age groups in the population and allows for a nonlinear relation with the dependent variables (see section 5.1 and 5.2). The mean age of insured with a voluntary deductible is about 6-8 years lower than of insured without a voluntary deductible. More specifically, in 2006-2011 the age group to which most of the insured with a voluntary deductible belonged was 38-47 which shifted to 18-27 from 2011 onwards. An explanation for the large share of insured aged 38-47 may be that they have a relatively high amount of financial means (on average 31% of them is in the highest household income quintile). This group is thus able to cover unexpectedly high healthcare expenditures in case these incur.

4.3.5 Education

To characterize the insured in terms of education levels we look at two extremes: the zip codes with on the highest share of low educated inhabitants and zip codes with the highest share of high educated inhabitants. We selected the highest 10% of both and derived dummy variables. We

consider these variables as proxies for the education level of the insured. About 13% of the insured lives in a zip code with one of the highest shares of high educated inhabitants (from here on: individuals with a high education level), whereas 9% of the insured lives in a zip code with one of the highest shares of low educated inhabitants (from here on: individuals with a low education level).[10] Since we only have the education data for 2011, we assume that the education level by zip code remains constant over time and use this data for the other years (2008-2010 and 2012-2013) as well. Moreover, individuals with a high education level opt relatively often for a voluntary deductible; 19% of the insured with a voluntary deductible is high educated. The contrary holds for low educated insured, as only 6% of the insured with a voluntary deductible is low educated.

4.3.6 Household income

The median and average household income by zip code are both approximately €34,000 with outliers up to €118,600. The sample is divided over household income quintiles as this enables us to distinguish between groups of the population. We consider this variable as a proxy for the household income of the insured. Moreover, since the data did not cover all years (2006-2013), the missing years were imputed by the most recent available value, resulting in using the values of 2009 for 2010 and 2011.

Furthermore, on average 26% of the insured with a voluntary deductible belongs to the highest household income quintile (from here on: insured with a high household income) whereas only 14% of them belongs to the lowest (from here on: insured with a low household income). Perhaps this is because insured with a high income are better able to cover a large sum of healthcare expenditures at once, in case these arise. Another possible explanation is provided by the theories on risk attitude, suggesting that risk aversion declines with income (Hartog et al., 2002). However, over the years the percentage insured with a low household income that opted for a voluntary deductible increased, thereby causing a shift to a more equal distribution across income quintiles (figure 9 in the appendix). This may be explained by the fact that, in contrast to individuals with a low income, individuals with a high income were already familiar with the option to increase their deductible (Van Vliet, 2004). It may thus took some time before insured with a low income were aware of the option.

4.3.7 Immigrants and low socioeconomic neighborhood

The mean share of western immigrants by zip code is 0.09 and the mean share of nonwestern immigrants is 0.11. On average, 5% of the insured lives in a low socioeconomic neighborhood. Low

[10] Zip codes with high education levels thus seem to have a higher number of inhabitants than zip codes with low education levels.

socioeconomic neighborhoods are for example characterized by a relatively large share of nonwestern immigrants (0.48), relatively young inhabitants, and lower household income compared to other neighborhoods. Insured with a voluntary deductible live in zip codes with on average a slightly higher share of western immigrants and a slightly lower share of nonwestern immigrants than insured without voluntary deductible.

5 Methodology

This chapter describes the methodology used for the data analysis. The data was analyzed using STATA version 14.1. First, the focus is on estimating the effect of specific characteristics of individuals on opting for a voluntary deductible, yes or no, and on the chosen level, provided that they that opted for a level higher than €0. We study this by using a binary and ordered regression model. Next, we explore the group of switchers and informed decisions made by descriptive analyses.

5.1 Binary regression model

To study the effect of specific characteristics of insured on the decision regarding the voluntary deductible, we estimate a model where the dependent variable reflects whether or not an insured opted for a voluntary deductible. As this is a binary dependent variable, the probit model is a suitable model for our estimations. With this model, we want to estimate the effect of specific characteristics of an individual is on the likelihood that he/she opts for a voluntary deductible.

Probit models are binary response models. The primary interest of these models is the response probability

$$P(y = 1|x_1, x_2, \ldots\ldots, x_k) = \Phi(\beta_0 + \beta_1 x_1 + .. + \beta_k x_k) \quad (1)$$

as a function of the independent variables (x). $\Phi(.)$ is the cumulative distribution function (CDF) and is limited to a [0,1] interval. The betas reflect the change in the z-score of Y due to a one unit change in x. An assumption of the probit model is that the error term is unrelated to the independent variables, i.e. exogenous independent variables, and has the standard normal distribution (Wooldridge, 2014). The probit model can be derived from an underlying latent variable model, where y^* is an unobserved, or latent, variable (Long & Freese, 2006).

$$y_i^* = \beta_0 + \boldsymbol{x_i}\beta + \epsilon_i, \quad \text{where } \epsilon_i \sim N(0,1) \quad (2)$$

The observed binary y and the latent y^* are related in the following way (Long & Freese, 2006):

$$y_i = \begin{cases} 1 \; if \; y_i^* > 0 \\ 0 \; if \; y_i^* \leq 0 \end{cases} \tag{3}$$

In our case y^* reflects the individual propensity to opt for a voluntary deductible. When $y_i^* > 0$ the model predicts that that insured *i* opts for a voluntary deductible ($y_i = 1$) and when $y_i^* \leq 0$ the model predicts that insured *i* does not opt for a voluntary deductible ($y_i = 0$).

The independent variables used to determine the response probability for insured *i* are male, DCG, PCG, healthcare expenditures subject to the deductible in the past two years (exp_{t-1} and exp_{t-2}), age, and education level (*loweduc* and *higheduc*) and average household income (*hhinc*) of the zip code where insured *i* lives on. The variables share of western and nonwestern immigrants in the neighborhood, and whether the neighborhood is marked as low socioeconomic neighborhood are added as control variables. The probability that the insured *i* opts for a voluntary deductible is therefore estimated by the following equation, based on equation (1).

$$\begin{aligned} Pr(vd = 1)_i = \Phi \, (\beta_0 + \beta_1 male_i + \beta_2 DCG_i + \beta_3 PCG_i + \beta_4 exp_{i,t-1} + \beta_5 exp_{i,t-1} + \beta_6 age_i + \\ \beta_7 loweduc_i + \beta_8 higheduc_i + \beta_9 hhinc_i + \beta_{10} westimm_i + \beta_{11} nwestimm_i + \\ + \beta_{12} lowsocioecnbh_i) \end{aligned} \tag{4}$$

where i=1,….,N. This equation is estimated for six different years in order to see whether effects of independent variables change over the years. After that, the marginal effects are estimated to be able to interpret the magnitude of the effects.

5.2 Ordered regression model

In addition to estimating the effect of the independent variables on the probability that insured *i* opts for a voluntary deductible, we estimate the effect of our independent variables on the chosen level of the voluntary deductible. For example, does being classified in a DCG decrease the likelihood that an individual opts for a high voluntary deductible level? To study this we use the different voluntary deductible levels, €100, €200, €300, €400, and €500, as dependent variable. This is an ordered, categorical variable and an ordered probit model is, therefore, an appropriate statistical approach. The model for binary outcomes is here expanded to divide y^* into five ordinal categories (Long & Freese, 2006).

Using the same independent variables as in the binary regression model, the following model is used to estimate the probability that the insured *i* opts for a certain voluntary deductible level *m*

$$Pr(vdl = m)_i = \Phi(\beta_0 + \beta_1 male_i + \beta_2 DCG_i + \beta_3 PCG_i + \beta_4 exp_{i,t-1} + \beta_5 exp_{i,t-1} + \beta_6 age_i + \beta_7 loweduc_i + \beta_8 higheduc_i + \beta_9 hhinc_i + \beta_{10} westimm_i + \beta_{11} nwestimm_i + + \beta_{12} lowsocioecnbh_i) \quad (5)$$

where i=1,….,N. We estimate the ordered regression model for six years: 2008-2013.

An assumption that is implicit in ordered regression models is the parallel regression assumption, which implies that the probability curve for each of the outcomes differs only in being shifted to the left or right. Hence, the probability curves are parallel as a consequence of the assumption that the β's are equal for each equation (Long & Freese, 2006). However, this assumption is often violated in practice. According to Long & Freese (2006), the generalized ordered logit (GOL) model is a suitable alternative in these cases as it relaxes the parallel regression assumption and thereby avoids incorrect, incomplete, or misleading results. One of the three special cases of the GOL model is the partial proportional odds model which allows some of the beta coefficients to be the same for all values of j while others can differ. The advantage of using this model is thus that it only imposes constraints on the variables that violated the assumption. The model for an ordinal outcome variable with J categories is formulated as

$$P(y_i > j) = \frac{exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_{2j})}{1 + exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_{2j})} \qquad j = 1,2, \ldots . J-1 \quad (6)$$

where β_1 is vector of parameters that does not violate the parallel regression assumption and β_{2m} is a vector of parameters that vary according to the cut points of the ordered logit model (Williams, 2006).

5.3 Descriptive analyses

To study the characteristics of switchers and individuals who possibly made uninformed decisions regarding the voluntary deductible we provide descriptive analyses. This is a less econometric approach than the models discussed in the previous two sections. Still, it is sufficient to answer research question two and three.

5.3.1 Switchers

To study characteristic of switchers we look at the group who altered their voluntary deductible choice between 2006 and 2013. We created two groups of switchers. One group of individuals with no voluntary deductible that switches for a voluntary deductible larger than €0, and the second group of individuals with a voluntary deductible that switches to a €0 or no voluntary deductible. To study their differences we provide descriptive analyses.

