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The Effect of the Dutch Long-Term Care Reform on the Distribution of Lifetime Out-of-Pocket Expenditures

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Abstract

This thesis measures the effect of the Dutch long-term care reform in 2015 on the distribution of lifetime out-of-pocket expenditures. Addition to previous research concerns the inclusion of a life-cycle perspective, a comprehensive measure of private out-of-pocket medical expenditures and a better understanding of the post-reform Dutch financing system of long-term care in terms of equity. Data from the Dutch LISS panel are used. First, age-specific transition probabilities between health states are estimated for those aged 65 and older using a logit model. Second, age-specific out-of-pocket medical expenditures are estimated pre-reform and post-reform using a linear regression model. Third, a markov model is set up to estimate the change in total lifetime out-of-pocket medical expenditure as well as the change in it's proportion of lifetime income for individuals aged 65. A distinction is made across groups with different background characteristics in terms of socio-economic status, gender, initial health state and accessibility to informal care. On average, an increase from €6,448 in 2012 to €19,954 in 2017 is found. This reflects a substantial increase of 209 percent. A higher impact is found among the initially disabled, the low-income groups, women and those with children and/or a partner. The findings show an effect of the reform on both vertical and horizontal equity in the financing of long-term care. The pre-reform Dutch LTC system showed a pro-poor inequity in the delivery of LTC so whether the bigger impact on lower-income groups is harmful or beneficial for policy implications is interesting for further research. The results could open doors for private long-term care insurance as well as for further research on the effects of the reform in reaching policy objectives such as equity and affordability.

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Chapter 1: Introduction

In 2015, a major reform took place in the financing structure of long-term care (LTC) within the Dutch healthcare system (Maarse & Jeurissen, 2016). The aim of this research is to investigate whether the out-of-pocket (OOP) expenditures on LTC over the lifetime in the Netherlands have increased as a result of this reform and how this effect differs across groups with different background characteristics.

1.1 The Long-Term Care Reform

The reform took place in order to contain public costs on LTC. The ageing population will increase the prevalence of disability among the population, which in turn will increase the need for LTC (Hussem, van Ewijk, ter Rele, & Wong, 2016). To contain the costs related to this increased need for LTC, public budget cuts took place and a shift from residential to non-residential care was introduced, which decentralized non-residential care to the municipalities (Maarse & Jeurissen, 2016). Hereby municipalities became responsible for the provision of LTC and the shift from public to private provision increased individual responsibility (Van Ooijen, Bresser, & Knoef, 2016). An expected consequence of the public savings on LTC is that a part of these public savings were replaced by an increase in private expenses on LTC. Therefore, I expect an increase in the OOP medical expenses over the lifetime for those in need of LTC as a result of the reform.

1.2 Life-Cycle Perspective

In analyzing expenditures of Dutch elderly, Van Ooijen et al. (2016) already observed a noticeable increase in OOP medical expenditures of the Dutch population after the reform in 2015. This research did not apply a life-cycle perspective, which is of importance to account for the effect the reform has on a person its whole life; medical expenditures are very skewed over the lifetime and high costs often occur successive years. LTC costs in particular are concentrated at older ages (Hussem, ter Rele, & Wouterse, 2017) and the likelihood to recover from disability is low among the elderly (Lamarca et al., 2004), leading to higher LTC needs and costs in subsequent years as well. Moreover, disability needs to be considered as a time-dependent variable to avoid an underestimation of its association with mortality (Lamarca et al., 2003). Following the course of the LTC expenditure over the lifetime, given an initial state of disability, provides a more comprehensive understanding of the overall effect of the reform on OOP medical expenditure. Therefore, I will shed light on the effect of

the reform on OOP medical expenditures of the elderly in the Netherlands from a life-cycle perspective.

Besides providing a more comprehensive estimation of the effect of the reform, a quantification of OOP LTC expenditure on a lifecycle perspective could for example also be relevant for investigating the future potential of private LTC insurance.

1.3 Impact Across Groups with Different Background Characteristics

The impact of the reform might differ among, for example, socio-economic groups, resulting from different needs for LTC and different disposable incomes among high and low socio-economic groups. According to a review of empirical findings in the Netherlands in 1992, lower socio-economic status is associated with a higher prevalence of disability (Mackenbach, 1992). Recent research indeed showed that the use of LTC of elderly is more concentrated among low-income groups than among high-income groups (Bockarjova, Rouwendal & Polder, 2018). On the other hand, lower income implies lower affordability of increased OOP expenses on LTC.

Increased OOP expenditures can affect both the degree of progressivity and affordability of LTC payments and, as a result, increased inequity in healthcare financing could arise. I will investigate whether the effect of the reform on OOP medical expenditures differs between different socio-economic groups. Besides analyzing different socio-economic groups, differences in the impact are also analyzed among gender, initial level of health and accessibility to informal care as I expect these background characteristics to play a role in the impact of the reform on OOP LTC expenditures as well. This sheds light on whether certain groups of elderly suffer more from the reform than others. If the reform affected socio-economic classes differently, this suggests redistribution in LTC financing among these groups. Previous research on equity in the Dutch LTC system is mainly focused on equity in the delivery of LTC before the reform (e.g. Duell, Koolman & Portrait, 2017; Non, 2017; Tenand, Bakx & Doorslaer, 2018), and findings revealed a highly equitable, or even pro-poor system in terms of LTC delivery. This suggests that some redistribution in OOP medical expenditure is not necessarily harmful, as this could increase efficiency of demand by ameliorating overuse (Non, 2017). Nevertheless, as equity and accessibility of healthcare to everyone are objectives in the Dutch healthcare system (Ministry of Health, Welfare and Sport, 2018), the impact of the reform is important for policymakers to see whether these objectives are not violated.

1.4 Research Questions

The research consists of two parts. First, the private OOP expenditures over the lifetime are analyzed both before and after the reform in 2015. Subsequently, I investigate whether there are differences in the impact of the reform across groups with different background characteristics, with special attention to different income-groups to interpret the findings in terms of equity in the financing of LTC. The research aims at answering the following two questions:

1.4.1 Research question

Did out-of-pocket expenditures on long-term care over the lifetime increase as a result of the LTC reform in the Netherlands?

1.4.2 Secondary question

How did the effect of the reform on lifetime out-of-pocket expenditures differ across groups with different background characteristics in terms of socio-economic status, initial health status, gender and accessibility to informal care?

This paper starts with a theoretical background in Chapter 2. Thereafter, Chapter 3 is devoted to research methods. Results will be presented in in Chapter 4 and Chapter 5 ends with a conclusion and discussion.

Chapter 2: Background and Literature Review

This chapter is devoted to substantiate the matters discussed in Chapter 1 into more detail. It starts with the definition of LTC, thereafter the reform and the corresponding changes in the financing structure of LTC, the importance of the lifecycle perspective and the definition of equity in healthcare financing are discussed.

2.1 Long-Term Care

LTC can be defined as:

The on-going health and social services provided for individuals who need assistance on a continuing basis because of physical or mental disability. Services can be provided in an institution, the home, or the community, and include informal services provided by family or friends as well as formal services provided by professionals or agencies (Folland, Stano, & Goodman, 2017).

LTC cases are few among the young (Werblow, Felder, & Zweifel, 2007). As the use of LTC and thereby the expenditures on LTC mainly take place late in life, focusing on the elderly is most suitable in finding the effect of the LTC reform. Expenditures over the remaining lifetime of individuals aged 65 years and older will be analyzed.

2.2 The Financing Structure of Long-Term Care

2.2.1 The reform and it's rationale

The Dutch system has a relatively high level of public expenditure on LTC. In 2010, the Netherlands spent 4,3% of its GDP on LTC, and this was expected to grow to 7-9% in 2040 as a result of the ageing population. The government argued that this growth would not be sustainable (Maarse & Jeurissen, 2016). Prior to the reform in 2015, some developments took place to control for the increasing public expenses in the LTC sector. As of 2013, an increase in mandatory deductibles of health insurance was introduced and the coverage of mobility devices by the basic healthcare package was recalled (Van Ooijen et al., 2016). In 2015, the reform was introduced, with the policy objective to "reign in expenditure growth to safeguard the fiscal sustainability of LTC" (Maarse & Jeurissen, 2016). Before the reform, the Exceptional Medical Expenses Act (AWBZ) covered 95% of public LTC expenditures. The reform replaced the former AWBZ with the newly introduced Long-Term Care Act (Wlz), together with the Social Support Act (Wmo), the Healthcare Insurance Act (Zvw) and the Youth Act.[1] In section 2.2.2, the changes in OOP expenditures on LTC that followed from these new care acts are discussed.

The reform in 2015 was accompanied by substantial governmental budgetary cuts of €1.5b on the total amount spend on LTC. The biggest part of these budgetary cuts concern personal care and assistance. As these tasks were transferred to healthcare insurers and municipalities, the savings are spread out over several parties. In 2016 and 2017, an extra €1b was saved as part of the LTC reform (CPB, 2014).

The new LTC Act aimed at shifting residential care to non-residential care and decentralized non-residential care (Maarse & Jeurissen, 2016). The major goals of the reform were cost containment, keeping individuals self-sufficient for as long as possible and improving quality and coordination of care. An example of the impact of the reform is a decrease in home help provided by some of the municipalities as a result of the major funding cut in home help (a governmental savings target of 34%). Greater pressure was put on LTC

[1] In Dutch: Algemene Wet Bijzondere Ziektekosten (AWBZ), Wet langdurige zorg (Wlz), Wet maatschappelijke ondersteuning (Wmo), Zorgverzekeringswet (Zvw), Jeugdwet (Youth Act)

seekers to first try to find a solution by themselves, for example by using informal care (Van Ginneken & Kroneman, 2015), which suggests an increase in LTC private expenditure.

2.2.2 Change in out-of-pocket payments

The reform involved changes with respect to the OOP payments for those in need of LTC. Direct changes in OOP payments resulted from the required personal contributions related to the new healthcare acts, and these are discussed below. Table 1 of the appendix provides an overview of the different healthcare acts in place accompanied by its specifications and the related changes in public financing.

The WLZ applies to those in need of heavy LTC, such as elderly with severe impairments. A personal contribution is required and the amount depends on the patient's disposable income, equity and type of care. No systematic changes occurred in the required OOP contributions for this type of LTC compared to the required OOP contributions in the AWBZ.

Less severe forms of LTC shifted to either the Wmo or the Zvw, handled by the municipality or the district nurse and the health insurer respectively. Users of district nursing and personal care do not longer pay personal contributions as this care was shifted to the Zvw and falls within the basic health care insurance. A higher increase than usual of the own risk applied, but this does not apply to district nursing. Moreover, this increase is roughly compensated by the disappearance of income-dependent own contributions for the new claims. As a consequence, LTC that falls within the Zvw only plays a small role in OOP expenditure. For specific aids such as a hearing aid or a denture, a personal contribution is required. The reform accompanied a budgetary cut of €1b in curative care in 2015 that fell within the new Zvw, followed by an additional cut of €0.25b during 2016 and 2017(CPB, 2014).

In case of non-medical personal care (for example home guidance or a short-stay in an institution), care is organized from the Wmo and a personal contribution is often in place, dependent on income, equity and the policy of the municipality. As of 2015, the municipalities decide for what provisions OOP contributions are required. Before the reform, OOP payments were not common for standard provisions within the Wmo. After the reform, some municipalities introduced new standard provisions and OOP payments became more common, depending on the policy of the municipality. For the customized provisions, own contributions are common in most cases but also different per municipality. Municipalities purchase care themselves and, combined with the governmental cost cutting, this likely

resulted in higher OOP contributions needed to cover the costs of municipalities on LTC given their budget.[2] Note that the reform accompanied a budgetary cut of €0.5b in domestic care within the Wmo in 2015, followed by an additional cut of €0.5b during 2016 and 2017 (CPB, 2014).

Next to changes in official personal OOP contributions, the decrease in home help in some municipalities also could have increased OOP expenditure for the elderly indirectly for those whose health was not bad enough to receive home help, as they needed to find solutions by themselves that could cost money. Elderly are forced into staying self-sufficient for as long as possible, and this could for example lead to OOP costs related to adjustments of the house to make it livable for elderly and costs related to household support. As municipalities are on a tight budget, it likely became more difficult to receive reimbursement for these kinds of expenses. In contrast with other literature (e.g. Hussem et al., 2016), these OOP expenditures on LTC are, next to the official contributions of the WLZ, Zvw and Wmo, also accounted for.

Another noteworthy development not directly related to the reform concerns the disappearance of a compensation organized in the Chronically Ill and Disabled Persons (Allowances) Act (WTCG)[3] (CBS, 2015). Before 2015, a financial compensation of 33 percent was in place for, among others, elderly to cover extra costs resulting from own contributions related to care at home. As of January 2015, the WTCG disappeared and this increased OOP payments for those with a Wlz-indication or a Wmo-indication for home care. As a result of the income- and equity-dependent personal contributions, the disappearance of this discount affects high- and low-income groups differently in absolute terms. In return, municipalities receive money for financial support of the chronically ill and they can set up their own regulations regarding this.

