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Financial Incentives in Long-Term Care

**Pieter Bakx**

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# FINANCIAL INCENTIVES IN LONG TERM

Financial Incentives in Long-Term Care

Pieter Bakx

**Financial Incentives in Long-Term Care**

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Chapter 1
**Introduction**

## 1.1 Should we rethink the way in which long-term care is financed?

The rate at which population ageing will change the composition of the population can be predicted fairly well. But its consequences for health care, long-term care for the elderly (henceforth, LTC) and for other parts of the welfare state and the economy as a whole are harder to foretell and for this reason population ageing causes apprehension:

> "Many people are afraid of aging – understandably of individual aging, but also of population aging. The expected demographic change is called an 'age bulge', pension systems are 'at the verge of collapse', economic growth of 'Old Europe' will 'come to a halt for decades' and society is expected to end up in a 'war between generations'. All this creates anxiety, while 'active aging' […] is seen by many as a pure political euphemism." (Börsch-Supan, 2013)

Which challenges does population ageing pose for LTC financing and for other parts of the welfare state? Which are the most important mediating factors: do demographic, cultural and institutional differences mean that population ageing will differentially affect countries? And how may we change the LTC financing system and other institutions to limit any undesired effects? The answers to these questions may help to understand the impact of population ageing and thus limit the uncertainty.

According to Eurostat (2014), population ageing will gradually increase the old-age dependency ratio – the number of dependent elderly persons divided by the working-age population – in the Netherlands from 0.26 in 2013 to 0.47 in 2040. This trend will cause an increase in the prevalence of disability, which means that, other things equal, total expenditures on long-term care for the elderly per capita are expected to increase substantially over the next decades.

In the Netherlands and in many other countries of the Organisation for Economic Co-operation and Development (henceforth, OECD), a large share of the LTC expenditures is financed through a mandatory public pay-as-you-go (henceforth, PAYG) system. In a PAYG system, contributions are used to pay for expenditures in the same year. Therefore, the increase in LTC expenditures means that the LTC insurance premium will increase as well. LTC expenditures are concentrated among the elderly (de Meijer et al., 2011; RIVM, 2013) and hence the degree of intergenerational redistribution that is generated by public PAYG financing is massive at any point in time. Population ageing is putting a strain on LTC financing: the intergenerational redistribution will increase because of population ageing and the increase in LTC expenditures may challenge

the support for public PAYG financing as well as fiscal sustainability (CPB, 2014). This is particularly true for the Netherlands because the Dutch public LTC insurance scheme is the most comprehensive within the OECD and public LTC expenditures are by far the highest (OECD, 2011a): in 2012 the Netherlands spent 2.9% of its Gross Domestic Product (GDP) on LTC, while the average for OECD countries was 1.2% (OECD, 2014).

*Population ageing is unavoidable and irreversible. What about excessive LTC expenditure growth?*
LTC expenditures have been increasing and the share of the GDP that is spent on LTC will again double over the next decades, according to projections (Schut and van den Berg, 2010; European Commission, 2012). Population ageing and its impact on LTC expenditures are widely known. But LTC reforms are politically sensitive and many countries have not adopted major policy reforms to address the consequences of population ageing. This raises many questions, including: has the series of recent, often incremental, policy changes successfully and sufficiently addressed the consequences of population ageing and ensured the affordability of LTC in the Netherlands? And if not, which other policies may the Dutch government use in the future?

Changing the way LTC is financed, e.g. by increasing co-payments, by introducing uniform eligibility rules for public insurance benefits or by promoting health savings accounts, will affect who *pays* for current and future LTC use. But alternative modes of financing LTC may also change the incentives for insurers, providers, users and potential users. Thus, LTC financing alternatives will differentially affect the supply of and demand for each of the types of LTC and ultimately the *amount* of LTC expenditures.

In the first part of this thesis, I investigate how alternative ways of financing and organizing LTC are associated with differences in LTC use. What is the role of centralized eligibility assessment in determining LTC use? Do the characteristics of users of publicly financed LTC mirror the eligibility criteria? Are policies that encourage and facilitate elderly to live at home indeed effective in keeping relevant groups of LTC users out of nursing homes and residential homes? And is broader and more generous insurance coverage associated with a fairer distribution of LTC use?

LTC financing affects which groups use LTC and how intensively each of these groups uses it. To learn more about the association between the financing and use of LTC, I study the relationship between personal characteristics and choices on LTC use. There is much prior research about the determinants of LTC use. I build on this literature to show that differences in the importance of each of the determinants are associated

with LTC financing differences. If this association is strong, LTC financing may be used to reduce LTC use and thus the impact of population ageing on LTC expenditures.

*How to align incentives to keep LTC affordable and efficient?*
In the second part of the thesis, I study how LTC financing arrangements affect the incentives for patients, insurers and providers of formal care and potential informal caregivers. These incentives are important because they shape how each of these groups of decision makers behaves and they thus affect who uses LTC, which types of LTC are being used and who pays for it. The government may try to ensure that the actions of these self-interested decision-makers are in the best interest of society by setting the incentives for them such that their interests are in line with society's interests. The incentives for Dutch decision-makers currently do not ensure full alignment (Schut and van den Berg, 2010). For example, when informal caregiving is costly to the caregiver but when these costs are lower than the marginal costs for hiring a professional caregiver, the informal caregiver would provide the care in the absence of insurance. But the informal caregiver would stop providing care if the formal care were paid for by public LTC insurance, even though his costs are lower than the costs of formal care: this option relieves the caregiver from the burden of caregiving and the care recipient only pays the co-payment.

Misalignment of interests threatens the efficiency of public LTC insurance and therefore the incentives need to be changed. I analyze how policy measures may change the incentives for patients, insurers and providers. For example, how may a system of risk-adjusted capitation payments be designed to give competing, risk-bearing insurers incentives to act in the best interest of their consumers? And how may the incentives for consumers be changed to encourage them to balance the marginal costs and benefits of formal and informal care?

Together, the two parts of this thesis describe LTC financing alternatives and their consequences for the allocation of LTC. Studying LTC financing helps to understand how LTC use and expenditures evolve and this knowledge may help to ensure efficient, high-quality and affordable LTC.

## 1.2 What are the main characteristics of LTC and how do they affect the demand and supply?

There are four main groups of conditions that require LTC: i) psychogeriatric and chronic somatic conditions, ii) chronic psychiatric conditions, iii) mental retardation and iv) sensory disabilities (see e.g. Ministry of

Finance, 2010; SER, 2008). These four groups have in common that recovery is not possible; they differ as to whether the condition occurs at an early stage of life or at a later stage and whether the patient is still able to make decisions independently after the onset of the condition. In addition, the incidence and the total amount of expenditures differ across these groups. This thesis is about financing LTC for patients with the first group of conditions. This group of patients encompasses about two-thirds of all patients needing LTC and accounts for about two-thirds of total LTC expenditures in the Netherlands (Schut and van den Berg, 2010).

LTC has been defined either positively or in comparison to curative care. A comprehensive positive definition is the definition by the US-based Institute of Medicine, which is quoted by Ikegami and Campbell (2002):

> "a variety of ongoing 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 community, and include informal services provided by family or friends as well as formal services provided by professionals or agencies."

This definition comments on five dimensions of the care: the period, the type of service provided, the type of condition, the location where the service is provided, and who provides the care.

Other authors indirectly define LTC by comparing it to curative care:

> "[…] LTC is care for chronic illness or disability instead of treatment of an acute illness." (Norton, 2000)

> "While health care services aim at changing a health condition (from unwell to well), LTC merely aims at making the current condition (unwell) more bearable". (Martins and de la Maisonneuve, 2006)

Both definitions further clarify one of the above-mentioned characteristics of LTC. While Norton's (2000) definition highlights that LTC is aimed at another type of condition than curative care, Martins and de la Maisonneuve (2006) point out that, because the type of condition is different, the goal of LTC is different as well.

As a result of these differences between LTC and curative care, the demand for and supply of LTC are somewhat different from the supply of and demand for curative care. The type of service provided and its

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1   LTC insurance causes substitution of formal care for informal care: insurance gives the heirs an incentive to stop providing informal care and put their parent in a nursing home because the insurance policy protects the bequest. This intrafamily moral hazard is a problem to insurers because they cannot observe whether informal care is available nor can they force potential informal caregivers to provide care. In fact, the heirs are the main beneficiaries of LTC insurance (Pauly, 1990; Zweifel and Struwe, 1996).

2   And Zweifel and Struwe (1996), who used a similar argument.

3   It is difficult to predict the types of LTC that future users will desire and the costs of these types of care. Because an enrollee's preferences are shaped by culture and institutions, preferences and changes in preferences are correlated across enrollees. Hence, expected future LTC expenditures are correlated as well.

aim have implications for i) the type of provider and ii) the setting in which the care is supplied. With regard to the type of provider, Pauly (1996) pointed out that:

> "[…] in contrast to curative care for acute illnesses, it appears to be relatively easier to substitute services provided by nonprofessionals in the care of people with long term chronic illnesses, even in the provision of some services which might be labeled medical."

Because of these differences in the types of providers and because some of these services aim to enable patients to continue to live at home despite their helplessness, LTC may be provided in a different setting than curative care (Mot, 2010): while curative care is typically provided in an ambulatory or institutional setting, LTC may also be provided at home or in the community.

Demand for LTC differs from demand for curative care in three ways. First, in a given year, annual costs per user are typically high and only a small proportion of the population has any expenditures (van de Ven, 2005). Second, the life-time costs will be high for persons who need LTC because the need for LTC will usually persist for the remainder of the patient's life. Third, demand for professional LTC does not only depend on the need for care but also on the availability of a social support network that is able to provide informal care, which may be a substitute or complement to formal/professional LTC (Norton, 2000; van de Ven, 2005). Table 1.1 summarizes the differences between curative care and LTC.

## 1.3  Why would the government intervene in LTC financing?

The amount and the types of LTC that an individual will need over his lifetime are uncertain, as are the costs and the timing of the need (van de Ven, 2005; Wong et al., 2007). Therefore, it is more efficient to pool risks than to save individually to protect oneself against the risk of LTC expenditures.

While the need for LTC is at least partly an insurable event, private LTC insurance typically fails to provide coverage for more than a few percent of the population, even when there is no public LTC insurance for large subgroups of the population (Barr, 2010; OECD, 2011a). The reasons for the small market for private LTC insurance in the absence of public LTC insurance are investigated in a number of studies (Cremer et al., 2012; Cutler, 1996; Cutler and Zeckhauser, 2007; Brown and Finkelstein, 2007; Finkelstein and McGarry, 2006; Oster et al., 2010; Pauly, 1990).

The low uptake of private LTC insurance may be the result of rational consumer choice stemming from the desire by elderly people to be supported by their own children rather than receiving formal care covered by insurance (Pauly, 1990; Zweifel and Struwe, 1996)[1]. Pauly (1990) argues that if this is the reason for the low uptake of private LTC insurance, there is no need for government intervention. Yet, Pauly (1990)[2] neglects another potential reason for government intervention: the difference between the costs and benefits for the individual for society. For LTC users it may be optimal to free ride on their family and friends rather than to take precautionary measures, while for the family and friends there are opportunity costs to providing the care. If this is the case, the lack of demand for LTC insurance itself is the problem.

The other studies mentioned above (Cremer et al., 2012; Cutler, 1996; Cutler and Zeckhauser, 2007; Brown and Finkelstein, 2007; Finkelstein and McGarry, 2006; Oster et al., 2010) explain the small size of private LTC insurance markets from five sources of market failure: i) adverse selection, ii) moral hazard, iii) the insurers' inability to handle the correlated (intertemporal) risks[3], iv) state-dependent utility and v) demand side deviations from rational behaviour, i.e. myopia or the denial of the possibility of heavy dependence. Consequently, private LTC insurance markets fail in four ways: a) coverage is limited, b) uptake is low, c) premiums are high, and d) the outcomes are often perceived as inequitable.

The government has several instruments to ensure that an appropriate level of LTC insurance is achieved: price subsidies, income transfers, regulation of private LTC insurance, and public provision (Barr, 2004). The former three instruments complement private insurance. Publicly provided insurance, however, substitutes for private insurance. Public insurance has the following basic features: i) it is compulsory for at least part of the population, ii) it includes cross-subsidies by design and iii) the insurance contract is usually not specific about premiums, other contributions and future benefits (Barr, 1992).

Providing public insurance is the only solution for some of the problems associated with private LTC insurance (see also: Barr (1992, 2010)). First, in case of mandatory coverage, low uptake is not an issue any longer. Second, if mandatory coverage is combined with a single-payer system, adverse selection is impossible so the pooling equilibrium is reached. Third, as there is no need for an explicit and specific contract, public insurance can provide protection against risks that can change over time and are privately uninsurable. While neither private insurers nor the government can take away the intertemporal correlation of risks, public insurance may handle these correlated risks more effectively because, unlike for private insurance, the government does not need

to be specific about either the contributions (e.g. premiums) to the insurance scheme in the future or the benefits that it will provide (Barr, 2010). Furthermore, as the public insurance premium paid by an individual does not need to be related to the individual's risk, public insurance may involve cross-subsidies between different risk and income groups and hence solve access problems and accommodate societal preferences for equity.

Public insurance solves many of the problems that are associated with private LTC insurance, yet it does not solve the moral hazard problem. Consequently, the negative consequences of moral hazard – higher-than-optimal LTC expenditures and a suboptimal allocation of resources in the LTC sector – need to be limited by providing suboptimal quality of LTC or incomplete LTC insurance or by additional policy measures or instruments (Cremer et al., 2012). These additional efforts may be targeted at the supply or the demand of LTC. Supply-side measures include budget restrictions and barriers to market entry, among other things; examples of demand-side strategies are cost sharing and coverage restrictions, which target the consumer, and managed competition, which targets the insurer.

## 1.4 Outline

*Part 1: How is LTC use related to LTC financing?*
In order to examine how LTC financing is associated with LTC use, I look at how differences in LTC financing coincide with differences in the relationship between LTC use and personal characteristics.

This part of my thesis mainly builds upon the literature on the determinants of LTC use. Many earlier papers have described which personal characteristics are related to LTC use and expenditures, given the institutional context. To approximate informal care availability, these previous studies often included information on whether a respondent lived alone. Chapter 2 describes which personal characteristics explain LTC use. It highlights the importance of informal care availability within the household, which so far had not gained much attention and shows that the characteristics of users of publicly financed LTC fairly closely mirror the eligibility criteria that are used to determine whether applicants are entitled to publicly financed LTC and that is a major instrument to influence public LTC expenditures.

Subsequently, I examine how LTC use may be influenced by LTC financing. I focus on two types of variation in LTC financing: cross-sectional differences and differences over time. First, I illustrate how cross-sec-

tional differences in LTC financing are linked with differences in LTC use by comparing the Netherlands and Germany (chapter 3). While differences in LTC use across countries have been described before, they are not very well understood. For example, may the differences between LTC use in the Netherlands and Germany be explained by differences in the characteristics of the population or by other differences? And is broader and more generous insurance coverage associated with a fairer distribution of LTC use?

The second type of variation in LTC financing is variation over time. In chapter 4, I examine how changes in LTC financing over time in the Netherlands are related to LTC use by comparing LTC use in 2000, 2004 and 2008. Are these changes related to changes in the composition of LTC users admitted to nursing homes and residential homes? And may the substitution of home care for institutional care by these groups fully explain the simultaneous increase in home care use?

Chapters 3 and 4 are among the first studies that describe how differences in financing are related to differences in the relative importance of each of the determinants of LTC use. Describing this relationship helps to understand which subgroups of the population are affected by differences in LTC financing. Knowledge about this relationship will be helpful when evaluating the impact of similar future changes: who may be affected and what may be the magnitude of this impact?

*Part 2: How can the government intervene to achieve its goals?*
Public insurance does not solve the moral hazard problem and therefore additional policy measures are needed to align the interests of decision makers and society. The second part of my thesis addresses how these measures may change the incentives for potential LTC users and insurers. To explore how LTC financing in the Netherlands may be changed in the future and how these changes may affect financial incentives for LTC users and insurers, I describe how various demand-side strategies have been implemented in four European countries with public LTC insurance: Germany, Belgium, Switzerland and the Netherlands. Chapter 5 aims to contribute to a better understanding of the consequences of design choices regarding demand-side measures, which play a key role in keeping public health care budgets in check. This chapter informs policy makers in these countries – and other countries with similar policies – by reviewing current policies. I answer three questions. First, which measures have been implemented? Second, what is the expected impact of the measures on the incentives for efficiency? And third, what negative side effects do they have? The answers to these questions generate information that helps to assess options for reform because, given the similarities in LTC financing, the policies

may be transferable across these four countries. More importantly, the answers generate testable hypotheses about causal relationships between LTC financing and outcomes in terms of efficiency and equity.

One demand-side strategy that may improve the incentives for insurers to act as prudent buyers of care is to introduce managed competition. Elements of this strategy have been implemented in Belgium and Switzerland and were be introduced in the Netherlands in 2015. One of the necessary conditions for effective managed competition is that insurers have no financial incentives for risk selection. In chapter 6, I examine the feasibility of appropriate risk adjustment in LTC insurance in the Netherlands: would risk adjustment based on the currently available administrative data sufficiently reduce the insurers' incentives for risk selection for subgroups of enrollees without compromising the insurers´ incentives for efficiency? Furthermore, I use the findings from chapter 2 about the personal characteristics that are associated with LTC use to provide suggestions on how the risk adjustment system may be improved.

Part 1
**How are the financing and
use of long-term care related?**

Submitted.
With Claudine de Meijer

Chapter 2
**The link between the spouse's ability to provide informal care and long-term care use**

## Abstract

Informal care substitutes for or postpones formal LTC use, especially in the Netherlands, where informal care supply affects eligibility for public LTC. The association between potential informal care supply within the household and formal LTC use has received little attention. We examine how the spouse's physical ability to provide informal care is linked with LTC use and transitions.

We used Dutch respondents aged 65 and over from waves 1 and 2 of the Survey of Health, Ageing and Retirement in Europe. A mixed multinomial logit regression is used to model the choice between no LTC use, informal LTC use only, and formal LTC use. Transitions into formal care use are modeled with a logit regression.

The spouse's ability is associated with less formal LTC use but living alone remains important after controlling for the spouse's ability. Other important determinants of use are having a child, age, disability and health status. Transitions are explained by informal care supply and changes therein, health and disability and the respondent's age.

The spouse's ability to provide informal care is associated with less use of formal LTC, which implies that future compression of disability would lower demand for LTC, directly and through an increase in the spouse's ability to provide informal care.

## 2.1  Introduction

In view of ageing populations and limited public budgets, LTC financing and provision has increasingly become a source of concern in developed countries. Two common concerns are to keep LTC affordable and to provide it according to need. These concerns are especially pressing in the Netherlands, where spending on LTC for the elders is high (2.3% of Gross Domestic Product) compared to the European average (1.5%) and a long-standing tradition of universal and comprehensive public coverage makes reforms politically sensitive (Martins and de la Maisonneuve, 2006; SER, 2008). A key issue is the appropriate public-private mix: LTC may be formal care that is financed either publicly or privately or may be informal care. This study improves the insight in the determinants of LTC use and changes in LTC use in the Netherlands. Improving knowledge about the choice for formal or informal care is important as informal care substitutes for or postpones home care use and serves as a complement to nursing home care and a set of other types of health care (Bolin et al., 2008; Bonsang, 2009).

In the Netherlands, LTC expenditures are universally and comprehensively covered by the Exceptional Medical Expenses Act and, since 2007, the Social Support Act. LTC use is curbed through income-related co-payments and through regulating access. Patients apply for publicly financed care at the Needs Assessment Agency. This agency decides about the applicant's eligibility on the basis of two sets of criteria: criteria regarding the patient's need and criteria regarding the availability of informal care. These criteria are based on international classifications, including the World Health Organization International Classification of Diseases for diseases and related health problems and the International Classification of Functioning, Disability and Health, which also considers contextual factors such as the availability of informal care. Patients who are eligible for publicly financed LTC can choose to receive either care in kind or a cash benefit. This cash benefit may be spent on formal and informal care, whereas benefits in kind consist of formal care only. Next to these demand-side measures, the government regulates supply through regional budgets and entry restrictions that are set at the national level (CIZ, 2009; Ministry of Health, Welfare and Sport, 2007). Beyond the system of publicly financed care, patients may use privately financed LTC, yet privately financed LTC accounts only for a few percent of the total LTC expenditures (RIVM, 2011).

Our contribution is twofold. First, we study the association between potential informal care supply and use of formal and informal LTC in the Netherlands in more detail. While previous studies have often approximated the effect of informal care supply by measuring the influence of

co-residence status, we investigate the association between informal care supply and LTC use more directly using information on the spouse's or partner's (henceforth, spouse's) ability to provide informal care and information on whether the respondent has children. Focusing on one country rather than studying LTC use in entire Europe makes the results easier to interpret because institutional differences within the sample are small and the eligibility rules in the Netherlands are uniform.

Our second contribution is that we model the probability of a transition from no formal LTC use to formal LTC use as a function of changes in personal characteristics. Looking at changes in these variables enhances knowledge of the relationship between health, disability and transitions in LTC use.

## 2.2   Previous findings

Andersen and Newman distinguish three categories of characteristics that influence health-seeking behavior: predisposing, enabling and need-related characteristics (Andersen and Newman, 1973). Of these three categories, the influence of need-related personal characteristics on LTC use has been studied most (Luppa et al., 2010; de Meijer et al., 2009, 2011; Manton et al., 2006, 2007; Portrait et al., 2000). Previous studies reported a strong association between need and LTC use.

Need-related determinants are classified as either disability or health measures. Of these, disability is considered the main determinant of LTC use. More specifically, the level of disability influences which type of LTC is chosen (de Meijer et al., 2009). De Meijer et al. (2009) found that elders using institutional LTC are substantially more disabled than elders relying on home care; the difference in disability between home care users and elders who did not use LTC was much smaller. Like disability, health status also affects LTC use but it is unclear whether health status affects LTC use only when it increases disability or if it also has an independent effect on LTC use.

The probability of LTC use is not only associated with need-related characteristics, but also with predisposing and enabling characteristics, e.g. demographic and socio-economic determinants such as being female, age, living alone and co-payments. (Luppa et al., 2010; de Meijer et al., 2009, 2011; Manton et al., 2006, 2007; Portrait et al., 2000). In contrast to the association between need and LTC use, the association between informal care supply and LTC use has not often been studied in detail. Informal care within the household has often been instrumented or approximated by the presence of a co-resident or spouse; informal

care from outside the household by the presence and proximity of children and by network size (Bonsang, 2009; Bolin et al., 2008; Weaver et al., 2008; Nihtilä and Martikainen, 2008a; Portrait et al., 2000).

Informal care provision is time-consuming and may adversely affect the physical and emotional health of the caregiver (Coe and van Houtven, 2009). Despite this burden, informal care may be a viable alternative to formal care because of affection, because caregivers may feel that it is their duty to care for a sick family member, because of the bequest they expect or because publicly funded formal care is insufficient and the family lacks financial resources to pay for private LTC (Pauly, 1990; Oudijk et al., 2011). In addition, whether someone provides informal care may depend, among other things, on their opportunity costs, the presence of other potential caregivers and (strategic) interactions with these other individuals (Bolin et al., 2008; Bonsang, 2009; Knoef and Kooreman, 2011; Pauly, 1990). Because of these reasons, not everyone is equally likely to be an informal caregiver and not everyone who needs LTC receives informal care. Unlike previous studies, which focus on the role of informal care from outside the household, this study examines the role of potential informal care supply within the household in more detail.

A number of studies examined determinants of transitions from one care setting to another. The majority of these studies, however, restricted attention to the curative setting (e.g. Coleman et al., 2004). A number of studies from the United States on nursing home admissions use a cox proportional hazard model (e.g. Bauer, 1996; Freedman, 1996; Tomiak et al., 2000). Due to this set-up, these studies make inferences on the association between the respondents' baseline characteristics and a transition to a nursing home, and not on how *changes* in the respondents' characteristics are associated with the time-to-transition. Another approach is to assess the probability of a transition from one care setting to another. Using this approach, Greene et al. (1993) found that the probability of a nursing home admission in the United States was affected by age, living alone, disability status and using home care. Knol et al. (2003) found that while disability is associated with LTC use among Dutch elders, transitions are not determined by baseline disability but by poor baseline health. This finding, they argue, shows that poor health is a precursor of disability and, hence, need for LTC.

Few studies explicitly study the effect of *changes* in health and disability on LTC use. Geerlings et al. (2005) and Glaser et al. (2006) reported that a divorce or the death of a respondent's spouse affected the probability of a transition to formal LTC use for the elders in the Netherlands and the United Kingdom, respectively, while Nihtilä and Martikainen (2008b) found that the death of a spouse increased the probability of institution-

4 A proxy respondent
answered at least one
set of questions in 205
interviews (3.05%).

5 Caregivers within the
same household only report
personal care in the SHARE
questionnaire.

6 Sensitivity checks revealed
that assigning informal care
from outside the household
differently did not affect the
final results.

alization in Finland. Geerlings et al. (2005) furthermore concluded that changes in need-related and resource-related factors influence the probability of a transition in the use of informal care and formal care. This article, like Geerlings et al. (2005), Glaser et al. (2006) and Nihtilä and Martikainen (2008b), examines the effect of baseline characteristics and subsequent changes on the probability of a transition to formal LTC use.

## 2.3  Methods

### 2.3.1  Data
The data comes from the first two waves of the Dutch sample of the Survey on Health, Ageing, and Retirement in Europe (SHARE). SHARE is a cross-national panel collecting micro data on health, socio-economic status, and other personal and household characteristics of individuals aged 50 years and above and their spouses. 2979 Dutch individuals were interviewed in 2004 (see Börsch-Supan and Jürges, 2005 for sampling methods and inclusion criteria). Of these respondents, 1766 were interviewed again in 2006. In 2006, a refreshment sample added 895 new respondents to compensate for attrition. The individual response rate was 87,8% in 2004 ('SHARE Data access and documentation', n.d.).
If the individual was not able to answer the questions himself, a proxy respondent was allowed to answer all questions that we used in the analysis, except for questions on cognitive ability and mental health[4]. But the number of excluded observations resulting from missing information on these variables was small and a sensitivity check showed that selection bias did not affect the results.

As explained in the introduction, we estimate two models: one for utilization of LTC and one for transitions from no formal LTC use to formal LTC use. The study sample for the utilization model consists of observations in 2004 and 2006 for all respondents who were 65 years of age or older, who live alone or with a spouse or a partner and for whom information is available on all variables of interest. As a result, the sample contains 1815 observations. The study sample for the transition model is restricted to respondents who participated in both waves of the survey and does not include individuals who used formal LTC in 2004 because we only study transitions from no formal LTC use to formal LTC use. As a result, the sample that is used for the transition model consists of 453 respondents.

### 2.3.2  Variables
*The utilization model*
The dependent variable measures the type of LTC service that the respondent used in the twelve months preceding the interview.

People take one decision on the mix of LTC they consume rather than a sequence of decisions for each type of care. Therefore, the dependent variable consists of three mutually exclusive alternatives: no care; only informal care; and formal care, possibly combined with informal care.

Informal care was defined as domestic help, help with paperwork or personal care provided by informal caregivers within the household and caregivers from outside the household[5]. Informal care from outside the household is only reported on the household level; respondents were not asked to specify which household members received this type of informal care. Therefore, we assigned informal care from outside the household to one household member if and only if this household member was the only person in the household with a health problem or disability. Otherwise, informal care from outside the household was coded missing[6]. Formal care comprised home care or institutional care, both publicly and privately financed. Formal home care consisted of professional or paid help with domestic tasks, personal and nursing care. Institutional LTC included temporary and long-term admissions to residential or nursing homes.

The set of explanatory variables contains the variables that are related to the determinants of LTC use that were mentioned in section 2.2: predisposing, enabling and need-related characteristics. All variables are self-reported. The predisposing characteristics include the age and gender of the respondent and whether the respondent lives alone; the enabling determinants that are included are whether the respondent has a child and two measures of socio-economic status: the amount of net household assets and income. These variables test whether the financial situation and income-related co-payments are associated with LTC use. The level of health insurance coverage, which is usually correlated with these measures, was not included in this study because public LTC insurance coverage in the Netherlands is universal and comprehensive and hence there is barely any variation in coverage.

The predisposing and enabling characteristics that indicate whether the respondent lives alone and whether the respondent has a child may be proxies for the availability of someone who may provide informal care. To capture informal care availability better, we also include variables that proxy for the spouse's physical ability to provide informal care. The spouse's ability to provide informal care was measured using information on the health and disability status of the spouse as well as his or her age. If this information was not available because the respondent did not have a spouse, in the case of a continuous variable, the average value for non-missing observations was taken; discrete variables were set to zero (Allison, 2002). These characteristics are associated with the physi-

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cal ability to provide informal care but are not affected by the burden
of informal care. This burden has been found to mainly impact the care-
giver's mental health and general health/well-being, not disability status
(Coe and van Houtven, 2009). Hence, the variables that we used to meas-
ure the spouse's ability are not directly affected by caregiving activities.

The need-related characteristics measure the respondent's disability
and health status. Disability was measured by limitations in 23 Activities
of Daily Living (Katz and Akpom, 1976), Instrumental Activities of Daily
Living (Lawton and Brody, 1969) and mobility items, which are partly
overlapping and partly complementary. To capture these complex rela-
tionships among all disability measures, all items were combined into
one disability score using the polychoric principle component analysis
method, which assigns weights indicative for the severity of disability
of each of these items. Subsequently, the weighted scores on the 23 lim-
itations were summed into one measure for disability (Kolenikov and
Angeles, 2009). As a final step, the disability score was rescaled and
is bounded between 0 (no disability) and 10 (most disabled).

The health status measures that are included are an indicator for having
at least 4 symptoms of depression as measured by the EURO-D measure
(Prince et al., 1999), the number of chronic conditions out of a list of 14,
self-perceived health, having been hospitalized in the past 12 months
and cognitive ability according the Mini Mental State Examination[7]
(Folstein et al., 1975).

*The transition model*
As a result of the small number of transitions between 2004 and 2006,
we only considered changes from no care/informal care to formal care.
This approach is similar to the approach used by Geerlings et al. (2005).
The dichotomization between formal and no formal care is a natural
one and this specification only excluded respondents who used formal
LTC in 2004 (n=75) or who died between 2004 and 2006 (n=27).

Like in the utilization model, in the transition model we included three
types of independent variables: predisposing, enabling and need-related
determinants. Yet, because of the small number of transitions in the data,
some variables that were used in the utilization model but turned out
not to affect the probability of a transition were not used, while in some
other cases answer categories were merged.

Among the independent variables, we distinguish between time-variant
and time-invariant variables. For both types of variables, the value for 2004
was included in the regression. In addition, for each time-dependent var-
iable a second variable was included representing the change that had

occurred. To represent the change between 2004 and 2006, for continuous time-dependent variables – disability and cognitive ability – the value in 2006 was included; for categorical variables, dummy variables indicated the direction of the change. For indicators of perceived changes in characteristics, e.g. self-perceived health, the direction of the causal effect is unclear because the timing of the changes in the independent variables and the transition within the two-year interval is unknown.

In addition to these variables, the transition model included a dichotomous variable measuring informal care use at baseline in order to account for state dependency (Martinez-Granado, 2002). State dependency is plausible in the context of transitions because a change from no care to formal care may be more drastic and therefore less likely to occur than a change from informal care to formal care: informal care may be a stepping stone towards formal care (Geerlings et al., 2005).