5.3.2 Uninformed decisions

There are numerous types of uninformed decisions with regard to the voluntary deductible possible. For example, insured with low healthcare expenditures who would benefit from a voluntary deductible but do not opt for one, perhaps because they were uninformed about possible choices or due reluctance to take action (status quo bias). On the other hand, insured with high healthcare expenditures may opt for a voluntary deducible because of myopic behavior. They do for example not take into account the possibility of high future healthcare expenditures when choosing for a voluntary deducible. In general, insured have to make a decision under uncertainty so there is also a certain degree of "gambling" involved in the decision-making. An important indicator which insured can use to estimate whether his/hers healthcare expenditures will be high or low is healthcare expenditures in the past. If individual healthcare expenditures are high for two consecutive years, then one could expect them to be high next year as well. To study individuals who possibly made uninformed decisions regarding the voluntary deductible, we thus provide descriptive analyses for insured with high healthcare expenditures in the past two years.

6 Results

This chapter outlines the estimation results of the models presented in chapter 5. Before interpreting the individual parameters some tests are performed to examine the usefulness of the models. After that, the parameters of interest are discussed. This provides an overview of the effects of the independent variables on both voluntary deductible choice (yes or no) and the chosen level of the voluntary deductible (>0). Section 6.3 and 6.4 subsequently discuss the characteristics of switchers and of insured who possibly made uninformed decisions.

6.1 Fit of the models

6.1.1 Multicollinearity

Several variables that are included in our models are likely to be related to each other. For instance being classified in a PCG or DCG is likely to be related to healthcare expenditures, as well as age.

Other possible relations are between education and household income, and low socioeconomic neighborhoods and share of nonwestern immigrants. When the correlation is strong between variables, multicollinearity may be a problem in our regression models (discussed in chapter 5). In order to examine this, we estimated a correlation matrix (table 12 in the appendix). The strongest correlation of 0.62 is found between low socioeconomic neighborhoods and nonwestern immigrants. According to Wooldridge (2014), multicollinearity is usually invoked when some correlations are "large", but an actual magnitude is not well defined. We do not perceive 0.62 as "large" and hence multicollinearity does not seem to be a problem.

6.1.2 Parallel regression assumption

An approximate likelihood-ratio test is performed to test the parallel regression assumption of the ordered probit models. The null hypothesis is that the coefficients are equal across categories so in this case it is desired to get non-significant test results. However, the results show significant results for all six models (table 13 in the appendix) and hence the null hypotheses are rejected. Using an ordered probit model, in this case, would create a misleading impression of how the outcome and the independent variables are related (Williams, 2016). Nonetheless, Williams (2016) notes that when sample sizes are large, which they are in our case, even small violations of the parallel regression assumption can be statistically significant. The substantive impact on the conclusions could thus be minor. He states that it is, therefore, important to assess whether the deviations are important enough to warrant moving away from the more parsimonious ordered probit model. Estimating the GOL model to check this, however, shows that some effects differ in both magnitude and direction across the panels. We, therefore, use the GOL model. After imposing the constraints to the models, the final models did not violate the parallel lines assumption anymore.

6.1.3 Model specification

Model specification is tested to see which independent variables should be included or excluded from the model. This is done by using a likelihood-ratio test. We perform this test for different groups of independent variables[11] to see whether adding these variables to the model significantly improves the fit of the probit model. In this case, the model would give a statistically significant result. All groups of variables tested showed significant likelihood-ratio test results and hence significantly improve the model fit.

[11] The groups of variables tested are: share of western and nonwestern immigrants, share of western and nonwestern immigrants and low socioeconomic neighborhoods, age groups, household income quintiles, lagged expenditure variables, education dummies, lagged expenditure variables and DCG and PCG.

In addition, the link test is used to detect a specification error due to an incorrect functional form. The idea behind this test is that if the model is properly specified, one should not be able to find additional statistically significant predictors. The test adds squared independent variables to the model and test for significance versus the non-squared model. In case a correctly specified model, the additional independent variables (_hatsq) will not be statistically significant. This test is performed for all the probit and GOL models, showing that the _hatsq's are statistically significant at 1% for all these models. Since we have no means to include more variables, we tried changing the specification of several variables[12]. This did however not improve the link test results. Hence, we leave the model like it was with the notion that the results should be interpreted with caution.

6.1.4 Goodness of fit

The goodness of fit is evaluated on the basis of pseudo R-squares scores, which reflect the extent to which the model is better than a model with only a constant term. For our probit and GOL models the pseudo-R-squares are quite low (table 16-22 in the appendix), implying that the models are only slightly better than a model with only a constant term. This may be explained by the fact that individual preferences and risk attitudes are likely to be important in the decisions made regarding the voluntary deductible and these factors are not directly picked up by our model. The fit is however slightly improving over the years, suggesting that a larger part of the decision regarding the voluntary deductible can be explained by our independent variables.

6.1.5 Classification

Classification statistics are used to examine the extent to which the probit models predicted values correctly (table 14 in the appendix). The overall rate of correct classification is estimated to be on average 92%. Classification is sensitive to the relative sizes of each component group, and always favors classification into the larger group. This phenomenon is evident here the specificity value is on average 95%, i.e. the failed events (voluntary deductible=0) are almost perfectly classified whereas the model was less able to correctly classify positive events.

6.1.6 Predictive power

To assess the predictive power of the probit models, we calculate the area under the receiver operating characteristic (ROC). This provides information about the discriminating ability of the model, i.e. it analyzes how many of the observations are predicted accurately. The larger this area the higher is the predictive accuracy of the probit model. Our models have an area under the curve

[12] For example, age^2, age^3, and interaction terms of male in combination with household income, age, low education, and high education

between 0.717 and 0.735, (table 15 in the appendix) indicating that they have some predictive power.

6.1.7 Endogeneity

When an independent variable is endogenous it is correlated with the error term either because of an omitted variable, measurement error, or simultaneity (Wooldridge, 2014). Simultaneity could have been present as the choice for a voluntary deductible is likely to affect healthcare expenditures. However, since we included healthcare expenditures in the past instead healthcare expenditures in year *t*, this problem is avoided. Still, healthcare expenditures in the past may be endogenous due to omitted variables like an individual's health and the perception of illness. The past healthcare expenditure estimates are thus likely to be biased. Moreover, another important omitted variable is risk aversion as this is probably an important determinant in the decision to opt for a voluntary deductible. It is likely to be related to household income and education as according to Hartog et al. (2002), risk aversion decreases with increasing income and education. In other words, risk attitude is likely to be correlated with both our dependent and independent variables, thereby causing a bias. Hence, the exogeneity assumption is likely to be violated and the results should, therefore, be interpreted with caution. The direction of the bias in the estimates of household income and education is likely to be upwards as the beta of risk aversion is probably negative and the correlation between income and education is likely to be negative as well. Finally, voluntary deductible choice may be affected by the situation before 2006, where individuals with a high income already had the option to increase their deductible. This may have affected choices made later in time, causing them to respond differently than individuals with a low income and thereby affecting the effect measured by our household income variable. These estimates are thus likely to be biased.

6.2 Parameter estimates

Table 16 in the appendix shows the average marginal effects of the probit regressions. Marginal effects express the effect that a 1 unit change in an independent variable has on the probability that y=1, i.e. on the probability that an individual opted for a voluntary deductible. The GOL model outcomes can be found in table 17-22 and show whether a variable is associated with opting for either higher or lower levels of the voluntary deductible.

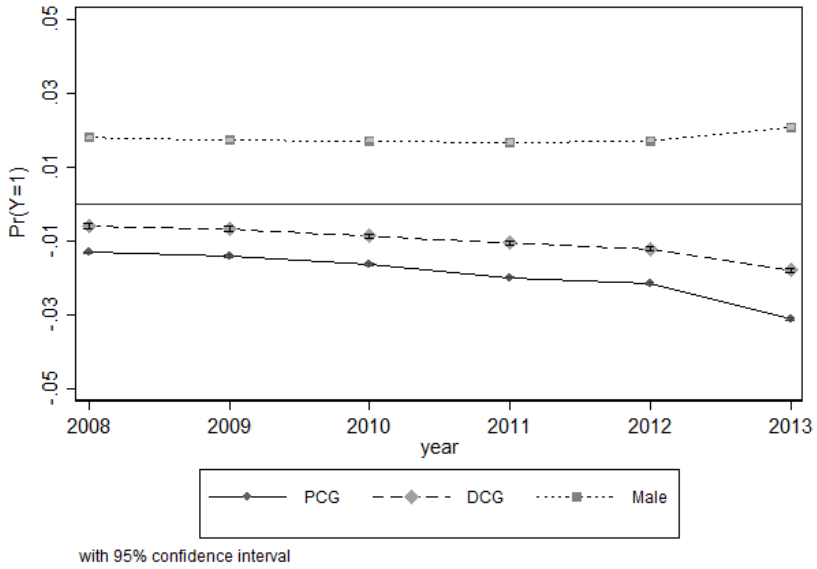

Figure 3. Marginal effects of the variables male, DCG, and PCG. Please note that the confident intervals in the figure are very small and therefore not clearly visible.

Male

For dummy variables, like male, the marginal effect is expressed in comparison to the base category. For example, being male on average increases the probability of opting for a voluntary deductible by 1.8 percentage points in 2008 compared to being female. The size of this effect can roughly be explained as follows: in 2008, 5.4% of the eligible insured opted for a voluntary deductible and about 63.1% of them was male (0.054*(0.631-0.370)=0.014). The difference between 0.018 and 0.014 can be explained by the correlation between the variable male and other variables. Changes in the effect over time can thus be explained by increases in the number of insured with a voluntary deductible, changes in the composition of this group, and changes in the correlation with other variables.[13] As shown by figure 3, the probability of opting for a voluntary deductible is higher for males than for females, thereby confirming our hypothesis. The results of the GOL show that the coefficients for male are positive and significant in all output panels and years. This indicates that being male makes it more likely that the individual is in higher voluntary deductible levels compared to females. These results correspond to theories on risk attitude by Hartog et al. (2002), indicating that males are less risk averse than females.