2.3 Importance of the Lifecycle Perspective

As previously mentioned in the introduction, Van Ooijen et al. (2016) already found an increase in OOP medical expenditures of the elderly in 2015. I will elaborate on the increase by taking into account the life-cycle perspective and by looking at possible

[2] Information retrieved from various websites and sources, a.o. www.zorgwijzer.nl, www.hetcak.nl, a report of the Dutch Care Authority and a report of the CBS on financial consequences of the LTC reform
[3] In Dutch: Wet Tegemoetkoming Chronisch Zieken en Gehandicapten (WTCG)

differences across groups. The lifecycle perspective accounts for the skewed expenditures over the lifetime and across individuals and groups. This way, the expectation and variation can be analyzed over the whole lifetime. Yielding a broader perspective gives a more complete view on how the reform affects different groups (Ter Rele & Wilkens, 2016). Following the rationale of Aaberge & Mogstad (2015), using current expenditures as a proxy for lifetime expenditures could lead to a lifecycle bias. The need for LTC at different ages as well as life expectancy and affordability differs across groups and should be accounted for in the measurement of lifetime OOP expenditures. The lifecycle perspective allows for the development of the need for LTC, as well as life expectancy and affordability. To provide an example: lower socio-economic groups are associated with higher LTC needs on the one hand, while higher socio-economic groups are associated with higher life expectancy and better affordability of LTC payments. This could lead to higher current expenditures among the lower socio-economic groups as a result of the reform, against higher future expenditures among the higher socio-economic groups resulting from more years in disability at later ages.

The importance of using the lifecycle perspective can be underpinned by previous research concerning lifetime expenditures on LTC. Research on the distribution of LTC expenditures over the lifetime in the Netherlands showed that distributions are very skewed over the lifetime as well as across individuals (Hussem et al., 2016; Hussem et al., 2017). As previously discussed, LTC expenditures are concentrated at the end of life and often occur several successive years. For some individuals these costs are substantially higher than the average. Hurd, Michaud and Rohwedder (2017) performed research on the distribution of OOP spending on the lifetime for nursing home use in the US and found a moderate mean but substantially higher expenditures among a small part of the population. This confirms that the distribution of OOP expenditures on LTC over the lifetime is skewed across individuals. Evidence is found that the distribution of LTC expenditures is even more skewed on a cross-sectional basis (Hussem et al., 2016). Cross-sectional studies do not reflect single individual's life expectancies (Alemayehu & Warner, 2004), as they do not allow for the inclusion of life expectancy and disability in the estimation of, in this case, the lifetime OOP medical expenditures. Disability needs to be considered as a time-dependent variable to avoid an underestimation of its association with mortality (Lamarca et al., 2003). Therefore, the use of a cross-sectional basis, as Van Ooijen et al. (2016) did, might lead to incorrect inference.

Findings related to differences in lifetime expenditures across groups show that, for example, LTC expenditures over the lifetime are higher among low-income households, despite of the higher life expectancy of higher incomes (e.g. Bockarjova et al., 2018; Hussem

et al., 2017). Moreover, Alemayehu and Warner (2004) found higher lifetime healthcare expenditures among women as a result of their longer life expectancy. This suggests higher lifetime OOP LTC expenditures among women as well. These findings raise interest in the distributional impact of the reform across socio-economic classes and other groups with differing background characteristics over the lifetime.

2.4 Equity in the Healthcare Financing

Universal access and generous coverage are important goals of the Dutch LTC system and it is a legal requirement that everyone eligible for LTC should be able to receive it (Duell, Koolman & Portrait, 2017). As mentioned in the introduction, both equity and economic accessibility of healthcare to everyone are objectives of the Dutch healthcare system. According to the World Health Organization (WHO)[4], equity refers to fair opportunity for everyone to attain their full health potential regardless of demographic, social, economic or geographic strata. Equity of the LTC system can be assessed in terms of financing and in terms of delivery of LTC. The first concerns the relation between ability to pay and actual payments of LTC, and the latter concerns the relation between need and actual treatment in LTC. Economic accessibility, also referred to as affordability, is a measure of people's ability to pay for services without financial hardship. OOP payments tend to be a highly regressive means of financing health care (Wagstaff & Doorslaer, 1992) and could affect both equity and accessibility. OOP payments reduce the degree of progressivity in the financing system, which is a measure of equity. Moreover, if OOP payments for LTC increase, it could put pressure on affordability for those in need of LTC. Those with high needs for LTC and low disposable incomes are likely to be affected more in terms of affordability. Awareness of the effect of the reform on OOP expenditures across socio-economic groups helps to understand the implications of the reform in terms of equity and economic accessibility.

2.4.1 Previous literature: equity in the delivery of LTC

Recent literature on equity and accessibility of the Dutch LTC system mainly focuses on the delivery of health care *before* the reform (e.g. Duell et al., 2017; Tenand, Bakx & Doorslaer, 2018; Non, 2017) in which horizontal equity is used, referred to as equal treatment for equal need. The findings of Tenand et al. (2018), using data from 2012, reveal limited

[4] Retrieved from www.who.int

financial barriers in the access to LTC in the Netherlands, especially for low-income elderly before the reform. Their findings even suggest that in the Dutch LTC system before the reform, the poor elderly received 'too much' LTC in comparison to richer elderly, resulting from substantial subsidizing of LTC use for poorer population groups. Duell et al. (2017) researched whether access to the Dutch LTC is equitable by using data from between 2010 to 2013, and their findings ensured equitable access to everyone. Non (2017) studied the effect of the policy change in co-payments implemented in 2013 on LTC use and found that persons affected by the policy change, who were the ones with higher incomes, became less likely to take up care. Overall, these findings show that the Dutch system was highly equitable, or even pro-poor in terms of LTC delivery. Consequently, one could argue that an increase in OOP LTC expenditure would not harm but rather be beneficial for the equitability of the LTC system as co-payments may increase efficiency of demand by ameliorating overuse (Non, 2017) among the poor. On the other hand, co-payments could also exaggerate underuse if it would lead to catastrophic healthcare payments and unaffordability among certain groups. This research focuses on the financing aspect of equity, with the aim to provide better understanding on affordability, progressivity and redistributions in LTC payments across groups. Distinctions in the need of LTC can be derived from the background characteristics of different groups (resulting from disability, gender, accessibility to informal care or socio-economic class) and these will only be considered briefly in the interpretation. The effect of the reform on equity in the delivery of LTC is not in the scope of this research, as no exact measure of treatment (the use of LTC) as well as need (official indication for LTC) are included.

2.4.2 Equity in the financing of LTC

Little research is conducted on both the level of equity in the LTC system in the Netherlands *after* the reform and the level of equity in terms of financing in specific, likely resulting from the comprehensive and universal coverage of the Dutch LTC system. This research aims to provide better understanding of the effect of the reform on equity in the financing of LTC.

The equity requirement that healthcare is financed according to ability to pay can be interpreted in terms of both vertical equity and horizontal equity. Vertical equity concerns the requirement that individuals with unequal ability to pay make appropriately dissimilar payments for healthcare, and this can be measured by the degree of progressivity of healthcare payments (Wagstaff & Doorslaer, 2000). Progressivity is the degree to which

payments for healthcare deviate from a distribution proportional to income (Wagstaff & Doorslaer, 1992). Horizontal equity concerns the requirement that individuals of the same ability to pay make the same contribution. Horizontal inequity systematically puts groups of people who are already socially disadvantaged (for example, the low socio-economic classes or women) at further disadvantage with respect to their healthcare financing (Braveman & Gruskin, 2003).

Identification of the lifetime OOP LTC expenditures as a proportion of income among different groups provides understanding on how the system is affected and helps in answering the critical policy question: does public funding ensure an equitable distribution of LTC? The lifecycle perspective plays an important role in this as affordability over the whole lifetime should be in place, while LTC expenditures often occur successive years as a result of low recovery at older ages. The measure of OOP medical expenditures over the lifetime as a proportion of income among the elderly can be used as a measure of progressivity and affordability over the lifetime in the financing of LTC.

Chapter 3. Research Methods

3.1 Methodology

This section describes stepwise what methods are used to measure expected OOP medical expenditures given an initial health state for individual i at time t with different characteristics observed in background variables (age, gender, income, etc.) $x_{i,t}$. These expenditures will, ultimately, be compared before and after the reform. The research methods are divided into three steps, as described in the following subsections. The first step concerns the estimation of the transition probabilities between health states at different ages, the second step concerns estimation of the OOP medical expenditures at different ages and the third step concerns simulation of the expected OOP expenditures over the remaining lifetime for individuals with different background variables.

3.1.1 Model transition probabilities

First, the transition probabilities at different ages between health states h are estimated. Health states in the final model are good health, poor health and death. The health states serve as a measure of the need for LTC. As there is no data available on deceased respondents in the dataset[5], I will start with estimating the transition probabilities between

[5] Data description can be found in section 3.2

good health and poor health and thereafter, rescale these transition probabilities with transition probabilities related to death derived from the Dutch mortality rates.

In the data, the health variable $h_{i,t} = 1, 2$ is observed in each year t for every individual i, in which 1 is good health and 2 is poor health. Health at t+1 is the dependent variable, conditional on health at t. The transitions in the data are pooled to estimate the models reflected in equation 1 and 2.

$$P\left(h_{i,t+1} = m \middle| h_{i,t} = 1\right) = f\left(age_{i,t}, age^2{}_{i,t}, netincome_{i,t}, gender_{i,t}, age * gender_{i,t}\right) \quad (1)$$

$$P\left(h_{i,t+1} = m \middle| h_{i,t} = 2\right) = f\left(age_{i,t}, age^2{}_{i,t}, netincome_{i,t}, gender_{i,t}, age * gender_{i,t}\right) \quad (2)$$

$m = 1,2$

Equation 1 gives the probability of a good and poor health in the subsequent year given certain background variables for respondents who are in good health initially. Equation 2 gives the probability of a good and poor health in the subsequent year given background variables for respondents who are in poor health initially. For the function of this $f\left(x_{i,t}\right)$, a logit model is used to measure the predicted probabilities.

The explanatory variables included in the logit model are listed below, accompanied with the rationale of inclusion.

Age and a squared term of age: I am interested in the probabilities at different ages of the elderly and therefore age is included. The probability of becoming disabled is expected to increase with age with a steeper increase at older ages. A quadratic term of age is included to allow for this non-linearity.

Net income: Net income is used as a proxy for socioeconomic status. I expect a higher income to decrease the chance of having a poor health, as higher socio-economic classes are associated with better health.

Gender: Because of a difference in disability and death rates between men and women at different ages, gender is included as a control variable to allow for this difference. On average, women tend to get older, but this often leads to more disabled years.

Interaction term gender and age: The effect of age is most likely influenced by gender. Men and women are expected to have a different age effect because of a different pattern in health-status over the lifetime, especially at later ages.

After the calculation of transition probabilities between the two health states, Dutch mortality rates for males and females are used to add a third health state, $h_{i,y} = 3$, which is related to death. Unfortunately, there is no separate mortality data available for non-disabled and disabled individuals at different ages. Forman-Hoffman et al. (2015) conducted research on mortality related to disability status in the US. This study found that adults with any disability are more likely to die than adults without disability with a corresponding hazard ratio of 1.47 for adults aged 65 and older. This hazard ratio is used to recalculate the mortality rates of males and females at different ages for the disabled and non-disabled health states separately. Eventually, these probabilities on mortality are used to rescale the probabilities of becoming disabled and staying disabled as found in the logit model of function $f\left(x_{i,t}\right)$, such that the probabilities given the initial health state add up to 1. The exact methodology is explained in Annex 1 of the appendix.

3.1.2 Model expected costs before and after the reform

The second step concerns the estimation of expected OOP medical expenditure c per health state, leading to the following model:

$$E(c_{i,t}) = g\left(age_{i,t}, age^2{}_{i,t}, gender_{i,t}, age * gender_{i,t}, netincome_{i,t}, partner_{i,t}, children_{i,t}\right) \quad (3)$$

I am interested in the change in expenditures before and after the reform. Estimates of expenditures are gathered for the years 2012, 2015 and 2017. For the function of $g(x_{i,t})$, a linear regression model is used.

The explanatory variables included in the regression model are listed below:

Age, a squared term of age and disability: These are included as I am interested in the medical expenditures for different health states at different ages. The expected rise in medical expenditures is steeper among older aged individuals, as they are likely to be in need of more LTC. The squared term of age allows for this non-linearity.

Gender: Medical expenditure is expected to be higher for women because, on average, they become older than men and they receive less informal care.

An interaction term of age and gender: the effect of age is expected to be dependent of gender. Therefore, an interaction term between the two is included.

Having a partner and having children: both a partner and children provide accessibility to informal care and therefore they play a role in the OOP medical expenditure when being disabled. They might replace a part of the formal medical care needed, leading to decreased OOP medical expenditures. Note that it could, on the other hand, also ask for higher OOP expenditures outside the official contributions as it facilitates people to stay self-sufficient and live at home longer.

Net income: this is not only a measure of socio-economic status, but it also exposes information on the affordability of OOP expenditures, which might influence the level of OOP expenditure. This is also an interesting aspect to consider. Net income is used, as this is closest to disposable income, revealing more on the affordability for care not covered by insurance. A positive effect between net income and medical expenditure is expected.

3.1.3 Simulate expected health and costs over remaining lifetime

In the third step, expected health and costs over the remaining lifetime for individuals with different characteristics at some starting age $t = 65$ are simulated. The model from the first step $f(x_{i,t})$ is used to simulate the probability that an individual will be in health state m at age $t + 1$. This leads to the probabilities that the individual will be in good health, disabled health or death in the subsequent year.

The expected costs are estimated by multiplying the average expected costs per health state (estimated in step 2) with the probability that the individual will be in that particular health state at age $t + 1$ (estimated in step 1). The research concerns expenditures in different years, so the consumer price index of 2015 from the CBS Statline is used to correct for inflation in order to allow for comparison between different waves.[6]

Subsequently, all costs over all health states will be summed up, as visualized in Equation 4.