### 2.3.3 Model specification
*The utilization model*
Data analyses for both the utilization and transition model are performed in Stata 12.0. To analyze LTC use, we selected a user written program (Hole, 2007) for mixed multinomial logit models (Train, 2003). This model was most appropriate for several reasons. First, it is more flexible than other multinomial models and does not rely on the Independence of Irrelevant Alternatives assumption (Train, 2003). Second, it does not impose any decision structure upon the data set. Third, the mixed multinomial logit model has the advantage that it allows for unobserved correlation over time through random effects. Therefore, it properly handles panel data and filters out unobserved personal characteristics, e.g. assertiveness and beliefs, in case of multiple observations (Train, 2003; Cameron and Trivedi, 2009). A likelihood-ratio test indicated that the mixed multinomial logit model performed significantly better than the multinomial logit model. Cluster robust standard errors were used to correct for correlation within households (Cameron and Trivedi, 2009).

*The transition model*
Because the dependent variable was dichotomous, we analyzed the transitions with a logit regression model. Like in the utilization model, observations were clustered at the household level.

## 2.4 Results

### 2.4.1 Descriptive statistics
Table 2.1 shows descriptive statistics for the study sample of the utilization model stratified by the type of LTC respondents used. Compared

to the full sample, LTC users were on average older, more often female, more often living alone, had fewer assets and were less likely to have a spouse or children. Spouses of LTC users were older, less healthy and more disabled than spouses of non-users. In addition, they had a lower income, were more disabled, more ill and were in worse general health.

Table 2.2 contains descriptive statistics for the study sample that we used for the transition model. This sample only contained the respondents who were interviewed twice: the balanced panel. Compared to the total sample – the unbalanced panel, the balanced panel was on average younger and the spouses of these respondents were more disabled. Furthermore, the balanced panel had less chronic illnesses and hospitalizations, a better self-perceived health and cognitive functioning, was less disabled and used less LTC in 2004 than the unbalanced panel. Table 2.2 also shows that on average, the respondents who experienced a transition were older than the balanced panel, lived alone in 2004 more often, had a lower amount of assets and had more often received informal care in 2004. Furthermore, they were more disabled, faced a larger deterioration in disability and were more often hospitalized in 2006.

### 2.4.2  Use of care

The results for the utilization model are reported in table 2.3. Because the coefficients are difficult to interpret, we also list the empirically derived average partial effects (APE) (see e.g. Cameron and Trivedi, 2009). These APEs equal the difference in predicted probabilities if the independent variable changes by one unit. No $R^2$-scores were calculated; the pseudo $R^2$-score for a comparable simple multinomial model was 0.38 for a pooled regression.

Of the predisposing characteristics, age was positively associated with the probability of using informal and formal LTC. The APE of age on the probability of using informal care was negligible; a one-year increase in age was linked with an increase of 1.0 percentage point of the probability of using formal care. Being male was only associated with a lower probability of using formal care. The coefficients related to the dummy for living alone compare the probability of use of informal and formal care for an individual living alone with an individual co-residing with a partner of average age, disability and cognitive ability and no chronic disease and no hospitalization in the past 12 months. The APEs for living alone on using informal and formal care were 5.6 and 21.8 percentage points, respectively.

Only one enabling determinant was associated with the probability of informal care and formal care use: the spouse's disability. The APEs for spouse's disability were large compared to the average probability

of using informal or formal LTC. For example, a 1-point increase in the spouse's disability score is associated with an increase of the probability of using formal LTC by 2.3 percentage points[8]. This positive association may have either of the two following causes. First, use of informal care and use of formal care are negatively correlated because the eligibility for some types of public home care is conditional on the absence of a potential caregiver in the household. The eligibility criteria thus reduce the price for formal care that someone pays who does not live together with a potential caregiver relative to the price paid by someone who lives together with a potential caregiver. As a result, other things equal, demand for formal care is lower within the latter group. Second, informal care and formal care are substitutes, even in the absence of government intervention.

Of the need-related characteristics, disability was associated with a higher probability of using informal and formal LTC. A one-point higher disability score was associated with a 2.4 percentage point and 6.5 percentage point higher probability of using informal care and formal care, respectively. A recent hospitalization was also associated with an increase in the probability of using informal and formal LTC. Poor or very poor general health was associated with formal care use.

### 2.4.3 The transition model

Table 2.4 presents the estimated coefficients and average partial effects for the transition model. The pseudo $R^2$-score of the model was 0.35. The average probability of a transition was 11.9 percent. Age, initially living alone and a change in co-residence status were important determinants of a transition. The probability of starting to use formal LTC was 33.3 percentage points higher for respondents who were no longer living together than for respondents who did not experience a change in the co-residence status and was 15.2 percentage points higher for respondents who were initially living alone than for co-residing respondents. Furthermore, elders whose disability status or self-perceived health deteriorated or who were admitted to a hospital in the 12 months preceding the 2006 interview were significantly more likely to start using formal LTC.

## 2.5 Discussion

This article covers two related topics. First, we discuss which personal characteristics and which characteristics of the respondent's spouse or partner determine the type of LTC use – no LTC, informal care or formal care (+ informal care) – among the Dutch middle-aged and elders. Second, we study the determinants of a transition from no formal LTC use to formal LTC use.

9  Similarly, when health
is partly unobserved and
when the respondent's
health status is correlated
with the health status of the
spouse, differences in health
status may cause an upward
bias of the estimated coeffi-
cients for the variables related
to the spouse's disability and
the spouse's health status.

10  Results are available
upon request.

The main findings are as follows. First, the presence of potential informal caregivers is important. Our regression results highlight that the spouse's ability to provide informal care matters for decisions regarding LTC use. Similarly, the transition model shows that the probability of a transition is associated with no longer living with a spouse.

Earlier studies concluded that there was a strong association between living alone and LTC use (e.g. de Meijer et al., 2009, 2011; Portrait et al., 2000), which was attributed to the ability of the partner or spouse to provide informal care. The spouse's physical ability to provide informal care is a better proxy of informal care availability than the mere presence of a spouse and complements the latter: the indicators of the spouse's physical ability distinguish according to ability to provide informal care within the population of respondents who live with a spouse, while the indicator for respondents who live alone distinguishes between single-living respondents and respondents who live with a spouse with an aver-age ability to provide informal care. The observed associations between living alone and informal and formal LTC use may however also result from differences in health status that are associated with co-residence status and that are not picked up by the other independent variables (Lillard and Panis, 1996)[9].

Other measures of informal care availability further reconfirm its impor-tance. That is, the probability of using formal care is lower for respond-ents having a child, which approximates informal care supply from outside the household. In addition, the probability of formal care use is higher for females than for males, which may not only reflect gender differences in morbidity, but might also capture gender-related differ-ences in the willingness and ability to provide informal care to a partner. Gender-specific regressions that we performed as a robustness check[10] confirm previous findings (de Meijer et al., 2011): living together with a spouse and the spouse's ability are associated with LTC use for males but not for females. The negative associations between informal care availability and formal care use suggest that these types of care may be substitutes, which may in turn be induced by the eligibility assessment criteria that entail that informal care availability within the household lowers public LTC benefits.

Second, disability and health status are important determinants of LTC use and transitions. Unlike de Meijer et al. (2009, 2011), we find that bad self-reported health and a recent hospitalization are strongly associated with LTC use. These health status measures might be significant because unlike de Meijer et al. (2009), we could only include presence, and not severity, of disability. The transition model shows that increased disa-bility, worse health and poor baseline mental health determine the

probability of starting to use formal care. While Knol et al. (2003) find poor baseline health to be the main determinant of transitions, we find that changes in health, disability and co-residence status are more important than baseline characteristics when explaining transitions.

Age is an important determinant of LTC use and transitions in this study. The effect of age on LTC is subject of debate (Werblow et al., 2007; Weaver et al., 2008; de Meijer et al., 2011). According to these studies, age (Werblow et al., 2007) and time-to-death (de Meijer et al., 2011) may merely be proxies for what really drives LTC demand: disability and poor health. The significant effect of age may therefore reflect that some dimensions of disability and frailty were not completely captured.

The findings summarized here show that the allocation of formal care is consistent with the guidelines that the Needs Assessment Agency uses to assess eligibility for publicly funded care: disability, potential informal care supply and, to a lesser extent, illness and general health are determinants of formal LTC use. These findings are also relevant for other countries that aim to keep LTC affordable and distribute it according to need. The relatively large role of need-level determinants and the presence of informal caregivers and the negligible effect of assets and income likely reflect the central role of the independent Needs Assessment Agency, the eligibility criteria and the comprehensiveness of the Dutch social insurance system in distributing LTC according to need rather than ability to pay. If the institutional structure indeed affects LTC use and transitions, the relative importance of determinants of LTC use will be different for countries with less comprehensive systems. These international differences in LTC use and transitions are not well understood.

Our results also show that the demand for LTC would be reduced if (spouse) disability and its impact can be reduced, e.g. through prevention and by improvements in durable medical equipment. Demographic trends may not only affect the demand for LTC by raising the share of the population that is impaired but may also affect the supply of informal care. That is, larger gains in life expectancy for males than for females (Lakdawalla and Philipson, 2002), and changes in female labor participation and retirement policies may affect the availability of informal care. Future compression of morbidity would lower LTC use, not only directly but also indirectly because it increases the spouse's ability to provide informal care.
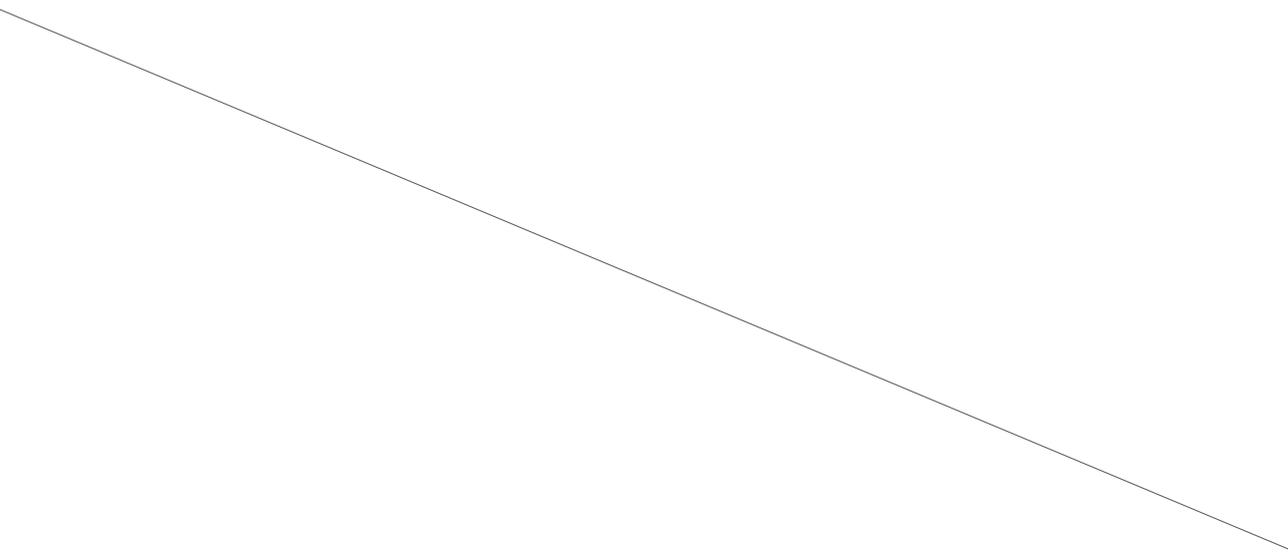
Chapter 3
**Going formal or informal, who cares?**
**The influence of public long-term care insurance**

## Abstract

International differences in LTC use are well documented, but not well understood. Using comparable data from two countries with universal public LTC insurance, the Netherlands and Germany, we examine how institutional differences relate to differences in the choice for informal and formal LTC. Although the overall LTC utilization rate is similar in both countries, use of formal care is more prevalent in the Netherlands and informal care use in Germany. Decomposition of the between-country differences in formal and informal LTC use reveals that these differences are not chiefly the result of differences in population characteristics but mainly derive from differences in the effects of these characteristics that are associated with between-country institutional differences. These findings demonstrate that system features such as eligibility rules and coverage generosity and, indirectly, social preferences can influence the choice between formal and informal care. Less comprehensive coverage also has equity implications: for the poor, access to formal LTC is more difficult in Germany than in the Netherlands.

## 3.1 Introduction

Patterns of utilization of LTC differ across Europe. Two phenomena in LTC
utilization have received particular attention in the literature: differences
in the relative importance of formal and informal care and differences
in rates of institutionalization (OECD, 2005; Huber et al., 2009; Rodrigues
and Schmidt, 2010). Although cross-country variation in LTC use is well
documented, it is not very well understood. Studies on LTC using the
Survey of Health, Ageing and Retirement in Europe[11] (SHARE) do not
go beyond including country dummies to account for cross-country
differences. We aim to explain international differences in LTC use by
investigating the impact of differences in public LTC insurance on house-
hold decisions. We focus on Germany and the Netherlands because both
countries have a similar system of financing and organizing universal
coverage for LTC but with some interesting differences in their degree
of comprehensiveness. Despite the similarities in financing and organi-
zation, there are large differences in the mix of LTC use. We hypothesize
that (part of) these differences in LTC use between the Netherlands and
Germany stem from two important differences in the design of the pub-
lic insurance system: i) the use of the spouse's ability to provide informal
care as a criterion in determining eligibility for publicly funded care and
ii) comprehensiveness of public LTC coverage.

To test our hypotheses, we model LTC use as a function of personal
and household characteristics and decompose the difference in formal
and in informal LTC use into contributions of differences in population
characteristics and of differences in coefficients. These differences in
coefficients show that the association between population characteris-
tics and LTC use is different and may result from institutional and cul-
tural differences. Previous studies on which characteristics are impor-
tant determinants of formal LTC use (e.g., Manton et al., 2006, 2007;
Nihtilä and Martikainen, 2008b; de Meijer et al., 2009; Weaver et al.,
2008; Luppa et al., 2010; de Meijer et al., 2011) have obtained qualita-
tively similar findings, regardless of the institutional setting. Need-
related characteristics, such as measures of health status and disability,
are invariably the most important determinants in terms of size and
significance and have therefore received most attention. The second
most important determinant is typically the availability of informal
care, a close substitute to formal LTC. Informal care availability within
the household is approximated by the respondent's co-residence status
in all of these studies. Chapter 2 shows that living alone is indeed a proxy
for informal care availability in the Netherlands: the importance of living
alone is reduced when variables are included that indicate the spouse's
physical ability to provide informal care. Spouse age increases use of
formal and informal LTC and that spouse disability lowers the probability

of spouse caregiving and increases the probability of receiving other types of LTC (Chapter 2; Goeree et al., 2011). Meng (2010) finds that spouse problems with activities of daily living (ADLs) and instrumental activities of daily living (IADL) have a small effect on LTC choices of disabled persons: it increases the probability that the respondent does not use any LTC, possibly because the spouse cannot provide informal care.

A related strand of the literature has addressed the relationship between informal care (from children) and formal LTC (Van Houtven and Norton, 2004; Charles and Sevak, 2005; Bolin et al., 2008; Bonsang, 2009; Kalwij et al., 2009; Knoef and Kooreman, 2011). One of the main findings is that the relationship between informal care and formal care differs between countries and between types of formal care. Informal care is always found to be a substitute for formal LTC, but the magnitude of the substitution effect differs. Bolin et al. (2008) attribute the difference that they find between northern, central, and southern Europe to differences in the strength of family ties and norms regarding family responsibility. Our research does not directly assess substitution of formal and informal care but investigates what specific factors may explain some of these between-country differences.

When testing the hypotheses regarding eligibility and comprehensiveness, we also highlight differential equity implications of alternative systems by examining the effect of institutional differences on horizontal equity in LTC use. Horizontal equity is defined as equal use in case of equal need, that is, irrespective of income or wealth. Hence, horizontal equity holds if LTC use is not associated with income after controlling for other characteristics. That is, we assume that vertical equity – appropriately unequal treatment in unequal situations – is not an issue: on average, each system gets it right (van Doorslaer et al., 2000). This assumption is reasonable because within both countries, eligibility criteria are uniform and explicit. To our knowledge, horizontal equity in LTC use has not been studied before. Previous studies have only examined equity consequences of alternative LTC arrangements either by looking at the extent to which needs are assumed to be met (Kemper et al., 2008; Gannon and Davin, 2010) or by assessing perceived financial protection (Keese et al., 2010; Zuschandke et al., 2010).

## 3.2 LTC financing in Germany and the Netherlands

The Netherlands and Germany share several characteristics in the way they finance LTC. First, both countries have a separate mandatory public LTC insurance system with legal entitlements. Public LTC insurance coverage is (nearly) universal: it covers 100% of the population in the

Netherlands (although income-related co-payments do exist) and 90% of the German population. In Germany, high-income individuals may opt out but have to buy mandatory private insurance that has the same benefit package as public LTC insurance. Public insurance accounts for the great majority of total LTC expenditures: 68% in Germany and 90% in the Netherlands. Voluntary LTC insurance only plays a small role in Germany and no role at all in the Netherlands: uncovered care is paid for out-of-pocket (Rothgang, 2010; Schut and van den Berg, 2010; CVZ, 2011).

Second, insurance companies jointly negotiate prices (both countries) and volume (the Netherlands only) with each provider (SER, 2008; Rothgang and Igl, 2007). Insurance companies have little incentive to negotiate down prices because they are fully reimbursed for all LTC expenditures.

Third, eligibility for public LTC is assessed by independent officials and is based on objective eligibility criteria that are set centrally, and the outcomes of the eligibility assessment are legally binding. The officials are employed by either the association of health insurers (Germany)[12] or the government (the Netherlands). Eligibility for publicly funded LTC is not affected by the use of private formal LTC. Upon established eligibility, the patient may choose to receive care either in kind or through a cash benefit. Cash benefits can be spent freely in Germany but only on formal and informal care in the Netherlands (Ministry of Health, Welfare and Sport, 2007; CIZ, 2009; Schulz, 2010).

However, there are also two important differences in LTC financing. First, patient cost sharing is much higher in Germany than in the Netherlands. In Germany, the patient pays the difference between the lumpsum insurance benefit and the cost of care, neither of which depends on income. In addition, the patient pays for board and lodging and investment costs (if applicable) (Rothgang, 2010). Private expenditures amount to 31% of total expenditures in Germany and 8% in the Netherlands (OECD, 2011a). When in Germany a patient is unable to pay the bill, his or her children or, ultimately, social assistance steps in (Schulz, 2010). In the Netherlands, the level of co-payment depends on the type of LTC used and on income. The co-payment never exceeds the household income (CAK, 2012).

Second, the rules for eligibility differ with respect to the availability of informal care. In Germany, LTC is publicly financed regardless of the presence of a potential informal caregiver if LTC is needed daily for at least 90 min (e.g., Schulz, 2010; MDS, 2011). In the Netherlands, eligibility is contingent not only on medical need but also on the availability of

informal care: LTC is not publicly funded if an informal caregiver has already been providing it. Furthermore, unskilled LTC is not financed publicly if there is someone in the household who is able to provide it[13]. Unskilled LTC is domestic help and supportive guidance; skilled LTC is nursing, activating guidance, and treatment of an ailment. Personal care – help with ADLs – is at the border and is only paid for if it is needed for at least 3 months (CIZ, 2005; Schut and van den Berg, 2010). No objective criteria have been defined to assess physical ability to provide informal care. Ability depends on the household member's health but not on employment status and preferences, unless the combination of providing care and having a job causes (mental) health problems for the caregiver or if the caregiver is often away from home for a long period for work (CIZ, 2005).

## 3.3  Expected implications of the institutional differences

The differences in the treatment of informal care and the level of out-of-pocket payments may affect a household's decisions on LTC use. When a family member needs LTC, the family essentially makes a make-or-buy decision: buy formal care or provide informal care, which may be provided by someone from either inside or outside the household. The cost of formal care is the sum of i) the price that is borne by the user and ii) the cash benefit that the user foregoes and that the user may partly have spent freely otherwise; the cost of informal care is foregone leisure or, if not yet retired, the wage rate. In case of compensation for informal care, for example, through cash benefits, the cost of informal care is lower. More comprehensive coverage of formal care increases the probability of using formal LTC for everyone (Stabile et al., 2006). But we hypothesize that there may be differences in the magnitude of the increase between subgroups for which the increase in probability is higher because differences between the Netherlands and Germany will impact LTC use in two indirect ways. That is, *ceteris paribus,* differences in comprehensiveness and eligibility may affect i) the effect of spouse characteristics on LTC use and ii) the effect of income on LTC use. The first hypothesis means that the effect of spouse characteristics on LTC use may be affected by the difference in eligibility rules between the Netherlands and Germany – although in the Netherlands, public coverage is contingent on the availability of informal care within the household, in Germany, it is not. That is, in the Netherlands, the household's cost of (some types of) formal care depends on the spouse's ability to provide informal care. According to the former hypothesis, spouse ability will be more important in explaining formal LTC use in the Netherlands than in Germany.

Differences in comprehensiveness and eligibility may affect the effect of income on LTC use because when public coverage is not comprehensive, the cost of formal care can be substantial. If, in addition, co-payments and cash benefits are not income related, this situation may differentially affect the decisions of the rich and the poor (Newhouse et al., 1981; van Doorslaer et al., 1992; Ellis and McGuire, 1993).

A higher co-payment implies an increase in the out-of-pocket price of formal care. This price increase has two effects. First, it leads to substitution of informal care for formal care. Furthermore, the price increase implies lower real income and may therefore have a negative effect on demand for both goods (in case of positive income elasticities). The net price effect on formal care is therefore negative (e.g., Doehner et al., 2007); the price effect on informal care use is unclear. With diminishing marginal utility of income, the impact of a price increase is smaller for households with a higher income because the income effect will be smaller for these households. Furthermore, the difference between income groups is larger for formal care than for informal care if formal care is a more luxury good implying that the income elasticity of formal care is higher than the income elasticity of informal care, which is likely if formal care is more expensive. As a result, income is expected to have a stronger effect on formal LTC use in Germany than in the Netherlands. More specifically, in Germany, low-income households will more often forgo formal LTC than high-income households.

## 3.4  Empirical analysis

### 3.4.1  Data
We use data from the first and second wave of the SHARE. The SHARE collects microdata on health, socioeconomic status, and other personal and household characteristics of individuals 50 years and older and their spouses irrespective of age[14]. If the individual was not able to answer the questions, a proxy respondent was allowed to answer (part of) the questions. The final sample consists of both respondents living alone and respondents living together with their spouse. Respondents who reported having a spouse but whose spouse was not interviewed were also excluded from the sample. Table 3.1 shows the size of the sample and composition for both countries.

### 3.4.2  Variables
The dependent variable indicates self-reported use of LTC: no LTC, informal care only, or formal LTC with or without informal care. Informal care includes domestic help or help with paperwork provided by family, friends, or relatives from outside the household only and personal care

provided by caregivers living within or outside the household. Because it was unclear from the survey which household member(s) benefited from informal care from outside the household, we attributed this type of informal care to a household member if and only if this household member was the only person in the household with a health problem or disability. Informal care from outside the household was coded missing if the main respondent indicated that someone within the household received informal care from outside the household and if there were more persons with a health problem in the household. Otherwise, this variable was coded zero. Formal care comprises home care or institutional care, both publicly and privately financed. Formal home care consists of professional or paid help with domestic tasks, nursing, and personal care. Institutional LTC includes (temporary) admissions to residential or nursing homes. We do not model level of use because hours of informal care provided within the household are not measured in SHARE.

Explanatory variables include health status and disability, age, gender, and whether the respondent has a spouse. Other covariates are household net worth (assets), year-specific and country-specific income quartiles, and the presence of an informal caregiver either inside or outside the household. Income and household wealth are imputed if missing. Presence of informal care outside the household is approximated by a variable indicating whether the respondent has children; the presence of an informal caregiver within the household is measured by the spouse's physical ability to perform caregiving tasks conditional upon the presence of a spouse. The spouse's physical ability to provide informal care is approximated by the health and disability status of the spouse while we control for his or her age. These characteristics are related to the ability to provide informal care but not affected by the burden of informal care: this burden has been found to mainly impact the caregiver's mental health and well-being (self-rated health), not disability status (Coe and Van Houtven, 2009). Hence, the variables we use to measure spouse's ability are not directly affected by caregiving activities.

### 3.4.3 Model specification and decomposition

We use a multinomial probit model to analyze LTC use. Although alternative specifications can allow for correlated error terms and correct for unobserved heterogeneity over time for respondents with multiple observations, we chose not to exploit the panel structure of the data because it would unnecessarily[15] complicate the decomposition (e.g., van de Poel et al., 2009). Instead, standard errors are adjusted for correlation of choices over time by clustering observations at the individual level.

Institutional differences are expected to contribute to between-country differences in LTC use as described in Section 3.3. They will do so be-

cause they lead to differences in the relationship between LTC use and the covariates rather than to differences in means of covariates themselves. As a first step, we compare coefficients and average partial effects (APEs) resulting from separate regression analyses for both countries. But differences in APEs estimated by nonlinear models may result from both between-country differences in coefficients and differences in the distribution of other independent variables included in the model. Therefore, we use a decomposition method for nonlinear models proposed by Yun (2004) to examine whether differences in LTC use between the Netherlands (NL) and Germany (DE) result from differences in means of covariates or in the functional relationship. The decomposition is:

$$\overline{Y}_{NL} - \overline{Y}_{DE} = \overline{F(X_{NL}\beta_{NL})} - \overline{F(X_{DE}\beta_{DE})}$$
$$\left[\overline{F(X_{NL}\beta_{NL})} - \overline{F(X_{DE}\beta_{NL})}\right] + \left[\overline{F(X_{DE}\beta_{NL})} - \overline{F(X_{DE}\beta_{DE})}\right] \tag{3.1}$$

where Y is LTC use and X and $\beta$ are the sets of covariates and coefficients, respectively. F denotes the multinomial probit. The first part represents the contribution of the difference in covariates to the difference in outcomes, and the second part represents the contribution of the difference in coefficients. Subsequently, both terms can be broken down further to identify the contribution of each variable. The detailed decomposition is based on a Taylor expansion at the sample averages $\overline{Y}_{NL}\beta_{NL}$ and $\overline{X}_{DE}\beta_{DE}$ and results in sets of weights $W$ that measure the contributions of between-country differences in means and coefficients:

$$\overline{Y}_{NL} - \overline{Y}_{DE} = \sum_{i=1}^{i=K} W^i_{\Delta X} \left[\overline{F(X_{NL}\beta_{NL})} - \overline{F(X_{DE}\beta_{NL})}\right] + \sum_{i=1}^{i=K} W^i_{\Delta\beta} \left[\overline{F(X_{DE}\beta_{NL})} - \overline{F(X_{DE}\beta_{DE})}\right] \tag{3.2}$$

where $K$ is the number of independent variables in the model, and for variable $i$

$$W^i_{\Delta X} = \frac{(\overline{X}^i_{NL} - \overline{X}^i_{DE})\beta^i_{NL}}{(\overline{X}_{NL} - \overline{X}_{DE})\beta_{NL}} \quad ; \quad W^i_{\Delta\beta} = \frac{\overline{X}^i_{DE}(\beta^i_{NL} - \beta^i_{DE})}{\overline{X}_{DE}(\beta_{NL} - \beta_{DE})}$$

and hence

$$\sum_{i=1}^{i=K} W^i_{\Delta X} = \sum_{i=1}^{i=K} W^i_{\Delta\beta} = 1$$

(Yun, 2004). It is customary to decompose the conditional expectation into the relative contributions, but in a multinomial outcome model,

this approach is not feasible. Because the values of the choice alternatives are arbitrary, the conditional expectation of this model cannot be interpreted (Bauer and Sinning, 2008). Therefore, we focus on decomposing the differences in predicted probabilities for informal care (IC) and formal care (FC) separately instead. That is, rather than decomposing $\overline{Y}_{NL} - \overline{Y}_{DE}$, we decompose $P(IC)_{NL} - P(IC)_{DE}$ and $P(FC)_{NL} - P(FC)_{DE}$, where $P()$ denotes denotes the probability of use. In other words, we treat each part of the multinomial probit as if it were a binary probit model. The interpretation of the results changes accordingly. Following Yun (2008), the contribution of differences in coefficients of dummy variables is normalized, and standard errors are calculated using the delta method.

## 3.5  Results

### 3.5.1  Descriptive statistics

Table 3.2 presents summary statistics stratified by country. The probability of not using any LTC is similar in both countries, but the probability of using any formal care is much higher in the Netherlands (10.23%) than in Germany (3.64%), which is in line with macro figures reported by Huber et al. (2009). The opposite holds for informal care: the average probability of using informal care is 6.7 percentage points higher in Germany (11.57%) than in the Netherlands (4.85%).

Between-country differences in the levels of covariates are indicative for the extent to which these differences could contribute to variation in LTC use patterns. Between-country differences in sample averages are statistically significant only for age, wealth, income in 2006, presence of a child, disability, and health status. Spouse characteristics show the same pattern, which is not surprising as spouses are also included as respondents.

The higher share of respondents with a child in the Netherlands and the similar shares of single-living respondents seem counterintuitive with the fact that informal care is twice as high in Germany than in the Netherlands. Worse health and higher disability in Germany are reflected in the hospitalization rate but not in LTC use. Although a number of between-country differences in means are statistically significant, they are fairly small in economic terms, except for the differences in income and assets.

### 3.5.2  Analysis

Table 3.3 presents the results for the regression analyses, run separately for each country. Because nonlinearity complicates the interpretation of the coefficients, the table also includes estimates of APEs. Comparing

APEs between the Netherlands and Germany in Table 3.3 reveals that differences in the coefficients primarily reflect differences in eligibility rules. Spouse disability, for instance, is taken into account in the Netherlands but not in Germany when assessing eligibility and positively affects the probability of formal care use in the Netherlands but not in Germany: in the Netherlands, a one-point increase in the spouse's disability score leads to a 1.6-percentage point increase in the probability of using formal care. In Germany, higher cognitive ability of the spouse is associated with a slightly lower probability of using formal LTC. Having a child decreases the probability of using formal LTC. The role of living alone in explaining LTC use is reduced but still significant once spouse ability is included (Chapter 2).

A disabled spouse positively affects the probability of informal care use in the Netherlands; in Germany, the coefficient is positive but insignificant. Informal care includes informal care from within the household and informal care given by someone from outside the household. As expected, the influence of spouse disability on informal care within the household is negative (but not significant in the Netherlands) but are offset by the positive (insignificant) influence of spouse disability on informal care from outside the household (regression with separate categories not shown). Having an income below the median decreases the probability of using formal LTC in Germany but not in the Netherlands. Access to formal LTC is therefore less constrained by income in the Netherlands than in Germany. Furthermore, *ceteris paribus,* wealthier respondents use more informal care in the Netherlands.

The signs of the other coefficients are as expected and are similar for both countries: worse health and disability scores increase the probability of receiving care. Yet, the size of the APEs does differ in some cases. The APE of disability on formal care use is three times higher in the Netherlands, which may be caused by higher co-payments or stricter eligibility rules in Germany. This finding may indicate that vertical treatment norms differ between the Netherlands and Germany. Reporting a hospitalization or bad health increases the probability of using informal care in Germany, whereas in the Netherlands, it mainly affects formal care use. Although eligibility rules matter, other factors matter too. In Germany, only the number of ADL and IADL limitations was used to assess need for public LTC (Rothgang, 2010). Yet, other measures of health and disability, such as a hospitalization, chronic diseases and depression, or having children, which measures informal care availability outside the household, affect (formal) LTC use as well.

### 3.5.3 Decomposition
We know from the descriptive statistics (Table 3.2) that the average

probability of using informal care was 6.7 percentage points lower in the Netherlands (4.9%) than in Germany (11.6%). Of this difference, only 0.6 percentage points could be explained by differences in means of covariates (Table 3.4, first column). This contribution of covariates is reinforced by the much larger contribution of the difference in coefficients (Table 3.4, second column). That is, if the Dutch sample had the characteristics of the German sample, the average probability of using informal care would still be 6.1 percentage points lower in the Netherlands than in Germany. The use of formal care is 6.6 percentage points higher in the Netherlands (10.2% vs 3.6%) than in Germany.