[13] This reasoning can be applied to all other variables as well. It should, however, be noted that the sample used for the descriptive statistics and the sample used to estimate the models differ due to the excluded incomplete observations in the latter. In addition to deviations due to the correlations between variables, the difference between 0.018 and 0.014 may thus also partly be explained by the different samples.

DCG and PCG

The effect of being in a DCG is negative and significant at 1% in all years and the magnitude of the effect increases every year (figure 3). In 2008 and 2013, being classified in a DCG on average decreases the probability that the insured opts for a voluntary deductible by respectively 0.6 and 1.8 percentage points compared to not being classified in a DCG. Insured with a DCG are thus less likely to opt for a voluntary deductible, and when they do, they are more likely to opt for the lower voluntary deductible levels according to the GOL outputs.

Being in a PCG significantly decreases the probability of opting for a voluntary deductible. Compared with the effect of being in a DCG, the effect of being in a PCG is stronger and both increase in magnitude. Moreover, the GOL output shows that the coefficients for PCG are negative across all panels and years. This indicates that when an insured is in a PCG he/she is more likely to opt for one of the lower voluntary deductible levels than an insured who is not classified in a PCG, provided that he/she opted for a voluntary deductible. These findings are in line with our expectations as insured classified in a DCG or PCG typically have high healthcare expenditures and are therefore less likely to benefit from a voluntary deductible.

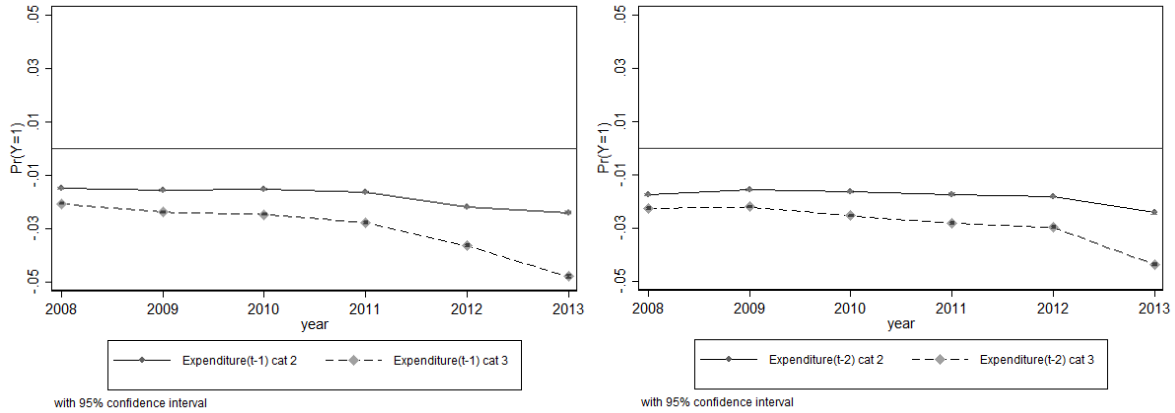

Figure 4. Marginal effects of healthcare expenditures in *t-1* and *t-2*. Please note that the confident intervals in the figure are very small and therefore not clearly visible. Category 2 represents expenditures between the mandatory deductible and the mandatory deductible plus rebate. Category 3 represents expenditures exceeding the mandatory deductible plus the rebate.

Healthcare expenditures

Having healthcare expenditures that exceed the mandatory deductible plus the rebate (category 3) in t-1, lowers the probability that someone opts for a voluntary deductible with on average 2.1 percentage points compared to having expenditures below the mandatory deductible (category 1) in 2008. Hence, when an insured has high healthcare expenditures in the year preceding the voluntary deductible choice, the insured is less likely to opt for a voluntary deductible than an insured who had

low healthcare expenditures. This confirms our hypothesis, stating that high healthcare expenditure in the past decreases the chance for an uptake of the voluntary deductible. The effect of having healthcare expenditures in category 2 is also negative, but weaker. Similar effects are found for healthcare expenditures in t-2. Overall, higher healthcare expenditures in the past decrease the probability that an insured opts for a voluntary deductible.

Moreover, GOL results show that when insured have high healthcare expenditures (i.e. category 3), they are more likely to opt for one of the lower voluntary deductible levels once they opt for one. On the other hand, being in category 2 significantly increases the probability that the insured opts for a higher voluntary deductible compared to being in category 1.

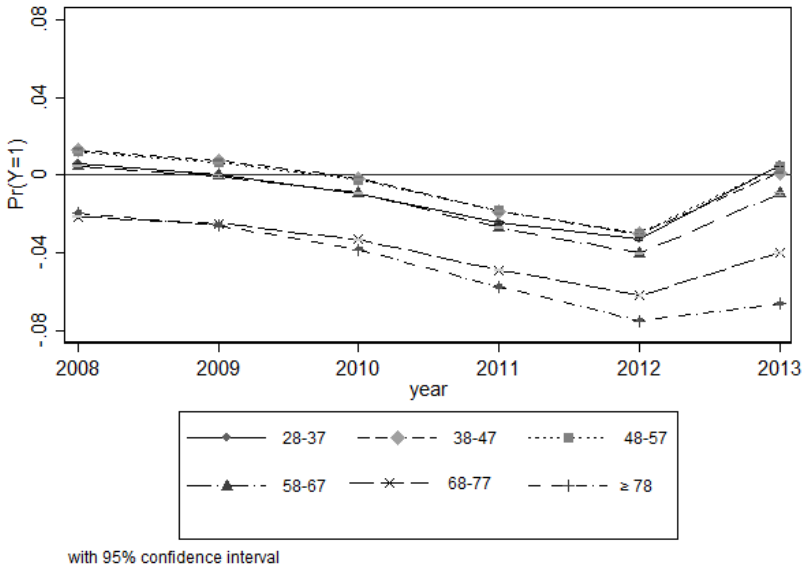

Figure **5.** Marginal effects of the age categories, compared to being aged 18-27. Please note that the confident intervals in the figure are very small and therefore not clearly visible.

Age

Since these results are compared to being aged 18-27, figure 5 indicates that in general insured aged older than 27 are less likely to opt for a voluntary deductible than insured aged younger than 27. Only in 2008 and 2009, insured aged 28-57 are slightly more likely to opt for a voluntary deductible than the youngest age group. Between 2012 and 2013, there is a sudden weakening of all effects. In the descriptive statistics we found similar patterns; the share of insured with a voluntary deductible that is aged 18-27 increased until 2012, but dropped in 2013.

Overall, elderly are thus less likely to opt for a voluntary deductible compared with young insured which confirms our hypotheses and may be explained by the higher healthcare expenditures of elderly. Moreover, the results of the ordered regression models show that elderly are significantly

less likely to opt for higher voluntary deductible levels compared to being 18-27 years old. An explanation for this may be that risk aversion increases with age (Schellhorn, 2001).

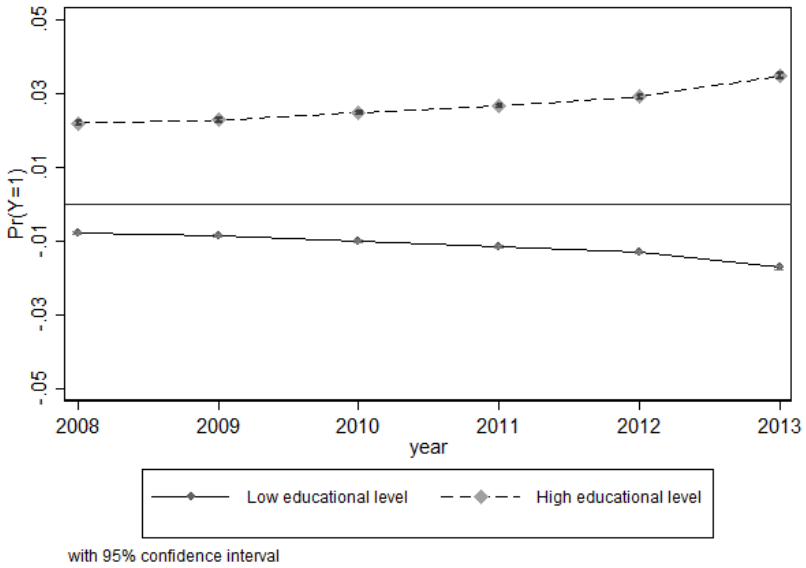

Figure **6.** Marginal effect of living in a zip code with 10% lowest education levels and effect of living in a zip code with the 10% highest education levels. Please note that the confident intervals in the figure are very small and therefore not clearly visible.

Education

The effect of living in a zip code with one of the largest shares of low educated inhabitants is negative in all years (compared to living in another zip code) and its effect increases over time. The magnitude of the effect varies between -0.7 percentage points in 2008 and -1.7 percentage points in 2013. This suggests that low educated insured are less likely to opt for a voluntary deductible than others. Additionally, the GOL outputs show that they are more likely to opt for the lower voluntary deductible levels. On the other hand, living in a zip code with one of the largest shares of high educated inhabitants has a positive effect on the probability of opting for a voluntary deductible, compared to living somewhere else. The magnitude of the effect varies between 2.2 percentage points in 2008 and 3.5 percentage points in 2013. The results of the ordered regression show these insured are significantly more likely to opt for higher voluntary deductible levels. These results could be explained by the theory on risk attitudes provided by Hartog et al. (2002), suggesting that risk aversion declines with education. High educated individuals are thus more inclined to take risks than low educated individuals, which is reflected in their probabilities to opt for a voluntary deductible.