[6] Retrieved from www.statline.cbs.nl

$$E\left(c_{i,t+1}\middle|h_{i,t}=l\right)=\sum_{m=1}^{3}P\left(h_{i,t+1}=m\middle|h_{i,t}=l\right)*E(c_{i,t+1}|h_{i,t}=m) \quad (4)$$
$$l=1,2,3$$

The same equation can be used for all subsequent years, in order to simulate the whole lifecycle. A Markov Model is used for this simulation and this allows for comparison of expected OOP medical expenditure over the remaining life for different groups of elderly. In adding up healthcare costs over the lifetime, a discount factor of 4 percent is used on future health care costs, in line with economic evaluations in the Dutch healthcare sector. A discount factor is of importance because less value is attached to future expenditures so future expenditures need to be converted into the current value (Institute for Medical Technology Assessment, 2016). By running this model using the estimates of $E(c)$ before and after the reform, I can assess the impact of the reform on lifetime OOP expenditures. The changes in OOP medical expenditures over the remaining lifetime for individuals aged 65 are analyzed for groups with different background characteristics in order to say something about the effect the reform had on different groups. The effect is measured by the change in OOP expenditures relatively to the initial level of OOP expenditures for each group.

Ultimately, expected expenditures over the remaining lifetime as a percentage of expected income over the remaining lifetime are analyzed for different income groups to observe how the share of income spent on LTC developed after the reform. Again, the change in the share of income spent on OOP expenditure is measured relatively to the initial share of income spent on OOP expenditure for all income groups. This provides insight on affordability and progressivity of the OOP LTC expenditures. To realize this, I make a rough estimation of the expected net income over the remaining lifetime by taking the total sum of the discounted yearly net income multiplied by the expected number of life years. I made the assumption that the income remains stable over the years (not adjusted for inflation) and that the discount factor for future income is equal to the discount factor of future expenditures. A stable income can be assumed as it concerns retired people, for whom growth in future income is unlikely. Note that this measure of total expected net income is still a rough measure and is only used to provide some presumptions on expected progressivity and affordability of LTC payments.

3.2 Data Collection

For this research, the Dutch Longitudinal Internet Study for Social Sciences (LISS) panel data is used.[7] The panel consists of 4,500 households, comprising 7,000 individuals aged 16 years and older and is based on a true probability sample of households drawn from the population register by Statistics Netherlands.

The core study comprises the Health Panel, which can be used to assess variables to measure the need for LTC. Data is also collected for more specific research purposes, among which the Time Use and Consumption Panel. This panel can be used to assess OOP medical expenditures as well as other expenditure categories. Background variables such as gender, age, income and having children and/or a partner are retrieved from the monthly updated Household Box, which comprises background variables of the panel members.

Availability of the data and the number of respondents of the different panels per wave are shown in Table 1. Collection events for the Health Study and Consumption Study were performed once or twice per wave. The Household Box is presented to the contact person of the household every month to enter any changes that may have occurred and data is available every month as of November 2007. For each year, the data of the background variables from January is collected to assure that the data in a particular year from the Household Box precede the data on both Health and Consumption within that year.

Table 1: Number of respondents of the health study and the consumption study

Wave	Health Study	Consumption Study
2008	5,961	-
2009	6,119	5,594
2010	5,718	5,337
2011	5,072	-
2012	5,780	5,463
2013	5,379	-
2014	-	-
2015	6,009	6,167
2016	5,408	-
2017	5,959	5,288

Source: LISS panel data

[7] Retrieved from www.dataarchive.lissdata.nl

As mentioned in the methodology, there is no data available on deceased respondents due to privacy considerations of the LISS panel. Age- and gender-specific survival rates of 2017 are collected from CBS Statline and are used to calculate and include mortality rates.[8]

3.3 Data Description

This section provides a data description considering the methodology discussed in Section 3.1. First, a description of the dataset is given; thereafter the health measure, the measure of OOP medical expenditure and the background variables are elaborated on.

3.3.1 Dataset aggregation

To calculate the transition probabilities as described in step 1, data on health and background variables of the waves 2008 until 2017 are merged. Using all available waves leads to improved reliability in the results resulting from a high number of observations. Number of the household member encrypted *(nomem_encr)* and wave *(wave)* are the key variables. Hereby a panel dataset is created with 48,571 matched observations.

Subsequently, to model the expected medical expenditures before and after the reform as described in step 2, the dataset is merged with consumption data of 2012, 2015 and 2017. As one can see in Table 1, the most recent data available before the reform concerns 2012 and the most recent data available after the reform concerns 2017. Van Ooijen et al. (2016), already estimated a cross sectional effect of the reform in 2015 (note that this does not take into account the lifecycle perspective). Inclusion of data of 2017 allows measurement of more long-term effects of the reform that might have occurred. Given the availability of the data on consumption, the waves of interest concern the years 2012, 2015 and 2017. This results in a dataset with 16,727 matched observations of those aged 65 years and older, divided relatively equally over the three waves.

Summary statistics of the data are shown in Table 2, and the corresponding variable description is shown in Table 2 of the appendix.

[8] Retrieved from www.statline.cbs.nl

Table 2: Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Max
age	16,442	72.22	6.04	65	103
gender	16,442	0.52	0.50	0	1
partner	16,442	0.72	0.45	0	1
children	19,276	0.18	0.38	0	1
netincome	15,564	1897.54	7111.52	0	298,759
log(netincome)	14,964	7.24	0.61	3.91	12.56
disability	13,216	0.31	0.46	0	1
disability_t+1	9,440	0.33	0.47	0	1
med_persexp 2012	1,278	35.12	92.95	0	1,500
med_persexp 2015	1,509	92.31	234.65	0	4,000
med_persexp 2017	2,355	122.74	608.12	0	24,000

3.3.2 Health measurement

In measuring the need for LTC of the individuals, the variables subjective health and disability are considered. Theoretically, disability is the best measure for LTC within this dataset as it is directly related to the need for LTC. Folland et al. (2017) explicitly mentions physical or mental disability as the cause for LTC. Subjective health and disability are both subjective measures and self evaluation might differ among individuals and among different ages. Disability, however, is a more tangible description than subjective health. Subjective health is subject to a broader interpretation, as it also includes health problems not necessarily related to LTC. This makes subjective health less appropriate. Besides, only few of the elderly within the sample rate their subjective health as poor, which might be the result of coping. This reduces the reliability of the results when using this measure. Disability shows a more sufficient number of observations in the different health state, making it more appropriate to use as a measurement of health. These numbers of observations can be seen in Table 3 of the Appendix.

The disability measure is retrieved from the following question (and its corresponding answer categories) in the Health Panel:

To what extent do your physical health or emotional problems hinder your daily activities over the past month, for instance in going for a walk, walking up stairs, dressing yourself, washing yourself, visiting the toilet?

(1=not at all, 2=hardly, 3=a bit, 4=quite a lot, 5=very much)

I translate this question into the dummy variable *disability* by transforming the possible answers into the following categories:

Non-disabled; comprising *not at all* and *hardly*.

Disabled; comprising *a bit*, *quite a lot* and *very much*

Subsequently, a lead variable *disability_t+1* is created in which the measure of disability of the subsequent year (t+1) is indicated. In Table 3, the number of respondents on disability at both t and t+1 for each wave are shown.

Table 3: Number of respondents per wave for disability

	Disability at t	Disability at t+1
2008	848	717
2009	1.737	1.394
2010	990	878
2011	958	873
2012	1.194	1.094
2013	1.183	0
2014	0	1.221
2015	1.413	1.255
2016	1.368	1.183
2017	2.535	0

The waves 2013, 2014 and 2015 are excluded in deriving the transition probabilities. This results from missing data in wave 2014, as can be seen from table 3, and from a deviation in the collection moment of 2015 compared to the other years, leading to a longer period between waves 2015 and 2016. All remaining transitions in the data are used. A sufficient number of transitions between the two health states are of importance, as this directly relates to the aim of step 1. These numbers can be found in Table 4.

Table 4: Number of transitions observed between the disabled and non-disabled health states among individuals aged 65+

	Non Disabled at t+1	Disabled at t+1
Non Disabled at t	3,339	754
	81.84%	18.16%
Disabled at t	668	1,228
	35.32%	64.77%

Note: Frequency and row percentages are provided

From the results in Table 4 it can be concluded that there are sufficient number of observations for the transition between the disabled and non-disabled health state to come up with appropriate estimates. The table shows that the transition of disabled to non-disabled is 35%, which is higher than expected. As discussed earlier, older aged individuals are not likely to recover from disability.[9]

3.3.3 Measurement of out-of-pocket medical expenditure

In the questionnaire on Consumption and Time Use, respondents are asked to give an indication on monthly personal spending in euros on average on several types of non-durable expenditures. This question can be translated into continuous variables given in euros per month. The category of interest concerns the spending on medical care health costs that are not covered by insurance (such as medicines, doctor, dentist, hospital bills, maternity care, spectacles, hearing aids, etc.). In this measure, I assume that both official OOP contributions related to the WLZ, Wmo and Zvw as well as other OOP expenditures on LTC are covered. An indication of monthly medical personal expenditure is asked for in the questionnaire, so this variable can directly be used as a proxy for medical OOP expenditures. Detailed summary statistics are shown in Table 5.

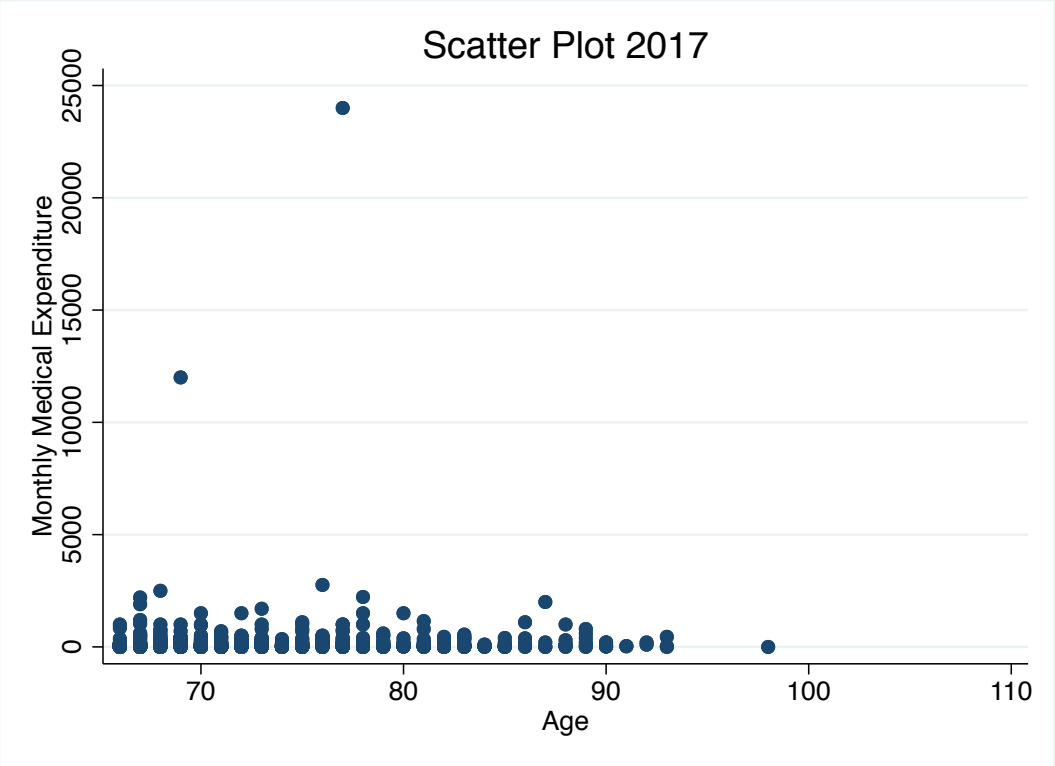
Table 5: Detailed summary statistics monthly medical personal expenditures (in euros)

Wave	Mean	Std. Dev.	Min	Max	P5	P50	P95
2012	35,79	96,25	0	1.500	0	15	125
2015	93.06	239.36	0	4.000	0	35	375
2017	124.20	619.91	0	24.000	0	35	482.50

This table reveals that the mean is substantially higher than the median, which implies a skewed distribution to the right. This results from the long tail of high expenditures that increase the mean. A remarkable observation concerns the exceptionally high maximum value for monthly medical expenditures in 2017 of 24,000 euros. The observations are visualized in the scatter plot in Figure 1.

[9] An explanation could be related to the inclusion of moderate disability in the disabled category. However, against expectations, shifting moderate disability to the non-disabled category even increased the number of transitions from disabled to non-disabled among the elderly (as can be seen in Table 4 of the Appendix). With this in mind, I decided to stick with the categories in which *a bit, quite a lot* and *very much disabled* belong to the *disabled* health state.