The decomposition results in Table 3.4 show that the contribution of differences in means of covariates to variation in formal LTC use is negative: given the observed distribution of population characteristics, the German sample is expected to have a 3.1-percentage point higher use of formal care (third column) than the Dutch sample. However, the contribution of differences in means of covariates is more than offset by the contribution of differences in coefficients (fourth column). As a result, most of the between-country gaps in use of formal and informal LTC are explained by differences in coefficients (91% for informal care and 146% for formal care) as opposed to differences in means of covariates (9% for informal care and 46% for formal care).

Table 3.4 furthermore shows the contribution of (groups of) variables to the aggregate contribution of both differences in coefficients and differences in means of covariates.[16] The differential impact of age is by far the largest contributor to the gaps between the two countries. Differences in the age coefficients for informal and formal LTC account for a difference of 30.2 percentage points (452.1%) in informal care use and 13.3 percentage points (200.2%) in formal care use (not significant). Differential income effects – especially at the low end of the income scale – also explain a large part of the differences: the variation in formal LTC use would be 2.7 percentage points (41%) lower if having a low income would have the same effect in Germany as in the Netherlands. The differential low-income effect is partially offset by the differential high-income effects: high-income respondents in Germany are more likely to use formal LTC and less likely to use informal care than high-income respondents in the Netherlands. As a result, the aggregate contribution of differences in the relationship between income and LTC use is 1.2 percentage points for formal care (19%) and 0.2 percentage points (3%) for informal care.

Differences in eligibility rules also matter. The differential effect of disability contributes 1.5 percentage points (22%) to the discrepancy in the probability of formal care use. The differential association of spouse

disability – which is taken into account in determining eligibility for formal LTC in the Netherlands but not in Germany – and formal LTC use also contributes to the gap in formal LTC use: it explains 1.4 percentage points (22%) of the aggregate difference.

## 6    Conclusion and discussion

We have exploited the availability of comparable data to perform a detailed comparison of formal and informal LTC use in the Netherlands and Germany and a decomposition analysis of the differences. Our starting point is the observation that in the Netherlands, there is more use of formal care and a less use of informal care than in Germany. We then set out to unravel the sources of these differences. Do we observe these differences because the observable characteristics differ between Dutch and German users? Or because institutions differ between these countries?

Our findings are as follows. First, next to demand-related characteristics such as needs and supply factors, for example, informal care availability, LTC use is also strongly affected by country-specific eligibility criteria for public LTC coverage and comprehensiveness of the public LTC system. These institutional differences translate into very different relationships between LTC use – formal and informal – and personal characteristics. For instance, the spouse's ability to provide informal care, which is an eligibility criterion in the Netherlands but not in Germany, affects the use of public formal LTC in the Netherlands. In Germany, it does not. Furthermore, the role of income is very different in both countries, with low income deterring use of formal care in Germany much more because of higher co-payments for public LTC. As a result, access to formal care for low-income users in Germany without an able spouse is much lower than that in the Netherlands, and this group is much less likely to use formal care. Future research on the timing of the onset of LTC might indicate whether lower access means that low-income users more often postpone formal LTC use or that they do not use it at all.

Second, the decomposition results show that the difference in formal LTC use between the Netherlands and Germany is largely (for 90%) explained by differences in coefficients of covariates, that is, reflecting mostly differences in eligibility rules, while differences in means of covariates play a minor role. This finding confirms that institutional differences as embodied in these coefficients account for much more of the between-country difference than patient characteristics. This is most clearly brought out by the greater importance of spouse characteristics

in the Netherlands in determining eligibility for public care services that was described previously. The decomposition results demonstrate that the choice between formal and informal care can substantially be influenced through system features such as eligibility and coverage generosity and, indirectly, by social preferences. Our findings suggest that use of formal care in the Netherlands would be 9.7 percentage points lower and informal care use 6.2 percentage points higher if the German system were in place and unobserved differences in preferences do not play a role.

Third, there is no difference in LTC use between rich and poor in the Netherlands. By contrast, being in the bottom income quartiles in Germany is negatively related to formal LTC use, indicating that conditional on health, disability, and other covariates, the rich use more formal LTC than the poor. Horizontal equity is achieved in the Netherlands but not in Germany. Our results for the German sample show that even with universal public LTC insurance, horizontal equity is not achieved if total expenditures are relatively low and co-payments are large and unrelated to income. However, horizontal equity in the Netherlands appears to come at a price. Total expenditures on LTC for the elderly are much higher in the Netherlands (2.4% of GDP in 2009) than in Germany (1.3% in 2008) (CVZ, 2011; OECD, 2011b). Whereas Germany has recently expanded LTC insurance coverage, recent government proposals in the Netherlands involve a substantial reduction of coverage and entitlement to ensure the sustainability of the LTC system (e.g., Rothgang, 2010; Rijksoverheid, 2012). The results of this paper suggest that if the ability to pay and the ability to care are not taken into account when deciding on cost sharing for formal care, undesirable disparities in use may emerge as system features have a strong influence on who ends up taking the burden of caregiving.
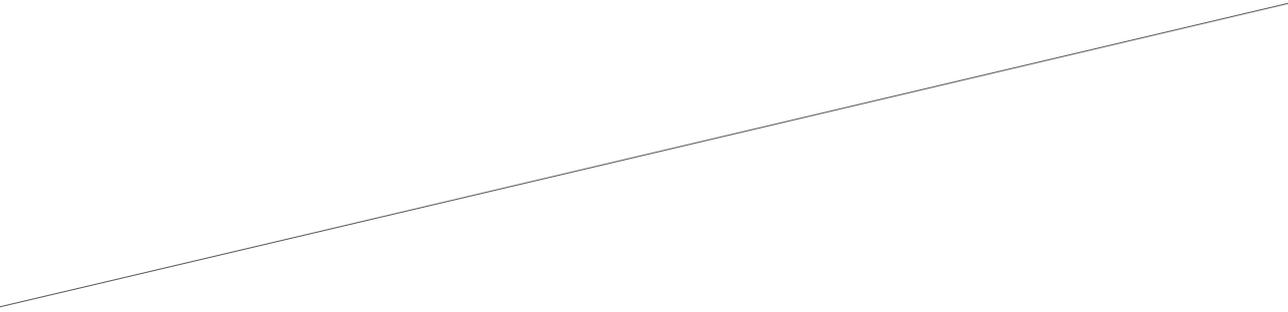
## Abstract

The use of LTC is changing rapidly. In the Netherlands, rates of institutional LTC use are falling, whereas homecare use is growing. Are these changes attributable to declining disability rates, or has LTC use given disability changed? And have institutionalization rates fallen regardless of disability level, or has LTC use become better tailored to needs? We answer these questions by explaining trends in LTC use for the Dutch 65+ population in the period 2000-2008 using a nonlinear variant of the Oaxaca-Blinder decomposition. We find that changes in LTC use are not due to shifts in the disability distribution but can be traced back almost entirely to changes in the way the system treats disability. Elderly with mild disability are more likely to be treated at home than before, whereas severely disabled individuals continue to receive institutional LTC. As a result, LTC use has become better tailored to the needs for such care. This finding suggests that policies that promote LTC in the community rather than in institutions can effectively mitigate the consequences of population aging on LTC spending.

## 4.1 Introduction

Aging populations have pushed up the demand for LTC. As a result, LTC expenditures in OECD countries have soared in recent decades (OECD, 2011a). In the Netherlands, for instance, real LTC expenditures grew on average by 3.9% annually in the period 1995-2010 (Pommer, 2012). This trend challenges the future accessibility and affordability of LTC services.

Two issues have attracted particular attention in the literature on LTC. One strand of research has focused on identifying the determinants of LTC use (e.g., Portrait et al., 2000; Manton et al, 2007; de Meijer et al., 2009; Weaver et al., 2008; Luppa et al., 2010; de Meijer et al., 2011). Some of these studies apply the estimated LTC use function to the future distribution of these determinants to forecast LTC use. In all studies, disability is one of the key determinants of LTC use; age and informal care availability are other important determinants. These studies suggest that population aging, both directly and indirectly through its impact on population health, will further mount the pressure on the public LTC sector. A second strand of research has investigated the options to cope with the rising demand for public LTC. One of the options that has featured prominently is the substitution of less expensive LTC services for expensive alternatives. This research mostly addresses the question whether formal and informal LTC and institutional LTC and homecare are complements or substitutes. With regard to the former, the majority of studies found that informal care is a substitute for formal LTC, particularly for lower-skilled LTC services (e.g., Van Houtven and Norton, 2004; Bolin et al., 2008; Bonsang, 2009; Balia and Brau, 2014). Although the growing demand for publicly financed LTC can therefore to some extent be absorbed by informal care, the substitution effect appears small in relative terms (Balia and Brau, 2014). With respect to the latter and despite LTC deinstitutionalization policies being very popular in many OECD countries (OECD, 2011a), studies on the substitutability of institutional LTC by homecare have almost exclusively focused on the USA (e.g., Kemper, 1988; Muramatsu et al., 2007; Kaye et al., 2009; Weissert and Frederick, 2013; Guo et al., 2014). Although higher (state-level or individual-level) spending on homecare has consistently been found to lower the probability of nursing home admission, evidence on whether the decrease in institutional LTC expenditures offsets the increase in homecare expenditures is less conclusive.

As in many other OECD countries, the Dutch government has been encouraging LTC recipients to substitute homecare for institutional LTC for decades. In spite of population aging, institutional LTC use rates in the Netherlands and elsewhere have fallen in recent decades (OECD,

2005; Statistics Netherlands, 2013), which may be the result of deinstitutionalization policies. Other potential explanations for this decline include improved health, enhanced well-being, or better-educated elderly (OECD, 2005). Did these changes in the composition of the elderly population indeed result in the decline in institutionalization? To the best of our knowledge, there is no empirical evidence on what explains the trend in declining institutional LTC use. This paper aims to shed some light on this issue for the Netherlands. We start by explaining the decrease in the probability of being institutionalized among the Dutch elderly in the period 2000-2008. We then explain the trend in homecare and institutional LTC use jointly. This extension to the literature is important because these two types of care are to some extent substitutes. We use a data set that is unique because it contains detailed information on disability and LTC use for *both* the independent living population *and* the institutionalized population.

LTC use may change for two reasons (Figure 4.1). The first reason is that the distributions of LTC determinants, for example disability trends, change. With population aging, the average disability level is expected to increase between *t1* and *t2*. Hence, the disability density will shift to the right (arrow A). As LTC use rates generally increase with the degree of disability, the use of LTC is also expected to rise. Second, structural and behavioral changes may alter the relationship between LTC use and its determinants. These changes in the relationship between LTC use and its determinants may be the result of changes in policies and patient preferences. Deinstitutionalization policies, for instance, may alter the relationship between disability and institutional care use (arrow B) and shift the eligibility threshold for institutional LTC to the right. Consequently, fewer individuals are eligible for institutional LTC, as indicated by the smaller area under the shifted density curve to the right of the shifted threshold, raising the average level of disability of institutional care users. The growing number of individuals located to the left of the threshold may become dependent on homecare as it will act as a substitute for institutional LTC. Although Figure 4.1 focuses on disability, similar arguments can be made for other determinants and their relationship to LTC use.

Employing a nonlinear variant of the Oaxaca-Blinder decomposition method, we decompose changes in LTC use for the Dutch 65+ population into a part due to changes in determinants and a part due to their changed impact. We demonstrate that changes in the relationship between use and its determinants (henceforth, structural changes) explain most of the changes in LTC use. This finding is important for forecasts of LTC use. Most forecasting efforts for LTC use only account for the part that is due to trends in the determinants of LTC use while

neglecting the role of structural changes (Spillman, 2004; Lafortune et al., 2007; Manton et al., 2007; OECD, 2011a; de Meijer et al., 2012). Although some studies do acknowledge the role of structural changes (OECD, 2011a), none has quantified their role. Structural changes are likely to continue to play a substantial role given the high frequency of regulatory reforms in the LTC sector.

## 4.2  Institutional context

In a heavily regulated sector like LTC, the institutional context strongly affects which factors are important predictors of use (Chapter 3). Policy changes are one important source of structural change. In order to explain which structural changes may have contributed to trends in LTC use, and how, this section describes the institutional context and the major changes in LTC policy in the Netherlands during the study period.

### 4.2.1  Long-term care in the Netherlands

All Dutch citizens have mandatory public LTC insurance covering both homecare and institutional LTC. Homecare services include domestic help, social assistance, personal care, and nursing care. Institutional LTC consists of temporary and permanent admissions to residential or nursing homes. Residential homes provide assistance with (instrumental) activities of daily living, whereas nursing homes also provide nursing care. Institutional LTC accounts for approximately 70% of total LTC spending (de Meijer et al., 2011). Access to public LTC is regulated by the Needs Assessment Agency[17], which employs strict guidelines for eligibility. In addition to disability and health, eligibility for some types of homecare also depends on the living situation and informal care availability of the applicant (van Gameren and Woittiez, 2005; Chapter 3). Empirical evidence indeed confirms that LTC use is largely determined by the eligibility criteria for disability and informal care availability (e.g., de Meijer et al., 2009; Chapter 3). Public LTC is subject to an income-related copayment.

### 4.2.2  Changes in long-term care policy

During the study period, the capacity of institutional LTC fell by approximately 11,000 beds (6.3%), whereas the production in the homecare sector was increased by 50% (de Klerk, 2011; Dumaij, 2011). These opposite trends are likely to be associated with two LTC policy shifts in particular. First, a budget increase in the period 2000-2005 facilitated a swift expansion of homecare services. Until 2000, the volume of LTC was constrained by fixed global budgets, but rising demand resulted in a gradual lengthening of waiting lists. In 1999, a court ruling reconfirmed the enforceable right to timely care for those who were eligible for public

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LTC. Subsequently, additional resources were deployed to reduce the waiting lists. In practice, budgets became open ended until 2005 (European Court of Justice, 2001; van de Vijsel et al., 2011). Because homecare capacity is expanded more easily than institutional capacity, homecare production grew much faster during this period. Homecare waiting lists decreased by no less than 35,000 patients and nursing homes waiting lists by 4000 patients from 2000 through 2003. This policy change also drastically accelerated LTC expenditure growth, which averaged an annual 7.5% in the period 2001-2003 (Pommer, 2012).

Second, the government had been encouraging substitution of homecare for institutional LTC for several decades. To further promote substitution, a new series of policy reforms was enacted between 2000 and 2008 (de Klerk, 2011). The new policies were in accordance with strong patient preferences to stay and live in the community as long as possible and made homecare more demand driven (Pommer, 2012). First, from 2003, eligibility for LTC care was no longer tied to the place of delivery – at home or in an institution – but was instead defined in terms of the type of LTC required, for example, personal or nursing care. Second, public homecare provision was no longer restricted to certified homecare suppliers; residential and nursing homes and organizations that had previously not been certified to provide publicly financed LTC could also provide public homecare (Pommer, 2012).[18] As a result, the sharp division between homecare and institutional care suppliers gradually disappeared. The third reform that encouraged homecare use was that, from 2007 onwards,[19] elderly who were eligible for institutional LTC could choose to receive homecare instead (Pommer, 2012). Alongside these reforms, eligibility criteria were standardized, for example, through the centralization of the eligibility assessment and the introduction of the notion of 'usual care'[20] in 2003. Yet, the eligibility criteria for institutional LTC use did not become stricter, at least not explicitly.

## 4.3  Methods

### 4.3.1  Data and sample selection

For all three observation periods, we pooled two cross-sectional surveys: the Facilities Use Survey (FUS), a quadrennial population survey among private households, and the Elderly in Institutions Survey (EIS), a quadrennial survey among residents of LTC institutions. The questionnaires of both surveys were identical for the variables of interest.

For FUS, households were sampled from a national sample of postal addresses.[21] Of the gross samples of FUS, 66-69% of the households participated, containing 2029 individuals aged 65+ in 2000, 2302 in

18  Before 2003, homecare suppliers that did not offer all homecare services were not certified to provide publicly financed LTC. From 2003, agencies that offer at least one homecare service could enter the market, which resulted in an expansion of homecare capacity (Varkevisser et al., 2007).

19  Note that this reform is of limited relevance for our study period given that it took place in 2007 and may not immediately have had a large impact on LTC use decisions.

20  Usual care is the part of care household members are expected to provide and is therefore not publicly financed.

21  The sample selection design in 2000 differed from that in 2004 and 2008. In 2000, households were randomly selected in one stage; in 2004 and 2008, a two-stage sampling design has been used. First, municipalities stratified by region and interviewer area were selected with selection probability proportional to their size. Second, households within the selected municipalities were randomly selected.

2004, and 2064 in 2008. Item non-response further reduced the samples to 1514, 1827, and 1374 respondents in 2000, 2004, and 2008, respectively.

The sample selection of EIS consisted of two stages. First, institutions stratified by region and type of institution (residential home and somatic or psychogeriatric ward of a nursing home) were selected with selection probability proportional to their capacity. Second, in all selected institutions, a sample of five to seven permanent residents and two reserve samples were randomly selected. To obtain the desired number of participants, respondents who refused participation were replaced by a resident from one of the reserve samples. A proxy respondent was interviewed when the respondent was not capable of answering the questions. In total, 967, 1126, and 1381 residents participated in EIS 2000, 2004, and 2008, respectively, resulting in 937, 1005, and 1217 complete cases. The pooled study samples of 2000, 2004, and 2008 therefore comprised 2451, 2832, and 2591 respondents, respectively.

We applied a two-step weighting procedure. First, post-stratification weights were derived to correct for selection caused by item non-response. The weighting variables were self-reported health * institutional setting. Second, iterative proportional fitting (IPF) weights were computed to correct the marginal distribution of the weighting variables in our sample to those of the Dutch 65+ population (Battaglia et al., 2004). In this second step, the weighting variables were age * sex * marital status and institutional setting. This procedure ensured that the decline in institutional LTC use in our weighted sample is identical to the actual decline observed among the entire Dutch 65+ population. Final weights were obtained by multiplying the post-stratification and IPF weights.

### 4.3.2  Variables

LTC use consists of the alternatives no use, homecare use, and institutional LTC use. Homecare includes formal personal or nursing care. Institutional LTC includes permanent admissions to residential and nursing homes. Informal care, domestic care, and temporary admissions to LTC institutions were not considered. Disability is measured by activities of daily living (ADL), mobility, and the global activities limitation indicator (GALI), all self-reported. ADL includes the following activities: getting in/out bed, (un)dressing, washing face and hands, washing oneself completely, and toileting. The following mobility items were included: getting up/sitting down, walking stairs, walking for 10 min, leaving/entering the house, and moving outdoors.[22] The GALI comprises one question that measures to what extent respondents were hampered in daily activities by chronic conditions: not at all, mildly, or severely (van Oyen et al., 2006). We constructed a disability index, using all items, by means of a polychoric principal component analysis (Kolenikov and

23 Chronic conditions
included asthma; chronic
bronchitis; lung emphysema;
chronic obstructive pulmo-
nary disease; cancer; heart
disease; narrowing vessels
in abdomen or legs; cere-
brovascular accident or
stroke; serious disease of
the kidney, gall bladder,
liver, or thyroid; osteoar-
thritis; rheumatoid arthritis;
diabetes; serious disease
of the spine, neck, shoulder,
elbow, wrist, or hand; epilep-
sy; and diseases of the skin.

24 No comparable data
were available for homecare
use in the year 2000.

25 The multinomial logit
relies on the independence
of irrelevant alternatives
assumption. A mixed multi-
nomial logit model that does
not require this assumption
provided very similar average
partial effects as the ones
reported in this paper by
multinomial logit models.
Given the similarities of the
average partial effects (APEs),
we chose the multinomial
logit model as decomposing
predicted probabilities ob-
tained by a mixed multino-
mial model that involves
decomposing a random
effect, which is very complex.

Angeles, 2004), which is appropriate for ordinal variables as it allows for nonlinearity in the scale of individual items. The advantage of this method is that it exploits information on all disability items and answer categories and that it acknowledges that not all items contribute equally. The index was rescaled from 0 (not disabled) to 10 (severely disabled). To allow for nonlinearity of the relationship between disability and LTC use, we use six dummy variables for being non-disabled and for having a disability score of 1-2, 3-4, 5-6, 7-8, and 9-10, respectively.

In addition to disability, we added health, socio-demographic charac-teristics, and educational attainment as other determinants. Health was included as the number of chronic conditions of a pre-specified list of chronic conditions.[23] Cognitive functioning could not be included as one of our samples (FUS) lacked information on cognitive functioning The socio-demographic determinants include age (5-year categories), sex, and living alone status. The latter is a proxy for informal care avail-ability. For the institutionalized respondents of EIS, living-alone status was recorded at the time of admission. Some of the covariates are poten-tially endogenous to LTC use. Therefore, we do not interpret the average partial effects obtained from the estimates as causal effects but rather as partial associations that can be used to decompose the trend in LTC use. The decomposition technique (Section 4.3.3) is used to statistically account for the changes in LTC use.

### 4.3.3 Model specification and decomposition

As discussed in the introduction, both changes in determinants and their changed association with LTC use contribute to trends in LTC use. In order to quantify the contribution of both sources of change to trends in LTC use, we employed a nonlinear variant of the Oaxaca-Blinder decomposition technique proposed by Yun (2004). Formally,

$$\overline{LTC_t} - \overline{LTC_{t-1}} = \overline{F(X_t\beta_t)} - \overline{F(X_{t-1}\beta_{t-1})}$$
$$\left[\overline{F(X_t\beta_t)} - \overline{F(X_{t-1}\beta_t)}\right] + \left[\overline{F(X_{t-1}\beta_t)} - \overline{F(X_{t-1}\beta_{t-1})}\right] \qquad 4.1$$

where $X$ and $\beta$ represent vectors of determinants and coefficients, respectively. $t$ denotes the year 2008, and $t$-1 represents either the year 2000 when decomposing the predicted probability of institutional LTC use or the year 2004 when decomposing trends in the predicted proba-bilities of no use, homecare use, and institutional LTC use.[24] $F$ denotes the logit function in the first case and the multinomial logit function in the second.[25] The first term on the right-hand side represents the con-tribution of changes in covariates (determinants), whereas the second represents the contribution of changes in coefficients. Subsequently, a more detailed decomposition identifies the contribution of each

determinant.[26] As in Yun (2008), we normalize the contribution of the changed coefficients for dummy variables. The standard errors are calculated using the delta method and are clustered at the household level, or at the homecare level.

## 4.4 Results

### 4.4.1 Trend in long-term care use

Table 4.1 shows that institutional LTC use dropped significantly between 2000 and 2008. The 1.50 percentage point reduction is almost entirely due to a decrease in residential homes admissions. This implies a relative reduction of nearly 25%, which is substantial, especially when considering that institutional LTC accounts for approximately two-thirds of LTC expenditures. The fall in institutional LTC use is more than compensated by an increase in homecare users. Homecare use increased from 5.34% in 2004 to 8.70% in 2008, in line with LTC policy aims at the time.

### 4.4.2 Trends in determinants

None of the distributions of the core determinants, that is, disability, age, and co-residence status, significantly changed during the periods 2000-2008 and 2004-2008 (Table 4.1). This is consistent with earlier reports of a stable or slightly increasing disability rate between 2000 and 2008 (van Gool et al., 2011; Hoeymans et al., 2012). Changes in disability therefore cannot explain the fall in institutional LTC use. Although the slightly increased share of the older age groups suggests that the population is aging, none of these increases were significant.[27] Interestingly and despite the aging, the average number of reported chronic conditions significantly decreased between 2004 and 2008. Elderly in 2008 were also significantly better educated than in 2000. The absence of significant trends in most of the determinants suggests that the contribution of changes in determinants to the explanation of the trend in LTC use must be small.

### 4.4.3 Changes in the association between long-term care use and its determinants

As disability is the key determinant of LTC use, any change in the association between disability and use will strongly contribute to the trend in institutional LTC use. Figure 4.2 presents the probability to be institutionalized as a function of disability for each of our observation years. It shows a marked reduction in the overall probability of residing in an institution between 2000 and 2008. But the decline was not identical across levels of disability: use declined most for those with a disability score between 3 and 8, and it even slightly increased for the most severe-

26  See Yun (2004) for a more detailed description of the aggregate and detailed decomposition technique.

27  Note that although the mean age of the 65+ population did not increase, the mean for the entire Dutch population did. Changes in the age composition reported in this paper are in line with those reported by Statistics Netherlands.

28 The time since admission of EIS respondents decreased across the survey years, which rules out that the observed incline in average disability level of the institutionalized sample is the result of an increase in the time since admission.

29 Decomposition results are similar for the periods 2000-2004 and 2004-2008. A slight difference is that the detailed decomposition does not return any significant contributions because the observed change in institutional LTC use is rather small over a 4-year period.

ly disabled. Institutional LTC in 2008 therefore has become more concentrated among those in greatest need.[28] The added density plot highlights the fact that the large majority of respondents have low levels of disability.

Figure 4.3 displays the trends in no use and homecare use by severity of disability and the density distribution of homecare use. Note that the probability of receiving homecare first rises with disability and then falls for respondents with a disability score exceeding 8 (Figure 4.3b). The probability of not receiving any LTC at all fell for all disability levels in the period 2004-2008, confirming growth in overall LTC use (Pommer, 2012). However, use increased most among the elderly with a disability score below 8. This subgroup also became less likely to be institutionalized, suggesting that institutional LTC has indeed been substituted by homecare for those with lower disability levels. The most severely disabled elderly continued to use institutional care: for this group, homecare does not seem to be a viable alternative.

Figures 4.2 and 4.3 strongly suggest that the relationship between disability and LTC use has indeed changed, but other, potentially confounding determinants are not controlled for in these figures. Tables 4.2 and 4.3 present the APEs that are based on regressions of homecare use and institutional LTC use on all determinants.

The changes in the APEs of determinants on institutional care use and homecare use are similar in Tables 4.2 and 4.3. The level of disability, age, being a female, and living alone all raise the probability of using institutional care. Additional analyses (results not shown) made clear that the probability of residing in a residential home first rises and then falls with disability level as the most severely disabled more often live in a nursing home. The APE of low to moderate levels of disability on institutional care use fell between 2000 and 2008. Also the APE of age decreased, especially among the older subgroups.

For homecare, the APEs of nearly all covariates on the probability of using homecare increased between 2004 and 2008. The APE of disability among elderly with a disability score of 3 or higher increased substantially in the period 2004-2008, but the change was not significant. Chronically ill elderly in 2008 were more likely to receive homecare than those in 2004 and were less likely to receive no care at all.

#### 4.4.4  Decomposition of the trend in institutional long-term care use
Table 4.4 presents the decomposition of the trend in institutional LTC use.[29] The first rows show that the decrease in the probability to be institutionalized is entirely attributable to the changes in the coefficients

of determinants. In fact, changes in the distribution of determinants contributed *negatively* to the decline in institutional LTC; in other words, in the absence of structural changes, institutional LTC use rates would have *risen* by 0.31 percentage points.

The detailed decomposition reveals that nearly 11 percentage points of the negative contribution of trends in determinants (20.47%) can be attributed to changes in the age composition and 15 percentage points to changes in the disability distribution. The latter finding indicates that if the relationship between disability and institutional LTC had remained as it was in 2000, the trend in disability would have resulted in a 0.22 percentage point higher use of institutional LTC in 2008 (compared with 2000).

Concerning the changes in the association between institutional LTC use and its covariates, it is clear that the changed coefficients of non-disabled and mild disability on institutional LTC use are responsible for the majority of the decrease in institutional LTC use. Interestingly, changes in the coefficients of being more severely disabled (3-10) contributed *negatively* to the observed trend in institutional LTC use. Had the association between institutional care use and a disability score above 3 remained as in 2000, institutional LTC use rates would have been 0.13 percentage points lower in 2008 than actually observed.

### 4.4.5   Decomposition of the changes in long-term care use

Table 4.5 presents the decomposition of changes in LTC use, including homecare use, between 2004 and 2008. The second and third columns show the decomposition of the observed change in homecare use, the last two columns the decomposition of the observed change in institutional LTC use. The point estimates for institutional LTC are virtually identical to those in Table 4.4. However, the observed change (0.69 percentage points) is probably too small to detect any significant contributions.

For homecare, changes in both the determinants and in their coefficient estimates contribute positively to the increased homecare use, but only the latter contribution is significant and explains 91% of the increase. The detailed decomposition does not identify any significant contribution of individual determinants to either of the aggregate contributions. This may be due to the small numbers of homecare users in our samples (87 and 92 in 2004 and 2008, respectively; Table I presents weighted descriptives).

## 4.5 Conclusion and discussion

Recent shifts in LTC use among the Dutch elderly are explained by changes in how the LTC system treats disabled elderly, not by shifts in the prevalence of disability among the elderly. This conclusion derives from a decomposition analysis that splits the change in LTC use into two parts: one part that is explained by changes in the determinants of LTC and another part that is explained by structural changes in the relationship between LTC use and its determinants, such as policy reforms and changed patient preferences. Our findings are as follows.

First, the overall drop in institutional LTC use between 2000 and 2008 is not equal across the disability distribution. The propensity to use institutional LTC has fallen primarily among non-disabled or those with a mild disability, whereas it has even increased for the most severely disabled. This suggests that LTC use is better tailored to needs in 2008 than it was in 2000.

Second, a joint analysis of changes in home care and institutional care use demonstrates that the reduction in institutional LTC was (more than) compensated by a rise in homecare use. This finding is in accordance with the Dutch LTC policy goal of encouraging LTC use in the community rather than in institutions. It also squares with stronger population preferences to remain living at home independently.

Third, observed trends in LTC use are almost entirely explained by changes in their association with determinants. For homecare use, the changed association with determinants explains 91% of the 3.36 percentage point higher use of homecare in 2008 than in 2004. For institutional LTC, the decrease is entirely attributable to changes in the (partial) association between institutional care use and its determinants. In the absence of structural changes in the responsiveness of use to disability, institutional LTC use would have risen – not fallen – between 2000 and 2008. Unfortunately, the method does not allow us to identify which structural changes have contributed most to trends in LTC use. Because the changes in estimated coefficients are in line with the LTC policy objectives (Section 4.2.2) and with the preferences of the elderly to live at home, they are likely to both have played a role. Technological developments, including telemedicine and information and communication technology, and housing adaptations to facilitate living at home with disability may also have played their part (OECD, 2005; Lindberg et al., 2013).

Finally, a more detailed decomposition reveals that elderly with no or mild disability became far less likely to reside in a LTC institution, which accounts for most (67%) of the fall in institutional LTC use.

Without this reduced probability of institutionalization, use rates would have decreased by 0.5 percentage points instead of the observed 1.5 percentage points. The most severely disabled were unaffected: the probability to receive institutional LTC only fell for the less disabled elderly. The fall may either reflect stricter eligibility criteria, that is, a shift of the eligibility threshold for institutional LTC in Figure 4.1 to the right, or a stronger preference for receiving LTC at home. In the latter case, LTC policy reforms have played a role by accommodating this shift in preferences. One other potential explanation why homecare use has risen is related to the so-called woodwork effect that has been shown to have played a role in experiments in the USA that evaluated the cost effectiveness of setting up a homecare program to postpone nursing home entries (Weissert and Frederick, 2013). The woodwork effect refers to a situation where an expansion of the entitlement (e.g., to home care) induces individuals who had already been eligible but not exercised their rights, to sign up for homecare merely because of the increased attention, thereby 'coming out of the woodwork'. A similar phenomenon may have occurred in the Netherlands because the decrease in institutional LTC use is more than offset by the increase in homecare use and homecare use also grew among respondents with low levels of disability, who are less likely to use institutional care. These observations suggest that at least part of the increase is not likely to result from substitution of homecare for institutional care. Further research is required to investigate the causes of the observed changes in LTC use patterns.