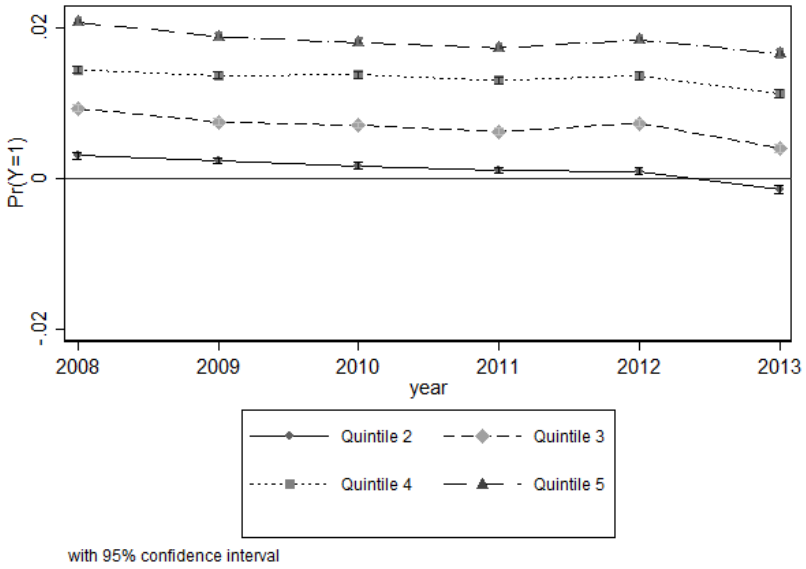

Figure **7.** Marginal effects of household income quintiles, compared to the lowest quintile (1). Please note that the confident intervals in the figure are very small and therefore not clearly visible.

Household income

The higher the household income quintile the more positive the effect on the probability that an individual opts for a voluntary deductible compared to lowest household income quintile. The decreasing magnitude of the effects corresponds to less dispersion in the distribution among household income quintiles as shown by the descriptive statistics. The results, which indicate that individuals with a high household income are more likely to opt for a voluntary deductible, confirm our hypothesis and correspond to the risk attitude theories of Hartog et al. (2002), who suggested that risk aversion declines with income.

In 2008-2010, individuals with a higher household income tend to be less extreme in their voluntary deductible choice i.e. they are less likely to opt for €500 or €100, than insured in the lowest household income quintile. This can be seen by the positive, significant coefficients in the first panels and the negative, significant coefficients in the last panels. In 2011-2013, the coefficients are negative and significant, indicating that insured in household income quintile 2-5 are less likely to opt for higher voluntary deductible levels compared to insured in quintile 1. The significance levels vary by year and quintile (see table 17-22 appendix).

6.3 Switchers

A large number of insured, about 13.9 million, never switched between an insurance plan without a voluntary deducible and a plan with voluntary deductible in the years 2006-2013. Nevertheless, the number of switchers increased every year (table 24 in appendix) and, in total, 1.3 million insured switched at least once. There are several explanations for this relatively low number of switchers.

First, the theory on choice overload suggests that people can become overwhelmed and demotivated to choose anything. Second, the status quo bias explains why insured rather stick to the current situation and therefore do not switch. The increased number of switchers may be explained by an accumulation of available information sources over the years. Consequently, search costs became lower and insured may have become more inclined to switch.

Descriptive analyses show that the most notable difference between switchers who move into a voluntary deductible and who move out is their healthcare expenditures in the past, especially healthcare expenditures in *t-1.* Individuals who moved out had on average 2.6 times higher healthcare expenditures in *t-1* than insured who moved in in that same year. For expenditures in *t-2* this pattern was also evident but to a lesser extent; here the expenditures of insured who moved out of an insurance plan with voluntary deductible were on average 1.7 times higher. A reason for moving out could thus be high healthcare expenditures in the previous year(s). This suggests that many insured make informed decisions, i.e. that they take into account important information like previous healthcare expenditures to estimate the potential financial gain of a voluntary deductible. Section 6.3, however, discusses some examples where this does not seem to be the case.

Furthermore, insured who moved out an insurance plan with voluntary deductible are characterized by a higher percentage of females, a higher percentage of insured classified in a DCG or PCG, and a lower household income than insured who moved in (see table 25-26 in the appendix for all numbers). More specifically, the share of insured with a low household income has been increasing in the group of switchers to €0, from 15% in 2008 to 23% in 2013. This increase is mainly at the expense of the share of individuals with a high household income, which decreased from 27% to 22%. This pattern is not evident in the group of switchers to a voluntary deductible larger than €0. An explanation for this may be the increasing mandatory deductible, making the total financial risk faced by insured larger, and perhaps too large for insured with a low income. 64% of them would have gained financially if they kept their voluntary deductible. Moreover, in the total group of insured with a voluntary deductible the share of the lowest income quintile increased over the years, so eventually, the absolute inflow of this group was larger than the outflow.

6.4 Uninformed decisions

The group with high healthcare expenditures (i.e. exceeding the mandatory deductible plus rebate) in the past two years (*t-1* and *t-2*) consists of about 4 million insured every year. 84% of them also have high healthcare expenditures in year *t.* Expenditures in the past two years thus seem to be a meaningful predictor for future expenditures.

Most insured with high healthcare expenditures in two consecutive years and no voluntary deductible in these years do not change their voluntary deductible level in year *t*. However, even though it is a small share, some insured did switch (table 6). This is remarkable as one could expect to have high healthcare expenditures in year *t* as well. On average, 62% of this group also had high expenditures in year *t* and were thus financially worse off by opting for a voluntary deductible (by contrast, of all insured with a voluntary deductible only 25% is financially worse off). This suggests that for some of these insured opting for a voluntary deductible may be an uninformed decision. The share of these types of uninformed choices decreased over the years, starting with 84% in 2008 and ending with 48% in 2013. This suggests that, in 2013, 52% of the insured who opted for a voluntary deductible after two years of high expenditures made well-informed choices because they financially gained by opting for the voluntary deductible in *t*.

	2008	2009	2010	2011	2012	2013
High $exp_{t-1,\ t-2}$ & $VD_{t-1,\ t-2}=0$	3,473,281	3,883,561	4,536,859	4,679,096	4,709,565	4,576,537
$VD_t=1$	17,079	3,707	6,164	14,164	14,716	46,858
	0.5%	0.1%	0.1%	0.3%	0.3%	1.0%
High exp_t & $VD_t=1$	14,423	2,581	3,889	8,027	7,970	22,297
	84.4%	69.6%	63.1%	56.7%	54.2%	47.6%

Table 6. Insured with high expenditures and vd= 0 in *t-1 t-2* who switched to a voluntary deductible in *t*.

The majority in the group that opted for a voluntary deductible after two years of high expenditures and was subsequently financially worse off is female (57%). On average 13% of them is classified in a DCG and 43% in a PCG, which are substantially higher shares than in the total group of insured with a voluntary deductible (respectively 2% and 8%). 86% in of the insured who were financially worse off had to pay the full deductible and, on average, they lost €148. Furthermore, this group is characterized by a significantly lower share (16%) of high-educated insured and a significantly higher share (7%) of low-educated insured than in the total group of insured with a voluntary deductible (18% and 6%). There are no clear differences between the groups on the basis of their age and household income. Hence, the group of insured who were financially worse off due to opting for a voluntary deductible after two years of high healthcare expenditures can be characterized by more females than males, a large share of chronically ill, and lower education levels.

Another remarkable group consists of insured with high healthcare expenditures and a voluntary deductible in the two consecutive years. After two years of being financially worse off due to the voluntary deductible, one would expect them to switch to an insurance plan without voluntary deductible. However, on average 84% of the insured in this group kept their voluntary deductible (table 7). 75% of them were again financially worse off due to the voluntary deductible. For them, it would thus have been better to switch to an insurance plan without a voluntary deductible, and not switching could thus indicate an uninformed decision. About 7% of all insured with a voluntary made this or the previous type of uninformed decisions described. Moreover, just as the previous uninformed decisions described, the share of financially worse off in this group declined every year which suggests that there is higher share of insured who make informed decisions. Possible explanations for this may be the impact of an increased amount of available information and learning effects.

	2008	2009	2010	2011	2012	2013
High $exp_{t-1, t-2}$ & $VD_{t-1, t-2}$ =1	46,275	50,811	93,727	101,476	97,080	97,012
VD_t=1	36,956	43,722	84,779	83,625	84,050	75,687
	79.9%	86.0%	90.5%	82.4%	86.6%	78.0%
High exp_t & VD_t=1	31,142	35,193	64,634	62,515	59,469	48,667
	84.3%	80.5%	76.2%	74.8%	70.8%	64.3%

Table 7. Insured with high expenditures and a voluntary deductible in year *t-1* and *t-2* who kept their voluntary deductible after these years.

The group of insured who were financially worse off due to the voluntary deductible in three consecutive years is characterized by a substantial share of chronically ill (on average 19% is in a DCG and 54% in a PCG) and a large share of elderly. 20% is older than 68 years old whereas in the group of insured with a voluntary deductible only 4% is older than 68. Perhaps these insured have limited knowledge about deductible plans (Reed et al., 2009), have no clear insights into incurred costs, or are not aware of the fact that they have a voluntary deductible. Another notable characteristic is the large share of individuals with a high household income: 30% belongs to the highest quintile whereas only 13% belongs to the lowest. This hardly changes over the years. In the total group of insured with a voluntary deductible, this distribution is less dispersed; here 26% is in the highest quintile and 15% is in the lowest quintile. The large share of insured in the highest income quintile may be because the financial loss has no large impact on their total budget. So they may not notice the increased out-of-pocket payments or they are simply still willing to take the risk because of the

limited impact, whereas for insured in the lowest quintile this amount may cause financial hardship. Another possible explanation for not switching, after being financially worse off in two consecutive years, may be the status quo bias.

7 Conclusions and discussion

This thesis considers the decision to opt for a voluntary deductible. It thereby contributes to the existing literature in three ways. First, it characterizes insured with a voluntary deductible. Secondly, it characterizes insured who altered their choice regarding the voluntary deductible. Thirdly, it provides insights into which insured may have made an uninformed decision by opting for a voluntary deductible and were consequently financially worse off.