Figure 1: Scatter plot OOP monthly medical expenditure in euros over age



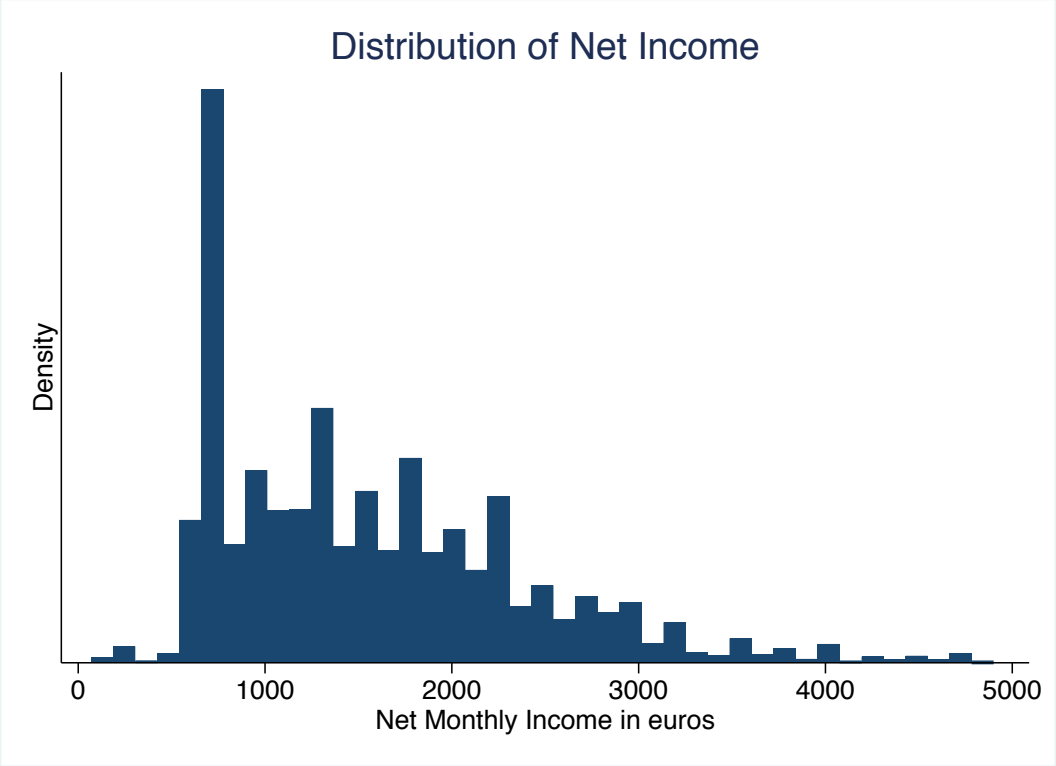
The occurrence of two remarkably high observations is revealed in Figure 1. To keep the mean representative, I decide to exclude observations with medical expenditure exceeding 5,000 euros per month, as these levels seem to be non-realistic on a lifetime basis. Hereby two observations in 2017 are excluded. The resulting scatter plots of the separate years can be found in Figure 1, 2 and 3 of the Appendix.

3.3.5 Explanatory variables

Background variables comprising age, gender, net income, having children and having a partner are obtained from the yearly updated background variables of the panel members. Age, gender, having children and having a partner are straightforward variables that are directly related to the questions posed in the questionnaire. As discussed, income is used as a measurement of socioeconomic status. Net income in specific is chosen because this the closest measure to disposable income, which relates to affordability. Net income in the data concerns a monthly measure. Summary statistics on net income show that net income takes some extreme values, as can be observed in the maximum value of net income shown in Table 2. This might for example be the result of misreporting (yearly net income instead of monthly net income). To deal with these outliers, I do not take into account observations with

a monthly net income higher than 10,000 euros. This leads to the distribution shown in Figure 2.

Figure 2: Distribution of net income



The distribution is skewed to the right. Therefore, a logarithmic formation of net income is created and used in the models shown in Equation 1, 2 and 3.

To compare the effect of the reform among different income groups, a low-income group, a moderate-income group and a high-income group are compared. The net modal income of 2017 is used as a measure of a moderate income. The net modal income is defined as the income that falls just below the income related to the maximum premium under the Healthcare Insurance Act. Using the short-term estimates on yearly gross modal income of the Centraal Plan Bureau (CPB) in 2017[10], a rough estimation of the net monthly modal income is set at €2152. For low-income groups, I choose an income of €1000 and for the high-income groups, I choose an income of €5000.

[10] Retrieved from www.cpb.nl/cijfer/kortetermijnraming-maart-2017

Chapter 4: Results

This chapter is divided in the same three steps as described in the methodology, and these steps are discussed in section 4.1, 4.2 and 4.3 respectively. Section 4.4 provides a critical view on the results.

4.1 Transition Probabilities

4.1.1 Transition probabilities between good health and poor health

Table 6 shows the logistic regression results of the estimated transition probabilities. The first column reflects the results for initially non-disabled individuals and the second column for initially disabled individuals.

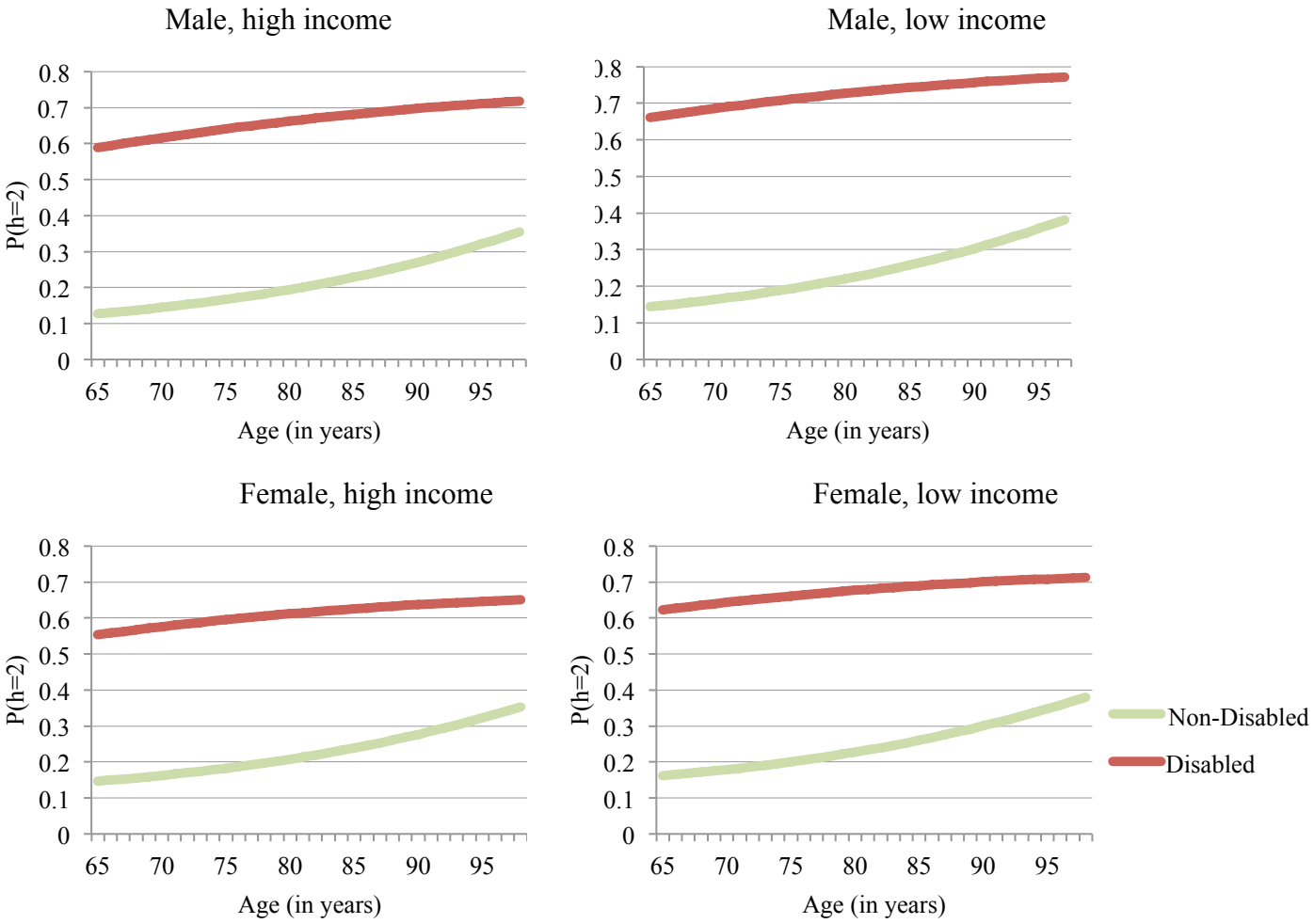
Table 6: Logistic regression results: estimated transition probabilities of becoming disabled by initial health

Variable	**β (SE)**	**β (SE)**
	Initially Non-Disabled	Initially Disabled
constant	-0.805 **	0.170
	(0.257)	(0.385)
age	-.0268 **	0.0447***
	(0.00837)	(0.0108)
age^2	0.000380 ***	-0.000199*
	(0.0000823)	(0.000101)
gender	-0.502 **	-0.196
	(0.154)	(0.218)
age*gender	0.00520	-0.00519
	(0.00283)	(0.00380)
log(netincome)	-0.0959 **	-0.238***
	(0.0356)	(0.0466)
N	17,157	5,341
Pseudo R-squared	0.0112	0.0294

Note: * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$

Table 6 shows significant effects on transition probabilities for most explanatory variables, exceptions are gender for the initially disabled and the interaction term of age and gender for both categories. The squared term of age and the interaction term of age and gender make it somewhat hard to directly interpret the results. To provide some better understanding, transition probabilities over age among the elderly are visualized in Figure 3 for different groups in terms of gender and income. Note that this figure only concerns the regression results and these probabilities are not rescaled with mortality rates.

Figure 3: Probability of becoming disabled in the subsequent year over age



Note: Not rescaled with mortality rates

The positive slopes of the four graphs in Figure 3 reveal a positive effect of age on the probability of becoming disabled after the age of 65, in line with expectations. However, the curves of disabled and non-disabled individuals show clear differences. Decreasing positive slopes among the disabled are observed and increasing positive slopes among the non-disabled are observed. As already discussed, I expected a decrease in the probability of recovering from disability at older ages. Therefore, the decreasing slope among the disabled is against expectations.

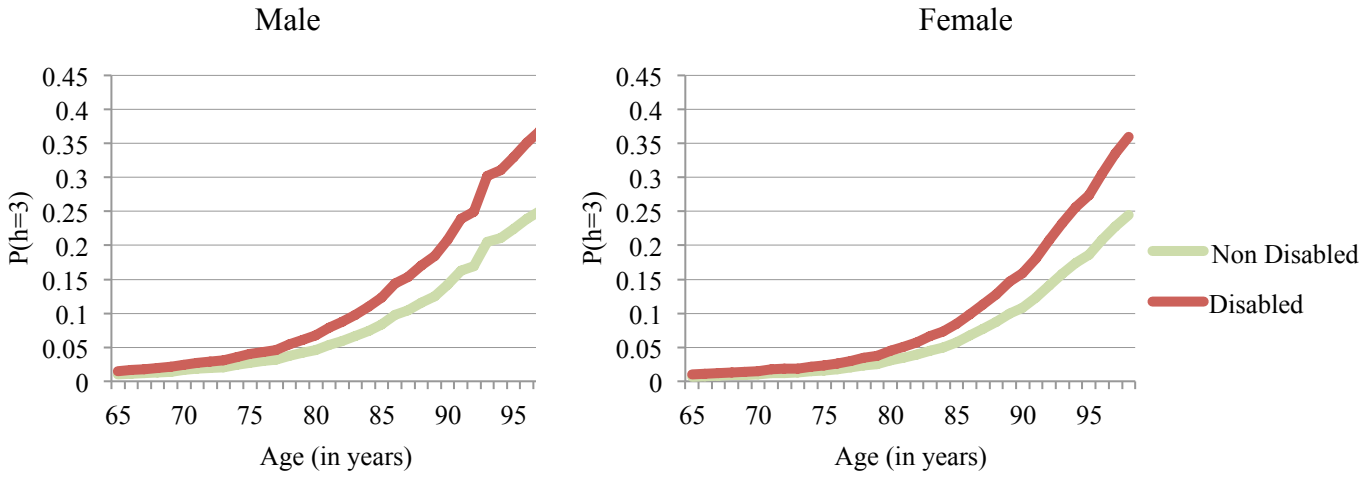
The graph shows that being a man as well as having a low income increases the probability of staying disabled when disabled. The differences in transition probabilities resulting from differences in gender and income for non-disabled individuals are less distinctive. Nevertheless, it is observed that a low income slightly increases the probability of becoming disabled. The effect of gender differs from the effect found for disabled

individuals, as being a man compared to being a woman decreases the transition probability for non-disabled individuals.

4.1.4 Inclusion of mortality rates

As mentioned in the methodology, the transition probabilities between good and poor health are rescaled in order to include the deceased health state. Results of the linear regression on the estimated disability/non-disability ratio used for the rescaling can be found in Table 5 of the appendix. The results of Equations 2 and 3 of Annex 1 in the appendix on the probability to die in the subsequent year are visualized in the graphs in Figure 4.

Figure 4: Probability of dying in the subsequent year over age



The graphs in Figure 4 show an increasing probability to die in the subsequent year over age. This probability is higher for males than for females at the same age, in line with higher life expectancy of women compared to men. The graphs shown in Figure 3 are rescaled with these probabilities to die. The rescaled version of the graphs in Figure 3 can be found in Figure 4 of the appendix.

4.2 Estimated Out-of-Pocket Medical Expenditure

Table 7 shows the linear regression results of the estimated OOP medical expenditures. The three columns refer to 2012, 2015 and 2017 respectively. The first column reflects the period before the reform, while the second and the third column reflect the period after the reform.