Other limitations of our study are as follows. First, as we lack information on LTC expenditures, our conclusions only hold for LTC use. Structural changes affecting the prices and the amount of LTC are therefore not taken into account. In the period 1995-2008, price increases, mainly due to quality improvements and rising salaries, were responsible for a significant part of the growth in LTC expenditures (Dumaij, 2011). From 2000 onwards, greater emphasis was placed on improvements in the quality of care and the living situation of the elderly (Dumaij, 2011). For instance, multi-person nursing home rooms were largely replaced by two-person or private bedrooms. Second, our data do not register domestic help, a common type of homecare use. As these are relatively low cost compared with other LTC services, the types of LTC that we study account for the vast majority of LTC expenditures. Third, our sample may contain too few homecare users to be able to detect significant contributions of changes in single determinants and their effects on the trend in homecare use.

We conclude that the changes in the association between LTC use and its determinants, in particular the responsiveness of use to disability, rather than changes in the determinants are responsible for the

observed changes in LTC use. This finding highlights that forecasts of LTC use based only on trends in determinants are on shaky ground. In our case, such a forecast would have estimated a 0.31 percentage point *increase* in institutional LTC use instead of the actually observed 1.5 percentage point *decrease* between 2000 and 2008. Adequate LTC substitution policy that is capable of moving LTC users from institutions to the community can accommodate the consequences of population aging and may be successful in containing LTC expenditure growth.

Part 2
**How can the government
intervene to achieve its goals?**

Chapter 5
**Demand-side strategies to deal with
moral hazard in public long-term care insurance**

## Abstract

Moral hazard in public LTC insurance may be counteracted by strategies influencing the supply or the demand. Demand-side strategies may include cost sharing and coverage restrictions, which target the consumer, and managed competition, which targets the insurer. We analyse the pros and cons of the various demand-side strategies to counteract moral hazard and to what extent these are implemented in four European countries with public LTC insurance: Germany, Belgium, Switzerland and the Netherlands.

Consumer-oriented strategies to counteract moral hazard in public LTC insurance are used in all four countries but their net impact on efficiency is unclear and crucially depends on their design. In Germany and Switzerland, cost sharing is higher and less related to income than in Belgium and the Netherlands. Higher cost sharing may have a larger impact on moral hazard but the net impact on efficiency is not clear. Furthermore, it may negatively affect access to LTC.

Demand-side strategies targeted at insurers are much less popular: only Belgium and Switzerland have introduced elements of managed competition for some types of LTC. Because only elements of managed competitions have been introduced, it is unclear whether it improves efficiency. Its effect will depend on the feasibility of setting appropriate financial incentives for insurers using risk equalization and the willingness of governments to provide insurers with instruments to manage LTC.

## 5.1 Introduction

Affordable, universal, comprehensive insurance helps to ensure access to LTC. But public and private insurance against LTC expenditures suffer from ex-post moral hazard because consumers do not bear the full cost of the services that they consume and because insurance gives the heirs an incentive to stop providing informal care. Moral hazard makes the resource allocation less efficient: moral hazard may lead to use beyond the point where the marginal benefits equal the marginal costs because moral hazard may cause substitution of more expensive formal LTC for informal care and less expensive LTC and may increase the group of individuals who claim benefits. As a result, LTC expenditures grow fast.

Public LTC expenditures are a matter of concern in many countries because of population ageing and increasing constraints on public budgets. Therefore, controlling the consequences of moral hazard is a major policy issue. The negative consequences of moral hazard may be mitigated by strategies limiting the supply or the demand for LTC. In this article, we focus on the demand-side strategies, which may target either the consumer or the insurer. Consumers may be targeted by cost sharing and coverage restrictions that change their marginal cost of use; insurers may be turned into prudent buyers of care by introducing managed competition. Managed competition is a system in which supply and demand determine the allocation of insurance contracts sold by competing insurers to individuals, subject to government regulation of the benefit package and premium setting (e.g. through compulsory community rating), an open enrolment requirement, and a system of risk equalization (van de Ven and Ellis, 2000).

Managed competition may enhance efficient health care provision by giving insurers financial incentives to act as prudent buyers of health services on behalf of their enrolees. The role of managed competition in health care and its proper scope have been a major topic in health economics. Elements of managed competition have been introduced in public health insurance by a number of countries (Enthoven, 1998; van de Ven and Ellis, 2000; van de Ven and Schut, 1994; van de Ven et al., 2007). So far, however, experience with managed competition in LTC is limited to a few countries in which health care and some LTC services are integrated into a single public insurance scheme. Whether managed competition may, under certain conditions, be an appropriate way to finance some types of – or all – LTC is an unanswered question. The answer depends, among other things, on whether the insurers can be provided with the appropriate instruments and incentives to act as prudent buyers of LTC and on whether a sufficient proportion of consumers will

(be able to) act as critical buyers of LTC benefits offered by insurers
(van de Ven and Schut, 1994).

In practice, several versions of the demand-side strategies have been
implemented in four European countries that finance LTC through
public insurance as opposed to subsidizing LTC from general taxation –
Belgium, Germany, the Netherlands and Switzerland. In Germany and
the Netherlands, LTC is covered through a separate public mandatory
LTC insurance scheme; Belgium and Switzerland have integrated cover-
age for medical LTC services into their system of health insurance while
non-medical LTC is organized by local or regional governments. Medical
LTC is defined as the evaluation of needs, and provision of advice,
direct medical care and support with Activities of Daily Living (ADL)
in Switzerland (Weaver, 2012); in Belgium, a similar definition applies
(Willemé et al., 2012).

The main research question of this article is: do the ways in which the
demand-side strategies are currently implemented in these countries
help to curb the impact of moral hazard on allocative efficiency and
expenditures? And do these strategies have negative side effects on
universal access to basic LTC? The answers to these questions highlight
the consequences of design choices regarding demand-side measures.
These answers generate hypotheses about causal relationships between
demand-side measures and outcomes and suggest how each of these
countries – and other countries with similar policies – may change their
policies. The variation in demand-side measures may have many rea-
sons, including political reasons, compatibility with other government
programs and the relationship between the central or federal and the
local and regional governments. However, the variation in demand-side
measures is not likely to be explained by differences in the technical fea-
sibility of these measures because all four countries have a similar LTC
financing system and because this system to a large extent determines
which measures are technically feasible. Hence, the experience with
the various measures may be transferable across these countries.

## 5.2  Strategies to reduce moral hazard

Policies targeting consumers aim to limit their demand. One of these
policies is independent eligibility assessment. In medical care, eligibility
is usually determined by providers. But to limit the influence of provid-
ers on the type and amount of LTC used, in LTC this task is often entrust-
ed to independent assessment agencies. Eligibility assessment aims to
reduce excessive LTC use resulting from ex-post moral hazard by only
granting the insured access to the LTC services that they need. Eligibility

assessment criteria related to health and disability help to ensure the allocation of formal care according to need; criteria related to the availability of informal care prevent – undesired, and possibly, desired – substitution of formal care for informal care. Thus, independent eligibility assessment limits expenditures and may improve the resource allocation.

In addition to independent eligibility assessment, governments may also curb demand for public LTC through cost sharing, providing benefits in-kind, reimbursement limits, coverage restrictions and means testing. Cost sharing reduces the demand by increasing the price of formal LTC for LTC users, their informal caregivers or both parties. As a result, cost sharing reduces the gap between the total marginal costs and the marginal costs of the consumers and thus limits moral hazard and its negative consequences. A potential drawback of cost sharing is that the consumers' reactions to the price increase resulting from cost sharing are heterogeneous, which will affect the impact of cost sharing on efficiency. If, for example, some consumers who need formal care forego it, this formal care will not be used by the individuals who would benefit most from it. The impact of cost sharing measures depends on their design. In absence of transaction costs, the ideal cost sharing arrangement is tailored to the price sensitivity of each consumer given his income and wealth, the amount of LTC that he uses and the availability of substitutes, among other things. Cost sharing designs that take into account at least some of these differences are therefore more efficient than having a single tariff for everyone. More sophisticated designs that take differences in income and wealth into account are also superior to plain tariffs because they guarantee financial access to LTC for low-income individuals.

Providing benefits in-kind rather than handing out cash benefits may limit moral hazard as they make claiming unnecessary benefits less attractive. When the insurance benefits can for example only be spent on formal care, it will only be attractive to claim these benefits for who need these services; patients for whom the net marginal benefit of receiving formal care is smaller than or equal to zero will not claim benefits, while they may have claimed them anyway when the benefits could have been spent on other things. The net impact of in-kind transfers on efficiency is unclear. While in-kind transfers limit moral hazard because they make it less attractive to claim unnecessary benefits, unrestricted cash benefits may help to improve coordination between formal LTC and informal care and to ensure efficient substitution of formal and informal LTC: they may lower demand for formal LTC as they enable and encourage consumers to search for the most efficient alternative, which may be informal care or formal care provided by a lower-skilled provid-

er. A major underlying assumption is that the consumers are sufficiently informed and capable to take on this task. In-kind transfers are unlikely to have a direct impact on universal access to based LTC.

Reimbursement limits and coverage restrictions limit the amount and the type of benefits that LTC users may claim and therefore may improve the allocation by preventing excessive use. Strict reimbursement limits and coverage restrictions may have a negative impact on universal access to basic LTC: while high-income are able to pay for the basic care that is not covered, low-income may not be able to do this.

A means test limits the group of potential beneficiaries to individuals who meet the income-related or asset-related eligibility criteria. Therefore, a means test may reduce LTC expenditures but does not affect the allocation in other ways; a means test does not prevent inefficient substitution and overuse by eligible individuals. The means-tested benefits need to be set at a low level to prevent strategic behaviour, e.g. through transfers within the family (Cremer and Pestieau, 2014). When the benefits need to be set at a very low level, means testing may impede universal access to basic LTC.

Another demand-side strategy is managed competition. This strategy is different because it targets the insurer, unlike the previous strategies, which target the consumer. Managed competition aims to provide insurers or other third party payers with incentives to act as prudent buyers of care on behalf of their enrolees. Insurers' incentives to counteract moral hazard come from capitation payments that depend on the risk profile of their insured. Because of this capitation payment, insurers may bear the full financial risk – i.e. they retain all of the difference between the capitation payment and any expenditures – or part of it. Other things equal, insurers that bear risk would therefore benefit from limiting moral hazard, improving allocative efficiency and keeping costs down. In addition to improving the allocative efficiency, managed competition may also cause technical efficiency improvements. But only if the market for LTC insurance works well, these efficiency gains result in benefits for consumers (van de Ven et al., 2013).

## 5.3 Current policies targeting the consumer

In this section we discuss how each of the four countries uses demand-side measures targeting consumers to limit the negative consequences of moral hazard.

### 5.3.1 Differences in LTC financing

All four countries that we study have a public LTC insurance system and at least some public insurance coverage for home care and institutional care is mandatory. But the financing and organization of LTC differs in four other aspects between these countries. First, as shown in Table 5.1, the overall share of GDP spent on LTC for the elderly differs substantially, ranging from 1.4% in Germany to 2.5% in Belgium. Part of these expenditures are government expenditures, yet the share of public spending differs, both as a proportion of total LTC expenditures and in nominal terms. Second, these differences in public spending on LTC are associated with differences in public insurance coverage for LTC (table 5.1).

Third, the LTC financing mix differs: in Belgium, Germany, and the Netherlands public insurance accounts for the largest share in LTC financing, whereas Switzerland primarily relies on out-of-pocket payments (Table 5.1). Fourth, the public LTC financing system is set up differently: Germany and the Netherlands have separate public insurance for LTC, while Belgium and Switzerland have an integrated public insurance scheme for both health care and medical LTC.

### 5.3.2 Demand constraints in Belgium and Switzerland

In Belgium and Switzerland, coverage for medical LTC is integrated in the public health insurance scheme (Table 5.1). Non-medical home care services, which are not covered through the integrated public insurance scheme, are financed by local and regional governments. Cantons in Switzerland, for example, provide subsidies for domestic care and furthermore cover part of the LTC costs that are not paid by health insurers, whose contribution is fixed at roughly 55% of the costs of medical LTC.

In Belgium, the organisation and funding of non-medical home care is taken up by the regional governments and there are cash allowances to pay for assistance. A cash allowance is paid out to the disabled who are at least 65 years of age. The amount depends on the recipient's use of care and on their financial situation. In Flanders, a complementary cash allowance is a fixed amount for all disabled, regardless of their age, income or wealth (Willemé, 2010).

Belgium and Switzerland heavily rely on cost sharing as a strategy to counteract moral hazard. About 30 to 40 percent of LTC expenses have to be paid out of pocket (Table 5.1). The percentage of LTC expenditures paid out-of-pocket is the highest in Switzerland, where cost sharing for medical LTC is high and consists of deductibles and co-payments. These co-payments are independent of income but poor individuals are eligible for subsidies. In Belgium, co-payments are income-related and

capped while the additional cash benefits at the national level are means-tested.

In both countries demand is further constrained by excluding LTC services from the benefit package: LTC insurance does not cover room and board costs for nursing home residents (Willemé, 2010; Willemé et al., 2012). Furthermore, benefits are provided in kind. Yet, in Belgium additional cash benefits are available to compensate elderly for additional costs of living in bad health and domestic help is subsidised by government-issued service vouchers (Willemé et al., 2012).

In Belgium, eligibility for medical LTC and the means-tested national-level cash allowances for assistance is assessed by a federal government service doctor according to national-level guidelines that focus on health and disability, whereas eligibility assessment for cash benefits for non-medical LTC occurs at the regional level. Home care providers are required to give priority to low-income patients (Wallonia) and patients not receiving informal care (Flanders) (Willemé, 2010). In Switzerland, eligibility is assessed by providers and is based not only on criteria related to disability and health status, but, for non-medical LTC only, also on criteria related to the availability of informal care. Both Swiss and Belgian insurers have a formal role in the need assessment procedure by conducting audits and thus they can influence the eligibility decisions.

### 5.3.3  Demand constraints in the Netherlands and Germany
The Netherlands and Germany both have separate public LTC insurance schemes and either regional single payers (the Netherlands) or sickness funds and private insurers (Germany) organize LTC and contract LTC providers. Eligibility assessment is based on national guidelines and entrusted to independent agencies, although in the Netherlands providers may do the reassessment in some cases. Consequently, providers and insurers can only indirectly, if at all, influence eligibility decisions. Eligibility is based on criteria related to disability and health status. In the Netherlands, eligibility for non-medical services also depends on the availability of informal care.

In Germany, the amount of LTC benefits depends on the level of disability – individuals who are eligible for LTC insurance benefits are divided in four groups according to their level of disability – and on the care recipient's choice to live at home or to move to a nursing home. That is, the benefit levels are not related to income or actual use. The benefits usually do not suffice to cover the costs of LTC, so the care recipients have to pay the difference. These substantial out-of-pocket payments are believed to cause patients to be cost-conscious and therefore moral hazard is currently not considered a major issue (Rothgang and Igl,

2007). The out-of-pocket payments may be too high for low-income individuals and therefore a separate means-tested program covers part of the out-of-pocket payments for this group. In the Netherlands, co-payments are lower than in Germany and income-related. Furthermore, coverage is more restricted in Germany than in the Netherlands. For in-stance, the costs of board and lodging in LTC institutions are covered by LTC insurance in the Netherlands but not in Germany (Schut and van den Berg, 2010; Rothgang, 2010).

Extensive demand rationing through cost sharing may endanger access to good quality LTC, particularly for low-income groups. Indeed, low-income individuals in Germany have less access to formal LTC than high-income individuals, while in the Netherlands, where out-of-pocket payments are much lower, LTC use is not associated with income (Chapter 3).

In both countries, users can opt for cash benefits rather than in-kind benefits but the cash benefit is lower than the monetary value of in-kind transfers: there is a discount of 25% in the Netherlands and of 50% in Germany (Schut and van den Berg, 2010; Rothgang, 2010). In an experiment in Germany, participants were randomly assigned to either a voucher for formal LTC that enables the recipient to choose freely which care-related services to purchase, or to their previous enti-tlement, consisting of in-kind benefits (i.e. formal LTC of the same mon-etary value that is contracted by the insurer) or a cash benefit equal to 50% of the monetary value of the voucher. Arntz and Thomsen (2011) find that vouchers, compared to cash benefits, improved health out-comes and led to substitution of formal LTC for informal LTC. However, whether this substitution is the result of the higher monetary value of the vouchers or of the difference in rules on what they could be used for is unclear because of the set-up of this part of the experiment. Compared to in-kind benefits, vouchers led to substitution from rela-tively few hours of expensive LTC services to relatively many hours of cheaper LTC services but had similar health outcomes. The difference between the bundle of services that the voucher group chose to buy and the bundle of services that was consumed by the group that continues to receive in-kind benefits shows that the in-kind benefit system induces inefficient substitution of expensive LTC services for cheaper services: the introduction of the vouchers engendered a welfare increase. Ramakers and van den Wijngaart (2005) report similar findings regard-ing substitution for the Netherlands based on a survey among recipients of cash benefits and their informal caregivers; a randomised controlled trial in the UK about the impact of receiving cash benefits or in-kind services on the quality of life of the beneficiaries shows mixed results (Netten et al., 2011).

## 5.4 Current policies targeting the insurer

Managed competition among risk bearing insurance carriers may encourage insurers to promote efficiency while guaranteeing access. But the potential of managed competition depends on the ability to empower the competing insurers and to mitigate potential negative side effects of the financial incentives for efficiency. To act as prudent buyers of LTC, insurers need appropriate incentives: being a prudent buyer of LTC and ensuring an appropriate allocation of LTC should positively affect their financial position. One of the crucial questions is therefore: can risk equalization and the integration of health and LTC insurance provide insurers with appropriate incentives? Three important determinants of the insurers' incentives are i) whether the insurers bear any financial risk and, if so, ii) whether risk adjustment ensures that this financial risk provides appropriate incentives for efficiency; and iii) whether health insurance and LTC insurance are integrated.

### 5.4.1  Financial risk and risk adjustment

Managed competition involving mandatory cross-subsidies between risk groups (*e.g.* through community-rated premiums), financial risk for insurers and competition among insurers may give these insurers strong financial incentives for selection. In public health insurance schemes with managed competition, these incentives for risk selection are typically reduced by a system of risk equalization (van de Ven and Ellis, 2000). An important question, therefore, is whether adequate risk equalization is also feasible for LTC insurance.

As I will explain in more detail in chapter 6, achieving adequate risk equalization for LTC insurance may be more difficult than for health insurance for three reasons. First, LTC expenditures are concentrated in a smaller part of the population. Second, most users have high expenditures and their demand is stable, particularly once someone is institutionalized. Third, demand for formal LTC depends on the availability of informal care, which is usually not routinely measured for the entire population and can therefore not be included in the risk adjustment model, but may be known to insurers. As a consequence of these three differences, it is easier and more profitable for insurers to select profitable subgroups of the population based on prior use of services and basic demographic characteristics in LTC insurance than in health insurance.

Good risk adjusters reduce insurers' incentives for risk selection. The quality of risk adjusters furthermore depends on their appropriateness, fairness and feasibility (van de Ven and Ellis, 2000). A major category of good risk adjusters for future LTC expenses are personal characteristics that are correlated to LTC use (van Barneveld et al., 1997). Finding

good risk adjusters is difficult because data on many of these personal characteristics, e.g. disability and informal care availability, is not collected routinely at the population level. Because of the strong positive correlation between current and past LTC use and because data on past LTC use is often readily available, using information past LTC use for risk adjustment appears attractive. However, including past entitlements in the risk-adjustment formula might lead to reduced incentives for efficiency if not done carefully and may therefore be suboptimal. That is, including these variables eliminates incentives for insurers to select against these subgroups but also dilutes the insurers' incentives for prevention. When the risk adjustment subsidy is positively related to past entitlements, the insurer may not be interested in preventing or reducing excessive use because the insurer will (partly) be reimbursed for these expenditures in the future. On top of this, risk adjusters based on prior use may even generate perverse incentives as risk adjustment may encourage insurers to organize excessive use. For instance, if next year's risk-adjusted payment depends on whether the individual received nursing care for three months and if an enrolee needs nursing care at home for two months, the insurer might encourage the enrolee to use care for another month if the reward in terms of an increased risk-adjusted subsidy exceeds the costs of an additional month of nursing care at home. Despite these drawbacks, introducing past entitlements is superior to payments to the insurer based on actual costs, both from the point of view of efficiency and from the point of view of risk selection (Marchand et al., 2003).

So far, the experience with financial risk and risk equalization in LTC insurance is limited. In the separate public LTC insurance schemes in the Netherlands and Germany, insurers do not compete for customers and are retrospectively compensated from a central fund for providing LTC coverage and therefore they are not at risk. Consequently, they hardly play any role in promoting efficient use or provision of LTC (van de Ven and Ellis, 2000; chapter 6). By contrast, in Belgium and Switzerland LTC is partly covered by health insurance and health insurers compete and bear financial risk. In these countries, health insurers receive risk-adjusted subsidies for their clients. In Belgium the financial risk for insurers is limited to 8% of losses incurred on medical expenses. In Switzerland, insurers bear the full financial risk.

To date, Belgium is the only country having specific LTC-related risk adjusters in its risk equalization scheme: past LTC entitlements, and demographic and (chronic) medical conditions that are associated with LTC use. Hence, Belgium is currently the only country with a risk equalization scheme that compensates health insurers for having enrolees who use LTC. However, it is unclear whether this compensation is ade-

quate and thus counteracts risk selection because insurers bear only limited financial risk and competition among insurers is weak (Paolucci et al, 2007; Schokkaert and van de Voorde, 2011). Whether the current risk adjusters would be sufficient to prevent risk selection if the degree of financial risk and competition are substantial is therefore not sure. Evaluating the Belgian risk adjustment scheme is further complicated because the adequacy of the risk adjustment scheme may depend on the type of LTC services covered. Medical LTC may be better predictable than non-medical LTC personal care because the latter is more contingent on the availability of social support.

Of the six variables in the current Belgian risk-adjustment formula that are clearly related to LTC use, two meet the criteria mentioned above: living alone and being a widow, widower or orphan. Yet, their validity is doubtful because it includes individuals of all ages. The other variables included in the risk adjustment formula are based on past or current entitlements, e.g. having a chronic condition, which is determined using drug prescriptions (Schokkaert and van de Voorde, 2011). To date, there is no evidence that the insurers' behaviour has been affected by the perverse incentives that risk adjustment based on past LTC use may have caused.

In contrast to the extensive risk adjustment scheme in Belgium, the Swiss formula for risk-adjusted subsidies only includes age, gender and last year's inpatient stays, which also include nursing home admissions, and hence picks up only some variation in expected LTC expenditures. Therefore, Swiss health insurers have strong incentives to select against LTC users. Furthermore, because inpatient stays increase next year's capitation payment but home care does not, insurers have incentives to institutionalize their enrolees, even more so if institutionalization may also lower medical expenditures. From the comparison of the sets of risk adjusters and the percentage of the financial risk that insurers bear, we conclude that incentives for Swiss insurers are strong and wrong, whereas incentives for Belgian insurers are much more right but weak.

### 5.4.2  Integration of health and LTC insurance

Expanding managed competition among insurers to include LTC may be done either by integrating LTC into the public health insurance scheme with managed competition or by introducing managed competition in a separate public LTC insurance scheme.

Financing LTC and health care services through separate schemes may result in coordination problems and cost shifting. Substitution of formal LTC for medical care may be desirable if LTC is more efficient than ongoing medical treatment, *e.g.* a prolonged hospital stay. When both medi-

cal care and LTC services are paid for by the same insurer and it has been provided with appropriate financial incentives, it is rewarded for efficient substitution.

But integration is only beneficial if it is compatible with the strategies that have been chosen to improve the efficiency of LTC and health care. That is, if insurers are at risk for both types of care, integration of health and LTC insurance may enhance efficient substitution of LTC and health care. However, if insurers are only at risk for health care expenditures, as is currently the case in Germany and the Netherlands, integration may result in inefficient substitution of LTC for medical care as long as insurers are not at risk for LTC expenses.

## 5.5   Conclusion and discussion

Comprehensive, affordable and universal public LTC insurance ensures that everyone has financial access to LTC. Yet, if demand and supply are unconstrained, public LTC insurance is likely to suffer from moral hazard, which may result in inefficient allocation and excessive expenditures. The negative consequences of moral hazard on allocative efficiency may be limited through demand-side strategies, among other things. These demand-side strategies may target the consumer or the insurer.

In all four countries that we have studied, the negative impact of moral hazard on efficiency is controlled through demand-side measures, yet the importance of each of these measures and their design varies. Although these measures are likely to reduce moral hazard, their net impact on efficiency and universal access may depend on their design. For instance, the experience with cost sharing in these four countries indicates that the net effects of cost sharing on allocative efficiency and access to basic LTC may depend on whether the characteristics of the users, e.g. their income and wealth, are taken into account. Table 5.2 provides a summary of the demand-side measures as they are implemented in each of the countries and the effect that they are expected to have on the efficiency of the system and the access to LTC. These expectations may guide future research into the causal impact of these demand-side measures on the outcomes in terms of efficiency and access to LTC.

Whereas most demand-side strategies to counteract moral hazard traditionally focus on the *consumer,* one strategy to solve the efficiency problems while maintaining universal access to basic LTC is to ensure that *insurers* act as prudent buyer of LTC on behalf of their subscribers through extending managed competition in health insurance to LTC

insurance. This strategy – managed competition – is pursued in Belgium and Switzerland, and the Dutch government aims to integrate home healthcare into the health insurance scheme in 2015.

A crucial precondition for the effectiveness of managed competition in LTC is to provide insurers with appropriate incentives. We argue, however, that the prospects of fulfilling this precondition are unclear. To ensure that the incentives for insurers are appropriate, adequate risk adjustment is essential. However, the specific actuarial features of LTC use may make developing adequate risk adjusters difficult and little is known about the feasibility of adequate risk equalization for LTC.

In case of managed competition, the insurers' incentives for efficiency not only depend on the risk adjustment system but also on whether health insurance and LTC insurance are integrated. Integration is necessary in order to avoid inefficient substitution of care, discontinuity of care, and excessive hospitalisation. But integration only has a positive impact if the insurers have the appropriate incentives. Currently, in all four countries that were surveyed, there is managed competition in health insurance. Hence, in these countries integration means managed competition in LTC insurance too. However, integration in a health insurance scheme with managed competition may come at the cost of increased risk selection if risk adjustment for LTC is not adequate.

Appropriate risk adjusters for LTC use are a necessary precondition for effective managed competition in a public LTC insurance scheme. But such risk adjusters may also be important for managed competition in health insurance if, after risk equalization, LTC users have higher expected costs than non-users. In this case, even in a separate health insurance scheme competing health insurers have an incentive to select against LTC users. This situation seems to be relevant for all countries with such a scheme, since empirical research demonstrates that even in case of the sophisticated Dutch risk equalization scheme health insurers are likely to incur a substantial loss on the medical cost of LTC users. For example, Dutch health insurers are expected to lose 650 euro annually on providing health insurance to a person using home health care (Stam and van de Ven, 2008). When health insurers sell both health insurance and LTC insurance, inadequate risk adjustment for LTC in health insurance may also discourage insurers to contract good quality LTC providers and to adapt to the preferences of LTC users, even when insurers are not at risk for LTC expenditures. Hence, adequate risk adjusters for LTC are not only a crucial precondition for introducing managed competition in public LTC insurance, but may also be important for improving the risk adjustment formula for health insurance.

In addition to the preconditions that ensure appropriate incentives for insurers – financial risk, risk adjustment and integration of LTC and health care –, there are other necessary preconditions for successful managed competition and it is not clear whether these other preconditions can be fulfilled. Managed competition also requires, among other things, that insurers are able to counteract supplier-induced moral hazard (van de Ven et al., 2007). That is, insurers have to be able to prevent that providers supply excessive (or excessively expensive) services because people are covered by public LTC insurance. Hence, insurers need to be able to negotiate prices, volume and quality with providers. But governments may be reluctant to give up price and supply regulation and to provide insurers with sufficient room and instruments to influence the allocation of LTC. Currently, individual insurers negotiate contracts with LTC providers in none of the four countries we studied; volume and prices are largely or fully determined by the government. In Belgium, the government restricts the number of nursing home beds (Willemé, 2010; Willemé et al., 2012) and all the price negotiations between providers and insurers are at the collective level. Individual insurers have no role in setting price and volume. In Switzerland, nursing homes and providers of domestic care are contracted by local authorities. Insurers are obliged to reimburse all contracted providers according to regulated prices (GD, 2011). In the Netherlands, regional single payers contract with regional LTC providers within a regional budget constraint and maximum prices set by the government. Only in Germany, insurers collectively negotiate prices with each provider and have somewhat more room for negotiations than in other countries as there are no supply constraints (Rothgang and Igl, 2007). So at best, insurers can negotiate quality and steer consumers towards well-performing providers. Putting insurers at risk for LTC expenses while giving them strong incentives for risk selection but without providing them with appropriate tools to influence the provision of LTC, as is currently the case in Switzerland, is unlikely to lead to outcomes that are efficient and equitable.

In addition to these concerns about incentives and instruments, there are institutional and cultural preconditions for managed competition, *e.g.* the presence of a sufficient number of well-informed critical consumers who can discipline insurers to contract efficient and good quality LTC (van de Ven et al, 2007). It is not clear whether these other preconditions can be fulfilled. Further research is required to address these uncertainties. Finally, even when managed competition is technically and institutionally and culturally feasible, the broader question is which model is the most appropriate for financing and organising the provision of LTC services. To answer this question, a full comparison of alternative options for publicly funding and purchasing LTC is required.

Chapter 6
Can universal access and competition
in long-term care insurance be combined?

## Abstract

In countries with a public LTC insurance scheme administered by multiple non-competing insurers, these insurers typically lack incentives for purchasing cost-effective LTC because they are not at risk for LTC expenses. Plans to introduce these incentives by allowing competition among risk bearing LTC insurers are likely to jeopardize universal access. Combining universal access and competition among risk bearing LTC-insurers requires an adequate system of risk adjustment. While risk adjustment is now widely adopted in health insurance, LTC-specific features cause uncertainty about the feasibility of risk adjustment for LTC insurance. We examine the feasibility of appropriate risk adjustment in LTC insurance by using a rich set of linked nationwide Dutch administrative data. As expected, prior LTC use and demographic information are found to explain much of the variation in individual LTC expenses. However, we find that prior health care expenditures are also important in reducing predicted losses for subgroups of health care users. Nevertheless, incentives for risk selection against some easily identifiable subgroups persist. Moreover, using prior utilization and expenditure as risk adjusters reduces incentives for efficiency, creating a trade-off between equity and efficiency. To ease this trade-off, data on individuals' underlying needs for LTC are required.

## 6.1  Introduction

Worldwide, health policy makers are confronted with ageing populations and rising demand for LTC[30] and are looking for ways to guarantee access to LTC services in a sustainable way. Barr (2010) argues that there is a strong case for public provision of LTC insurance. Indeed, virtually all OECD countries have at least some publicly provided mandatory coverage against LTC expenditures. Several of these countries have integrated some 'medical' LTC services in their public health insurance schemes, e.g. Belgium, Switzerland and the US Medicare and Medicaid programs. Other countries have a separate public LTC insurance scheme, e.g. the Netherlands (since 1968), Germany (since 1995), Japan (since 2000) and South-Korea (since 2002).