A probit model and a GOL model are used to estimate the likelihood of opting for a voluntary deductible, and the likelihood of opting for either a high or low level, based on specific characteristics for the insured. Our results show that young males, living in zip codes with a high education level and a high average household income are most likely to opt for a voluntary deductible. A plausible explanation for this is provided by the study of Hartog et al. (2002), suggesting that these groups of individuals are typically less risk averse. Further, healthcare expenditures in the past decrease the likelihood that an insured opts for a voluntary deductible. , insured with a voluntary deductible have lower healthcare expenditures, on average €1341, than insured without. It seems therefore that mainly relatively healthy insured opt for a voluntary deductible which is in line with our expectations. An unanticipated finding, therefore, is the reasonably constant share of insured classified in a DCG and/or PCG among individuals with a voluntary deductible. Our estimations indicate that being classified in one of these groups significantly decreases the probability of opting for a voluntary deductible, and once they do opt for a voluntary deductible they are more likely to opt for one of the lower levels. Still, a substantial number of them opt for a voluntary deductible. This is remarkable as chronically ill are not likely to benefit from a voluntary deductible. Of the insured classified in a DCG or PCG with a voluntary deductible, respectively 90% and 75% of were financially worse off. We could not clarify their presence by other explanations than behavioral biases such as misperceptions of risk or choice overload (Baicker et al. 2012). Hence, further studies regarding the rationale of these insured for opting for a voluntary deductible would be interesting. Another interesting option for future research may be to follow these insured over time to see whether they made a single suboptimal choice or structurally made uninformed decisions.

A limitation of our study is, however, that our findings on education and household income are not fully accurate. First, because they reflect an average value in a zip code instead of the

individual value of the insured, and second, because they only cover a limited number of years. Additionally, their reported coefficients are likely to be overestimated due to the potential endogeneity bias. Future investigations should thus preferably use individual data of these variables and include a variable on risk attitude to avoid this endogeneity bias.

Noteworthy in the results of the probit models is that the coefficients of all variables have a deviating size in 2013; either they reflect a relatively strong increase in magnitude or, in case of age and household income, a suddenly weaker effect compared to the other years. This can be explained by a relatively strong increase in voluntary deductible uptake (from 7.65% to 9.91%). Other explanations are provided by a change in the composition of the group of insured with a voluntary deductible.

Our results with regard to switchers indicate that their characteristics are line with the characteristics found for insured with a voluntary deductible. Moreover, the main difference between switchers who move into an insurance plan with voluntary deductible and who move out is their healthcare expenditures in the past. This suggests that insured make informed decisions with regard to the voluntary deductible. However, we also find that in 7% of all cases, insured incurred a financial loss due to the voluntary deductible after two consecutive years of high healthcare expenditures. We consider this as possible uninformed decisions. Some of them were financially worse off due to the voluntary deductible in two consecutive years and still did not switch to an insurance plan without voluntary deductible. This group consisted of a relatively large share of chronically ill and elderly. A possible explanation for this, is that these insured have limited knowledge about deductible plans or no clear insights into incurred costs. Moreover, the group consisted of a relatively large share of insured with a high household income. Perhaps, these insured are not triggered to switch because the higher out-of-pocket expenditures make no large enough impact on their total budget. Of the group who switched to a plan with a voluntary deductible after two years of high healthcare expenditures, 57% is female and again a large share is chronically ill. Despite these groups, it seems by the increasing fit of the probit models that insured did make better-informed decisions over time as this indicates that the variables explain a larger part of the decision with regard to the voluntary deductible. Hence, insured seem to take information like past healthcare expenditures to a larger extent into account. Additionally, in both groups of uninformed decisions studied, the share of individuals who were financially worse of due to the voluntary deductible in year *t* declined in both groups. Possible explanations for this are an increased number of information sources and the suggestion that people learn from their mistakes.

A suggestion for future investigation may be to include variables that depict how an individual handles decisions where risk is involved. In this thesis, the theories on individual

determinants and behavioral biases are primarily used to explain our findings. It may, however, be interesting to explicitly include this information. This is also likely to improve the fit of the models which is in our study quite low.

To conclude, our study confirms previous findings on characteristics by De Jong & Brabers (2016) and Schellhorn (2001), expands this evidence base by analyzing the total Dutch insured population, and provides new evidence to uninformed decisions made by insured. A key strength of the present study was the size of our data set, enabling us to study the total insured population in the Netherlands over eight years. Moreover, the information provided by this thesis may be useful for policymakers. First, the finding that a large share of the insured with a voluntary deductible lives in a zip code in the highest household income quintile may be considered as positive as this group is able to cover large out-of-pocket expenditures in case these arise. However, the increasing share of insured in low-income zip codes may be a development which may warrant further investigation. Besides, there is a considerable large number of insured (about 7% of the insured with a voluntary deductible), who seem to have made uninformed decisions by opting for a voluntary deductible. Among them, there is a substantial share of chronically ill and elderly. Keeping healthcare affordable for consumers is an important policy goal. These findings, therefore, suggest that courses of action are necessary to protect this vulnerable group of insured against high out-of-pocket expenditures. For example, policymakers can use this information to develop targeted information campaigns for these insured to make them more aware of the financial consequences of opting or a voluntary deductible and provide them with clearer information about their expenditures and current health insurance plan.

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Appendix

Table 8.

Healthcare expenditures subject to the deductible
• Cross-border healthcare • Dental care • Geriatric rehabilitation care • Hospital care • Medical transport • Mental care with stay • Mental care without stay • Mental care, other • Paramedical care • Pharmaceutical care • Physiotherapy • Mental care in primary care sector • Transportation for persons lying down • Transportation for persons sitting • Medical aids

Table 9. Voluntary deductible uptake

Voluntary deductible	2006	2007	2008	2009	2010	2011	2012	2013
0 (%)	96.38	96.31	94.64	94.44	93.94	93.19	92.35	90.09
100 (%)	1.05	1.04	1.47	1.43	1.44	1.39	1.39	1.42
200 (%)	0.63	0.64	0.85	0.83	0.84	0.84	0.89	1.14
300 (%)	0.43	0.43	0.50	0.57	0.65	0.78	0.89	0.67
400 (%)	0.13	0.12	0.14	0.13	0.13	0.14	0.14	0.20
500 (%)	1.38	1.45	2.39	2.60	3.00	3.66	4.34	6.47
>0 (%)	3.62	3.69	5.36	5.56	6.06	6.81	7.65	9.91
>0 (number)	446,174	444,797	702,682	736,450	809,674	917,464	1,038,948	1,350,784

Table 10. Description of variables

Variable	Description
vd	dummy equal to 1 if the insured opted for a voluntary deductible, 0 otherwise
vdl	categorical variable consisting of the 5 voluntary deductible levels; €100, €200, €300, €400, and €500
male	dummy equal to 1 if the insured is a male, 0 otherwise
DCG	dummy equal to 1 if the insured is in a DCG, 0 otherwise
PCG	dummy equal to 1 if the insured is in a PCG, 0 otherwise
exp	categorical variable consisting of three expenditure categories: 1. exp≤md, 2. md<exp≤(md+rebate), and 3. exp>(md+rebate). In case the insured had a voluntary deductible the rebate of the corresponding level is used. In other case the rebate of the maximum voluntary deductible is used (€500)
age	categorical variable consisting of 10-year age groups starting from age 18
loweduc	dummy equal 1 if the insured lives in a zip code belonging to the zip codes with the 10% highest shares of low educated people, 0 otherwise
higheduc	dummy equal 1 if the insured lives in a zip code belonging to the zip codes with the 10% highest shares of high educated people, 0 otherwise
hhinc	categorical variable consisting of household income quintiles, based on the average household income per zip code weighted by the number of households by zip code according to the CBS data
westimm	continuous variable consisting of the share of western immigrant per zip code. Derived by dividing the number of western immigrants living in zip code *z* by the total number of inhabitants in zip code *z.*
nwestimm	continuous variable consisting of the share of nonwestern immigrants per zip code. Derived by dividing the number of nonwestern immigrants living in zip code *z* by the total number of inhabitants in zip code *z.*
lowsocioecnbh	dummy variable equal to 1 if the zip code is market as “Low socioeconomic neighborhood”, 0 otherwise
md	variable representing the mandatory deductible level
rebate	Variable representing the rebate associated with the voluntary deductible level and year

Table 11. Summary statistics

	Mean	Std. Dev	Min	Max
Voluntary deductible	0.06	0.24	0	1
Voluntary deductible level	22	95	0	500
Male	0.49	0.50	0	1
DCG	0.07	0.26	0	1
PCG	0.26	0.44	0	1
Expenditures subject to deductible	2,027	6,657	0	2,253,642
Age	48	18	18	115
Low educated	0.09	0.29	0	1
High educated	0.13	0.33	0	1
Household income	34,107	6,247	11,000	118,600
Western immigrants (share)	0.09	0.05	0	1
Nonwestern immigrants (share)	0.11	0.13	0	1
Low socioeconomic neighborhood	0.05	0.21	0	1
Mandatory deductible	214	66	150	350
Rebate	9	41	0	230

Figure 8. Average healthcare expenditures subject to the deductible by voluntary deductible level (x-axis) and year.