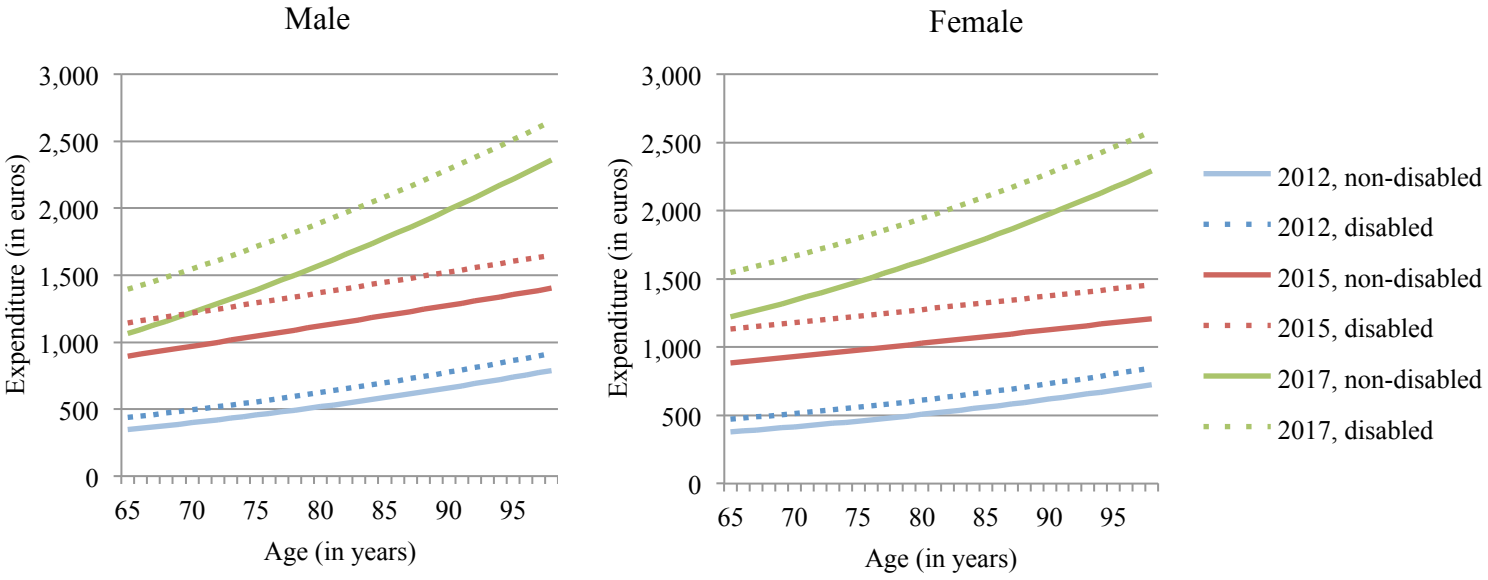
Table 7: Linear regression results: estimated OOP medical expenditures

Variable	**β (SE)**	**β (SE)**	**β (SE)**
	2012	2015	2017
disabilty	4.913*	20.674**	31.061**
	(2.455)	(6.958)	(9.920)
age	-0.636	0.605	-1.113
	(0.397)	(1.014)	(1.399)
age^2	0.00947*	0.00135	0.0231
	(0.00424)	(0.00973)	(0.0139)
gender	-19.107	-28.669	-49.455*
	(6.303)**	(14.895)	(21.843)
age*gender	0.252	0.456	0.562
	(0.137)	(0.307)	(0.428)
log(netincome)	4.973***	-0.714	3.109
	(1.317)	(4.313)	(5.382)
partner	3.904*	-5.115	16.096*
	(1.908)	(6.158)	(7.512)
children	-0.138	6.791	11.942
	(2.051)	(5.585)	(7.783)
constant	-8.035	39.230	34.573
	(10.797)	(27.298)	(44.684)
N	4,072	4,483	3,154
R-squared	0.0231	0.0124	0.0267

Note. * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$

This section briefly discusses the findings. Note, however, that only a few of the effects found show a significant effect on OOP expenditures. In all years, disability does show a positive, significant effect on OOP medical expenditures, ceteris paribus. The coefficients related to disability increased over the years. This effect is also visualized in the graphs in Figure 5, in which yearly OOP expenditure over age for both males and females is provided.

Figure 5: Yearly OOP medical expenditures



Note. The graphs concern an individual with a modal income, a partner and without children

Figure 5 reveals that in all years, expenditures are higher for disabled individuals, compared to non-disabled individuals, in line with the positive regression coefficients of disability. The absolute difference between disabled and non-disabled individuals became bigger, which relates to the increasing coefficient over the years. From the graphs it can be observed that the OOP expenditures increased substantially after the reform in 2015. To illustrate: the estimated expenditures for disabled individuals more than tripled between 2012 and 2017. An increase is expected, but the size increase seems to be notably higher than expected.

Moreover, the graphs in Figure 5 provide a better view on the effects of age and gender on the expenditures. The increasing slopes show a positive effect of age at older ages. Besides, in 2017, the slope became steeper which implies a stronger, positive effect of age on OOP expenditures in 2017. The different graphs for male and female show that OOP medical expenditure among women is slightly higher compared to men.

Having children shows a negative influence in pre-reform while it shows a positive influence post-reform. The negative effect in 2012 is relatively small compared to the positive effects in 2015 and 2017. This implies that having children increases OOP medical expenditure after the reform, which conflicts with the expectation that accessibility to informal care relates to lower OOP expenditures. These findings are not significant.

However most findings are in line with expectations, this is not the case for all estimations, especially for those in 2015 there exist some inconsistencies. A finding that contradicts the expectation concerns the negative effect of income in 2015. Note however, that this effect is of relatively small impact compared to the positive coefficients in 2012 and 2017, and besides is not a significant finding. The coefficients concerning partner also provide some inconsistencies. The coefficients turn out positive in 2012 and 2017, but negative in 2015. Again note that the result in 2015 is not significant.

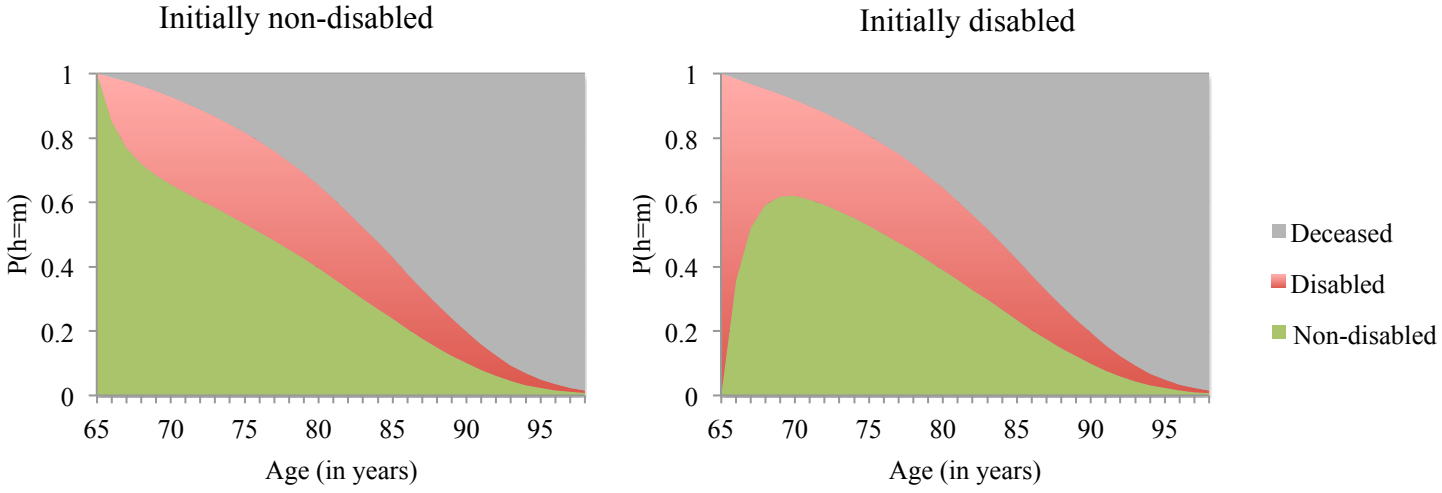
4.3 Expected Health and Expected Medical Expenditure over the Lifetime

This section is devoted at presenting the results of expected health and expected costs of elderly over the remaining lifetime, resulting from the Markov Model set up in the third step.

4.3.1 Expected health

In order to visualize the expected health over the lifetime resulting from the estimated transition probabilities, a 65-year old man with a modal income, a partner and without children is used to create the graphs in Figure 6.

Figure 6: Expected health over the lifetime



Note. The graphs concern a man at 65 years old with a modal income, with partner and without children

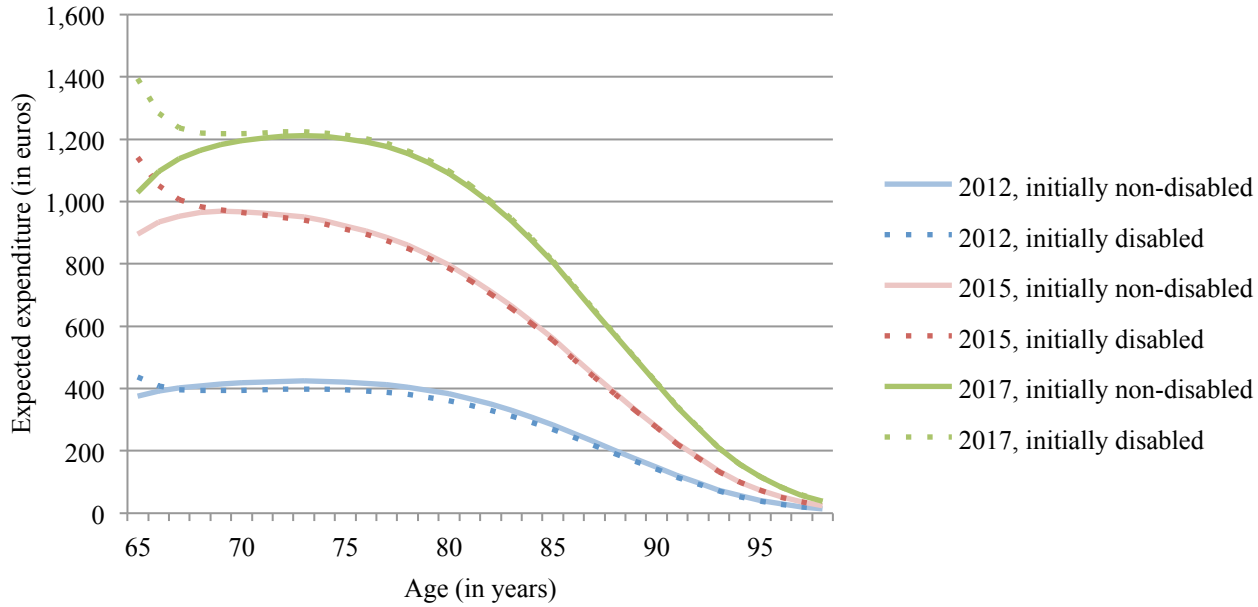
The left-hand and the right-hand graph in Figure 6 show the expected health over the lifetime of a non-disabled and a disabled individual at the age of 65 respectively. The graph of an initially disabled individual reveals a substantial probability of returning to good health. This results in a relatively similar pattern after the age of approximately 70 in the graphs. It was expected that the probability to return to good health was smaller at older ages, as

discussed earlier. It is hard to observe from the graphs but the data does show that the probability of being non-disabled remains somewhat lower at all ages for the initially disabled compared to the initially non-disabled whereas the probability of death remains somewhat higher for the initially disabled at all ages.

4.3.2 Out-of-pocket medical expenditures taking into account expected health

The output related to Figure 5 and Figure 6 are combined to get to the expected OOP medical expenditure resulting from the expected health over the remaining lifetime given an initial health state. Again, this is visualized for a 65-year old man with a modal income, a partner and without children and the graph allows for comparison between initially non-disabled and disabled health states.

Figure 7: Expected yearly OOP medical expenditures resulting from expected health and estimated OOP expenditures per health state



Note. The graph concerns a non-disabled man at 65 years old with a modal income, a partner and without children

As a result of the high similarity of the expected health after a certain age as found in Figure 6, the graphs in Figure 7 also show highly similar curves among initially disabled and non-disabled individuals in all years after a certain age. Zooming into Figure 7 shows that the curves of 2012 and 2015 cross after a certain age. This reveals higher expected expenditures of an initially non-disabled man compared to an initially disabled man after this age. This can be explained by the fact that the probability of becoming deceased is higher for disabled than

for non-disabled individuals. This leads to a reduction in a part of the expected medical expenditures, as these are 0 for the deceased state. In 2017, this effect did not occur.

4.3.3 Total expected out-of-pocket medical expenditures over the lifetime

Ultimately, discounting and summing up the expected OOP medical expenditures over the lifetime, as given in Figure 7, leads to an estimation of the expected OOP medical expenditures over the lifetime. Thus far, the results have only been shown for a man with a modal income, a partner and no children. Now, I run the simulation for 48 different variants, in which all combinations of income, gender, having a partner, having children and initial health states are investigated. Table 6 and Table 7 of the appendix show the output on total expected lifetime expenditure of all different variants for all years. This section will discuss the main results by making a distinction between the effects of the reform among the different variants. The relative increases in expected OOP medical expenditure over the lifetime between 2012 and 2017 are compared. I focus on 2017 in my comparison (instead of 2015) as the regression results on expenditure seem more consistent and show more significant results in 2017, as discussed in Section 4.2. Relative increases are chosen over absolute increases, because this reveals the effect of the reform in comparison with the situation before the reform. On average, OOP medical expenditures increased from €6,448 to €19,954, which equals a relative increase of 209 percent. For the initially non-disabled this relative increase equals 198 percent, whereas for the initially disabled this increase equals 222 percent. Percentages of the relative increases per variant can be found in the last two columns of Table 8. A color scale is applied to these columns in which a darker color relates to a higher relative increase in OOP medical expenditure. Main findings are visualized in Table 9, in which the average expenditures and the corresponding relative increase are provided for the different groups of interest.