Typically, public LTC insurance is provided by public non-competing insurers who are not at risk for the LTC expenses of their enrollees (Costa-Font and Courbage, 2012). For instance, in the Netherlands LTC insurance is administered by about 30 regional insurers that are fully reimbursed for the LTC expenses of their clients that are covered by the public scheme. As a consequence, these public insurers have no incentives to secure that high-quality LTC services are provided at low cost. To control expenditures in public LTC insurance, governments have traditionally relied on demand rationing (e.g. means testing, copayments and coverage restrictions), and supply rationing (e.g. price regulation, provider budgets, and capacity restrictions) (Costa-Font and Courbage, 2012). Both types of rationing, however, have important drawbacks, which are likely to be exacerbated by the expected increase in demand for LTC. Demand-side rationing may result in access problems for low-income individuals who need LTC; supply-side rationing may result in waiting lists and substandard quality of care.

In several countries, another way to encourage efficient use of LTC has been introduced or proposed: to provide LTC insurers with incentives to contract efficient LTC providers. This could be achieved by putting LTC insurers at risk for providing LTC coverage and allowing them to compete for customers. However, competition among risk-bearing insurers is likely to jeopardize universal access because LTC expenses are typically high and correlated over time (van Barneveld et al., 1997) and consequently actuarially fair premiums will be unaffordable to many people needing LTC.

To combine competition with universal access in social health insurance markets, several countries have introduced a system of managed competition in which insurers cannot reject applicants and are required to charge community-rated premiums to all applicants. To guarantee

30  Definitions of LTC vary internationally. In this paper we focus on elderly care, which in the Netherlands (and elsewhere) accounts for the majority of total LTC expenditure covered by LTC insurance (CVZ, 2011). Elderly care is defined as home care, social assistance, assistance with activities of daily living and inpatient stays in either a residential home or a nursing home. This definition comprises both 'medical' and 'non-medical' LTC: unlike in some other European countries, in the Netherlands there is no sharp distinction between medical and non-medical LTC.

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31 See van de Ven and Schut (2011) for a description of how these subsidies are organized and for a full overview of strategies that are used to ensure affordable access to coverage.

32 Insurers may engage in risk selection by differentiating their benefit packages or, if the benefit package is fixed, the level of service or the quality of the contracted provider network that they offer to each type of patient (Cao and McGuire, 2003). Thus, an insurer may discourage individuals who need or desire a particular service to join its plan by limiting access or by contracting unattractive providers. Risk selection is undesirable because it may lead to welfare losses if i) resources are employed for risk selection rather than for improving care; ii) inefficient health plans that are successful in risk selection survive; and/or iii) good quality LTC is underprovided (van de Ven and Ellis, 2000).

affordable access to coverage, insurers receive risk-adjusted premium subsidies[31] that eliminate or at least reduce incentives to increase profits through risk selection[32]. These subsidies reduce differences in expected costs between individuals and thus make all applicants equally attractive for an insurer (Enthoven, 1988; van de Ven and Ellis, 2000).

Managed competition has been proposed and implemented to ensure equitable access to public LTC insurance (Medicaid) in the US and increase its efficiency (Lucas, 1996). In Switzerland and Belgium, medical LTC is integrated in social health insurance coverage that is offered by risk-bearing competing health insurers, although the financial risk for Belgian insurers is quite limited (OECD, 2011a; Schokkaert and van de Voorde, 2011; Weaver, 2012; Willemé et al., 2012). Recently, the Dutch government launched a similar proposal. According to this proposal, managed competition will be introduced for home care in 2015 and after two years insurers should bear the full risk for covering home health benefits. To this end, coverage for home care is included in the social health insurance benefit package. Managed competition may also be introduced for nursing home care after 2017 (Rijksoverheid, 2013).

An appropriate system of risk-adjusted premium subsidies is crucial to safeguarding universal access in a competitive LTC insurance market. However, whereas risk adjustment in health insurance has been studied extensively, empirical research on risk adjustment in LTC insurance is nearly nonexistent. The aim of this paper is to examine how and to what extent a system of risk adjusted subsidies can reduce the financial incentives for risk selection in LTC insurance within the context of managed competition. To this end, the following five questions are addressed: (1) How do LTC expenditures differ from expenditures on medical care and how do these differences affect the options to use risk adjustment to reduce risk selection? (2) What are the predicted losses and gains on LTC for insurers in case of annual contracts, community rating and no risk adjustment? (3) To what extent are the predicted losses and gains reduced by the most comprehensive risk-adjustment model based on data on: i) demographic characteristics, ii) prior LTC use and iii) prior health care expenditures (HCE) and inpatient hospital diagnoses? (4) What is the contribution of each of these sets of risk adjusters to the reduction of the predicted losses and gains in the most comprehensive risk-adjustment model? (5) How are the predicted losses and gains affected when the risk adjusters that provide substantial perverse incentives to insurers are removed from the risk adjustment model?

## 6.2 What is already known about risk adjustment in long-term care?

The experience with risk adjustment in health insurance cannot be readily used to develop an appropriate risk adjustment system for LTC insurance. LTC expenditures differ from health care expenditures (HCE) in at least two important aspects (van de Ven, 2005). First, LTC expenditures are concentrated among a limited group of beneficiaries, and are, conditional upon use, high and stable over time. Consequently, in the absence of risk adjustment, risk selection based on prior expenditures is much easier in LTC insurance than in health insurance. Second, the availability of informal care is expected to have a much larger impact on LTC expenditures than on HCE. But there is little experience with including informal care availability in risk adjustment and the availability of informal care is difficult to quantify with administrative data. Hence, differences in informal care availability cannot be fully captured by the risk adjustment formula.

Little is known about how these issues can be dealt with and about how to design appropriate risk adjustment for LTC insurance. To date, there is only one study about the feasibility of risk adjustment in Dutch LTC insurance (van Barneveld et al., 1997). With prior LTC expenditure as a risk adjuster and using data from one sickness fund, van Barneveld et al. (1997) examine the remaining potential for risk selection in the Dutch public LTC insurance scheme. They find an $R^2$-statistic of 0.90, which indicates that LTC expenditures are highly predictable at the individual level when information on prior expenditures is available.

Using prior expenditures as a risk adjuster means that the insurer will be partly or fully compensated for higher expenditures through higher future risk-adjusted capitation payments. This compensation may give insurers incentives for overprovision. Hence, compared to the situation of capitation payments that are not based on prior expenditures, insurers face fewer incentives for an efficient provision and allocation of LTC. Marchand et al. (2003) show that despite this drawback, if insurers compete on quality, they receive stronger incentives to be efficient when risk adjustment is based on prior expenditures or prior use than when they are fully reimbursed for all expenditures .

Several studies on risk adjustment in US Medicare and Medicaid have tackled similar issues. While the Medicare benefit package does not include LTC, the target population of Medicare is similar and studies on risk adjustment in Medicare therefore provide a number of relevant insights. First, risk adjustment for Medicare Advantage plans and for the Medicaid Program of All-Inclusive Care for the Elderly (PACE) takes into

account frailty as measured by the number of Activities of Daily Living (ADL) problems; a risk adjustment model without frailty was found to systematically underestimate expenditures for the frail elderly and might therefore induce risk selection against this group (Kautter et al., 2009). Second, the relationship between health care use in the past, demographic characteristics and future health expenditures changes upon institutionalization and it is different for those who became eligible for Medicare by reaching the age of 65 and those who became eligible because they were disabled (Pope et al., 2004). This finding implies that risk adjusters should be interacted with institutionalization and age. Third, incentives for risk selection persist despite extensive risk adjustment: while risk selection on expected costs decreased after expanding the risk adjustment formula beyond age and gender, insurers now select profitable enrollees by focusing on characteristics not included in the model. Consequently, the Medicare program has become more expensive and spending on those in good health increased vis-à-vis spending on those in bad health (Brown et al., 2014).

Outside the US, experience with risk adjustment in LTC insurance is limited to Switzerland and Belgium. In these countries, medical LTC is included in social health insurance. In Switzerland, the risk adjustment formula comprises age, gender and a dummy variable accounting for a recent stay of at least three days in a hospital or a LTC facility (Von Wyl, 2014). This dummy variable is likely to pick up some of the variation in expected LTC expenditures. The Belgian risk adjustment formula includes more LTC-specific risk adjusters. The capitation payment is adjusted for receipt of certain allowances (e.g. for handicapped or because of a need for assistance) or nursing care at home during 3 months (category B or C on the Katz-scale (Katz and Akpom, 1976)). In addition, the risk adjustment formula includes a number of indicators related to LTC use, *e.g.* living alone, being widow/widower, physiotherapy for a severe illness, and Parkinson's disease (Schokkaert and van de Voorde, 2011). While the Belgian risk adjustment formula is more sophisticated than the one used in Switzerland, the financial risk is much more limited for Belgian than for Swiss health insurers (Schokkaert and van de Voorde, 2011; Paolucci et al., 2007). Therefore, risk selection against LTC patients appears to be financially attractive in Switzerland but not in Belgium. It is, however, unclear whether the more sophisticated Belgian model would suffice to prevent risk selection if financial risk for insurers were expanded.

## 6.3 Data and methods

### 6.3.1 Data

We use information from five nationwide administrative registries and one survey which are all linked by Statistics Netherlands at the individual level[33] . The administrative data would be readily available if risk adjustment were implemented and include (1) health care expenditures in 2000-2004 from the health insurance data collected by Vektis; (2) use of LTC in 2004 and 2005, which includes home care, social assistance, assistance with activities of daily living and inpatient stays in either a residential home or a nursing home and which comes from the Central Administration Office of the LTC insurance scheme (CAK); (3) hospital admissions in 2002, 2003 and 2004 from the hospital discharge register (LMR); (4) demographic information for 2004 from the municipal register (GBA) and (5) mortality from the cause-of-death registry (CBS). In addition, the General Survey of Living Conditions (POLS) held in 2004 provides details on health, disability, and other individual characteristics for a randomly drawn, representative sample of the non-institutionalized population. Prior health care expenditures are registered for sickness fund enrollees only (two-thirds of the population)[34] and LTC use is registered for adults only ($\geq 18$ years of age); the other administrative data sets comprise the entire Dutch population.

The sample was further reduced for two reasons. First, the records for one third of those eligible for sickness fund coverage cannot not be linked. Second, 1.7% of the sample was excluded because of item non-response which always was the result of missing co-residence status. As a result, the final sample consists of individuals who were insured through a sickness fund, did not die in 2004 and whose records could be linked to the municipality register. The total study population was 5,719,934 which is 45% of the Dutch adult population in 2004. From this subset of the population, 7790 individuals were included in the 2004 POLS survey; 3619 of these respondents also completed the more specific health module.

### 6.3.2 Methods

A good risk adjustment system should reduce insurers' incentives for risk selection while maintaining their incentives for efficiency. Ideally, after risk adjustment there are no easily identifiable subgroups for which insurers are undercompensated or overcompensated. In addition to an accurate prediction of individual expenditures, good risk adjusters should provide appropriate incentives and should be administratively feasible (van de Ven and Ellis, 2000). Partly following Beck et al. (2010) and Shen and Ellis (2002) among others, we identify the extent to which a risk adjustment model can reduce incentives for risk selection in three

steps. First, we measure the insurers' incentives to select against subgroups[35] based on individual characteristics in case of community-rated annual contracts but in the absence of risk adjustment. To quantify the insurers' incentives for risk selection, we calculate the difference between the average actual expenditures by subgroup and the average expenditures for the entire population in 2005. We consider the incentives for risk selection to be strong when the number of users in the subgroup is substantial ($>300$), the predicted loss for a person in this group – the difference between observed expenditures for this subgroup and average expenditures for the entire population – is large ($>1000$ euro) and significantly ($p<0.05$) different from zero. When these criteria are met, the benefits of risk selection are likely to exceed the costs and therefore the subgroup is included in the risk-adjustment model.

Second, we build the full risk adjustment model in a stepwise manner to examine to what extent each set of individual characteristics contributes to explaining individual variation in LTC use. To this end, we estimate a series of four models. We first test the impact of a basic model based on demographic characteristics on the predicted loss for all subgroups. Next, we add subgroups based on i) prior LTC use, and ii) prior health care expenditures and hospital admissions to this basic model. The full model includes all subgroups that were identified in the first model. For each risk adjustment model, the remaining predicted loss is the difference between the observed expenditures for these subgroups and the expenditures predicted by the risk adjustment model.

Third, for each subgroup that is included in the full model, we assess the impact of including this subgroup in the risk adjustment formula on the insurers' incentives for efficiency – a commonly used selection criterion (see e.g. van Kleef and van Vliet, 2010; van de Ven and Ellis, 2000; Pope et al., 2000). Subgroups that are likely to have a negative impact on the insurers' incentives for efficiency are those for which conditions of eligibility can be easily manipulated by insurers and for which it is highly attractive for them to do so. Manipulation may be financially attractive when the expected benefits exceed the costs, which consist of the required effort and the cost of the additional treatment that the enrollee is required to receive to be eligible for the subgroup. Excluding these subgroups from the full model results in an incentive compatible risk adjustment model. This third step thus sheds light on the tradeoff between creating incentives for efficiency and incentives for risk selection.

All five models described above are estimated by ordinary least squares regression (OLS) in order to facilitate interpretation of the results (van de Ven and Ellis, 2000)[36]. Moreover, currently all Dutch risk adjustment

36 Other commonly used specifications did not provide a strictly better fit than OLS. Results for the other specifications are available from the corresponding author.

37 The remaining 5% consisted of cash transfers, which are not in the dataset.

38 These four categories include domestic care I – cleaning, domestic care II – cleaning and help with organizing the household, personal care and nursing. Information on assistance and support is not available for 2005.

models use OLS, so using OLS increases the comparability and compatibility with these models.

The POLS sample was very small compared to the population of sickness fund enrollees and therefore the subgroups based on detailed information about health status, disability and socio-economic status from the POLS survey are not included in the risk adjustment model. Instead, these subgroups are used as a benchmark to evaluate the impact of the risk adjustment model on incentives for risk selection.

### 6.3.3 Variables

In each of the models, the dependent variable measures public LTC expenditures in 2005. In case the individual dies in 2005, expenditures are annualized by dividing expenditures by the share of the year the individual was alive. The data set provides information on the quantity of LTC that was provided in kind, which was 95% of the publicly financed LTC in the Netherlands in 2006[37] (CVZ, 2011). The quantities provided, i.e. days institutionalized or hours of home care, are multiplied by the maximum prices as set by the government in order to calculate expenditures; co-payments are not taken into account. The data contains information about institutional care use in 2004 and 2005 and about all use of six types of home care in 2004. For 2005, the data contained information about use of only four out of six types of home care[38].

The set of subgroups that make up the basic model are based on three demographic characteristics: age, gender and co-residence, i.e. whether someone lived in a single-person household. Age and gender are the backbone of any risk-adjustment model, while co-residence proxies informal care availability. Informal care availability is an element of the eligibility assessment procedure for homecare (CIZ, 2005) and formal LTC use is known to be correlated with informal LTC use (Bonsang, 2009; van Houtven and Norton, 2004).

The subgroups of LTC users are based on prior LTC *use* rather than *expenditures* because using prior LTC use as a risk adjuster rewards insurers for negotiating lower prices with providers. Subgroups are created for each type of home care and each type of institutional care separately. Each of the subgroups of home care users consists of individuals who used this specific type of home care at least one hour per week on average. In selecting subgroups of institutional care users, we aim at balancing responsiveness to changes in LTC use against incentives for overreporting and oversupply resulting from the (partial) reimbursement of additional expenditures in the future. Therefore, for each of the four types of institutional care, four subgroups are generated consisting of individuals who stayed in an LTC institution for ≥1 day, 91-180 days, 181-365 days,

39  As for LTC, risk adjust-
ment based on health care
use rather than expenditures
would reward insurers for
negotiating lower prices but
data on health care use was
not available, except for the
data needed to construct
Diagnostic Cost Groups.

40  The assigned DCG does
not match with the actual
DCG for some individuals
because of two limitations
of the data set: 1. not all hos-
pitals reported information
on patients to the national
medical registry; 2. infor-
mation on two relevant
'side treatments', dialysis and
artificial respiration at home
was not available at all.
As a consequence, DCG 13
(dialysis) is empty and the
reference category consists
of DCG0, DCG13 and patients
who needed artificial respira-
tion and should therefore be
in DCG12. Furthermore, infor-
mation on radiotherapy and
chemotherapy was not specif-
ic enough to ensure that no
patients who do not belong
in the related DCG are
excluded.

41  Appendix 1 contains
descriptive statistics and
all regression results.

and the entire year (366 days), respectively. These subgroups reflect differences in expected future expenditures between long-term and short-term residents: future expenditures are positively correlated with the number of days that the individual is institutionalized. Furthermore, following van Barneveld et al. (1997), two subgroups are created consisting of patients who received home care and institutional care, respectively, on the last day of 2004, which shows the size of the predictable loss for enrollees who only use a very small amount of LTC in the prior year.

We also include subgroups based on prior HCE. Each of these subgroups measures health care expenditures[39] that are associated with LTC use: expenditures on hospital and outpatient care, prescription drugs, paramedical care, transportation, and durable medical equipment. For each of these categories, three subgroups are constructed that consist of persons who are among the 15% who had the highest expenditures during the last year (omitted for hospital and outpatient expenditures), during each of the last three years, and during each of the last five years. Because the data only includes HCE covered by sickness funds, we also include a variable indicating which persons were not insured through a sickness fund in one of the four years preceding 2004. If someone was no longer registered with a sickness fund during a year, *e.g.* because of losing his/her eligibility status due to exceeding the income threshold, and hence is not in the data set for the entire year, expenditures are annualized.

In addition to the subgroups based on prior HCE, we also create subgroups based on hospital admissions because information on hospitalization and diagnosis information may help to predict LTC use (Wong et al., 2010). Subgroups are based on 94 diagnoses (based on a grouping algorithm of ICD-9 codes, see Polder et al., 2002) and on 48 types of treatments (based on ICD-9-CM volume 3 codes) using hospital admission data from 2002-2004. In addition, we create 12 Diagnostic Cost Groups (DCGs). DCGs are used for risk adjustment in the Dutch health insurance scheme and consist of clinically homogenous inpatient diagnoses for chronic health problems that have similar future HCE (van de Ven and Ellis, 2000). Using the ICD-code of the main diagnosis and the medical specialty that set this diagnosis, each individual is assigned to either the reference group (DCG 0) – people with no hospital admission or an incidental admission (e.g. fractures) – or the highest DCG they are eligible for (Rijksoverheid, 2005; Prinsze and van Vliet, 2007)[40]. We include the DCGs but not the separate subgroups based on diagnoses and treatments in the risk adjustment model because the subgroups based on diagnosis and treatments and the DCGs overlap. Furthermore, the impact of the DCGs on the incentives for efficiency is known to be limited

in the context of health insurance (Lamers, 1998) while including
all subgroups separately will increase incentives for oversupply
and over-reporting.

As the administrative data do not provide detailed information on
personal characteristics, subgroups based on health, disability and
socio-economic characteristics could only be created using the smaller
set of respondents that completed the POLS survey. Although it is much
smaller and persons in nursing homes are not sampled, this survey al-
lows investigating incentives for insurers to use such questionnaires for
risk selection purposes. The same subgroups are used as in de Meijer
et al. (2011), who study determinants of LTC expenditures among the el-
derly, and in Stam and van de Ven (2008), who identify subgroups that
generate losses for health insurers. Of these subgroups, only those are
selected for which the predicted loss deviates significantly from zero
in the absence of risk adjustment. Because the average predicted profit
without risk adjustment for the POLS sample and the subsample answer-
ing the health module are positive, the predictions for these samples
are adjusted by subtracting the mean deviation from zero for the relevant
sample multiplied by the ratio of the individual's observed expenditures
to the sample mean observed expenditures in order to ensure that the
average predicted profit was zero for this subsample.

## 6.4   Results

### 6.4.1   Descriptive statistics
Figure 6.1 and table 6.1 show that the distribution of LTC expenditures
is highly skewed. The median is at 4,598 euro; 2 out of 3 LTC users spend
less than 10,000 euro. Furthermore, there are two spikes, one at 32,000
euro (a full year of care in a residential home) and one at approximately
91,000 euro (a full year of care in a nursing home). The average cost per
LTC user (15,677 euro) is much higher than the average cost per user of
medical care (about 2000 euro in 2004). Furthermore, LTC expenditures
are strongly correlated with prior use of LTC: average LTC expenditures
in 2005 are higher for home care users in 2004 than for non-users and
highest for nursing home residents in 2004 (table 6.1).

### 6.4.2   Analysis
The regression analysis reveals that the included covariates explain
a large share of the variation in aggregate expenditures of LTC use in
2005: the $R^2$-statistics are generally higher than those obtained in similar
studies on medical care and mental health care (see e.g. van de Ven and
Ellis, 2000)[41]. Most of the explanatory power derives from the demo-
graphic variables and prior LTC use. The model that only includes

demographics has an $R^2$ of 0.23. Including prior LTC use increases the $R^2$-statistic to 0.73, while variables related to prior HCE contribute only marginally to the overall goodness of fit, regardless of whether prior LTC use is included. A Copas test (Copas, 1983) did not detect overfitting and therefore we do not need to split the sample in two. Nearly all coefficients are significant in each of the models and show the expected sign. The DCGs sometimes violate the monotonicity requirement: being assigned to a higher DCG with a more severe diagnosis does not in all cases lead to a higher capitation payment. This is undesirable as it generates disincentives for providing more care in cases in which more care might be desirable. The most prominent example is DCG 4, which includes diagnoses related to a cardiovascular accident; myocardial infarct; and angina pectoris among other things, and which has the third largest coefficient. These results highlight that the relationship between prior hospital stays and LTC expenditures is different from the relationship between prior hospital stays and HCE, on the basis of which these DCGs were constructed.

*No risk adjustment model*
In case of annual contracts with community rated premiums but no risk adjustment, the predicted losses would be very large for subgroups based on prior LTC use or based on prior health care expenditures (table 6.2)[42]. These predicted losses, together with the large size of most of these subgroups (last column), signal that incentives for risk selection against these subgroups would be huge. Other results (available upon request) show that some diagnoses are indicators of a persistent loss: for four diagnoses that yield a large predicted loss in the next year, the predicted loss is still larger than 1000 euro two years later and three years later.

*Demographic model*
The results for the Demographic Model, which adjusts subsidies for the age, gender and co-residence status of the enrollee, show that including demographic characteristics in the risk adjustment model does not sufficiently reduce the predicted losses for subgroups based on prior LTC use and prior HCE (table 6.2). Therefore, it seems imperative to include the latter subgroups in the risk adjustment model to reduce incentives for risk selection.

*Prior LTC model*
Including variables on prior LTC use as risk adjusters by definition reduces the predicted losses on these subgroups to zero. But risk adjustment based on prior LTC use not only reduces predicted losses for prior LTC users but also for many subgroups based on prior HCE and for several subgroups of individuals who were hospitalized for diagnoses that were

associated with the highest predicted loss without risk-adjustment (table 6.2). This finding implies that it is no longer attractive for insurers to select against any of these groups of patients.

For some other subgroups based on prior health care use and on HCE, however, including variables on prior LTC use as risk adjusters does not substantially reduce the predicted losses. Therefore, insurers have an incentive to detect and avoid these subgroups, which are not included in the risk adjustment formula and which are expected to generate a loss to the insurer.

*Prior HCE and DCG model*
Subsequently, we examine the effect of adding information on prior health care use and HCE patterns in the risk adjustment formula on the predicted losses. The predicted losses for the subgroups of insured that used LTC in 2004 all remain above the threshold of 1000 euro when DCGs are added to the model, along with variables indicating high expenditures (top 15%) on hospital and outpatient care for the last three and the last five years, and high expenditures on prescription drugs, transport, and durable medical equipment for the last year, the last three and the last five years (table 6.2). But while these variables only have a small impact on the predicted loss for subgroups of LTC users, including HCE is important for reducing the predicted loss for subgroups based on prior hospital admissions for several diagnoses, *e.g.* heart failure, and asthma and COPD. So while for some diagnoses prior LTC use is more important in reducing the predicted loss, for other diagnoses prior HCE and DCGs causes the largest drop in the predicted losses.

*Full model*
When all information is combined in the full risk adjustment model, the predicted losses are substantially reduced for many of the subgroups we distinguished. For example, this full model reduces predicted losses sufficiently for all but seventeen diagnoses and for all but one type of treatment. Yet, including information on prior HCE and the variables on LTC use also leads to predicted profits larger than 1000 euro for three diagnoses: hip fracture, chronic ulcers of skin including decubitus (table 6.2) and other lower extremity fracture (not in table 6.2).

The initial predicted losses also vanish for the subgroups based on self-reported disability, health and socio-economic status when prior LTC use and prior HCE are included in the risk adjustment formula. Although the loss is still larger than 1000 euro for persons who are unable able to perform at least one ADL, it is no longer significantly different from zero (table 6.2).

*Incentive compatible model*

All subgroups based on prior LTC use and listed in table 6.2 are large and generate a large predicted loss in the absence of risk adjustment. Yet, some of these subgroups are expected to give insurers perverse incentives because inclusion of enrollees in these subgroups is financially attractive and can be easily manipulated. For example, the required additional spending for admitting a person for a single day in a nursing home (about 190 euro – see appendix) is much lower than the subsequent increase in the risk-adjusted capitation payment of 11299 euro for the subgroup of people who are admitted to a nursing home for 1-90 days. The appendix shows that when an individual uses LTC during a given year, in the next year the insurer would be compensated for most of the loss if risk adjustment were based on prior LTC utilization.

The trade-off between incentives for efficiency and incentives for risk selection is also relevant for some subgroups based on prior HCE and health care use. For some subgroups, the inclusion criteria are set at low levels because very few individuals use these services, e.g. individuals with high expenditures on transportation or medical equipment. As a result, for these groups the minimum amount of expenditures is lower than the increase in the risk adjustment payment. Therefore, the subgroups based on only high expenditures in the previous year are omitted in the incentive compatible model. For DCGs and subgroups with high HCE in successive years the incentive problem is expected to be limited (van de Ven and Ellis, 2000).

Leaving subgroups that were expected to compromise insurers' incentives for efficiency out of the incentive compatible model has a small effect on the overall predictive power of the model: the incentive compatible model has an $R^2$-statistic of 0.70, compared to 0.73 for the full model. A comparison of the results of the full model and the incentive compatible model at the subgroups level reveals that removing these risk adjusters does not only affect the predicted losses for the subgroups that are no longer included but also the predicted losses for subgroups based on hospital diagnoses and treatments and for the subgroups based on detailed survey information on health and disability. Yet, the impact on the predicted losses for these other subgroups is often fairly limited. Therefore, further reduction of the number of subgroups in the risk adjustment model may be considered.

## 6.5  Conclusion and discussion

In the Netherlands and several other countries, public LTC insurance is offered by non-competing agents that are not at risk for providing

43  An alternative solution to the problems caused by risk selection would be to deny LTC users to switch from one insurer to another, yet this alternative would substantially reduce the insurer's incentives to act as prudent buyers of LTC for this group and would increase their incentives to keep out future LTC users if risk adjustment is inadequate.

44  In addition to the incentives for efficiency and for meeting consumer preferences that managed competition may create for insurers, it may also affect overall efficiency by facilitating innovation through trial-and-error by insurers.

45  Risk adjustment may not only be used to equalize insurer payments and their expected costs but also in the context of capitated and bundled provider payments.

46  Risk adjustment based on multiple years of use may be more useful for home care than for institutional care because of the limited average length of stay at a care facility.

47  In addition, incentives for risk selection may be reduced by including more subgroups, e.g. based on socio-economic status and more specific information on prior use of durable medical equipment that indicates disability (see e.g. van Kleef and van Vliet, 2010) as risk adjusters.

coverage. This situation is suboptimal because it provides these agents with little or no incentive for efficiency and cost containment. In the Netherlands, the government proposed to incentivize insurers to increase efficiency and innovation of LTC provision by putting them at risk for providing LTC coverage and allowing them to compete for customers and thus let them reap the benefits of improvements in quality and reduced expenditures. Introducing financial risk would be easy but might lead to socially undesired outcomes in terms of equity and efficiency.

To maintain universal access in a competitive LTC insurance market, an adequate system of risk-adjusted premium subsidies is imperative. Without adequate risk adjustment insurers face strong incentives to deter subgroups that generate predictable losses, *e.g.* by excluding relevant benefits from the benefit package or by lowering the service level or the quality of the contracted provider network that they offer to these subgroups (Cao and McGuire, 2003). We have investigated the scope for risk selection and the feasibility of a LTC risk adjustment formula that sufficiently reduces insurers' financial incentives for risk selection[43]. The attractiveness of managed competition vis-à-vis alternative ways to organize LTC insurance depends inter alia on the ability to prevent risk selection[44]. Little is known, however about the feasibility of adequate risk adjustment for LTC. Hence, improved knowledge about the extent to which risk adjustment can successfully reduce insurers' incentives for risk selection helps us to better evaluate the feasibility of managed competition in LTC insurance[45].

Our findings demonstrate that a model that is only based on demographic characteristics performs poorly: subgroups that may be identified based on their prior LTC use, prior HCE or other individual characteristics are predicted to generate large losses to the insurer in case of annual contracts with community rated premiums. This means that in this case, insurers will face very strong financial incentives to discourage these subgroups from joining their plan.

Subsequently, we investigated the impact of ii) including individual-level information on prior health care and LTC use and ii) excluding risk adjusters that compromise insurers´ incentives for efficiency. Not surprisingly, prior use of LTC services is the best available predictor of future LTC use and its inclusion substantially reduces incentives for risk selection. The main drawback of this risk adjuster is that it simultaneously reduces incentives for efficiency. This problem may at least partially be overcome by i) including indicators for having used LTC for multiple years because it may be harder for insurers to manipulate use and expenditures for multiple subsequent years than for just one year[46] and ii) by optimizing the DCGs for predicting LTC expenditures[47].

An important finding is that in addition to prior LTC use, prior HCE and inpatient diagnosis and treatment information also prove to be vital: predicted losses persist for certain categories of HCE and for some inpatient diagnoses that occur mostly among the frail elderly even when prior LTC use is taken into account. These diagnoses probably indicate a negative health shock that leads to increased formal LTC use. However, including all available risk adjusters in the model does not fully eliminate the potential for risk selection. While the predicted losses disappear for health, disability and socio-economic characteristics that can be obtained from a survey, risk selection on the basis of some inpatient diagnoses and treatments as well as prior LTC use remains feasible. An insurer can easily identify most of these subgroups, e.g. the subgroup of patients who received short-term institutional LTC, were admitted to a hospital for a hip fracture, dementia-related problems or asthma or COPD, or who had high HCE in 2004 but not in 2003 or 2002. Yet, including these variables in the risk adjustment formula is not an option, as it would give insurers an incentive to overprovide these types of health care.

Ideally, risk adjustment is based on data on individuals' underlying needs for care but such information is rarely included in administrative data and insurers' LTC claims data. As a consequence, in the Netherlands and elsewhere, risk adjustment in LTC will have to rely on prior utilization and expenditure data, which is likely to not only reduce incentives for risk selection but also incentives for efficiency. Most of all, our findings highlight the interrelatedness of elderly care, medical care and social care. This implies that, in order to prevent risk selection, any risk adjustment formula needs to take into account the potential simultaneous or subsequent use of these other types of care. Therefore, our findings also have implications for the reverse relationship: taking into account prior LTC use should also be considered and studied for optimizing risk adjustment in health insurance.

# Chapter 7
## Conclusion and discussion

## 7.1  Main findings

*LTC financing influences use*

The share of elderly is projected to double over the next decades and therefore population ageing will continue to increase LTC expenditures, according to many studies. Because some insurance against LTC expenditures is desirable and because the market fails to provide adequate insurance coverage, the government intervenes and in most countries a substantial amount of LTC expenditures are publicly financed. For this reason, public policy reforms may change the level and the growth rate of LTC expenditures. This thesis explains how policy changes influence LTC use, how policies may keep LTC financing efficient and affordable and what side effects these policies may have.