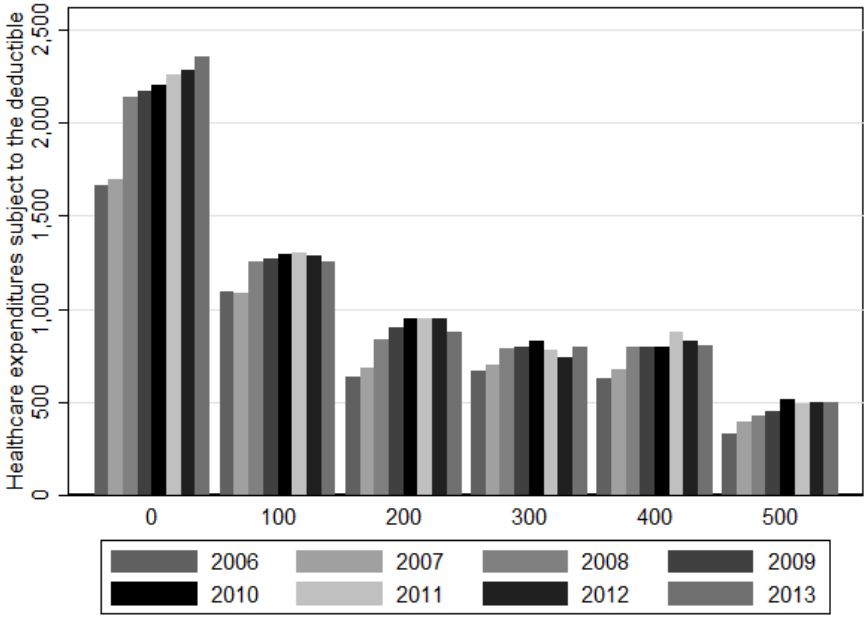

Figure 9. Insured with a voluntary deductible divided over household income quintiles (x-axis). Quintile 1 represents insured who live in zip code with on average one of the 20% lowest household income levels. The dashed, horizontal line at 20% represents the average in the total population.

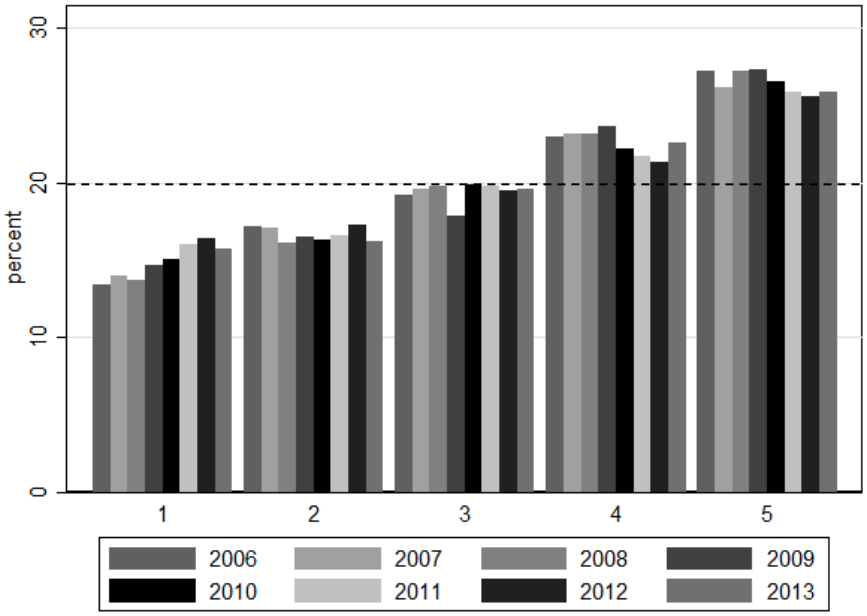

Table 12. Correlation matrix

	Male	DCG	PCG	Exp t-1	Exp t-2	Age	Low educ	High educ	House-hold income	West imm	Nwest imm	Low socio ec. nbh.
Male	1.000											
DCG	-0.005	1.000										
PCG	-0.040	0.276	1.000									
Exp t-1	-0.132	0.252	0.465	1.000								
Exp t-2	-0.131	0.228	0.452	0.545	1.000							
Age	-0.050	0.244	0.475	0.320	0.317	1.000						
Low educated	0.001	0.007	0.016	0.019	0.019	-0.015	1.000					
High educated	-0.003	-0.016	-0.043	-0.023	-0.023	-0.045	-0.119	1.000				
Household income	0.002	-0.010	-0.023	-0.031	-0.029	0.038	-0.291	0.053	1.000			
West. imm.	-0.005	0.004	-0.013	0.021	0.021	-0.029	-0.027	0.430	-0.278	1.000		
Nonwest. imm.	0.000	-0.005	-0.020	0.017	0.016	-0.093	0.345	0.028	-0.497	0.273	1.000	
Low socio ec. neighborhood	0.004	-0.005	-0.010	0.008	0.007	-0.055	0.283	-0.024	-0.319	0.079	0.622	1.000

Table 13. Likelihood-ratio test of proportionality of odds across response categories (omodel)

	2008	2009	2010	2011	2012	2013
Chi2(36)	1782.10	2403.42	5142.89	10276.55	13362.55	2116.52
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000

Table 14. Classification statistics. The cutoff point used is 0.15. This is based on graphs of sensitivity and specificity versus probability cutoff (lsens). Specificity is the percentage of vd=0 observations that are correctly specified, and sensitivity is the percentage of vd=1 observations that are correctly specified.

Classification	2008	2009	2010	2011	2012	2013
Sensitivity	2.77	3.45	4.55	8.63	15.34	42.21
Specificity	99.35	99.17	98.86	97.47	95.20	82.11
Positive predictive value	16.59	16.32	17.11	16.37	17.40	18.19
Negative predictive value	95.65	95.60	95.25	94.90	94.46	93.78

False + rate for true ~D	0.65	0.83	1.14	2.53	4.80	17.89
False - rate for true D	97.23	96.55	95.45	91.37	84.66	57.79
False + rate for classified +	83.41	83.68	82.89	83.63	82.60	81.81
False - rate for classified -	4.35	4.40	4.75	5.10	5.54	6.22

Correctly classified	95.06	94.85	94.23	92.66	90.26	78.68

Table 15. Receiver operating characteristic. The larger the area under the ROC curve the greater the predictive power of the model. A model with no predictive power has an area of 0.5 and a perfect model has an area of 1.

	2008	2009	2010	2011	2012	2013
ROC	0.717	0.719	0.721	0.727	0.735	0.727

Table 16. This table reflects the average marginal effects betas and robust standard errors of the probit models. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		2008		2009		2010		2011		2012		2013	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.018***	0.000	0.017***	0.000	0.017***	0.000	0.017***	0.000	0.017***	0.000	0.021***	0.000
DCG		-0.006***	0.000	-0.007***	0.000	-0.009***	0.000	-0.011***	0.000	-0.012***	0.000	-0.018***	0.000
PCG		-0.013***	0.000	-0.014***	0.000	-0.016***	0.000	-0.020***	0.000	-0.022***	0.000	-0.031***	0.000
Exp t-1	2	-0.015***	0.000	-0.016***	0.000	-0.015***	0.000	-0.016***	0.000	-0.022***	0.000	-0.024***	0.000
	3	-0.021***	0.000	-0.024***	0.000	-0.025***	0.000	-0.028***	0.000	-0.036***	0.000	-0.048***	0.000
Exp t-2	2	-0.017***	0.000	-0.016***	0.000	-0.016***	0.000	-0.017***	0.000	-0.018***	0.000	-0.024***	0.000
	3	-0.023***	0.000	-0.022***	0.000	-0.025***	0.000	-0.028***	0.000	-0.030***	0.000	-0.044***	0.000
Age	28-37	0.006***	0.000	0.000	0.000	-0.009***	0.000	-0.025***	0.000	-0.033***	0.000	0.005***	0.000
	38-47	0.013***	0.000	0.008***	0.000	-0.001***	0.000	-0.019***	0.000	-0.030***	0.000	0.001***	0.000
	48-57	0.012***	0.000	0.007***	0.000	-0.002***	0.000	-0.018***	0.000	-0.030***	0.000	0.004***	0.000
	58-67	0.005***	0.000	0.000*	0.000	-0.009***	0.000	-0.027***	0.000	-0.040***	0.000	-0.010***	0.000
	68-77	-0.021***	0.000	-0.025***	0.000	-0.033***	0.000	-0.049***	0.000	-0.062***	0.000	-0.040***	0.000
	≥ 78	-0.020***	0.000	-0.026***	0.000	-0.038***	0.000	-0.058***	0.000	-0.075***	0.000	-0.066***	0.000
Low educated		-0.008***	0.000	-0.009***	0.000	-0.010***	0.000	-0.011***	0.000	-0.013***	0.000	-0.017***	0.000
High educated		0.022***	0.000	0.023***	0.000	0.025***	0.000	0.027***	0.000	0.029***	0.000	0.035***	0.000
Household	2	0.003***	0.000	0.002***	0.000	0.002***	0.000	0.001***	0.000	0.001***	0.000	-0.001***	0.000
income	3	0.009***	0.000	0.008***	0.000	0.007***	0.000	0.006***	0.000	0.007***	0.000	0.004***	0.000
	4	0.014***	0.000	0.014***	0.000	0.014***	0.000	0.013***	0.000	0.014***	0.000	0.011***	0.000
	5	0.021***	0.000	0.019***	0.000	0.018***	0.000	0.017***	0.000	0.018***	0.000	0.017***	0.000
West. Imm.		0.044***	0.002	0.050***	0.002	0.046***	0.002	0.044***	0.002	0.034***	0.002	-0.030***	0.002

Nonwest. Imm.	-0.002***	0.001	-0.002***	0.001	0.001*	0.001	0.001*	0.001	0.002***	0.001	-0.023***	0.001
Low socioec.nbh	-0.001***	0.000	0.001*	0.000	0.001***	0.000	0.002***	0.000	0.002***	0.000	0.002***	0.001
Number of observations	11,312,189		11,164,650		11,773,247		12,015,020		12,226,396		12,502,044	
Pseudo R-square	0.071		0.072		0.075		0.082		0.090		0.091	