Table 8: Relative increase in OOP medical expenditures over the remaining lifetime for different variants between 2012 and 2017

Variant	Gender	Income	Children	Partner	Non-Disabled	Disabled
1	Female	Low	No	No	203%	226%
2	Female	Low	Yes	No	236%	261%
3	Female	Low	No	Yes	211%	235%
4	Female	Low	Yes	Yes	241%	266%
5	Male	Low	No	No	186%	210%
6	Male	Low	Yes	No	220%	245%
7	Male	Low	No	Yes	196%	220%
8	Male	Low	Yes	Yes	227%	252%
9	Female	Moderate	No	No	189%	212%
10	Female	Moderate	Yes	No	220%	245%
11	Female	Moderate	No	Yes	199%	222%
12	Female	Moderate	Yes	Yes	227%	252%
13	Male	Moderate	No	No	173%	196%
14	Male	Moderate	Yes	No	205%	230%
15	Male	Moderate	No	Yes	184%	207%
16	Male	Moderate	Yes	Yes	213%	238%
17	Female	High	No	No	166%	189%
18	Female	High	Yes	No	194%	218%
19	Female	High	No	Yes	176%	199%
20	Female	High	Yes	Yes	202%	227%
21	Male	High	No	No	150%	173%
22	Male	High	Yes	No	179%	204%
23	Male	High	No	Yes	162%	185%
24	Male	High	Yes	Yes	189%	213%
				Average:	198%	222%

Note: A color scale is applied to the relative increases, in which higher increases are associated with darker shades.

Table 9: Average increase per group of interest

	2012	2017	Relative increase
All groups	€ 6,447.83	€ 19,953.84	209%
Men	€ 6,056.38	€ 18,113.55	202%
Women	€ 6,888.23	€ 21,794.13	217%
Low Income	€ 6,021.33	€ 19,737.97	228%
High Income	€ 6,981.65	€ 20,225.43	190%
Initially non-disabled	€ 6,558.79	€ 19,522.76	198%
Initially disabled	€ 6,336.86	€ 20,384.92	222%
With partner and/or children	€ 6,550.16	€ 20,696.61	217%
Without partner and/or children	€ 6,140.83	€ 17,725.53	206%

Table 8 reveals that the relative increase is highest for women with a low income, with children and a partner and the relative increase is lowest for a men with a high income, without children and a partner among both disabled and non-disabled. Besides, it can be observed that the relative increases are larger for the initially non-disabled individuals among all variants. This reveals a bigger effect of the reform on disabled individuals.

Table 8 and Table 9 show that the relative increase is higher for women for all different income levels in both initial health states. This implies a bigger effect of the reform on women compared to men. Table 9 shows that individuals with or without a partner and/or children reveal a bigger relative increase for individuals with a partner and/or children. This implies that having access to informal care leads to being relatively more affected by the reform, which contradicts expectations.

The category of main interest concerns the income level, as this reveals how the relative changes differ among socio-economic groups. Table 8 already shows a pattern in which the color gets darker with lower income, reflected in the darker shades in the upper part of the graph. To provide a better view of the development of the expected expenditures on the lifetime over the years related to initial health state, Figure 8 is set up. The left-hand graph concerns an initially non-disabled man with a partner and without children; the right-hand graph concerns an initially disabled man with a partner and without children. In the figure, a distinction is made between low net income, moderate net income and high net income.

Figure 8: Expected OOP medical expenditures over the lifetime

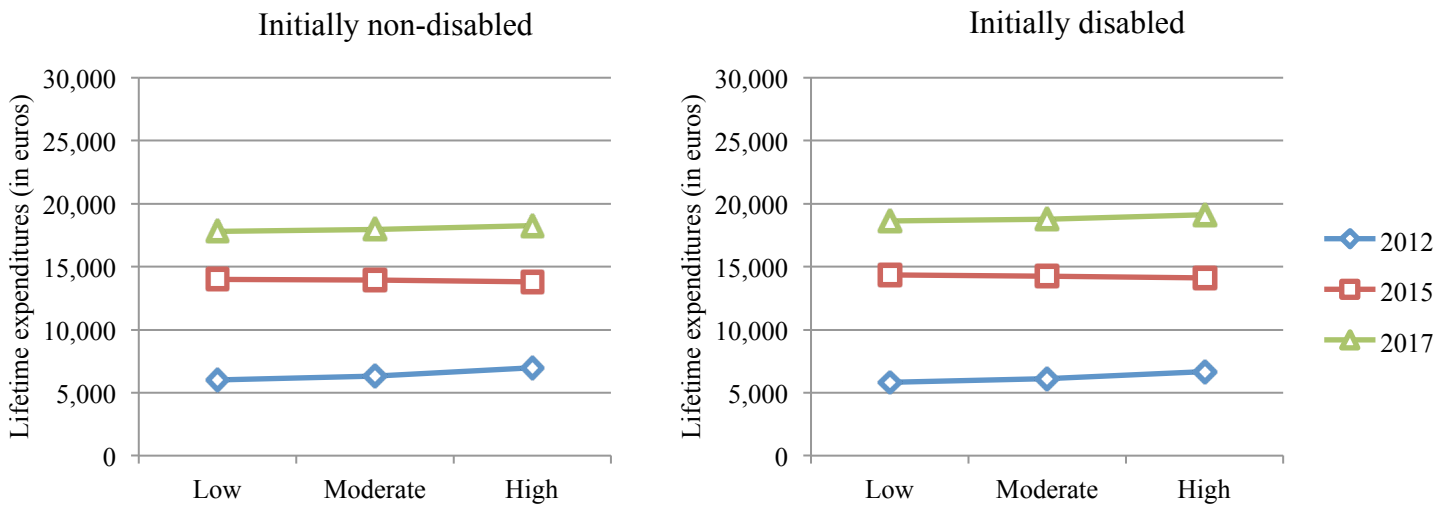


Figure 8 shows that higher income is associated with higher expenditures. Nevertheless, relatively flat curves are observed, leading to relatively small differences between the low-, moderate- and high-income groups. This suggests that low-income groups spend a higher percentage of their income on OOP medical expenditure both before and after the reform. As the results of Table 8 and 9 show, the relative increase among the low-income groups is higher which in turn decreases the difference between low- and high-income and flattens the curves even further in 2017 compared to 2012. This suggests an increase in the discrepancy in the share of income spent on OOP medical care between the low- and the high-income groups.

To get a better understanding on how these percentages developed between 2012 and 2017, the (rough) estimation of the expected net income over the remaining lifetime is used. The proportions are visualized in Table 10 for both initially disabled and initially non-disabled individuals in 2012 and 2017. The percentages in this table reflect the average percentage of the variants that belong to the income group in question. Moreover, the percentage changes between the two years are given with a color-scale in which the strongest increases are marked with a darker shade.

Table 10: Share of net income spend on OOP medical care over the lifetime

	Non-Disabled			Disabled		
Income	2012	2017	Relative increase	2012	2017	Relative increase
Low	1.07%	3.38%	215.12%	1.05%	3.56%	239.35%
Moderate	0.79%	2.37%	201.26%	0.77%	2.49%	225.32%
High	0.43%	1.22%	184.99%	0.41%	1.28%	208.86%

Note: The averages of the percentages of all variants among low, moderate and high income are used to calculate the overall percentages per income-group. A color scale is applied to the percentage changes, in which a higher change is reflected with a darker shade.

From these percentages it becomes clear that the proportion of income spent on medical expenditure is indeed higher among lower income groups for both the disabled and the non-disabled in both 2012 and 2017. In addition, the columns with the color scale reveal a higher relative increase in the share of income spent on medical expenditure among the lower income groups compared to the higher income groups among both disabled and non-disabled individuals. Again, a higher impact of is found for the disabled.

These findings reveal a higher impact of the reform on lower socio-economic groups in terms of the share of income spent, especially for those who are disabled. This affects

progressivity in the system and leads to redistributions among socio-economic groups. How this can be interpreted in terms of equity between groups is elaborated on in the conclusion.

4.4 Critical View on the Results

As mentioned earlier, the increase in expected OOP medical expenditure over the lifetime of both 2015 and 2017 compared to 2012 is remarkably high. Table 8 shows that expenditures over the lifetime for all variants have more than doubled in five years. This section is devoted at providing some more insight on whether this increase is feasible as a result of the reform. I do this by taking a closer look at the detailed summary statistics related to OOP expenditures, by comparing these statistics to the findings of Van Ooijen et al. (2016) and by looking at the development of OOP expenditure on LTC on a national level.

Table 11 provides detailed summary statistics of the elderly. The variable *size increase* is introduced here, and relates to the additional question posed in the questionnaires of 2015 and 2017 related to medical OOP expenditure. In this question, it is asked with how much medical expenditures increased compared to two years ago for those who indicated an increase.

Table 11: Summary statistics of monthly OOP medical expenditure of individuals aged 65+ (in euros)

	Mean	Standard Deviation	P50	P75	P95	Maximum
2012						
Non-Disabled	33.48	84.96	15	30	120	1,200
Disabled	37.37	91.03	15	40	140	1,100
All	35.79	96.25	15	30	125	1,500
2015						
Non-Disabled	82.90	180.74	33	70	375	2,450
Disabled	103.68	271.34	40	80	375	3,000
All	93.06	239.36	35	75	375	4,000
Size Increase	62.01	194.15	20	50	200	3,200
2017						
Non-Disabled	105.88	231.01	40	90	400	3,300
Disabled	121.78	251,77	50	100	500	2,500
All	105.75	232.27	35	100	455	3,300
Size Increase	70.92	174.68	25	60	300	3,300

Note: values above €5,000 are excluded. Size increase relates to the average size increase compared to 2 years ago for those who indicated a price increase (39% in 2015, 32% in 2017)

Table 11 reveals a substantially higher mean in 2015 and 2017 compared to 2012, in line with the results. Moreover, it becomes clear that the expenditures are very skewed and there exists high variance among individuals, as the median is much lower than the mean and the maximum value is much higher than the mean. It is noteworthy that the median also more than doubled compared to 2012, while the median is less robust to outliers than the mean. Van Ooijen et al. (2016) used the same data and they found a median of €40 of monthly OOP medical expenditures, an expenditure of €75 for people in the third quartile among the oldest age group[11] and a mean of €85.67[12]. Overall the summary statistics in Table 11 seem consistent with the findings of Van Ooijen et al. (2016).

The variable *size increase* shows that in 2015, 39 per cent of individuals aged 65+ indicated an increase with a mean of €62.01 and in 2017, 32 per cent of individuals aged 65+ indicated an increase with a mean of €70.92. The mean increase of OOP expenditure among the disabled[13] is relatively close to this indicated size increase. In conclusion, there seem to be no inconsistencies in the data.

To see whether an increase in OOP expenditure on LTC on a national level did occur, data of expenditure on nursing and residential care facilities in the Netherlands over the years 2012 until 2016 is retrieved.[14] This is visualized in Table 12.

Table 12: Expenditure on nursing and residential care facilities in the Netherlands

	2012	2013	2014	2015	2016
Total (in mln)	€ 18,356	€ 18,456	€ 18,641	€ 17,303	€ 17,624
OOP (in mln)	€ 1,469	€ 1,638	€ 1,670	€ 1,569	€ 1,638
Percentage OOP	8.00%	8.88%	8.96%	9.07%	9.29%

Source: CBS Statline 2018

Table 12 shows that an increase is observed in the percentage of OOP expenditure compared to the total health care expenditure on nursing and residential care facilities in the Netherlands. This is in line with my findings.

[11] In the research of Van Ooijen et al., the oldest age group corresponds to ages above 75

[12] They found a non-zero mean (only observations >0) of €1181.6 for OOP payments per year in 2015. Monthly, this is €98.47. Taking into account the zeros, a mean of €85.67 can be calculated.

[13] An increase of €66.31 between 2012 and 2015 and an increase of €59.77 between 2015 and 2018

[14] Retrieved from www.statline.CBS.nl

It is of importance to keep in mind that it concerns OOP expenditures over the lifetime. Therefore it is not that unexpected that the effect is substantial. As mentioned in the literature review, LTC expenditures often occur successive years and this is accounted for in the results by taking into account transition probabilities. Overall, no contradictions are found on the high increase of OOP expenditures observed in the results and therefore I conclude that the substantial increase is not unrealistic.

Chapter 5: Conclusion and Discussion

This research investigates the effect of the LTC reform in the Netherlands on the distribution of OOP medical expenditures over the lifetime. A lifecycle perspective is applied by setting up a Markov Model, which adds to the previous findings of Van Ooijen et al. (2015), who already found an increase in OOP medical expenditure after the reform on a cross-sectional basis. The lifecycle perspective is an important aspect, as it accounts for the skewed distribution of OOP expenditure over the lifetime as well as across individuals. As a consequence, this research provides a more thorough understanding of the impact of the reform on lifetime OOP expenditures. Moreover, the inclusion of all OOP private medical expenditure, instead of only the official contributions resulting from the healthcare acts as (e.g. Hussem et al., 2017), adds to previous research as it provides a more comprehensive measure of the effect of the reform. It is expected that other, non-official, expenditures increased as well, as a consequence of the increased individual responsibility in the provision of LTC.