LTC financing affects how much and which types of LTC individuals use. Differences in LTC financing therefore lead to differences in the relative importance of each of the personal characteristics that are associated with LTC use, i.e. determinants of LTC use. As chapter 2 shows, the most important determinants of LTC use in the Netherlands are disability and informal care availability and, to a lesser extent, illness and general health. This set of determinants closely mirrors the criteria that determine the eligibility for public LTC insurance benefits.

When population ageing causes an increase in the prevalence of disability or one of the other determinants of LTC, then the use of informal and formal LTC use is expected to increase too. Yet, the cross-sectional differences and the differences over time in the prevalence of disability among the elderly and in the supply of informal care are very small at the national level and may therefore only partly explain differences across countries and over time in the prevalence of LTC use. Instead, these differences may be caused by institutional differences.

In the first part of this thesis, I explain how LTC use is associated with the way LTC is financed. The prevalence of the determinants of LTC among the elderly is fairly similar in the Netherlands and Germany, yet in the Netherlands formal care use is much higher, while in Germany informal care use is more frequent (chapter 3). Differences in the eligibility criteria for public LTC insurance benefits and in the generosity of these benefits between the Netherlands and Germany help to explain this. The eligibility criteria for public formal LTC use are stricter in Germany than in the Netherlands and therefore coverage is more comprehensive in the Netherlands. In addition, co-payments are higher in Germany. Both differences make formal care use less accessible and less attractive for large groups of potential users in Germany relative to the same groups in the Netherlands.

In addition to this difference in the overall prevalence of LTC use, there are two other differences in use across subgroups of the population that are related to LTC financing. First, in Germany the use of formal LTC is lower among low-income elderly than high-income elderly after controlling for health and disability, while there is no difference in formal LTC use between income groups in the Netherlands. This difference may be explained by the difference in comprehensiveness of the public insurance coverage and the difference in co-payments, which are on average lower in the Netherlands than in Germany and are income-related in the Netherlands but not in Germany (see above). Second, in the Netherlands, the probability of formal care use is higher for individuals who have a spouse who is disabled and therefore less able to provide informal care, while in Germany the spouse's ability to provide informal care does not influence formal care use. This difference is also related to a difference in eligibility rules: eligibility for some types of formal LTC is conditional on the availability of informal care within the household in the Netherlands but not in Germany.

Within the Netherlands, the use of formal LTC has changed over time (chapter 4). More specifically, two potentially related trends stand out. First, the elderly less often choose to move to a nursing home or residential home than before; second, the prevalence of homecare use has increased. Like the difference in LTC use between the Netherlands and Germany, the changes in formal care use are not explained by changes in its determinants. Instead, the changes in the prevalence of LTC use are associated with changes in the relationship between formal care use and its determinants. These changes in the relationship may in turn be influenced by changes in government policy that increased the supply of home care and encouraged and facilitated the elderly to live at home longer. Together with the main findings from chapters 2 and 3, these results indicate that the way LTC is financed has a major influence on the relationship between individuals' characteristics and their LTC use.

*LTC financing influences incentives for users, insurers and providers of LTC*
As I describe in the first part of this thesis, LTC financing not only affects how and by whom LTC expenditures are paid for but also affects the type and amount of LTC that each individual chooses to use and thus the level of spending. LTC financing affects use and expenditures by altering incentives to users, providers and insurers: there is no incentive-neutral way of LTC financing.

As highlighted in the introduction and in chapter 2, the Netherlands is an outlier in terms of LTC financing and expenditures: Dutch public insurance coverage is very comprehensive and both its public and total

48 As beneficiaries may
apply for cash benefits
rather than service benefits
and because these cash ben-
efits are not included in these
regional budgets, the budget
constraint is not binding:
applicants can opt for a
cash benefit rather than
in-kind services to avoid
waiting lists if these services
cannot be provided because
the budget is depleted (Schut
and Ven den Berg, 2010).

LTC expenditures per capita are the highest of the OECD countries. The Dutch outlier position in LTC financing is further described in chapter 5. In chapter 5, I describe how four countries in which LTC is partly covered by public insurance – Belgium, Germany, the Netherlands and Switzerland – have attempted to limit the negative effects of moral hazard, which is one of the main threats to the efficiency and affordabil-ity of public LTC insurance: through cost sharing, centralized eligibility assessment, managed competition and other demand-side measures.

In comparison with the other three countries, the use of demand-side measures to curb the negative effects of moral hazard is relatively limit-ed in the Netherlands. That is, the level of cost sharing is lower than in the three other countries, the benefit package is more comprehensive and insurers are not incentivized to act as a prudent buyer on behalf of their enrollees. In the Netherlands, expenditure caps at the regional level have traditionally been the preferred strategy to contain LTC ex-penditures. These expenditures caps are set by the government and based on prior regional expenditures[48]. A court decision in 1999 limited the use of these expenditure caps as an instrument to contain costs. In this decision, the court ruled that budgetary considerations were not a valid reason to limit access to LTC services that were covered by public insurance. This court decision heralded a decade in which the Dutch government increasingly struggled to keep LTC expenditures in check (Schut and van den Berg, 2010). This case shows that there may be limits to stringent rationing through budgets in the case of fixed entitlements and public LTC insurance because the enrollee's legal entitlement to care may be upheld.

One way in which the demand-side measures may be expanded is through the introduction of elements of managed competition, i.e. by allowing insurers to compete for customers and to contract care providers for their enrollees. To ensure that these competing insurers are cost conscious, they may be paid through capitation payments that transfer some of the financial risk from the government to the insurers. Yet, these capitation payments make it profitable for insurers to attract customers for whom the expenditures are expected to be lower than the capitation payment and dissuade other potential applicants (risk selection). Therefore, the capitation payment needs to be risk-adjusted: for each subgroup of the population, it needs to be equal to – or at least close to – their expected LTC expenditures.

In chapter 6, I propose a system of risk-adjusted capitation payments based on the available administrative data and show how risk adjust-ment aligns the capitation payment with expected expenditures for most, but not all subgroups. To reduce the incentives for risk selection,

the model heavily relies on prior use. While prior LTC use is a good predictor of future use, risk adjustment based on prior use also reduces the insurers' incentives for efficiency. In health insurance, this undesired side-effect has been reduced by i) carefully selecting diagnoses that cannot be easily manipulated or avoided and ii) using indicators for multiple years of use. The latter may be a solution for types of LTC that are typically used for a longer period but the former may be difficult for LTC use without additional knowledge about the underlying health condition because most patterns of LTC use cannot be linked to a single condition.

The evidence on the determinants of LTC use from chapter 2 and the (limited) experience with risk adjustment for LTC expenditures from abroad suggest that a risk adjustment system may be further improved by including more subgroups based on their health or disability and the informal care that is available to them. The former two may be approximated by information on use of other government programs related to LTC and health care but information on informal care availability is unlikely to be found in administrative data.

## 7.2   Implications for policy and future research

*Policy implications: LTC expenditure growth is at least partly a choice*
When population ageing causes an increase in the prevalence of disability and other determinants of LTC use, LTC expenditures most likely increase too. However, the findings from chapter 3 and 4 suggest that changes in the financing and organization of LTC may change the rate at which aggregate LTC expenditures grow and that these differences contribute more to variation in the prevalence of LTC use among the elderly than differences in observable characteristics of individuals like health and disability. Although the increase in the number of elderly in the population may still be larger than the decrease in the probability of LTC use among the elderly resulting from policy changes and therefore aggregate LTC expenditures will still grow, the rate at which they will grow will be lower. This means that the LTC expenditure growth rate is at least partly a choice.

Governments have a number of policy instruments at their disposal to curb the negative effect of moral hazard and influence LTC expenditure growth. These instruments target either the incentives of suppliers of LTC or the incentives of users and insurers. The effectiveness of supply-side rationing may however be limited when users have a legal entitlement to care. This limitation may have contributed to the recent reforms of LTC financing in the Netherlands. These recent reforms aim to contain costs by i) limiting the legal entitlement to some types of LTC and ii)

49 Under the former public LTC insurance scheme, in some cases the power to assess the eligibility of users had been delegated to care providers, which were audited by the government organization that decides on eligibility for public LTC. Lindeboom et al. (2014) describe that the timing and the frequency of these audits, which are the two of the main dimensions determining how strict the audits are, had little impact on the number of applications. While these findings may suggest that supplier-induced demand may not be a major concern, Lindeboom et al. (2014) point out that the audits may not have affected the suppliers' behavior because noncompliance with the rules for determining eligibility was not punished.

intensifying demand-side measures for the other types of LTC. The legal entitlement to domestic help has been limited since this type of LTC has been transferred from the public LTC insurance scheme to the tax-financed Social Support Act in 2007. Because the Social Support Act is tax-funded, the act is not a legal basis for claims to LTC. Instead, the outcome is defined: the municipalities, who are now responsible for organizing and financing domestic help, ought to enable the disabled to run a household and participate in society. Each municipality has the freedom to further specify (and re-specify) the outcomes that it aims to achieve and to decide which means it uses to help inhabitants with disabilities. This freedom means that municipalities limit the amount of support that they finance when the budget is reduced: municipalities may choose to limit their role to acting as a last resort for applicants who cannot organize domestic help and sufficient informal care themselves and paying only for a minimum amount of support for this small group of applicants.

For other types of LTC, the demand-side measures are intensified and expanded (the latter reform option) to counter moral hazard and to curb expenditures growth. For example, the income-related co-payments were transformed into income- and asset-related co-payments in 2013. More importantly, in 2015 a major reform transferred the financing of medical home care to the Health Insurance Act. This reform affects the potential to keep negative effects of moral hazard in check. It means that care providers rather than an independent central agency will assess an individual's eligibility for home care. Eligibility for LTC has been determined by independent regional authorities since 1997 and was centralized in 2005 (RMO, 2010) in order to reduce the ability of suppliers to influence demand: the need for LTC is less objective than for some forms of medical care and therefore supplier-induced demand has been a major concern[49]. The end of the centralized, independent assessment of eligibility for home care implies that insurers may need to focus on other instruments to keep supplier-induced demand and moral hazard in check.

The transfer of coverage of medical home care to the Health Insurance Act also means that for this type of care the existing demand-side measures will be complemented by managed competition. Managed competition among insurers requires adequate risk adjustment. While the analysis in chapter 6 is about a LTC insurance system that is fully separate from health insurance, most of the insights about the design of risk adjustment for LTC are also applicable to the current Dutch situation. In chapter 6, I conclude that the determinants of LTC expenditures differ from the determinants of health care expenditures, so the risk adjustment formula that is based on limited demographic information and prior

health care use needs to be adjusted and expanded to ensure that insurers do not incur a substantial loss on home care users. The insights from chapter 6 help to enhance our understanding of the size of the subgroups generating a substantial predictable loss, to understand the effect of a risk adjustment model that is similar to the one presented in chapter 6 on these predictable losses, and to understand which additional information may be used to reduce the predictable losses.

Two caveats apply when using the results from chapter 6 in the current Dutch context. First, expenditures on home care are much less predictable than expenditures on institutional care, both for the government and for insurers. One of the reasons for this difference is the lack of routinely collected information about the supply of informal care: because informal care use is strongly related to formal home care use, the supply of informal care has a large impact on the demand for formal care.

Informal care supply is difficult to account for, yet important. Because of this strong relationship between formal and informal care, health insurers will be able to influence informal care use through the formal home care that they pay for and organize. Health insurers face a major challenge as they are responsible for achieving the optimal balance between formal and informal care. The legal obligation to organize adequate care makes them a Stackelberg-type leader when setting the amount and the types of formal care that their enrollees receive: the supply of formal care (and its price) will be observed by potential caregivers, who adjust their supply of informal care (Cremer et al., 2012). On a higher level, another challenge arises: how to set the incentives for health insurers such that they incorporate the full costs and benefits of informal care in their decisions?

Second, the relationship between personal characteristics and home care expenditures may differ from the relationship between these characteristics and institutional care expenditures. For example, in chapter 4, I showed that an increase in the disability level of an individual always increases the probability of institutional care use, while an increase in disability only leads to an increase in the probability of home care use up to a certain point and causes a decrease in this probability after this point. As a result, if a risk adjustment model contains multiple risk adjusters that are correlated with a dimension of disability, this model will either overestimate the expenditures on home care for enrollees with severe disabilities or will underestimate expenditures in lighter cases or both.

The transfer of home care coverage to the Health Insurance Act causes an additional problem. Home care is to some extent a substitute for

50  The direction in which the demand for home care and institutional care changes depends on whether these types of care are substitutes or complements to the domestic care that the municipality organizes.

51  Goncalves and Weaver (2014) summarize the literature on the impact of home care expenditures on spending on other types of LTC and hospitalizations and show that in Switzerland spending on home care has a small effect on hospital stays and GP visits.

the institutional care that is covered through the new Long-term care Insurance Act (Ettner, 1994; Pezzin et al., 1996; McKnight, 2006; Guo et al., 2014). Therefore, in addition to risk selection, health insurers have another, potentially more effective way to reduce their expenditures on home care enrollees, i.e. by facilitating a nursing home admission or by not investing in support that facilitates a prolonged stay at home. Currently, insurers are not rewarded for preventing nursing home admission, while postponing nursing home admissions has been a major policy goal since the 1970s. A good system of risk adjustment does not suffice to solve this problem: from an insurer's perspective, paying for (some) home care will always be more expensive than institutional care that is paid for through another public insurance scheme. Only capitation payments that are based on prior home care use or that reward the insurer in another way for enabling frail elderly to continue to live at home may effectively counteract insurers' incentive to substitute institutional care for home care. Of course, the incentives for municipalities are affected in the same way: municipalities may shift LTC expenditures to other payers by reducing expenditures on domestic care and thereby changing the demand for home care and institutional care[50].

*Is the Dutch outlier position justified and sustainable? An agenda
for future research on LTC financing*
The main findings and the policy implications that I presented in this chapter raise a set of new questions about the appropriate design of LTC financing and about its impact on access, on the allocation of resources and on the outcomes for LTC users and their informal caregivers.

The Netherlands spends much more on LTC than virtually all other OECD countries and most of these expenditures are public; is this outlier position justified? That is, do these additional expenditures also yield additional benefits, e.g. in terms of an increase in life expectancy or in the health and well-being of the care recipient and in terms of reduced negative externalities on the health and labor market status of spouses, children and other potential informal caregivers? And what is the negative impact of public expenditure cuts? Do they have the exact opposite impact as budget expansions? And how successful are efforts to limit any negative effects of budget cuts, e.g. by facilitating the use of illiquid assets to finance private expenditures or by better targeting the insurance benefits?

To answer the question whether the Dutch outlier position is justified, future research may look at the design and the impact of LTC financing reforms. One prominent set of recent policy reforms, which has not been evaluated so far, are 'ageing in place' policies that encourage and facilitate the elderly to continue to live at home. Like the introduction

of managed competition and the financing of domestic help through the Social Support Act, ageing in place policies may have an impact on the health and well-being of the users of these types of care and on LTC expenditures. However, these reforms may also have knock-on effects: demand for other types of care and services may change as well. If, for example, elderly who continue to live at home but who would have been admitted to a nursing home a few years ago are more often admitted to the hospital for emergency treatment, the additional health care expenditures resulting from the hospitalizations may offset at least some of the gains resulting from the ageing in place policies.

Another issue requiring further attention is whether health insurers, who finance home care, and municipalities, who finance domestic help, are able to shift the costs of LTC to other parties. Recent research by de Groot and Allers (2014) suggests that much of the variation in the use of domestic help at the local level cannot be explained by observable demographic characteristics. However, it is not clear whether these and similar differences at the local and regional level have persisted for years or whether some of them have been caused by stricter budgets for domestic help. If empirical evidence indeed shows that low LTC spending by insurers and municipalities causes higher expenditures on other types of care that are paid for by another party[51], an important follow-up question has to be addressed: how to reset the incentives for these agents such that their interests become better aligned with the interests of society, e.g. through improved risk adjustment for home care?

The answers to these questions will reveal whether high public LTC expenditures are justifiable and how LTC financing may be improved. The answers will not only be relevant for the Dutch situation but are also highly informative for other countries which are struggling with similar challenges and are considering similar solutions.

**Tables & Figures**

**Table 1.1    Summary of the differences between curative care and LTC**

|  | Curative care | LTC |
|---|---|---|
| **Type of condition** | Acute illness | Chronic illness or disability |
| **Aim of care** | Recovery | Making the condition more bearable |
| **Type of service** | Health care | Health care and social services |
| **Period** | Temporary, until recovery | Ongoing, until death |
| **Location** | Institution-based or ambulatory | Institution-based, ambulatory or in the community/at home |

# Table 2.1  Descriptive statistics

| | Full sample | No LTC | Informal care | Formal care |
|---|---|---|---|---|
| Number of observations | 1 846 | 1 379 | 114 | 353 |
| 2004 | 998 | 743 | 64 | 191 |
| **Dependent variable** | | | | |
| % No care consumed | 0.75 | 100 | 0 | 0 |
| % Only informal care consumed | 0.06 | 0 | 100 | 0 |
| % Formal care (+ informal care) | 0.19 | 0 | 0 | 100 |
| **Explanatory variables** | | | | |
| *Predisposing characteristics* | | | | |
| Age | 73.53 (6.53) | 72.07 (5.55)† | 73.75 (6.65) | 79.17 (6.94)† |
| % Male | 47.51 | 52.72† | 45.61 | 27.76† |
| % Living alone | 32.50 | 22.04† | 47.37† | 68.55† |
| *Enabling characteristics* | | | | |
| Assets (10000 euro) | 22.96 (56.12) | 26.35 (63.30)* | 18.04 (27.52) | 11.35 (19.69)† |
| Income in 2004 (10000 euro) | 3.64 (2.78) | 3.77 (2.85) | 3.54 (2.41) | 3.17 (2.59)† |
| Income in 2006 (10000 euro) | 3.55 (7.51) | 3.50 (4.8) | 3.06 (2.10) | 3.88 (14.33) |
| % Having at least one child | 90.63 | 92.10* | 92.98 | 84.14† |
| Spouse's age[b] | 70.89 (6.96) | 70.18 (6.68)† | 72.63 (7.13) | 76.86 (6.47)† |
| Spouse's disability[b] | 0.58 (1.07) | 0.50 (0.93)† | 0.88 (0.55) | 1.19 (1.55)† |
| % Spouse has 1-2 chronic conditions[b] | 53.45 | 53.67 | 55.00 | 50.45 |
| % Spouse has ≥ 3 chronic conditions[b] | 20.22 | 18.88 | 16.67 | 35.14† |
| % Spouse has been hospitalized[b] | 12.28 | 11.63 | 13.33 | 18.02 |
| Spouse's cognitive ability[b] | 6.68 (1.42) | 6.75 (1.35) | 6.46 (1.56) | 6.13 (1.82)† |
| *Need-related characteristics* | | | | |
| Disability[a] | 0.78 (1.36) | 0.37 (0.69)† | 1.47 (1.58)† | 2.16 (2.09)† |
| % having a mental health problem | 13.33 | 9.86† | 21.05* | 24.36† |
| % having 1-2 chronic conditions | 40.14 | 44.02† | 33.33 | 27.20† |
| % having ≥ 3 chronic conditions | 35.37 | 26.76† | 56.14† | 62.32† |
| % Self-perceived health: fair | 53.36 | 53.73 | 52.63 | 52.12 |
| % Self-perceived health: bad | 22.64 | 17.62† | 36.84† | 37.68† |
| % Hospitalization | 20.69 | 14.58† | 39.47† | 38.53† |
| Cognitive ability[a] | 6.49 (1.48) | 6.70 (1.33)† | 6.24 (1.52) | 5.76 (1.78)† |

* p < 0.05 and † p < 0.01 [a] rescaled on a 0-10 scale, a score of 0 indicates no disability. [b] Conditional on having a spouse, coded zero (dummy variables) or the average value (continuous variables) if the respondent has no spouse, coded missing if respondent mentioned having a spouse but the spouse was not interviewed. Standard deviations for continuous variables in parentheses.

**Table 2.2  Descriptive statistics for the study sample for the transition model**

| | Full transition sample | No transition | Transition |
|---|---|---|---|
| Number of observations | 453 | 399 | 54 |
| **Dependent variable** | | | |
| % Transition | 11.92 | 0 | 100 |
| **Explanatory variables** | | | |
| *Predisposing characteristics* | | | |
| Age | 71.93 (5.64) | 71.29 (5.19)* | 76.61 (5.20)† |
| % Male | 51.43 | 52.38 | 44.44 |
| % Living alone | 27.59 | 23.81 | 55.56† |
| % No longer living together/widowed | 3.53 | 23.81† | 11.11 |
| *Enabling characteristics* | | | |
| Assets (10000 euro) | 256741 (658894) | 270011 (697350) | 158691 (198884)† |
| Income (10000 euro) | 37236 (29877) | 37181 (27664) | 37639 (43196) |
| % Having at least one child | 92.94 | 93.48 | 88.89 |
| Spouse's disability[b] | 0.48 (0.82) | 0.45 (0.75) | 0.85 (1.36) |
| % Received informal care in 2004 | 8.39 | 6.52 | 22.22* |
| *Need-related characteristics* | | | |
| Disability[a] | 0.42 (0.67) | 0.38 (0.63) | 0.76 (0.85)† |
| Δ Disability | 0.17 (1.04) | 0.09 (0.90) | 0.72 (1.66)* |
| % having a mental health problem | 17.22 | 16.04 | 25.93 |
| % Worse mental health | 10.60 | 9.27 | 20.37 |
| % having ≥1 chronic conditions | 73.29 | 71.68 | 85.19 |
| Δ Chronic conditions | 0.04 (1.26) | 0.05 (1.27) | -0.09 (1.20) |
| % Self-perceived health: fair or bad | 64.90 | 64.16 | 70.37 |
| % Better self-perceived health | 17.22 | 17.79 | 12.96 |
| % Worse self-perceived health | 34.88 | 33.58 | 44.44 |
| % Hospitalization | 9.27 | 8.27 | 16.67 |
| % Hospitalization in 2006 | 14.57 | 12.28 | 31.48† |
| Cognitive ability[a] | 6.70 (1.24) | 6.72 (1.26) | 6.56 (1.08) |
| Δ Cognitive ability | 0.03 (1.35) | 0.04 (1.37) | -0.02 (1.23) |

* $p < 0.05$ and † $p < 0.01$, respectively.
[a] rescaled on a 0-10 scale; a score of 0 indicates no disability and no cognitive ability, respectively.
[b] Conditional on having a spouse, coded zero (dummy variables) if the respondent has no spouse, coded missing if respondent mentioned having a spouse but the spouse was not interviewed.
Standard deviations for continuous variables in parentheses.

## Table 2.3  Utilization model: coefficients and average partial effects

| | Informal care coefficient | Standard error | Average partial effect | Formal care coefficient | Standard error | Average partial effect |
|---|---|---|---|---|---|---|
| *Predisposing characteristics* | | | | | | |
| Age | -0.005 | 0.023 | -0.002 | 0.123† | 0.016 | 0.010 |
| Male | 0.143 | 0.244 | 0.022 | -0.761† | 0.211 | -0.052 |
| Alone | 1.875† | 0.444 | 0.056 | 2.684† | 0.448 | 0.218 |
| *Enabling characteristics* | | | | | | |
| Assets | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Income quartile 1 | -0.317 | 0.347 | -0.019 | 0.217 | 0.388 | 0.022 |
| Income quartile 2 | -0.153 | 0.365 | -0.007 | -0.045 | 0.396 | -0.009 |
| Income quartile 3 | 0.052 | 0.397 | -0.003 | 0.331 | 0.405 | 0.018 |
| Child | 0.665 | 0.397 | 0.031 | -0.155 | 0.262 | -0.024 |
| Spouse's age | 0.050 | 0.029 | 0.002 | 0.030 | 0.025 | 0.002 |
| Spouse's disability | 0.263* | 0.123 | 0.008 | 0.320† | 0.090 | 0.023 |
| Spouse has been hospitalized | 0.176 | 0.422 | -0.001 | 0.499 | 0.374 | 0.019 |
| Spouse has 1-2 chronic diseases | -0.199 | 0.339 | -0.018 | 0.296 | 0.378 | 0.024 |
| Spouse has ≥3 chronic diseases | -0.739 | 0.452 | -0.042 | 0.474 | 0.431 | 0.042 |
| Spouse's cognitive ability | -0.087 | 0.101 | -0.001 | -0.149 | 0.095 | -0.007 |
| *Need-related characteristics* | | | | | | |
| Disability | 0.766† | 0.104 | 0.024 | 0.966† | 0.106 | 0.065 |
| Hospitalization | 0.567* | 0.278 | 0.011 | 1.109† | 0.219 | 0.087 |
| Health status: fair | 0.371 | 0.357 | 0.013 | 0.154 | 0.272 | 0.013 |
| Health status: bad | 0.644 | 0.377 | 0.017 | 0.744* | 0.298 | 0.066 |
| 1-2 chronic diseases | 0.453 | 0.331 | 0.014 | 0.365 | 0.282 | 0.025 |
| ≥3 chronic diseases | 0.614 | 0.395 | 0.023 | 0.470 | 0.323 | 0.028 |
| Depression | 0.459 | 0.244 | 0.024 | 0.183 | 0.186 | 0.008 |
| Cognitive ability | 0.030 | 0.072 | 0.000 | 0.083 | 0.067 | 0.008 |
| Intercept | -7.968† | 2.094 | | -15.349† | 2.180 | |
| ± Standard deviation | 1.112† | 0.321 | | 2.095† | 0.388 | |
| Covariance | 0.937 | | | | | |
| Number of observations | 1846 | | | | | |

* $p < 0.05$, † $p < 0.01$

# Table 2.4 Transition model: coefficients and partial effects

| | Coefficient | Standard error | Average partial effect |
|---|---|---|---|
| *Predisposing characteristics* | | | |
| Age | 0.144† | 0.037 | 0.010 |
| Male | 0.237 | 0.405 | -0.017 |
| Living alone | 1.884† | 0.538 | 0.152 |
| No longer living together/widowed | 2.913† | 0.731 | 0.333 |
| *Enabling characteristics* | | | |
| Assets | 0.000 | 0.000 | 0.000 |
| Income below median | -0.279 | 0.551 | -0.020 |
| Having at least one child | -0.238 | 0.761 | -0.017 |
| Received informal care in 2004 | 0.762 | 0.510 | 0.062 |
| Spouse's disability[a] | 0.091 | 0.359 | 0.006 |
| *Need-related characteristics* | | | |
| Disability[b] | 0.332 | 0.332 | 0.023 |
| Δ Disability | 0.623† | 0.196 | 0.044 |
| Having a mental health problem | 0.410 | 0.491 | 0.031 |
| Worse mental health | 0.384 | 0.492 | 0.029 |
| Having ≥1 chronic condition | -0.202 | 0.727 | -0.015 |
| Δ Chronic conditions | -0.001 | 0.127 | 0.000 |
| Self-perceived health: fair or bad | 0.001 | 0.579 | 0.000 |
| Worse self-perceived health | 1.161† | 0.434 | 0.081 |
| Better self-perceived health | 0.875 | 0.579 | 0.057 |
| Hospitalization | 0.409 | 0.556 | 0.031 |
| Hospitalization in 2006 | 1.397† | 0.449 | 0.121 |
| Cognitive ability[b] | 0.062 | 0.158 | 0.004 |
| Δ Cognitive ability | 0.218 | 0.165 | 0.015 |
| Intercept | -16.865† | 3.226 | |
| Number of observations | 453 | | |

* p<0.05, † p<0.01
[a] Conditional on having a spouse, coded the average value if the respondent has no spouse, coded missing if respondent mentioned having a spouse but the spouse was not interviewed. [b] rescaled on a 0-10 scale, a score of 0 indicates no disability and no cognitive ability, respectively.