Table 17. Generalized ordered logit 2008 output. The reported standard errors are the robust standard errors. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		(1) 2008		(2) 2008		(3) 2008		(4) 2008	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.206***	0.006	0.170***	0.006	0.163***	0.006	0.146***	0.006
DCG		-0.168***	0.026	-0.149***	0.028	-0.214***	0.031	-0.236***	0.033
PCG		-0.299***	0.011	-0.315***	0.011	-0.358***	0.012	-0.382***	0.013
Exp t-1	2	0.072***	0.014	0.124***	0.013	0.142***	0.014	0.127***	0.014
	3	-0.485***	0.008	-0.545***	0.008	-0.607***	0.009	-0.634***	0.01
Exp t-2	2	-0.031**	0.012	-0.031**	0.012	-0.031**	0.012	-0.031**	0.012
	3	-0.560***	0.009	-0.637***	0.009	-0.681***	0.01	-0.703***	0.01
Age	28-37	0.028**	0.011	-0.073***	0.01	-0.028***	0.01	-0.052***	0.01
	38-47	0.010	0.010	-0.130***	0.01	-0.085***	0.01	-0.130***	0.01
	48-57	-0.028***	0.011	-0.132***	0.01	-0.086***	0.01	-0.146***	0.011
	58-67	-0.179***	0.012	-0.244***	0.012	-0.182***	0.012	-0.273***	0.012
	68-77	-0.554***	0.021	-0.293***	0.022	-0.488***	0.025	-0.451***	0.025
	≥ 78	-0.762***	0.028	-0.415***	0.03	-0.988***	0.041	-0.952***	0.042
Low educated		0.005	0.012	0.005	0.012	0.005	0.012	0.005	0.012
High educated		0.132***	0.009	0.157***	0.009	0.172***	0.009	0.181***	0.009
Household	2	-0.010	0.012	-0.034***	0.012	-0.044***	0.012	-0.045***	0.012
income	3	0.031**	0.013	-0.01	0.012	-0.014	0.012	-0.019	0.013
	4	0.072***	0.013	0.001	0.012	-0.012	0.013	-0.024*	0.013
	5	0.063***	0.012	-0.028**	0.012	-0.039***	0.012	-0.052***	0.012
West. Imm.		-0.843***	0.08	-0.694***	0.076	-0.538***	0.078	-0.837***	0.08
Nonwest. Imm.		-0.575***	0.038	-0.520***	0.037	-0.390***	0.038	-0.293***	0.038
Low socioec.nbh		0.191***	0.022	0.157***	0.021	0.146***	0.021	0.130***	0.021
Constant		0.929***	0.016	0.268***	0.015	-0.232***	0.016	-0.292***	0.016
Number of observations		499,473							
Pseudo R-square		0.030							

Table 18. Generalized ordered logit 2009 output. The reported standard errors are the robust standard errors. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		(1) 2009		(2) 2009		(3) 2009		(4) 2009	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.191***	0.006	0.158***	0.006	0.157***	0.006	0.139***	0.006
DCG		-0.104***	0.024	-0.104***	0.024	-0.104***	0.024	-0.104***	0.024
PCG		-0.280***	0.011	-0.308***	0.012	-0.350***	0.013	-0.375***	0.013
Exp t-1	2	0.560***	0.014	0.506***	0.012	0.415***	0.011	0.400***	0.012
	3	-0.572***	0.008	-0.623***	0.007	-0.664***	0.008	-0.671***	0.008
Exp t-2	2	0.0649***	0.014	0.115***	0.013	0.121***	0.014	0.108***	0.014
	3	-0.457***	0.008	-0.512***	0.008	-0.581***	0.009	-0.607***	0.010
Age	28-37	-0.135***	0.011	-0.254***	0.010	0.056***	0.010	0.027***	0.010
	38-47	-0.160***	0.011	-0.336***	0.010	-0.032***	0.010	-0.085***	0.010
	48-57	-0.190***	0.011	-0.329***	0.010	-0.0256**	0.010	-0.088***	0.010
	58-67	-0.319***	0.012	-0.432***	0.012	-0.119***	0.012	-0.222***	0.012
	68-77	-0.645***	0.020	-0.498***	0.021	-0.347***	0.023	-0.351***	0.023
	≥ 78	-0.941***	0.028	-0.648***	0.030	-0.943***	0.042	-0.912***	0.043
Low educated		-0.020	0.012	-0.020	0.012	-0.020	0.012	-0.020	0.012
High educated		0.167***	0.010	0.181***	0.009	0.179***	0.009	0.187***	0.009
Household	2	-0.0145	0.012	-0.055***	0.011	-0.046***	0.012	-0.041***	0.012
income	3	0.029**	0.013	-0.032***	0.012	-0.030**	0.012	-0.032***	0.012
	4	0.080***	0.013	0.003	0.012	0.013	0.012	-0.001	0.012
	5	0.039***	0.012	-0.055***	0.011	-0.044***	0.012	-0.053***	0.012
West. Imm.		-0.809***	0.081	-0.578***	0.076	-0.379***	0.078	-0.643***	0.079
Nonwest. Imm.		-0.553***	0.037	-0.498***	0.035	-0.307***	0.036	-0.222***	0.037
Low socioec.nbh		0.163***	0.021	0.134***	0.020	0.118***	0.020	0.100***	0.020
Constant		1.144**	0.016	0.519***	0.015	-0.247***	0.015	-0.299***	0.016
Number of observations		500,942							
Pseudo R-square		0.036							

Table 19. Generalized ordered logit 2010 output. The reported standard errors are the robust standard errors. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		(1) 2010		(2) 2010		(3) 2010		(4) 2010	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.174***	0.006	0.134***	0.006	0.128***	0.006	0.111***	0.006
DCG		-0.100***	0.014	-0.130***	0.015	-0.163***	0.016	-0.176***	0.017
PCG		-0.266***	0.010	-0.311***	0.011	-0.340***	0.012	-0.373***	0.012
Exp t-1	2	0.608***	0.014	0.527***	0.011	0.440***	0.011	0.426***	0.011
	3	-0.513***	0.007	-0.560***	0.007	-0.616***	0.007	-0.625***	0.007
Exp t-2	2	0.479***	0.013	0.430***	0.011	0.323***	0.010	0.314***	0.010
	3	-0.523***	0.007	-0.559***	0.007	-0.583***	0.007	-0.583***	0.008
Age	28-37	-0.406***	0.011	-0.527***	0.010	-0.057***	0.010	-0.092***	0.010
	38-47	-0.450***	0.010	-0.682***	0.009	-0.179***	0.009	-0.241***	0.009
	48-57	-0.454***	0.011	-0.648***	0.009	-0.150***	0.009	-0.219***	0.009
	58-67	-0.547***	0.012	-0.755***	0.011	-0.262***	0.011	-0.367***	0.010
	68-77	-0.824***	0.019	-0.819***	0.019	-0.418***	0.020	-0.367***	0.011
	≥ 78	-1.189***	0.028	-1.003***	0.030	-1.034***	0.039	-1.037***	0.040
Low educated		-0.043***	0.013	-0.041***	0.012	-0.023*	0.013	-0.031**	0.013
High educated		0.164***	0.009	0.164***	0.008	0.147***	0.008	0.153***	0.008
Household	2	-0.035***	0.012	-0.062***	0.011	-0.050***	0.011	-0.050***	0.011
income	3	0.029**	0.012	-0.026**	0.011	-0.016	0.011	-0.020*	0.011
	4	0.089***	0.012	0.0176	0.011	0.036***	0.011	0.0235**	0.011
	5	0.048***	0.012	-0.034***	0.011	-0.015	0.011	-0.0256**	0.011
West. Imm.		-0.619***	0.078	-0.440***	0.072	-0.197***	0.072	-0.391***	0.073
Nonwest. Imm.		-0.446***	0.035	-0.370***	0.032	-0.123***	0.033	-0.052	0.033
Low socioec.nbh		0.140***	0.020	0.118***	0.018	0.094***	0.018	0.078***	0.018
Constant		1.494***	0.016	0.938***	0.014	-0.021	0.014	-0.058***	0.014
Number of observations		577,162							
Pseudo R-square		0.045							

Table 20. Generalized ordered logit 2011 output. The reported standard errors are the robust standard errors. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		(1) 2011		(2) 2011		(3) 2011		(4) 2011	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.140***	0.006	0.100***	0.005	0.090***	0.005	0.074***	0.005
DCG		-0.139***	0.014	-0.168***	0.014	-0.205***	0.015	-0.225***	0.015
PCG		-0.303***	0.010	-0.361***	0.010	-0.377***	0.011	-0.403***	0.011
Exp t-1	2	0.544***	0.013	0.461***	0.011	0.364***	0.010	0.355***	0.010
	3	-0.524***	0.007	-0.540***	0.007	-0.584***	0.007	-0.578***	0.007
Exp t-2	2	0.450***	0.013	0.382***	0.010	0.291***	0.009	0.286***	0.009
	3	-0.485***	0.007	-0.500***	0.007	-0.524***	0.007	-0.522***	0.007
Age	28-37	-0.628***	0.010	-0.803***	0.009	-0.082***	0.008	-0.123***	0.008
	38-47	-0.722***	0.010	-0.975***	0.009	-0.266***	0.008	-0.336***	0.008
	48-57	-0.677***	0.010	-0.903***	0.009	-0.202***	0.008	-0.279***	0.008
	58-67	-0.802***	0.011	-1.019***	0.010	-0.330***	0.010	-0.438***	0.010
	68-77	-1.005***	0.018	-1.082***	0.017	-0.438***	0.017	-0.513***	0.018
	≥ 78	-1.498***	0.028	-1.380***	0.029	-1.144***	0.037	-1.164***	0.038
Low educated		-0.040***	0.011	-0.040***	0.011	-0.040***	0.011	-0.040***	0.011
High educated		0.160***	0.009	0.157***	0.008	0.130***	0.008	0.136***	0.008
Household	2	-0.037***	0.011	-0.069***	0.010	-0.044***	0.010	-0.047***	0.010
income	3	0.006	0.012	-0.048***	0.010	-0.027***	0.010	-0.033***	0.010
	4	0.052***	0.012	-0.012	0.010	0.08	0.010	-0.007	0.010
	5	0.001	0.011	-0.073***	0.010	-0.042***	0.010	-0.057***	0.010
West. Imm.		-0.921***	0.076	-0.818***	0.068	-0.613***	0.067	-0.776***	0.068
Nonwest. Imm.		-0.489***	0.033	-0.365***	0.010	-0.065**	0.030	-0.025	0.030
Low socioec.nbh		0.109***	0.019	0.096***	0.017	0.069***	0.016	0.064***	0.016
Constant		1.971***	0.015	1.455***	0.013	0.294***	0.013	0.268***	0.013
Number of observations		650,186							
Pseudo R-square		0.051							