Expenditures are analyzed for different groups in order to investigate possible differences in the effect of the reform across socio-economic groups, initial health states, gender and accessibility to informal care. This adds to the understanding of how the distribution of the financing of LTC changed across different groups. To compare the effect of the reform, the increase per group is measured relatively to the initial amount of OOP medical expenditure before the reform. This provides insight on whether certain groups suffer more from the reform relative to their initial OOP medical expenditure. Lastly, the research analyses the proportion of income spent on OOP LTC and how this was affected by the reform for different socio-economic groups. This sheds some light on the possible effect of the reform in terms of equity and affordability in healthcare financing, as it provides a measure of progressivity in OOP medical expenditure. Previous research on equity in the delivery of LTC revealed a pro-poor distribution, resulting from a highly generous Dutch LTC system (e.g. Tenand et al). With this in mind, it is not necessarily harmful if the reform

would have led to a somewhat higher increase in OOP medical expenditures among the poor. Nevertheless, affordability is a main objective of the Dutch healthcare system and this should not be violated. The findings provide better understanding of the effect of the reform in relation to policy objectives.

5.1 Main Findings

A substantial increase in OOP medical expenditures among the elderly occurred. On average, the private OOP expenditure over the remaining lifetime of a 65-year old person increased from €6,448 in 2012 to €19,954 in 2017. This reflects a relative increase of 209 percent. The size of this increase is substantial and therefore a heavy impact of the reform is found on OOP LTC expenditures over the lifetime.

The analysis of different groups shows that initially disabled individuals are affected more compared to initially non-disabled individuals. On average, a relative increase of 222 percent is found for disabled individuals whereas a relative increase of 198 percent is found for initially non-disabled individuals. In terms of socio-economic groups, a higher impact of the reform is found for those with a lower income compared to those with a higher income. The research reveals that the expected proportion of income spent on OOP LTC expenditures increased among all income groups. The low-income groups increased from 1.06 percent to 3.47 percent, which is a relative increase of 227 percent. The high-income groups increased from 0.42 percent to 1.25 percent, which is a relative increase of 197 percent. This increase (relative to the initial share of income spent) is stronger among the low-income groups and therefore the already higher share of income spent on OOP LTC by low-income groups became even higher compared to the high-income groups.

Other findings related to different groups show that women are also affected more compared to men, as well as people with a partner and/or children compared to people without a partner and/or children. Among women an increase of 217 percent is found, associated with a lifetime expenditure of €27,989 in 2017, whereas an increase of 202% is found among men, associated with an expected lifetime expenditure of €22,772 in 2017. For those with a partner and/or children, an increase of 217 percent is found, and for those without a partner and/or children, an increase of 207 percent is found. The latter is surprising, as children and a partner provide accessibility to informal care, which is expected to replace a part of the formal medical care needed. The findings suggest that having access to informal care asks for higher OOP expenditures. A possible explanation could be that accessibility of informal care increases the possibility of staying self sufficient, which might be associated

with higher indirect OOP expenditures such as costs related to adjustments of the house and household support. Policy could play a role in this, as municipalities could for example provide less provision to those with a partner and/or children.

5.2 Interpretation in Terms of Equity

The results show that the increase in OOP LTC expenditures is substantial and that the initially disabled with the lowest incomes are affected most heavily by the reform. Besides, the increase in the share of income spent on LTC was higher among lower income groups. As a result, pressure on the accessibility of LTC increased more among the disabled, low-income groups. They have lower disposable incomes to cover the substantial increase related to their higher need for LTC. A higher pressure on accessibility among lower socio-economic classes implies an increased level of inequality in terms of affordability of LTC.

As the main findings reveal, the proportion of income spent on OOP LTC falls continuously as one moves up the income distribution, implying a regressive system in terms of OOP medical expenditure. The lower socio-economic classes pay a larger proportion of their income on OOP LTC than the higher socio-economic classes do. This confirms that OOP payments are a regressive form of finance. As a result of the reform, the difference in the proportion of income spent on LTC became even bigger between the lower and the higher socio-economic classes and this further decreases the degree of progressivity in the LTC system. This decrease in progressivity affects vertical equity in the Dutch payment system of LTC.

Horizontal equity is also affected, as differences are found in the OOP LTC expenditures among different background variables while having the same disposable income (which is related to equal ability to pay). For example, women are affected more heavily than men with the same income and therefore pay a higher proportion of their income on LTC over their life. In conclusion, my findings show that both vertical equity and horizontal equity are affected by the reform and this implies income redistributions.

As mentioned before, the Dutch system used to be highly equitable and affordable to everyone in terms of the delivery of LTC. The reform involved redistributions among different groups in terms of OOP medical expenditures. It seems that those with higher needs for LTC (women, initially disabled and low-income groups), were affected more heavily by the reform. Whether this higher increase in OOP medical expenditure is beneficial in reaching the policy objectives, or whether this increase violates policy objectives, is subject to further research.

5.3 Implications and Relevance for Further Research

As discussed, the findings on average OOP LTC expenditures over the remaining life affect affordability and progressivity of the system, which are both related to policy objectives such as solidarity and accessibility of healthcare to everyone in the Dutch system. Policymakers should consider the increased pressure on accessibility as well as the decreased progressivity, as it affects the objectives of the Dutch healthcare system. It seems that the reform affect vertical as well as horizontal equity in the financing of LTC. More detailed quantification of the effect of the reform on equity and the resulting income redistributions are subject to further research. The same holds on how these findings relate to equity in the delivery of health care, which applies to the level of need and the level of actual delivery of LTC. These directions could provide policymakers better insight on the effect of the reform in relation to policy objectives.

A substantial increase in OOP medical expenditures is found across all groups. A possible solution to keep LTC accessible for everyone is the private LTC insurance market, which so far has been a very limited market with deficiencies (Hussem et al., 2017). Currently, less than 0.5% of the spending of LTC is financed by private insurance. Private LTC insurance is limited because costs are highly unevenly distributed across individuals and the costs are revealed only late in life (Hussem et al., 2016). Only people with a high risk for LTC costs are willing to pay for insurance, which leads to increasing premiums. This phenomenon is called adverse selection and can be seen as a market failure. According to Hussem et al. (2016), there is a clear need for LTC insurance. The substantial increase found in OOP LTC expenditures among all groups confirms this need, as this suggest a higher need for smoothing expenditures on LTC over the whole life. The results of this research contribute to the awareness of the development and expectation of OOP LTC expenditures among different groups. The quantification of these expenditures can be used to calculate premiums more effectively, in order to set up private insurance schemes in the future. This way, LTC expenditures can be smoothed over the lifetime, as proposed by Hussem et al. (2016) as a solution to the increased LTC expenditures. Policymakers could stimulate the use of private LTC insurance, by increasing the public awareness of the development and expectation of OOP LTC expenditures.

5.4 Limitations

Although I have found a substantial increase in OOP expenditures after the reform in 2015, it is not evident whether this increase is fully attributable to the reform, or whether

other developments played a role in this increase as well. As mentioned before, the increase is notably high which results in some question marks on whether this increase is feasible. No direct violations are found in the critical review but as it remains important to stay cautious and to consider other explanations that might have played a role in this remarkably high increase. Analyzing more recent years before the reform would lead to a better understanding of the effect of the reform in particular. Therefore, unavailability of data in other years can be seen as a shortcoming of this research.

Another concern arises from the expected health over the lifetime of an initially disabled individual. The results show that the transition probability of disability to non-disability is relatively high at older ages and that the disability state is not very persistent. Transition probabilities to recover are on average approximately 0.3 whereas the probabilities to stay disabled are on average approximately 0.6. To illustrate: in the case of a transition probability for staying disabled of 0.6, the chance of being disabled after three years is only 0.22. This transition probability seems relatively high compared to findings in previous literature (e.g. Mor et al. (1994) found a probability of 0.12 for recovering from disability and Fong, Shao & Sherris (2015) found a range between approximately 0.15 and 0.05 among men and women aged 70-90). Transition probabilities are sensitive to measures of LTC, which could lead to different results. Nevertheless, a certain bias seems to be in place that likely results from some quality issues in the data of the survey such as drop out of those with severe disabilities.

The last limitation relates to the absence of age- and health-specific mortality rates in the sample of the LISS panel. As a result of this, I was not able to measure age-specific transition probabilities to death given initial health from the data. I used a general hazard ratio to make a distinction between disabled and non-disabled individuals. This general hazard ratio does not allow for age-specific differences in mortality related to the specific health states, which leads to less reliability in the results.

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Appendix

Table 1: Distribution of the AWBZ

	AWBZ/WLZ	Wmo	Zvw
Type of long-term care	Integral package of 24h care and support	Common and customized (non-medical) provisions to help people participate in society	District nursing and personal medical care at home
Responsible Entity	The government	The municipalities	Health insurers
Out-of-Pocket Contributions	Own contributions dependent on income, equity and the type of care	Own contributions on (customized) provisions dependent on income, equity, the type of care and the individual policy of the municipality	Own risks (dependent on the type of care) and contributions for specific aids not fully covered (such as hearing aid and denture)
Shift in LTC financing	-€9.75b	€4b	€4.5b
Governmental savings 2015		Residential care: -€0.5b	Curative care: -€1b
Governmental savings 2016 & 2017	-€0.5b	-€0.5b	-€0.25b

Sources: Dutch Care Authority (NZa), Centraal Economisch Plan 2014 (CPB)

Table 2: Variable Description

Variable	Variable label
nomem_encr	The number of the household member encrypted
wave	Corresponding year
age	Age of the household member in years
gender	Gender (0=female, 1=male)
partner	Whether the household member lives together with a partner (0=no, 1=yes)
children	Whether the household member has children (0=no, 1=yes)
netincome	Personal net monthly income in euros
disabability	Disability at t (0=non-disabled, 1=disabled)
disability_t+1	Disability at t +1 (0=non-disabled, 1=disabled)
med_persexp	Monthly medical personal expenditure not covered by insurance in euros

Table 3: Number of observations per health state among individuals aged 65+

	Frequency	Percentage
Subjective Health		
Poor	214	1.75
Moderate	2,584	21.12
Good	9,438	77.14
Disability		
Disabled	1,458	11.93
A bit Disabled	2,419	68,71
Non-Disabled	8,349	68.29

Table 4: Number of transitions observed between the highly disabled and non-disabled health states among individuals aged 65+

	Not Disabled at t+1	Highly Disabled at t+1
Not disabled at t	4,958	408
	81.84%	7.60%
Highly disabled at t	357	326
	52.27%	47.73%

Note: Frequency and row percentages are provided

Figure 1: Scatter Plot Out-of-Pocket Medical Expenditure over Age 2012

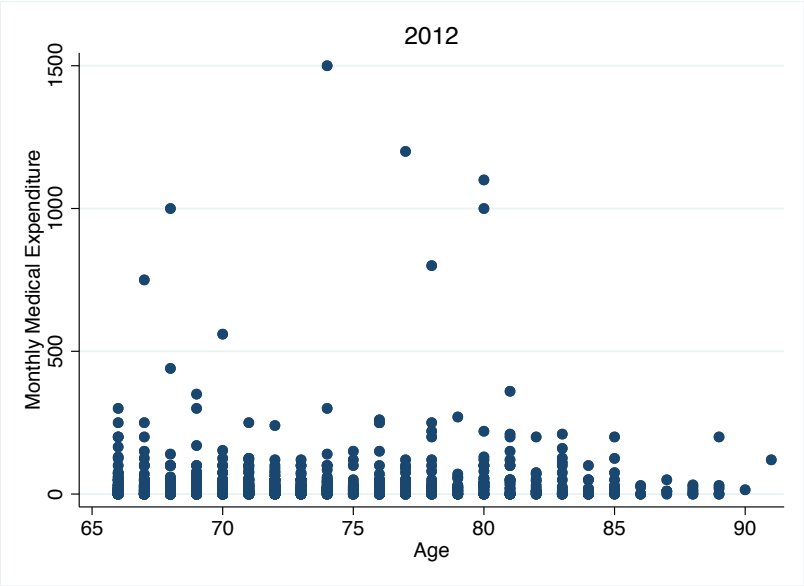


Figure 2: Scatter Plot Out-of-Pocket Medical Expenditure over Age 2015

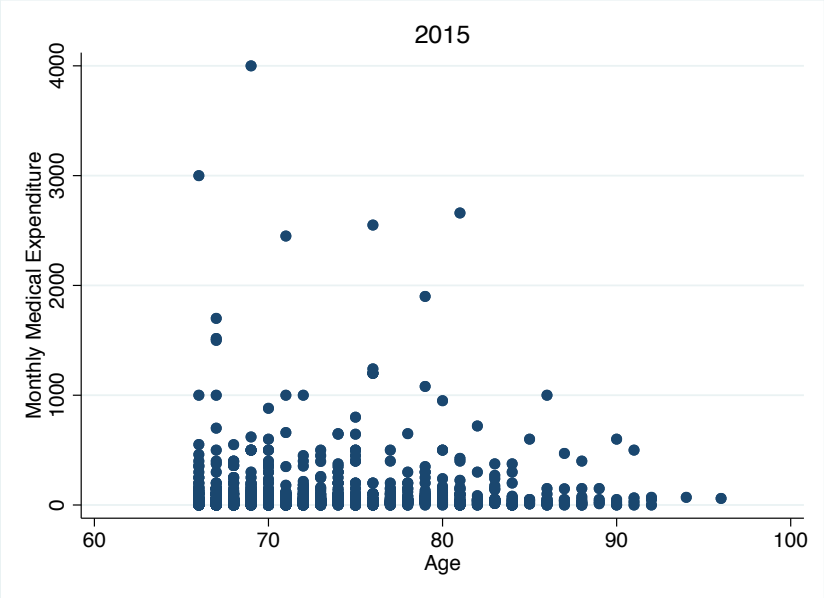
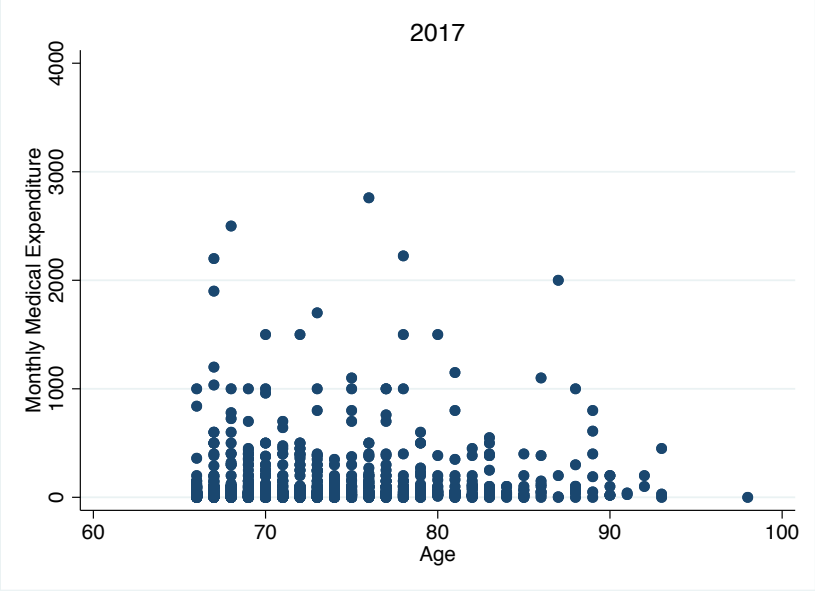