**Table 3.1    Sample selection and attrition: descriptive statistics**

| | The Netherlands | Germany |
|---|---|---|
| Individual response rate 2004* | 87.8% | 86.2% |
| 2004 sample | 2979 | 3008 |
| Interviewed twice/balanced panel | 1778 | 1544 |
| Refreshment sample | 884 | 1024 |
| 2006 sample | 2662 | 2568 |
| Total number of observations | 5641 | 5576 |
| Sample with full information (% of total # of obs) | 4349 (77%) | 4390 (79%) |

* See www.share-project.org

**Table 3.2    Descriptive statistics**

| | The Netherlands mean | Germany mean | Difference |
|---|---|---|---|
| Number of observations | 4349 | 4390 | |
| 2004 | 2357 | 2361 | |
| *Dependent variable* | | | |
| % No care use | 84.92 | 84.61 | 0.31 |
| % Only informal care | 4.85 | 11.57 | -6.72‡ |
| % Formal care (+ informal care) | 10.23 | 3.64 | 6.59‡ |
| *Explanatory variables* | | | |
| Age | 63.76 | 64.24 | -0.47† |
| % Female | 45.94 | 44.87 | 1.07 |
| % Living alone | 23.27 | 24.19 | -0.92 |
| Assets | 316530.30 | 232611.40 | 83918.90‡ |
| Income in 2004 + | 46614.30 | 47152.48 | -538.18 |
| Income in 2006 + | 40595.97 | 31922.67 | 8673.30‡ |
| % Having at least one child | 89.38 | 86.79 | 2.59‡ |
| Disability# | 0.55 | 0.68 | -0.14‡ |
| % having a mental health problem | 18.65 | 18.54 | 0.11 |
| % having 1-2 chronic conditions | 50.40 | 50.48 | -0.08 |
| % having ≥3 chronic conditions | 15.93 | 20.77 | -4.84‡ |
| % Self-assessed health: fair | 43.14 | 41.16 | 1.97* |
| % Self-assessed health: bad | 27.36 | 37.02 | -9.65‡ |
| % Hospitalization | 9.73 | 16.15 | -6.42‡ |
| Cognitive ability# | 6.94 | 6.99 | -0.05* |
| Spouse age^ | 62.33 | 62.94 | -0.61‡ |
| Spouse disability^ | 0.42 | 0.54 | -0.11‡ |
| % Spouse has 1-2 chronic conditions^ | 50.31 | 50.69 | -0.38 |
| % Spouse has ≥3 chronic conditions^ | 13.87 | 18.69 | -4.82‡ |
| % Spouse hospitalization^ | 8.96 | 14.90 | -5.94‡ |
| % Spouse cognitive ability^ | 7.06 | 7.13 | -0.07† |

* $p<0.05$; † $p<0.01$; ‡ $p<0.001$; # rescaled on a 0-10 scale, a score of 0 indicates no disability/no cognitive ability; ^ Conditional on having a spouse, coded zero if the respondent has no spouse; + Income in 2004 is gross income, Income in 2006 is net income

# Table 3.3 Results for multinomial probit regression[1]

| | Informal care only | | | | | Formal care (+ informal care) | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | The Netherlands Coefficients | Average partial effect (APE) | Germany Coefficients | APE | Difference APE | The Netherlands Coefficients | APE | Germany Coefficients | APE | Difference APE |
| Age | 0.012* | 0.000 | 0.033‡ | 0.003‡ | -0.003‡ | 0.069‡ | 0.005‡ | 0.052‡ | 0.002‡ | 0.003‡ |
| Gender | 0.035 | 0.014* | -0.049 | -0.001 | 0.015 | -0.616‡ | -0.045‡ | -0.284* | -0.010* | -0.035‡ |
| Alone | 0.974‡ | 0.050‡ | 0.611‡ | 0.057‡ | -0.008 | 1.344‡ | 0.097‡ | 1.116‡ | 0.041‡ | 0.056† |
| Assets | 0.000* | 0.000† | 0.000 | 0.000 | 0.000† | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Income quartile 1 | -0.231 | -0.014 | -0.037 | 0.014 | -0.029* | -0.023 | 0.003 | -1.029‡ | -0.042‡ | -0.044‡ |
| Income quartile 2 | -0.132 | -0.007 | 0.007 | 0.009 | -0.017 | -0.062 | -0.002 | -0.556† | -0.020‡ | 0.018 |
| Income quartile 3 | -0.205 | -0.013 | -0.043 | -0.004 | -0.009 | 0.007 | 0.004 | -0.055 | -0.001 | 0.005 |
| Child | -0.063 | 0.002 | -0.012 | 0.004 | -0.002 | -0.310* | -0.023† | -0.281‡ | -0.012 | -0.011 |
| Disability | 0.479‡ | 0.019‡ | 0.358‡ | 0.033‡ | -0.014‡ | 0.666‡ | 0.040‡ | 0.483‡ | 0.013‡ | 0.027‡ |
| Hospitalization | 0.495‡ | 0.018 | 0.469‡ | 0.047‡ | -0.029† | 0.892‡ | 0.068‡ | 0.678‡ | 0.022‡ | 0.046‡ |
| Health status: fair | 0.120 | 0.007 | 0.575‡ | 0.049† | -0.042† | 0.060 | 0.002 | 0.907† | 0.028 | -0.026 |
| Health status: bad | 0.360† | 0.016 | 0.773‡ | 0.081‡ | -0.065‡ | 0.496‡ | 0.031‡ | 0.817‡ | 0.022 | 0.010 |
| 1-2 chronic diseases | 0.253* | 0.012 | 0.313† | 0.039‡ | -0.027* | 0.254* | 0.014 | -0.222 | -0.014† | 0.028‡ |
| ≥3 chronic diseases | 0.535‡ | 0.031† | 0.342† | 0.046† | -0.015 | 0.467‡ | 0.026* | -0.255 | -0.015† | 0.042‡ |
| Depression | 0.356‡ | 0.022‡ | 0.459‡ | 0.050‡ | -0.028* | 0.175 | 0.006 | 0.456‡ | 0.011* | -0.005 |
| Cognitive ability | -0.028 | -0.002 | 0.021 | 0.003 | -0.005 | -0.003 | 0.000 | -0.025 | -0.001 | 0.002 |
| Spouse age | 0.003 | 0.000 | -0.002 | 0.000 | 0.000 | -0.010 | -0.001 | -0.020 | -0.001 | 0.000 |
| Spouse disability | 0.146‡ | 0.005 | 0.048 | 0.005 | 0.000 | 0.252‡ | 0.016‡ | 0.031 | 0.000 | 0.015‡ |
| Spouse hospitalization | 0.170 | 0.008 | -0.028 | -0.001 | 0.008 | 0.210 | 0.013 | -0.151 | -0.005 | 0.018 |
| Spouse 1-2 chronic diseases | 0.098 | 0.004 | 0.075 | 0.010 | -0.006 | 0.124 | 0.007 | -0.102 | -0.005 | 0.013 |
| Spouse ≥3 chronic diseases | -0.209 | -0.015 | -0.069 | -0.009 | -0.006 | 0.185 | 0.018 | 0.093 | 0.005 | 0.013 |
| Spouse cognitive ability | 0.012 | 0.001 | -0.003 | 0.002 | -0.001 | -0.026 | -0.002 | -0.136‡ | -0.005† | 0.003 |
| Intercept | -4.071‡ | | -5.383‡ | | | -6.979‡ | | -4.475‡ | | |

**Table 3.4  Decomposition results (Use Netherlands – Use Germany) share of total difference explained by covariates and coefficients**

| | Informal care Covariates | Coefficients | Formal care Covariates | Coefficients |
|---|---|---|---|---|
| Age | 0.3* | 466.5† | -4.7‡ | 190.4 |
| *Gender* | 0.0 | 1.5 | -0.9‡ | 3.0 |
| Male | 0.0 | -6.6 | -0.5‡ | -13.3 |
| Female | 0.0 | 8.0 | -0.5‡ | 16.3 |
| *Marital status* | 0.4‡ | 32.4* | -1.8‡ | -10.5 |
| Alone | 0.2‡ | -15.2* | -0.9‡ | 4.9 |
| Together | 0.2‡ | 47.6* | -0.9‡ | -15.4 |
| Assets | 0.8† | 24.3† | -0.7 | 3.5 |
| *Income* | 0.0 | 3.3 | 0.0 | 18.3‡ |
| Income quartile 1 | -0.1 | 8.7 | 0.0 | 39.5‡ |
| Income quartile 2 | 0.0 | 1.3 | -0.1 | 4.4 |
| Income quartile 3 | 0.1 | 2.4 | 0.1 | -10.8* |
| Income quartile 4 | 0.1 | -9.2 | 0.0 | -14.9† |
| *Children* | 0.1 | 6.4 | -1.2* | -1.9 |
| Child | 0.0 | 7.6 | -0.6* | -2.2 |
| No child | 0.0 | -1.2 | -0.6* | 0.3 |
| Disability | 2.9‡ | -28.7* | -13.3‡ | 22.4† |
| *Hospital* | 1.4‡ | 3.0 | -8.2‡ | -12.9 |
| Hospitalization | 0.7‡ | -0.7 | -4.1‡ | 3.1 |
| No hospitalization | 0.7‡ | 3.7 | -4.1‡ | -16.0 |
| *Health status* | 1.4† | 17.6* | -6.7‡ | -13.9† |
| Health status: fair | 0.0 | 23.7 | -0.4* | -33.6‡ |
| Health status: bad | 0.8† | 15.8 | -4.3‡ | 4.5 |
| Health status: good | 0.5 | -21.9* | -2.0* | 15.1* |
| *Chronic diseases* | 1.1‡ | 12.0 | -3.3‡ | -1.6 |
| 1-2 chronic diseases | 0.0 | 18.3 | 0.0 | 6.9 |
| ≥ 3 chronic diseases | 0.6‡ | -10.7 | -1.6‡ | 11.9† |
| No chronic diseases | 0.6‡ | 4.4 | -1.7† | -20.5† |
| *Depression* | 0.0‡ | -11.2 | 0.0 | 15.8 |
| Depression | 0.0‡ | 3.3 | 0.0 | -4.6 |
| No depression | 0.0‡ | -14.5 | 0.0 | 20.4 |
| Cognitive ability | -0.1 | 119.7 | 0.0 | 27.6 |
| Spouse disability | 0.8† | -18.8 | -4.4‡ | 21.7† |
| *Other spouse characteristics* | 0.1 | -133.9 | -1.0 | 225.7 |
| Spouse age | 0.1 | -114.5 | 1.0 | 112.5 |
| Spouse hospitalization | 0.2 | -3.9 | -0.7 | 3.6 |
| Spouse no hospitalization | 0.2 | 30.4 | -0.7 | -28.5 |
| Spouse 1-2 chronic diseases | 0.0 | -8.4 | 0.0 | 8.2 |
| Spouse ≥ 3 chronic diseases | -0.3 | 5.0 | -0.4 | -0.4 |
| Spouse no chronic diseases | -0.1 | -6.4 | -0.5 | -9.0 |
| Spouse cognitive ability | 0.0 | -36.2 | 0.3 | 139.2 |
| Intercept | | -403.3 | | -341.3 |
| Sum over column (without intercept) | 9.2 | 90.8 | -46.2 | 146.2 |
| Sum of all contributions | 100.0 | | 100.0 | |
| Difference in P(use) | -6.7 | | 6.7 | |

*p<0.05; †p<0.01; ‡p<0.001
Variables in italic represent the aggregate contributions for categorical variables and groups of variables.

**Figure 4.1    Sources of change in LTC use rates (hypothetical illustration)**
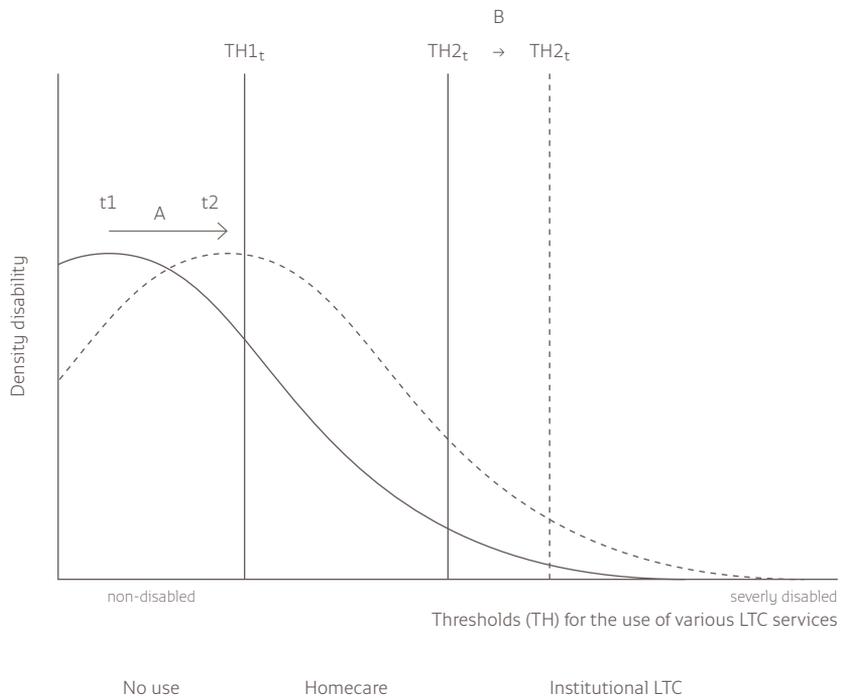
**Table 4.1    Summary statistics LTC use and its determinants stratified by year (weighted)**

| | 2000 | 2004 | 2008 | Δ2008-2000 | Δ2008-2004 |
|---|---|---|---|---|---|
| *Dependent variable* | | | | | |
| No use | n.a. | 89.33 | 86.66 | n.a | -2.67* |
| Homecare use | n.a. | 5.34 | 8.70 | n.a | 3.36† |
| Institutional LTC use | 6.14 | 5.33 | 4.64 | -1.50‡ | -0.69* |
| | | | | | |
| *Determinants* | | | | | |
| Age (mean ± sd) | 74.44 ± 0.17 | 74.69 ± 0.16 | 74.63 ± 0.19 | 0.19 | -0.06 |
| Age 65-69y | 29.55 | 29.02 | 29.22 | -0.33 | 0.20 |
| Age 70-74y | 25.65 | 25.46 | 24.31 | -1.33 | -1.14 |
| Age 75-79y | 21.37 | 20.41 | 20.07 | -1.29 | -0.34 |
| Age 80-84y | 12.80 | 14.66 | 14.76 | 1.97 | 0.10 |
| Age 85-89y | 8.52 | 7.04 | 9.14 | 0.62 | 2.10 |
| Age >=90y | 2.13 | 3.41 | 2.48 | 0.36 | -0.92 |
| Male | 40.74 | 41.55 | 42.43 | 1.68 | 0.87 |
| Living alone | 39.93 | 40.95 | 38.43 | -1.50 | -2.52 |
| Disability (mean ± sd) | 1.41 ± 0.05 | 1.50 ± 0.05 | 1.53 ± 0.07 | 0.11 | 0.03 |
| Disability score=0 | 59.48 | 56.42 | 57.45 | -2.03 | 1.03 |
| Disability score=1-2 | 20.66 | 21.57 | 20.83 | 0.17 | -0.74 |
| Disability Score=3-4 | 8.72 | 9.46 | 8.32 | -0.40 | -1.14 |
| Disability Score=5-6 | 5.06 | 6.28 | 6.16 | 1.10 | -0.12 |
| Disability Score=7-8 | 3.77 | 4.11 | 5.08 | 1.31 | 0.97 |
| Disability Score 9-10 | 2.32 | 2.16 | 2.16 | -0.16 | 0.00 |
| Educational degree | | | | | |
| None, primary or lower secondary | 76.71 | 73.00 | 67.28 | -9.43‡ | -5.72‡ |
| Higher secondary | 12.93 | 14.83 | 17.66 | 4.73‡ | 2.83* |
| Tertiary | 10.36 | 12.18 | 15.06 | 4.70‡ | 2.89* |
| Chronic condition | | | | | |
| None | 37.02 | 32.66 | 38.57 | 1.55 | 5.91‡ |
| 1-2 conditions | 41.49 | 42.82 | 39.59 | -1.90 | -3.23 |
| >=3 conditions | 21.49 | 24.53 | 21.84 | 0.36 | -2.68 |
| | | | | | |
| Number of observations | 2451 | 2832 | 2591 | | |

* p < 0.05; † p < 0.01; ‡ p < 0.001
n.a., not available; SD, standard deviation.

**Figure 4.2    Probability to be institutionalized as a function of disability**
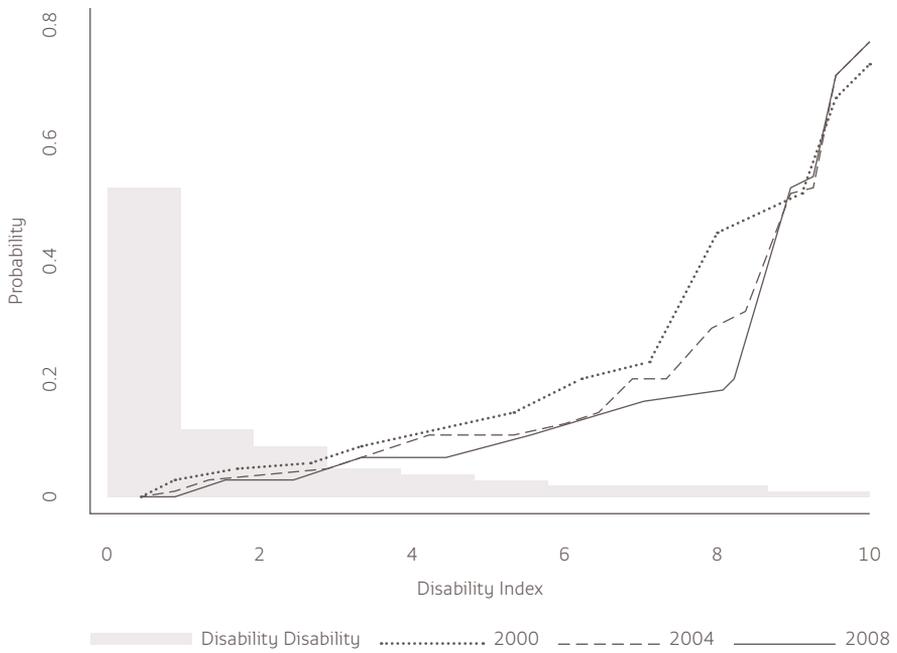
**Figure 4.3    Probability of no use (a) and homecare use (b) as a function of disability**
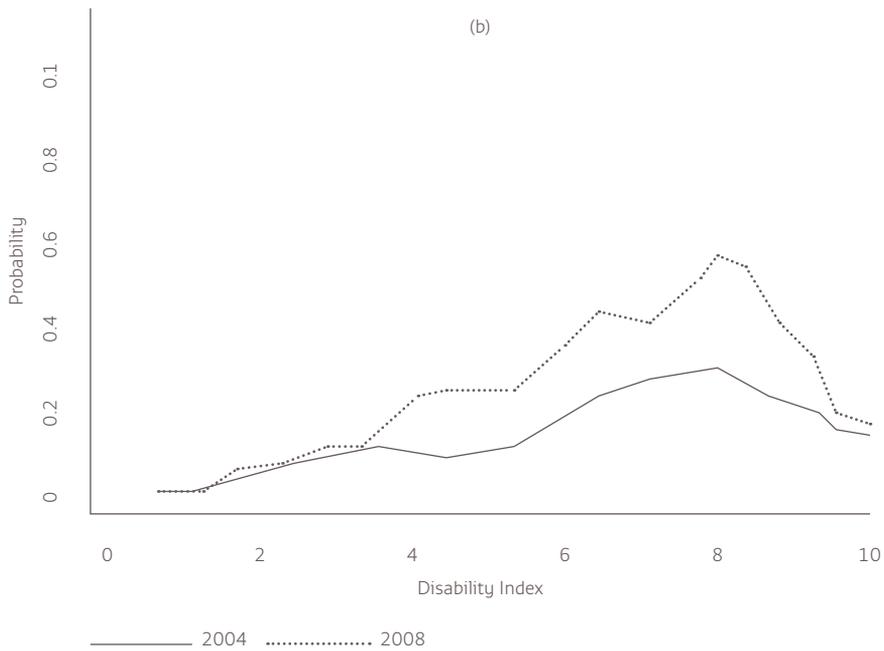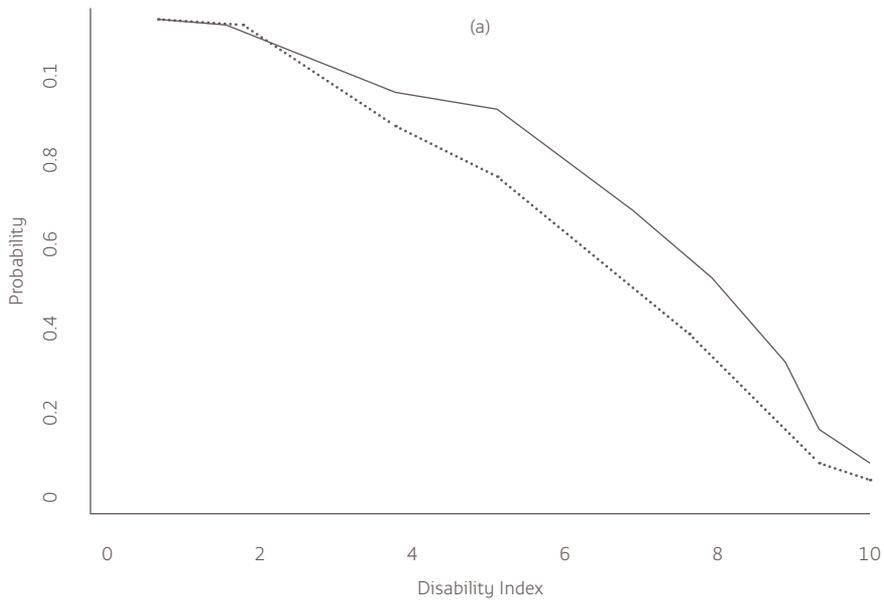
**Table 4.2    Average partial effects institutional LTC use, stratified by year**

| | 2000 | 2004 | 2008 | Δ 2008-2000 |
|---|---|---|---|---|
| Age (reference category: 65-69y) | | | | |
| Age 70-74y | 0.006 | 0.005 | 0.003 | -0.003 |
| Age 75-79y | 0.024‡ | 0.021‡ | 0.010* | -0.014 |
| Age 80-84y | 0.070‡ | 0.047‡ | 0.031‡ | -0.039† |
| Age 85-89y | 0.100‡ | 0.087‡ | 0.062‡ | -0.038* |
| Age >= 90y | 0.362‡ | 0.128‡ | 0.144‡ | -0.218* |
| Male | -0.021† | -0.006 | 0.003 | 0.024* |
| Living alone | -0.001 | 0.014* | 0.010 | 0.011 |
| Education (reference category: none, primary or lower secondary) | | | | |
| Higher secondary | -0.001 | -0.012 | -0.005 | -0.004 |
| Tertiary | 0.011 | -0.016* | -0.007 | -0.018 |
| Chronic conditions (reference category: none) | | | | |
| 1-2 conditions | 0.000 | -0.014 | -0.014 | -0.014 |
| >= 3 conditions | -0.009 | -0.023† | -0.031† | -0.022 |
| Disability (reference category: non-disabled) | | | | |
| Disability score = 1-2 | 0.037‡ | 0.026‡ | 0.018‡ | -0.019† |
| Disability score = 3-4 | 0.044‡ | 0.055‡ | 0.049‡ | 0.005 |
| Disability score = 5-6 | 0.091‡ | 0.069‡ | 0.075‡ | -0.016 |
| Disability score = 7-8 | 0.163‡ | 0.148‡ | 0.108‡ | -0.057 |
| Disability score = 9-10 | 0.470‡ | 0.518‡ | 0.555‡ | 0.085 |

$* p < 0.05$; $† p < 0.01$; $‡ p < 0.001$

**Table 4.3　Average partial effects no LTC, homecare and institutional LTC use**

| | No LTC use | | | Homecare use | | | Institutional LTC use | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2008 | Δ2008-2004 | 2004 | 2008 | Δ2008-2004 | 2004 | 2008 | Δ2008-2004 |
| *Age (reference category: 65-69y)* | | | | | | | | | |
| Age 70-74y | -0.033* | -0.012 | 0.021 | 0.030* | 0.010 | -0.020 | 0.003 | 0.001 | -0.002 |
| Age 75-79y | -0.053‡ | -0.044* | 0.009 | 0.035* | 0.039 | 0.004 | 0.018† | 0.006 | -0.012 |
| Age 80-84y | -0.089‡ | -0.086‡ | 0.003 | 0.044† | 0.059* | 0.015 | 0.045‡ | 0.027‡ | -0.018 |
| Age 85-89y | -0.150‡ | -0.153‡ | -0.003 | 0.064† | 0.091* | 0.027 | 0.086‡ | 0.062‡ | -0.024 |
| Age >=90y | -0.248‡ | -0.137‡ | 0.111 | 0.107† | 0.003 | -0.104 | 0.141‡ | 0.134‡ | -0.007 |
| Male | 0.015 | -0.016 | -0.031 | -0.008 | 0.012 | 0.020 | -0.007 | 0.004 | 0.011 |
| Living alone | -0.042† | -0.074‡ | -0.032 | 0.028* | 0.062‡ | 0.034 | 0.014* | 0.011 | -0.003 |
| *Education (reference category: none, primary or lower secondary)* | | | | | | | | | |
| Higher secondary | 0.002 | 0.035 | 0.033 | 0.011 | -0.031 | -0.042 | -0.013 | -0.004 | 0.009 |
| Tertiary | 0.011 | -0.007 | -0.018 | 0.005 | 0.014 | 0.009 | -0.017 | -0.008 | 0.009 |
| *Chronic conditions (reference category: none)* | | | | | | | | | |
| 1-2 conditions | 0.014 | -0.040* | -0.054* | -0.001 | 0.056† | 0.057* | -0.012 | -0.016 | -0.004 |
| >=3 conditions | 0.019 | -0.016 | -0.035 | 0.004 | 0.049* | 0.045 | -0.023* | -0.033† | -0.010 |
| *Disability (reference category: non-disabled)* | | | | | | | | | |
| Disability score=1-2 | -0.062‡ | -0.043† | 0.019 | 0.037† | 0.026 | -0.009 | 0.026‡ | 0.016‡ | -0.010 |
| Disability score=3-4 | -0.113‡ | -0.143‡ | -0.03 | 0.059† | 0.098† | 0.039 | 0.054‡ | 0.045‡ | -0.009 |
| Disability score=5-6 | -0.145‡ | -0.230‡ | -0.085 | 0.079† | 0.157‡ | 0.078 | 0.066‡ | 0.072‡ | 0.006 |
| Disability score=7-8 | -0.331‡ | -0.398‡ | -0.067 | 0.178‡ | 0.276‡ | 0.098 | 0.152‡ | 0.122‡ | -0.030 |
| Disability score=9-10 | -0.705‡ | -0.861‡ | -0.156 | 0.149* | 0.210* | 0.061 | 0.556‡ | 0.651‡ | 0.095 |

*p<0.05; †p<0.01; ‡p<0.001

**Table 4.4    Decomposition results P(institutional LTC2008) – P(institutional LTC2000)**

| | Changes in determinants (%) | Changes in the impact of determinants (%) |
|---|---|---|
| *Aggregate decomposition* | | |
| Change in inpatient LTC use rate | -1.50 | -1.50 |
| Overall contribution | -20.47‡ | 120.47‡ |
| *Contributions of single covariates to aggregate decomposition* | | |
| Age | -10.83‡ | -31.13 |
| Gender | -0.38 | 10.95 |
| Co-residence status | 1.29 | 6.78 |
| Education | 5.18 | -28.39 |
| Chronic diseases | -0.98 | -11.81 |
| Disability (0-10) | -14.75‡ | 67.25† |
| No-Mild disability (0-2) | -13.12‡ | 75.88‡ |
| Severe disability (3-10) | -1.63 | -8.63* |
| Intercept | | 106.82 |

*p<0.05; †p<0.01; ‡p<0.001

**Table 4.5    Decomposition results P(LTC use2008) – P(LTC use LTC2004)**

| | Homecare | | Institutional LTC | |
|---|---|---|---|---|
| | Changes in determinants (%) | Changes in impact of determinants (%) | Changes in determinants (%) | Changes in impact of determinants (%) |
| *Aggregate decomposition* | | | | |
| Change in LTC use | 3.36 | 3.36 | -0.69 | -0.69 |
| Overall contribution | 8.60 | 91.40† | -12.39 | 112.39 |
| *Contributions of single covariates to aggregate decomposition* | | | | |
| Age | -3.23 | 53.78 | -26.69 | 3.14 |
| Gender | -0.26 | -10.31 | -2.32 | 13.91 |
| Co-residence status | 3.80 | -10.21 | 24.63 | 8.35 |
| Education | 1.71 | 28.93 | 19.58 | 18.32 |
| Chronic diseases | 7.04 | 8.41 | -31.62 | -14.66 |
| Disability (0-10) | -0.46 | -59.08 | 4.04 | 124.78 |
| No or Mild disability (0-2) | 1.49 | -64.40 | 23.18 | 129.46 |
| Severe disability (3-10) | -1.95 | 5.32 | -19.14 | -4.69 |
| Intercept | | 79.88 | | -41.44 |

*p<0.05; †p<0.01; ‡p<0.001

## Table 5.1 Financing LTC for the elderly in four countries

| | LTC expenditure as % of GDP^ | LTC expenditures by source (% of total) | Mandatory insurance | Voluntary insurance | Tax-funded LTC | Integrated/ separated schemes for LTC and health insurance |
|---|---|---|---|---|---|---|
| **Belgium #** (2006) | 2.5 total<br>1.8 public<br>0.7 private | 42 mandatory insurance<br>28 tax-funded<br>30 out-of-pocket~ | · medical LTC services in institutions or at home #<br>· cash benefits (in Flanders) | | · home care | · integrated for medical LTC<br>· separated for non-medical LTC |
| **Germany\*** (2009) | 1.4 total<br>1.0 public<br>0.4 private | 60 mandatory insurance<br><1 voluntary insurance<br>11 tax-funded<br>28 out-of-pocket~ | · home care<br>· institutionalized care<br>· ADL devices | · additional LTC benefits not covered by mandatory insurance | · remaining costs in a means tested programme<br>· home care and institutionalized care for civil servants | · separated |
| **Netherlands** (2009) | 2.3 public | 68 mandatory insurance<br>24 tax-funded<br>8 out-of-pocket~ | · institutionalized care<br>· home care, except for domestic help)<br>· social assistance<br>· ADL devices | | · domestic help<br>· ADL devices | · separated |
| **Switzerland** (2008) | 2.0 total<br>0.7 public<br>1.3 private | 24 mandatory insurance<br>few voluntary insurance<br>35 tax-funded<br>41 out-of-pocket~ | · 55% of medical LTC services in institutions or at home | · only for limited periods after illness or accident | · subsidies for medical LTC and 50% of non-medical domestic help<br>· subsidies for individuals unable to pay the co-payments | · integrated for medical LTC<br>· separated for non-medical LTC |

^ As all international comparisons of aggregate expenditure data, these figures are prone to issues related to comparability and accuracy. # The health insurance budget in Belgium is mainly funded through (non-earmarked) social security contributions, but about one third is tax-financed. The Flemish care insurance is partly tax-financed, partly financed with a specific contribution. * Mandatory private LTC insurance is regarded as mandatory insurance. Expenditures on this type of insurance are regarded as private. ~ Including co-payments.
Sources: CVZ, 2012; Huber et al., 2009; OECD, 2011a, 2011b; Spitex, 2011.; van den Bosch et al., 2011; Weaver, 2012; Willemé, 2010; Willemé et al., 2012.

**Table 5.2   Demand-side measures and the expected effects on efficiency and access**

| | Policy measure | Expected effect on efficiency | Expected effect on access to LTC |
|---|---|---|---|
| **Belgium** | Standardized, independent eligibility assessment | Positive | Undetermined |
| | Limited benefit package | Positive[a] | Negative[d] |
| | Co-payments, related to income, assets, household composition and type and duration of care | Positive[a] | Limited |
| | Managed competition: limited financial risk, extensive risk adjustment | Limited | Limited |
| **Germany** | Standardized, independent eligibility assessment based on health and disability | Positive | Undetermined |
| | Low, fixed-level benefits | Positive | Negative |
| | Limited benefit package | Positive[a] | Negative[d] |
| | Cash benefits | Undetermined[b] | Limited |
| **Netherlands** | Standardized eligibility assessment based on health, disability and informal care availability | Positive | Undetermined |
| | Co-payments: income-related and asset-related | Positive[a] | Limited |
| | Cash benefits | Undetermined[b] | Limited |
| **Switzerland** | Eligibility determined by providers, insurers may audit | Positive | Undetermined |
| | Limited benefit package for non-medical LTC | Positive | Negative[d] |
| | Co-payments and deductibles for medical LTC | Positive[a] | Negative |
| | Managed competition: full financial risk for insurers, limited risk adjustment | Undetermined[c] | Negative |

[a] Out-of-pocket payments reduce the gap between the total marginal cost and the marginal cost for the care recipient and thus improve the allocation by making the care recipient more cost conscious. But out-of-pocket payment may also cause to forego necessary care and may thus lead to higher demand for care in the long run. The impact of out-of-pocket payments on efficiency is positive if the former effect dominates the latter.

[b] Assuming that the choice between cash benefits and in-kind provision does not affect the health of the recipient (Arntz and Thomsen, 2011), the impact on efficiency depends on whether the gain from efficient substitution between formal and informal care and the discount exceed the decrease in efficiency resulting from excessive claims to benefits.

[c] The impact of full financial risk for insurers combined with limited risk adjustment on efficiency depends on the relative magnitude of i) the positive impact of financial risk on the effort that the insurer puts in acting as a prudent buyer of LTC and ii) the negative impact of the limited risk adjustment on the quantity and the quality of the care that the insurer contracts and on how it allocates this care.