Table 21. Generalized ordered logit 2012 output. The reported standard errors are the robust standard errors. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		(1) 2012		(2) 2012		(3) 2012		(4) 2012	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.119***	0.006	0.0837***	0.005	0.0735***	0.005	0.058***	0.005
DCG		-0.140***	0.013	-0.199***	0.013	-0.239***	0.014	-0.249***	0.014
PCG		-0.264***	0.010	-0.193***	0.009	-0.290***	0.010	-0.305***	0.010
Exp t-1	2	0.592***	0.014	0.519***	0.011	0.455***	0.010	0.449***	0.010
	3	-0.544***	0.007	-0.567***	0.006	-0.580***	0.006	-0.576***	0.006
Exp t-2	2	0.420***	0.012	0.346***	0.010	0.248***	0.009	0.246***	0.009
	3	-0.466***	0.007	-0.457***	0.006	-0.473***	0.006	-0.463***	0.006
Age	28-37	-0.717***	0.010	-0.876***	0.009	-0.117***	0.008	-0.150***	0.008
	38-47	-0.867***	0.010	-1.104***	0.008	-0.344***	0.007	-0.408***	0.007
	48-57	-0.818***	0.010	-1.038***	0.008	-0.286***	0.008	-0.358***	0.008
	58-67	-0.986***	0.011	-1.178***	0.010	-0.438***	0.009	-0.537***	0.009
	68-77	-1.193***	0.016	-1.293***	0.015	-0.576***	0.016	-0.663***	0.016
	≥ 78	-1.692***	0.027	-1.592***	0.028	-1.270***	0.034	-1.297***	0.035
Low educated		-0.060***	0.013	-0.057***	0.011	-0.050***	0.011	-0.060***	0.011
High educated		0.160***	0.009	0.162***	0.008	0.125***	0.007	0.129***	0.007
Household	2	-0.0190*	0.011	-0.051***	0.010	-0.031***	0.009	-0.034***	0.009
income	3	-0.003	0.012	-0.042***	0.010	-0.031***	0.010	-0.039***	0.010
	4	0.030**	0.012	-0.039***	0.010	-0.024**	0.010	-0.040***	0.010
	5	-0.013	0.011	-0.073***	0.010	-0.047***	0.010	-0.062***	0.010
West. Imm.		-0.895***	0.074	-0.849***	0.065	-0.633***	0.063	-0.786***	0.063
Nonwest. Imm.		-0.465***	0.033	-0.309***	0.028	0.004	0.028	0.033	0.028
Low socioec.nbh		0.095***	0.018	0.069***	0.016	0.035**	0.015	0.028*	0.015
Constant		2.264***	0.015	1.727***	0.013	0.513***	0.012	0.495***	0.012
Number of observations		754,977							
Pseudo R-square		0.052							

Table 22. Generalized ordered logit 2013 output. The reported standard errors are the robust standard errors. The symbols *, **, and *** respectively denote the significance at 10%, 5%, and 1% levels.

Variable		(1) 2013		(2) 2013		(3) 2013		(4) 2013	
		Beta	SE	Beta	SE	Beta	SE	Beta	SE
Male		0.052***	0.005	0.030***	0.004	0.0123***	0.004	0.002	0.004
DCG		-0.123***	0.013	-0.157***	0.012	-0.182***	0.012	-0.196***	0.012
PCG		-0.259***	0.009	-0.234***	0.008	-0.226***	0.008	-0.229***	0.008
Exp t-1	2	0.683***	0.013	0.524***	0.010	0.485***	0.009	0.460***	0.008
	3	-0.529***	0.007	-0.493***	0.007	-0.463***	0.005	-0.452***	0.005
Exp t-2	2	0.500***	0.012	0.382***	0.009	0.358***	0.008	0.347***	0.008
	3	-0.406***	0.006	-0.367***	0.005	-0.333***	0.005	-0.321***	0.005
Age	28-37	-0.121***	0.009	-0.149***	0.008	-0.148***	0.007	-0.149***	0.007
	38-47	-0.299***	0.009	-0.372***	0.007	-0.385***	0.007	-0.407***	0.007
	48-57	-0.266***	0.010	-0.299***	0.007	-0.321***	0.007	-0.347***	0.007
	58-67	-0.347***	0.010	-0.373***	0.008	-0.397***	0.008	-0.436***	0.008
	68-77	-0.535***	0.014	-0.496***	0.012	-0.521***	0.012	-0.564***	0.012
	≥ 78	-1.136***	0.024	-0.901***	0.023	-1.145***	0.025	-1.135***	0.025
Low educated		-0.081***	0.011	-0.063***	0.010	-0.073***	0.009	-0.081***	0.009
High educated		0.104***	0.006	0.104***	0.006	0.104***	0.006	0.104***	0.006
Household	2	-0.059***	0.008	-0.059***	0.008	-0.059***	0.008	-0.059***	0.008
income	3	-0.082***	0.010	-0.103***	0.008	-0.109***	0.008	-0.112***	0.008
	4	-0.056***	0.010	-0.112***	0.009	-0.124***	0.008	-0.133***	0.008
	5	-0.092***	0.009	-0.141***	0.008	-0.151***	0.008	-0.159***	0.008
West. Imm.		-1.361***	0.066	-1.241***	0.056	-1.196***	0.054	-1.323***	0.054
Nonwest. Imm.		-0.719***	0.030	-0.540***	0.026	-0.439***	0.024	-0.400***	0.024
Low socioec.nbh		0.096***	0.017	0.073***	0.014	0.060***	0.014	0.049***	0.013
Constant		2.293***	0.013	1.536***	0.011	1.174***	0.010	1.106***	0.010
Number of observations		1,075,103							
Pseudo R-square		0.025							

Note: The results of the generalized ordered logit models can be interpreted as follows. The four panels reflect four binary logistic regressions, which are presented in table 17. When interpreting results for each panel, it is important to keep in mind that the current category of Y, as well as the

lower-coded categories, are serving as the reference group (Williams, 2006). Hence, a positive coefficient indicates that higher values of the independent variable make it more likely that the individual will be in a higher category of Y than the current one. Negative coefficients, on the other hand, indicate that higher values of the independent variable increase the likelihood of being in the current or a lower category (Williams, 2006). For example, the beta for the variable male in panel 1 is positive. This implies that males are more likely to be in a higher category, i.e. €200, €300, €400, or €500, than females. Moreover, individuals who are classified in a DCG are less likely to opt for higher voluntary deductible levels than individuals who are not classified in a DCG, but they were especially unlikely to opt for €500. In case of household income quintile 5, the coefficient is positive in the first panel and negative in the last. Individuals in this quintile are thus more likely to opt for €200, €300, €400, or €500 than individuals in quintile 1, but also less likely to opt for €500. This indicates that these insured are less extreme in their choices, i.e. they are likely to avoid the lowest and the highest level; €100 and €500.

Table 23. Four binary logistic regressions

	Recoded as 0	Recoded as 1
Panel 1	€100	€200, €300, €400, and €500
Panel 2	€100 and €200	€300, €400, and €500
Panel 3	€100, €200, and €300	€400, and €500
Panel 4	€100, €200, €300, and €400	€500

Table 24. Number of individuals who switched to an insurance plan without a voluntary deductible (€0) and to an insurance plan with a voluntary deductible (>€0)

Switchers	2007	2008	2009	2010	2011	2012	2013
To vd=€0	36,479	63,959	64,049	42,445	84,360	76,249	158,467
To vd>€0	36,992	202,473	82,526	83,869	149,808	167,575	445,192

Table 25. Descriptive statistics by switch group: to an insurance plan without a voluntary deductible (€0) and to an insurance plan with a voluntary deductible (>€0)

	Switchers to €0	Switchers to > €0
Male (%)	54.37	57.28
DCG (%)	4.65	1.91
PCG (%)	12.39	7.69
Healthcare expenditures$_t$ (mean €)	1353	644
Category 1 (%)	54.15	70.70
Category 2 (%)	9.61	6.54
Category 3 (%)	36.24	22.75
Healthcare expenditures$_{t-1}$ (mean €)	1297	517
Healthcare expenditures$_{t-2}$ (mean €)	908	586
Age (mean)	39	39
Low educ (%)	7.24	6.57
High educ (%)	18.45	18.04
Household income (mean €)	34,664	35,056
Household income quintile 1 (%)	19.08	16.76
Household income quintile 2 (%)	17.82	17.50
Household income quintile 3 (%)	18.71	19.24
Household income quintile 4 (%)	20.96	21.87
Household income quintile 5 (%)	23.42	24.63

Table 26. Individuals who switched to an insurance plan without a voluntary deductible (€0), divided over household income quintiles (1-5).

	2007	2008	2009	2010	2011	2012	2013
1 (%)	14.50	15.63	16.68	18.43	18.18	19.49	22.59
2 (%)	17.98	17.95	18.05	18.34	18.44	18.73	16.83
3 (%)	18.80	20.62	18.16	17.97	17.95	19.24	18.54
4 (%)	21.65	21.20	22.12	21.17	22.04	20.16	20.10
5 (%)	27.07	24.60	24.99	24.10	23.40	22.37	21.95