Figure 3: Scatter Plot Out-of-Pocket Medical Expenditure over Age 2017



Annex 1. Adding death as the third health state

The ratios of disabled over non-disabled individuals at different ages for both men and women are estimated using a linear regression, as visualized in Equation 1.

$$\mathrm{E}\left(\mathrm{disab\_ratio}_{i,t}\right) = \mathrm{h}\left(\mathrm{age}_{i,t},\ {\mathrm{age}^2}_{i,t},\ \mathrm{gender}_{i,t},\ \mathrm{age} * \mathrm{gender}_{i,t}\right) \quad (1)$$

The estimates of this regression together with the hazard ratio of 1.47 for disabled versus non-disabled individuals are used to calculate health state specific mortality rates from the average age- and gender-specific mortality rates retrieved from CBS Statline. Transition probabilities to the third health state are hereby created and this is visualized in Equations 2 and 3.

$$\mathrm{P}\left(\mathrm{h}_{i,t+1} = 3 \middle| \mathrm{h}_{i,t} = 1\right) = \frac{\text{CBS mortality rates}_{i,t}}{1 * \left(1 - \mathrm{disab}_{\mathrm{ratio}_{i,t}}\right) + 1{,}47 * \mathrm{disab}_{i,t}} \quad (2)$$

$$\mathrm{P}\left(\mathrm{h}_{i,t+1} = 3 \middle| \mathrm{h}_{i,t} = 2\right) = 1{,}47 * \frac{\text{CBS mortality rates}_{i,t}}{1 * \left(1 - \mathrm{disab}_{\mathrm{ratio}_{i,t}}\right) + 1{,}47 * \mathrm{disab}_{i,t}} \quad (3)$$

Equation 2 gives the probability of death in the subsequent year given age and gender for respondents who are in good health initially. Equation 3 gives the probability of death in the subsequent year given age and gender for respondents who are in poor health initially. Eventually, these probabilities on mortality are used to rescale the probabilities of becoming disabled and staying disabled as found in the logit model of function $\mathrm{f}\left(\mathrm{x}_{i,t}\right)$, such that the probabilities given the initial health state add up to 1.

Table 5: Linear Regression Results: estimated disability ratio

Variable	$\boldsymbol{\beta}$ $(\boldsymbol{SE})$
age	-0.00329***
	(0.000576)
age^2	0.0000721***
	(6.06e-06)
gender	-0.0626***
	(0.0106)
age*gender	0.000141
	(0.000217)
constant	0.228***
	(0.0132)
N	48,470
R-squared	0.0286

Note: * = p ≤ .05; ** = p ≤ .01; *** = p ≤ .001

Figure 4: Probability of becoming disabled in the subsequent year over age rescaled with mortality rates

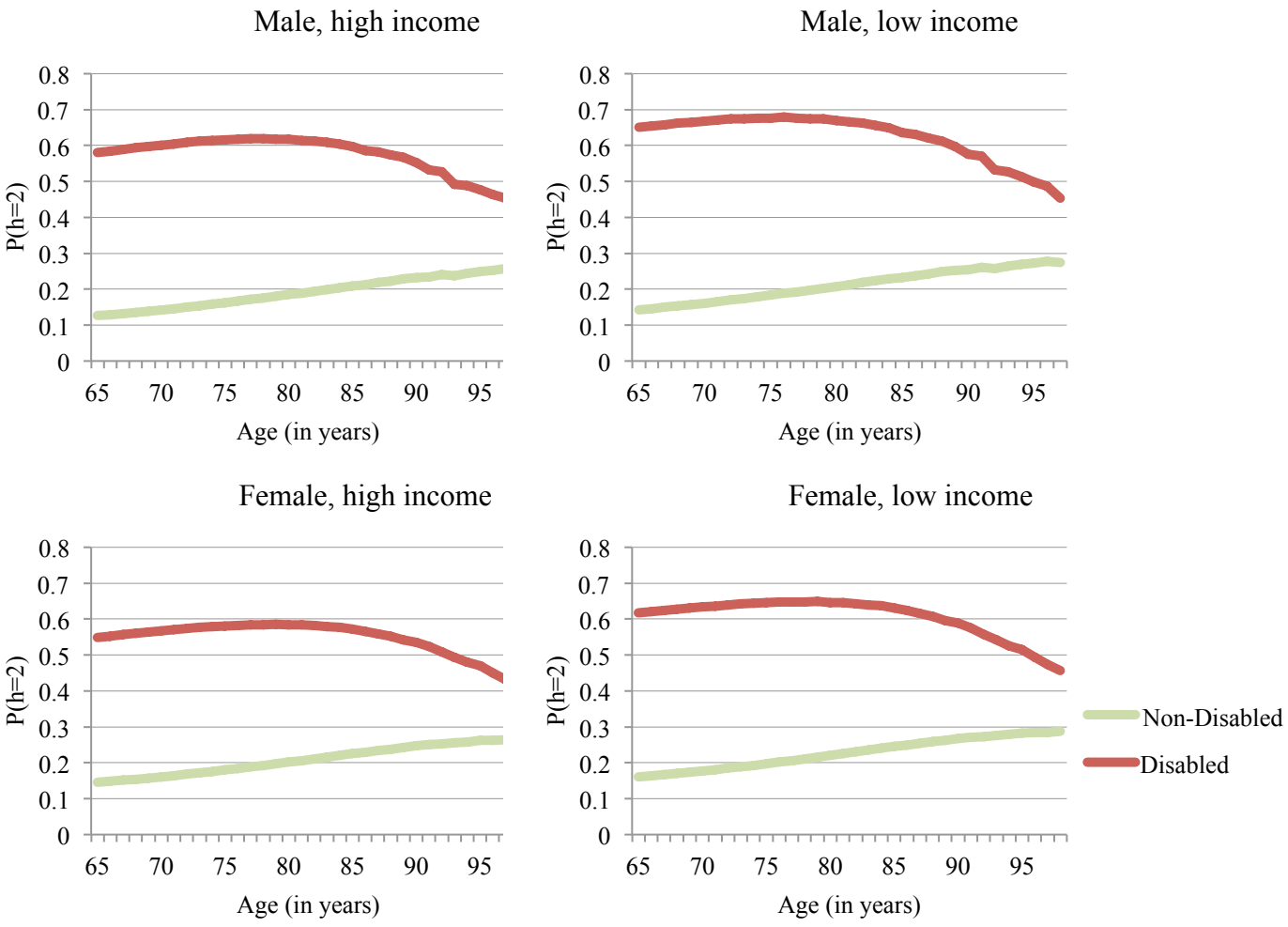


Table 6: Expected Discounted Out-Of-Pocket Medical Expenditures over the Remaining Lifetime of a 65-Year Old Non-Disabled Individual

Variant	Gender	Income	Children	Partner	Total 2012	Total 2015	Total 2017
1	Female	€1.500	No	No	€ 6,028.48	€ 16,031.13	€ 19,666.76
2	Female	€1.500	Yes	No	€ 6,005.47	€ 17,167.93	€ 21,669.28
3	Female	€1.500	No	Yes	€ 6,679.90	€ 15,175.00	€ 22,365.79
4	Female	€1.500	Yes	Yes	€ 6,656.89	€ 16,311.80	€ 24,368.31
5	Male	€1.500	No	No	€ 5,233.81	€ 15,093.93	€ 16,202.96
6	Male	€1.500	Yes	No	€ 5,213.06	€ 16,117.50	€ 18,005.02
7	Male	€1.500	No	Yes	€ 5,821.13	€ 14,323.08	€ 18,631.81
8	Male	€1.500	Yes	Yes	€ 5,800.39	€ 15,346.65	€ 20,433.86
9	Female	€2.152	No	No	€ 6,347.22	€ 15,944.21	€ 19,827.22
10	Female	€2.152	Yes	No	€ 6,324.21	€ 17,083.11	€ 21,834.82
11	Female	€2.152	No	Yes	€ 6,998.76	€ 15,086.50	€ 22,533.10
12	Female	€2.152	Yes	Yes	€ 6,975.75	€ 16,225.40	€ 24,540.70
13	Male	€2.152	No	No	€ 5,524.31	€ 15,024.27	€ 16,351.75
14	Male	€2.152	Yes	No	€ 5,503.55	€ 16,050.28	€ 18,159.42
15	Male	€2.152	No	Yes	€ 6,112.02	€ 14,251.57	€ 18,788.15
16	Male	€2.152	Yes	Yes	€ 6,091.26	€ 15,277.58	€ 20,595.82
17	Female	€5000	No	No	€ 6,986.53	€ 15,774.09	€ 20,156.55
18	Female	€5000	Yes	No	€ 6,963.51	€ 16,916.98	€ 22,173.82
19	Female	€5000	No	Yes	€ 7,638.30	€ 14,913.37	€ 22,875.46
20	Female	€5000	Yes	Yes	€ 7,615.28	€ 16,056.27	€ 24,892.73
21	Male	€5000	No	No	€ 6,107.36	€ 14,886.91	€ 16,656.57
22	Male	€5000	Yes	No	€ 6,086.58	€ 15,917.62	€ 18,474.98
23	Male	€5000	No	Yes	€ 6,695.81	€ 14,110.68	€ 19,107.45
24	Male	€5000	Yes	Yes	€ 6,675.03	€ 15,141.39	€ 20,925.87
				Average:	€ 6,558.79	€ 15,265.42	€ 19,522.76

Table 7: Expected Discounted Out-Of-Pocket Medical Expenditures over the Remaining Lifetime of a 65-Year Old Disabled Individual

Variant	Gender	Income	Children	Partner	Total 2012	Total 2015	Total 2017
1	Female	€1.500	No	No	€ 6,211.86	€ 15,684.35	€ 18,804.94
2	Female	€1.500	Yes	No	€ 6,187.68	€ 16,828.05	€ 20,782.43
3	Female	€1.500	No	Yes	€ 6,896.38	€ 14,823.02	€ 21,470.24
4	Female	€1.500	Yes	Yes	€ 6,872.20	€ 15,966.72	€ 23,447.73
5	Male	€1.500	No	No	€ 5,385.01	€ 14,760.46	€ 15,390.96
6	Male	€1.500	Yes	No	€ 5,363.15	€ 15,794.42	€ 17,178.70
7	Male	€1.500	No	Yes	€ 6,003.85	€ 13,981.78	€ 17,800.51
8	Male	€1.500	Yes	Yes	€ 5,982.00	€ 15,015.74	€ 19,588.26
9	Female	€2.152	No	No	€ 6,559.96	€ 15,606.46	€ 18,964.18
10	Female	€2.152	Yes	No	€ 6,535.74	€ 16,752.06	€ 20,944.94
11	Female	€2.152	No	Yes	€ 7,245.62	€ 14,743.71	€ 21,633.88
12	Female	€2.152	Yes	Yes	€ 7,221.40	€ 15,889.31	€ 23,614.65
13	Male	€2.152	No	No	€ 5,702.95	€ 14,699.54	€ 15,542.42
14	Male	€2.152	Yes	No	€ 5,681.05	€ 15,735.62	€ 17,333.83
15	Male	€2.152	No	Yes	€ 6,323.06	€ 13,919.26	€ 17,956.91
16	Male	€2.152	Yes	Yes	€ 6,301.16	€ 14,955.34	€ 19,748.32
17	Female	€5000	No	No	€ 7,259.84	€ 15,453.89	€ 19,290.37
18	Female	€5000	Yes	No	€ 7,235.55	€ 16,603.09	€ 21,277.37
19	Female	€5000	No	Yes	€ 7,947.65	€ 14,588.42	€ 21,968.48
20	Female	€5000	Yes	Yes	€ 7,923.36	€ 15,737.62	€ 23,955.49
21	Male	€5000	No	No	€ 6,342.62	€ 14,579.41	€ 15,851.73
22	Male	€5000	Yes	No	€ 6,320.63	€ 15,619.54	€ 17,650.16
23	Male	€5000	No	Yes	€ 6,965.16	€ 13,796.07	€ 18,275.68
24	Male	€5000	Yes	Yes	€ 6,943.17	€ 14,836.21	€ 20,074.10
				Average:	€ 6,336.86	€ 15,592.80	€ 20,384.92

Figure 5: Expected health over the lifetime given initial level of disability

Note: the graphs concern a 65-year old man with a partner and without children