[d] Assistance from the local and federal government may provide relief.
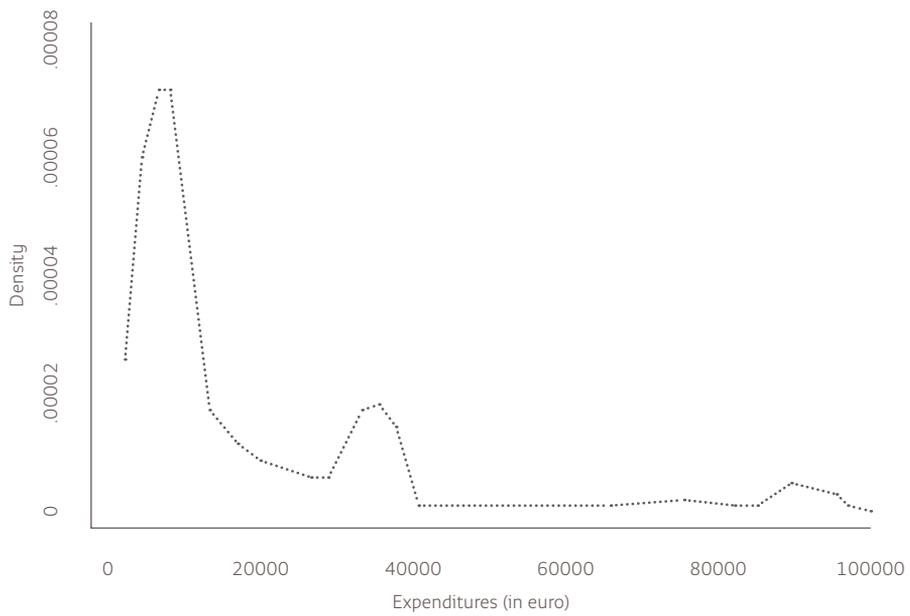
**Table 6.1   Descriptive statistics population**

| | Mean | St.dev. |
|---|---|---|
| LTC expenditures in 2005 | 1159.18 | 7564.05 |
| LTC expenditures in 2005 conditional on any use | 15677.04 | 23370.78 |
| LTC expenditures in 2005 if no LTC was received in 2004 | 93.62 | 1657.39 |
| LTC expenditures in 2005 if received home care in 2004 | 9673.22 | 18333.23 |
| LTC expenditures in 2005 if stayed in a residential care facility in 2004 | 31767.09 | 15902.13 |
| LTC expenditures in 2005 if stayed in a nursing home in 2004 | 61451.47 | 35674.80 |

**Table 6.2   Predicted losses for selected subgroups**

| | No risk adjustment | Demographic model | Prior LTC model # | Prior HCE and DCG model # | Full model # | Incentive compatible model # | Subgroup size |
|---|---|---|---|---|---|---|---|
| Demographic information | No | Yes | Yes | Yes | Yes | Yes | |
| Prior LTC use | No | No | Yes | No | Yes | Yes | |
| Prior HCE and diagnosis information | No | No | No | Yes | Yes | Yes | |
| *Subgroups of LTC users in prior year* | | | | | | | |
| Personal care | 16992* | 8293* | | 7269* | | | 82116 |
| Nursing | 25799* | 17183* | | 15303* | | | 24727 |
| Nursing home: combined care 1-90 days | 31009* | 23310* | | 20888* | | 21005* | 10546 |
| Nursing home: combined care 91-180 days | 51350* | 42482* | | 39803* | | | 3853 |
| Nursing home: combined care 180-365 days | 71408* | 61349* | | 59290* | | | 4359 |
| Nursing home: combined care 366 days | 85868* | 74655* | | 74693* | | | 12439 |
| Receiving home care on last day of 2004 | 10078* | 2459* | | 1669* | | 876* | 172291 |
| *Subgroups based on HCE in 2000-2004* | | | | | | | |
| In top 15% in prior 3 years: hospital + outpatient care | 3410* | 1804* | 278* | | | | 137618 |
| In top 15% in prior 5 years: hospital + outpatient care | 4031* | 2321* | 393* | | | | 57597 |
| Expenditures on transportation in prior year | 7350* | 4271* | 582* | | | 916* | 201609 |
| Expenditures on transportation in prior 3 years | 9040* | 5753* | 353* | | | | 43615 |
| Expenditures on transportation in prior 5 years | 8565* | 5347* | 374* | | | | 22462 |
| DCG 4, e.g. Cardiovascular accident, stroke, angina pectoris | 10172* | 6865* | 1145* | | | | 11358 |
| *Subgroups based on diagnosis information from 2004 hospital admission data* | | | | | | | |
| Dementia | 30423* | 20777* | 9255* | 20114* | 9274* | 11692* | 821 |
| Hip fracture | 21225* | 12029* | -950* | 9167* | -1229* | 3205* | 6433 |
| Chronic ulcers of skin including decubitus | 13421* | 8676* | -224 | 4514* | -1897* | -1528* | 873 |
| Stroke | 10840* | 7288* | 1109* | 2219* | 327* | 1271* | 11998 |
| Heart failure | 10054* | 3806* | 858* | 745* | 182 | 637* | 8147 |
| Diabetes mellitus including diabetic complications | 6478* | 4633* | 679* | 2770* | 133 | 231 | 4746 |
| Asthma and COPD | 6128* | 3721* | 876* | 122 | -78 | 26 | 8035 |
| *Subgroups from POLS health survey (n = 4619)* | | | | | | | |
| Has difficulty to/cannot perform ≥ 1 ADL | 16221* | 8918* | 357 | 7887* | 289 | 532 | 90 |
| Cannot perform ≥ 1 ADL | 23365* | 13476* | 1479 | 11906* | 1409 | 1365 | 32 |

\* $p < 0.05$. # Cells are empty if variable is included in this extension of the risk adjustment model

**Appendix Table A1**  Coefficients of risk classes included in the risk-adjustment model

| | Prevalence | Demographic model | Prior LTC model | Prior HCE and DCG model | Full model | Incentive compatible model | Min. cost of prior use to qualify for subgroup |
|---|---|---|---|---|---|---|---|
| Demographic information | | Yes | Yes | Yes | Yes | Yes | |
| Prior LTC use | | No | Yes | No | Yes | Yes | |
| Prior HCE and diagnosis information | | No | No | Yes | Yes | Yes | |
| Female age < 50 | 26.43 | -346* | -49* | -307* | -46* | -73* | |
| Female age: 50-64 | 9.54 | 327* | 30* | 147* | -7 | 22* | |
| Female age: 65-69 | 2.70 | 929* | 169* | 576* | 101* | 154* | |
| Female age: 70-74 | 2.47 | 2125* | 404* | 1569* | 317* | 460* | |
| Female age: 75-79 | 2.26 | 4733* | 928* | 3937* | 832* | 1135* | |
| Female age: 80-84 | 1.89 | 9469* | 1863* | 8444* | 1770* | 2286* | |
| Female age: 85-89 | 1.13 | 17034* | 3310* | 15770* | 3220* | 3946* | |
| Female age: 90+ | 0.68 | 27154* | 4556* | 25732* | 4481* | 5403* | |
| Male age < 50 | 31.01 | 0 | 0 | 0 | 0 | 0 | |
| Male age: 50-64 | 12.44 | 188* | 47* | 55* | 17* | 22* | |
| Male age: 65-69 | 2.96 | 592* | 210* | 313* | 154* | 148* | |
| Male age: 70-74 | 2.51 | 1256* | 401* | 853* | 329* | 370* | |
| Male age: 75-79 | 1.90 | 2698* | 793* | 2106* | 700* | 847* | |
| Male age: 80-84 | 1.25 | 5473* | 1460* | 4671* | 1350* | 1678* | |
| Male age: 85-89 | 0.58 | 9961* | 2333* | 8999* | 2229* | 2784* | |
| Male age: 90+ | 0.25 | 16478* | 3005* | 15384* | 2924* | 3631* | |
| Male living alone | 10.63 | 239* | -361* | 213* | -358* | -158* | |
| Female living alone | 11.3 | 2096* | 72* | 1917* | 68* | 339* | |
| ≥1 hour per week in 2004: domestic care I | 0.81 | | 336* | | 318* | 1534* | 2360.80 |
| ≥1 hour per week in 2004: domestic care II | 1.87 | | 2594* | | 2548* | 3865* | 733.20 |
| ≥1 hour per week in 2004: activating support | 0.06 | | 885* | | 857* | 1082* | 1367.60 |
| ≥1 hour per week in 2004: guidance | 0.16 | | 4760* | | 4783* | 5369* | 2298.40 |
| ≥1 hour per week in 2004: personal care | 1.44 | | 7346* | | 7275* | 9101* | 2033.20 |
| ≥1 hour per week in 2004: nursing | 0.43 | | 12079* | | 11840* | 13502* | 3088.80 |
| Residential home 1-90 days | 0.18 | | 6192* | | 6112* | | 86.02 |
| Residential home 91-180 days | 0.07 | | 11869* | | 11715* | 15147* | 7827.82 |
| Residential home 181-365 days | 0.13 | | 20595† | | 20458* | 27012* | 15569.62 |
| Residential home 366 days | 0.78 | | 22901* | | 22728* | 28010* | 31483.32 |
| Nursing home: somatic care 1-90 days | 0.02 | | 11578* | | 11299* | | 188.65 |
| Nursing home: somatic care 91-180 days | 0.01 | | 24051* | | 23572* | 26345* | 17166.87 |
| Nursing home: somatic care 180-365 days | 0.01 | | 41468* | | 41025* | 47521* | 34145.09 |
| Nursing home: somatic care 366 days | 0.02 | | 58101* | | 58089* | 63727* | 69044.77 |
| Nursing home: psychogeriatric care 1-90 days | 0.01 | | 29897* | | 29773* | | 203.70 |
| Nursing home: psychogeriatric care 91-180 days | 0.01 | | 37814* | | 37798* | 41849* | 18535.95 |
| Nursing home: psychogeriatric care 180-365 days | 0.01 | | 54145* | | 54055* | 59739* | 36868.21 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Nursing home: psychogeriatric care 366 days | 0.04 | | | 63126* | 63206* | 68788* | 74551.19 |
| Nursing home: combined care 1-90 days | 0.18 | | | 20167* | 19956* | | 247.01 |
| Nursing home: combined care 91-180 days | 0.07 | | | 37289* | 36939* | 38841* | 22477.55 |
| Nursing home: combined care 180-365 days | 0.08 | | | 59337* | 59072* | 63692* | 44708.10 |
| Nursing home: combined care 366 days | 0.22 | | | 78034* | 78092* | 83659* | 90404.23 |
| Used home care on the last day of the year | 3.01 | | | 2750* | 2609* | | 14.10 |
| Used institutional care on the last day of the year | 2.09 | | | 6366* | 6279* | | 86.02 |
| In top 15% in prior year: durable medical equipment | 12.12 | | | 156* | 79* | | 1 |
| In top 15% in prior 3 years: durable medical equipment | 5.78 | | | 1471* | 353* | | 3 |
| In top 15% in prior 5 years: durable medical equipment | 3.69 | | | 1980* | 370* | 469* | 5 |
| In top 15% in prior year: transportation | 3.52 | | | 3780* | 579* | | 1 |
| In top 15% in prior 3 years: transportation | 0.76 | | | 5802* | 209* | | 3 |
| In top 15% in prior 5 years: transportation | 0.39 | | | 4649* | 190* | 670* | 5 |
| In top 15% in prior year: paramedical care | 4.30 | | | 532* | -51* | | 1 |
| In top 15% in prior 3 years: paramedical care | 1.60 | | | 1064* | 172* | | 212.77 |
| In top 15% in prior 5 years: paramedical care | 0.90 | | | 1425* | 371* | 471* | 382.81 |
| In top 15% in prior year: drugs | 12.26 | | | -203* | 21* | | 588.88 |
| In top 15% in prior 3 years: drugs | 8.43 | | | -84* | 55* | 64* | 1761.78 |
| In top 15% in prior 5 years: drugs | 6.66 | | | -162* | 33* | 96* | 2743.73 |
| In top 15% in prior 3 years: hospital + outpatient care | 2.41 | | | 69* | -4 | 136* | 2096.22 |
| In top 15% in prior 5 years: hospital + outpatient care | 1.01 | | | 109* | 88* | 62* | 3145.02 |
| No records available for all of the last 5 years | 25.37 | | | 323* | 76* | | 0 |
| No DCG | 97.60 | | | 0 | 0 | 0 | |
| DCG 1 | 0.39 | | | -883* | -1518* | -116* | |
| DCG 2 | 0.49 | | | -861* | -81* | 243* | |
| DCG 3 | 0.25 | | | -1070* | -83* | 287* | |
| DCG 4 | 0.20 | | | 5323* | 986* | 3373* | |
| DCG 5 | 0.31 | | | 882* | 312* | 953* | |
| DCG 6 | 0.19 | | | 331* | 148* | 689* | |
| DCG 7 | 0.13 | | | 2295* | 1068* | 1730* | |
| DCG 8 | 0.12 | | | 1972* | 809* | 1445* | |
| DCG 9 | 0.13 | | | 1772* | 805* | 1397* | |
| DCG 10 | 0.09 | | | 4313* | 3093* | 3995* | |
| DCG 11 | 0.05 | | | 4770* | 3647* | 4540* | |
| DCG 12 | 0.05 | | | 2154* | 1635* | 2327* | |
| Intercept | | -3 | 6* | -207* | -36* | -18* | |
| $R^2$ | | 0.23 | 0.73 | 0.24 | 0.73 | 0.70 | |
| Number of observations | | 5,719,934 | 5,719,934 | 5,719,934 | 5,719,934 | 5,719,934 | |

* $p < 0.05$, † $p < 0.01$

| | No risk adjustment | Demographic model | Prior LTC model # | Prior HCE and DCG model | Full model # | Incentive compatible model # | Subgroup size |
|---|---|---|---|---|---|---|---|
| Demographic information | No | Yes | Yes | Yes | Yes | Yes | |
| Prior LTC use | No | No | Yes | No | Yes | Yes | |
| Prior HCE and diagnosis information | No | No | No | Yes | Yes | Yes | |
| Activating support | 3763 | 3556 | | 3080 | | | 3559 |
| Domestic care I | 5006 | -3232 | | -3524 | | | 46611 |
| Domestic care II | 9753 | 2147 | | 1479 | | | 107181 |
| Guidance | 21909 | 11406 | | 10617 | | | 9252 |
| Personal care | 16992 | 8293 | | 7269 | | | 82116 |
| Nursing | 25799 | 17183 | | 15303 | | 8207 | 24727 |
| Residential home 1-90 days | 22224 | 11978 | | 10488 | | | 10054 |
| Residential home 91-180 days | 34768 | 22153 | | 20826 | | | 3903 |
| Residential home 181-365 days | 36137 | 23203 | | 22153 | | | 7655 |
| Residential home 366 days | 31190 | 14777 | | 14139 | | | 44726 |
| Nursing home: somatic care 1-90 days | 24292 | 16859 | | 13829 | | 13104 | 1042 |
| Nursing home: somatic care 91-180 days | 38721 | 30839 | | 27738 | | | 389 |
| Nursing home: somatic care 181-365 days | 54610 | 46047 | | 42608 | | | 376 |
| Nursing home: somatic care 366 days | 65995 | 56700 | | 55923 | | | 1111 |
| Nursing home: psychogeriatric care 1-90 days | 51386 | 41756 | | 40013 | | 32614 | 755 |
| Nursing home: psychogeriatric care 91-180 days | 62188 | 52102 | | 51072 | | | 385 |
| Nursing home: psychogeriatric care 180-365 days | 68104 | 57465 | | 56406 | | | 517 |
| Nursing home: psychogeriatric care 366 days | 70693 | 58546 | | 58887 | | | 2049 |
| Nursing home: combined care 1-90 days | 31009 | 23310 | | 20888 | | 21005 | 10546 |
| Nursing home: combined care 91-180 days | 51350 | 42482 | | 39803 | | | 3853 |
| Nursing home: combined care 180-365 days | 71408 | 61349 | | 59290 | | | 4359 |
| Nursing home: combined care 366 days | 85868 | 74655 | | 74693 | | | 12439 |
| Receiving home care on last day of 2004 | 10078 | 2459 | | 1669 | | 876 | 172291 |
| Stay in LTC institution on last day of 2004 | 31213 | 21576 | | 20881 | | 3155 | 119785 |

* All reported predicted losses are significant at the $p < 0.05$ level. # Cells are empty if this variable is included in this risk adjustment model

| | No risk adjustment | Demographic model | Prior LTC model | Prior HCE and DCG model# | Full model | Incentive compatible model# | Subgroup size |
|---|---|---|---|---|---|---|---|
| Demographic information | No | Yes | Yes | Yes | Yes | Yes | |
| Prior LTC use | No | No | Yes | No | Yes | Yes | |
| Prior HCE and diagnosis information | No | No | No | Yes | Yes | Yes | |
| In top 15% in prior 3 years: hospital + outpatient care | 3410 | 1804 | 278 | | | | 137618 |
| In top 15% in prior 5 years: hospital + outpatient care | 4031 | 2321 | 393 | | | | 57597 |
| Expenditures on medical equipment in prior year | 4108 | 949 | 185 | | | 93 | 693144 |
| Expenditures on medical equipment in prior 3 years | 6524 | 1846 | 320 | | | | 330813 |
| Expenditures on medical equipment in prior 5 years | 7259 | 2057 | 326 | | | | 211030 |
| Expenditures on transportation in prior year | 7350 | 4271 | 582 | | | 916 | 201609 |
| Expenditures on transportation in prior 3 years | 9040 | 5753 | 353 | | | | 43615 |
| Expenditures on transportation in prior 5 years | 8565 | 5347 | 374 | | | | 22462 |
| Expenditures on paramedical care in prior years | 2409 | 1319 | 107 | | | 53 | 246233 |
| In top 15% in prior 3 years: paramedical care | 3635 | 2009 | 350 | | | | 91743 |
| In top 15% in prior 5 years: paramedical care | 4371 | 2338 | 462 | | | | 51218 |
| In top 15% in prior year: pharmaceuticals | 2832 | 572 | 130 | | | 28 | 701221 |
| In top 15% in prior 3 years: pharmaceuticals | 3215 | 678 | 140 | | | | 482222 |
| In top 15% in prior 5 years: pharmaceuticals | 3448 | 742 | 147 | | | | 381160 |
| No prior HCE available | -445 | 25 | 17 | | | | 1450876 |
| DCG 1 | 2080 | -272 | -1474 | | | | 22198 |
| DCG 2 | 1921 | 466 | 117 | | | | 27820 |
| DCG 3 | 2400 | 349 | 117 | | | | 14018 |
| DCG 4 | 10172 | 6865 | 1145 | | | | 11358 |
| DCG 5 | 5109 | 2189 | 471 | | | | 17981 |
| DCG 6 | 3821 | 1346 | 276 | | | | 10586 |
| DCG 7 | 4595 | 3512 | 1215 | | | | 7391 |
| DCG 8 | 6187 | 3881 | 1033 | | | | 7027 |
| DCG 9 | 4787 | 3231 | 978 | | | | 7459 |
| DCG 10 | 7602 | 5840 | 3275 | | | | 5365 |
| DCG 11 | 7461 | 6220 | 3823 | | | | 2939 |
| DCG 12 | 5275 | 3536 | 1805 | | | | 2684 |

* All reported predicted losses are significant at the $p < 0.05$ level. #Cells are empty if the variable is included in this risk adjustment model

**Appendix  Table A4**   Predicted losses for subgroups based on diagnosis information from 2004 hospital admission data

| Diagnosis in 2004 | No risk adjustment | Demographic model | Prior LTC model | Prior HCE and DCG model | Full model | Incentive compatible model | Subgroup size |
|---|---|---|---|---|---|---|---|
| Demographic information | No | Yes | Yes | Yes | Yes | Yes | |
| Prior LTC use | No | No | Yes | No | Yes | Yes | |
| Prior HCE and diagnosis information | No | No | No | Yes | Yes | Yes | |
| **10 diagnoses with the highest initial predicted loss** | | | | | | | |
| Dementia | 30423* | 20777* | 9255* | 20114* | 9274* | 11692* | 821 |
| Hip fracture | 21225* | 12029* | -950* | 9167* | -1229* | 3205* | 6433 |
| Parkinson's disease | 21093* | 17566* | 6486* | 13817* | 5730* | 7650* | 510 |
| Chronic ulcers of skin including decubitus | 13421* | 8676* | -224 | 4514* | -1897* | -1528* | 873 |
| Stroke | 10840* | 7288* | 1109* | 2219* | 327* | 1271* | 11998 |
| Septicaemia | 10620* | 7322* | 1100* | 4277* | 592 | 2330* | 679 |
| Heart failure | 10054* | 3806* | 858* | 745* | 182 | 637* | 8147 |
| Pancreas cancer | 9584* | 7556* | 6316* | 2605* | 3525* | 3469* | 329 |
| Osteoporosis | 9334* | 4590* | 1002* | 2710* | 662* | 1660* | 1598 |
| Acute renal and urinary infections | 8908* | 5452* | 1252* | 3420* | 954* | 1798* | 3942 |
| **10 diagnosis with the highest initial predicted loss for which the incentive compatible model sufficiently reduced the predicted loss** | | | | | | | |
| Heart failure | 10054* | 3806* | 858* | 745* | 182 | 637* | 8147 |
| Diseases of the blood and bloodforming organs | 8133* | 3713* | 1191* | 1718* | 494* | 755* | 6814 |
| Diabetes mellitus including diabetic complications | 6478* | 4633* | 679* | 2770* | 133 | 231 | 4746 |
| Stomach cancer | 6148* | 3900* | 2673* | -290 | 368 | 553 | 664 |
| Asthma and COPD | 6128* | 3721* | 876* | 122 | -78 | 26 | 8035 |
| Nephritis and nephropathy | 5579* | 3906* | 535* | 767* | -189 | 128 | 2117 |
| Esophagus cancer | 5429* | 3768* | 2184* | -1207 | -725 | -343 | 426 |
| Colorectal cancer | 5416* | 2438* | 1095* | -20* | 235 | 464 | 3975 |
| Other endocrine, nutritional and metabolic diseases | 4504* | 2829* | 761* | 1440* | 474* | 849* | 8510 |
| Congenital anomalies of nervous system | 4082 | 2558 | 181 | 546 | -239 | -229 | 50 |

* Significant at the p < 0.05 level

Results for subgroups based on primary treatment information from 2004 and from earlier years and for subgroups based on primary diagnoses from earlier years available upon request

| | No risk adjustment | Demographic model | Prior LTC model | Prior HCE and DCG model | Full model | Incentive compatible model | Subgroup size | Prevalence[a] |
|---|---|---|---|---|---|---|---|---|
| Demographic information | No | Yes | Yes | Yes | Yes | Yes | | |
| Prior LTC use | No | No | Yes | No | Yes | Yes | | |
| Prior HCE and diagnosis information | No | No | No | Yes | Yes | Yes | | |
| **From POLS survey (n = 7790)** | | | | | | | | |
| Self-rated health: bad | 4591* | 3167* | 421 | 2443* | 294 | 613 | 482 | 6.19 |
| Long-term illness | 1185* | 380 | 32 | 186 | -5 | 49 | 2927 | 37.6 |
| Education: low | 1314* | 193 | 9 | 166 | 8 | 72 | 2616 | 33.95 |
| Education: high | -834* | -245* | -20 | -240* | -23 | -86 | 1006 | 13.05 |
| GALI problems[b] | 2912* | 1405* | 134 | 986* | 67 | 200 | 1327 | 17.05 |
| Income: lowest quartile | 661* | 488* | 95 | 474* | 91 | 119 | 1936 | 25.00 |
| Income: highest quartile | -743* | -33 | -1 | 6 | 3 | -12 | 1945 | 25.00 |
| **From POLS survey (n = 3619)** | | | | | | | | |
| Specialist visit in 2004 | 679* | 157 | 11 | -7 | -19 | -76 | 1584 | 43.77 |
| Use of pharmaceuticals in prior 14 days | 1039* | 265 | -158 | 25 | -207 | -294* | 476 | 13.16 |
| Physiotherapy | 1042* | 738* | -9 | 509 | -36 | -40 | 738 | 20.39 |
| At least 1 chronic disease | 270 | 111 | 63 | 101 | 60 | 10 | 994 | 34.33 |
| At least 2 chronic diseases | 362* | 223 | 86 | 218 | 85 | 46 | 456 | 12.59 |
| Blindness | 638 | -318 | -189 | -442 | -209 | -258 | 536 | 17.96 |
| Deafness | 1370* | -148 | -124 | -176 | -134 | -144 | 466 | 15.66 |
| Diabetes | 1509 | -670 | -60 | -1153 | -129 | -320 | 121 | 4.05 |
| Cancer | 2621* | 968 | -26 | 588 | -122 | -319 | 181 | 6.07 |
| Stroke | 4349* | 1404 | -64 | 1161 | -165 | -302 | 108 | 3.61 |
| Blood pressure | 1801* | 204 | 34 | 133 | 0 | -53 | 405 | 13.5 |
| Ciculatory system | 2848* | 466 | -145 | -146 | -246 | -477 | 77 | 2.57 |
| Urinary incontinence | 3131* | 1283 | 683 | 911 | 631 | 688 | 166 | 5.53 |
| Osteoarthritis | 1649* | -126 | -78 | -266 | -105 | -124 | 445 | 14.82 |
| Arthritis | 2025* | 451 | -61 | 315 | -98 | -75 | 191 | 6.37 |
| At least 1 ailment | 198 | -107 | -66 | -152 | -77 | -128* | 1659 | 21.3 |
| At least 2 ailments | 752* | -49 | -133 | -167 | -157 | -194 | 917 | 11.77 |
| PCS-12[c] score <30 | 3746* | 1834 | -308 | 1326 | -397 | -219 | 208 | 7.62 |
| Has difficulty to/cannot perform ≥1 ADL[d] | 16221* | 8918* | 357 | 7887* | 289 | 532 | 90 | 7.45 |
| Cannot perform ≥1 ADL | 23365* | 13476* | 1479 | 11906* | 1409 | 1365 | 32 | 2.65 |
| Has difficulty to/cannot perform ≥1 mobility task | 9345* | 3627* | 212 | 2953* | 156 | 37 | 195 | 16.28 |
| Cannot perform ≥1 mobility task | 15394* | 7247* | 464 | 6225* | 388 | 656 | 69 | 5.76 |

* Predicted loss is not significant at the p < 0.05 level [a]Prevalence among respondents for whom this characteristic is not missing [b]Global Activity Limitation Indicator (van Oyen et al. 2006) [c]Physical Component Scale (Ware et al. 1996) [d]Activity of daily living: dressing; walking across a room; bathing; eating; getting in/out of bed; using the toilet (Katz and Akpom 1976)

# Acknowledgements by chapter

# Summary/Samenvatting

## English

*Should we rethink the way in which long-term care is financed?*
Long-term care (LTC) aims to help individuals to cope with their impairments. LTC may be provided at home or in an institution and it is composed of informal care – provided by family members, friends or neighbors – and of formal care, which is provided by professionals. LTC is mainly used by the elderly. The share of the elderly in the population will increase sharply over the next decades, and therefore LTC expenditures are expected to increase as well.

In many countries, a large share of total LTC expenditures is publicly financed. An increase in LTC expenditures that exceeds the growth of the Gross Domestic Product (GDP) means that LTC expenditures will crowd out other types of government spending, that the tax revenues need to go up or that the bill is passed on to future generations. In all cases, the increase in expenditures may challenge the support for public LTC expenditures. This threat is particularly serious in the Netherlands because of its outlier position with regard to LTC financing: the public LTC insurance scheme is more comprehensive and public LTC expenditures are the highest among the OECD countries.

Excessive LTC expenditure growth may be avoided. One of the ways in which LTC might be kept affordable, is to change the way in which it is financed. LTC financing arrangements affect the incentives for users, potential users, insurers and providers of formal and informal care. These incentives in turn affect the decisions that these individuals make and thus the quantity and the types of LTC that users end up using.

In my thesis, I describe LTC financing alternatives and their consequences for the allocation of LTC. This thesis consists of two parts. In the first part, I investigate how alternative ways of financing and organizing LTC are associated with differences in LTC use. In the second part of this thesis, I study how the government may intervene to keep LTC affordable and efficient.

*Part 1: How are the financing and use of long-term care related?*
To study how LTC financing alternatives are associated with differences in LTC use, I first analyze which personal characteristics determine LTC use and changes in LTC use in the Netherlands **(chapter two).** Use of informal care and use of formal LTC are both associated with disability, health status and the absence of an able informal caregiver within the household. In addition, the use of formal care is higher among women and increases with age. Studying changes in LTC use reveals that the onset of formal care use is associated with deteriorations in the care

recipient's health, more impairments and the loss of one's spouse, which may indicate a decline in the availability of informal care and support. These findings on the determinants of LTC use in the Netherlands are in line with the eligibility criteria for publicly financed formal care. The guidelines stipulate that access to formal care is only determined by the applicant's health and impairments and, for some types of LTC, the availability of an informal caregiver within the household.

In **chapter three,** I compare the determinants of LTC use in the Netherlands and in Germany to understand how differences in LTC use are associated with differences in LTC financing. Although the overall prevalence of LTC use is comparable in these two countries, patterns of LTC use differ: the prevalence of using formal care is higher in the Netherlands, while informal care use dominates in Germany.

This difference may be explained by differences in LTC financing because LTC financing affects the incentives for users and hence may affect their choices regarding the amount and the types of LTC that they use. The LTC financing systems in the Netherlands and Germany are similar in many aspects but public LTC insurance coverage is more comprehensive in the Netherlands than in Germany. Furthermore, while in Germany the eligibility for public insurance benefits only depends on the care recipient's health and impairments, in the Netherlands for some types of LTC eligibility for public insurance benefits also depends on the absence of an informal caregiver.

A decomposition of the differences in use reveals that they are not the result of differences in the composition of the study samples. Instead, the differences in use are the result of differences in the comprehensiveness of public LTC insurance coverage and eligibility rules. The results furthermore suggest that the equity in access to LTC may be reduced when coverage is less comprehensive and the ability to care is not taken into account: formal care use is unrelated to income in the Netherlands, but in Germany use of formal care is lower among the poor than among the rich.

The financing and use differ across countries but may also change over time within a country. **Chapter four** aims to explain the drop in the rate at which the population aged 65 and over lives in a nursing home or residential home that occurred in the Netherlands between 2000 and 2008. The Dutch government has been promoting substitution of home care for institutional care for decades and between 2000 and 2008 a series of policy reforms was enacted that facilitated the elderly to live at home longer.

To find out how the policy reforms and the change in use are related, I decompose the differences in the probabilities of use of institutional care and homecare in two parts: the part that is related to changes in the distribution of the personal characteristics that determine LTC use and the part related to changes in the relationship between the determinants and LTC use, which is affected by how the system treats individuals with these personal characteristics. This decomposition reveals that, in the absence of changes in the way in which the system treats disability and other determinants of LTC use, the use of institutional care would have increased rather than decreased because of increases in the prevalence of disability and the mean age of the population aged 65 years and over. Yet, this increase is more than offset by changes in the relationship between institutional care use and its determinants. Much of the resulting drop in the rate of institutional care use is the result of a drop in the use of institutional care by individuals with no or mild disability; the probability of institutional care use does not decrease for individuals with severe disability.

The finding that institutional care use decreased among respondents with no or mild disability but not among those with severe disability suggests that LTC use was better tailored to need in 2008 than in 2000. Furthermore, our findings show that policies that aim to help the elderly to continue to live at home, e.g. through home care, may be effective in keeping LTC expenditures in check.

*Part two: How can the government intervene to achieve its goals?*
To keep LTC affordable and efficient, the government may provide comprehensive public insurance coverage. Yet, like private LTC insurance, public LTC insurance suffers from the negative consequences of moral hazard: high LTC expenditures and a suboptimal allocation. These negative consequences may be limited by restricting the demand or the supply of LTC.

In **chapter five,** I describe how four European countries with universal public LTC insurance curb expenditures through demand-side rationing targeting *consumers* – measures that aim to keep the demand for formal care in check, e.g. cost sharing and coverage restrictions – and managed competition, which aims to incentivize *insurers* to act as prudent buyers of LTC for all enrollees.

All four countries – Belgium, Germany, the Netherlands and Switzerland – use demand-side rationing, yet they differ in which types of measures they use. Furthermore, the exact design of the measures differs across these countries. These differences in the design may affect the impact of the measures on efficiency and universal access. That is, for example,

the four countries have all introduced co-payments but differ in the way in which these co-payments are designed. High co-payments may have a larger impact on demand and thus improve efficiency. But they may also cause consumers who need formal care to forego this care, which would lead to a less efficient allocation of resources and hence the net effect of the size of the co-payments on efficiency is not clear a priori. High co-payments may increase the inequity in access to LTC, especially if they are not related to the care recipient's income and wealth.

Unlike demand-side rationing, which is used in all four countries, managed competition has only been expanded from health insurance to LTC insurance in Belgium and Switzerland – and recently to home care in the Netherlands. Its impact on efficiency has not been evaluated so far and may depend on whether a number of preconditions may be fulfilled, e.g. whether insurers have instruments that enable them to counter moral hazard, whether there is a sufficient number of critical consumers and whether they may be given appropriate financial incentives.

Only when insurers bear financial risk, they may have financial incentives to organize LTC efficiently. Yet, financial risk for insurers alone is not sufficient to guarantee this. When financial risk is combined with mandatory community rating and open enrolment, it is attractive for insurers to select enrollees whose expected LTC expenditures are lower than the community-rated premium that they pay. These incentives for risk selection are usually limited through risk-adjusted subsidies. Hence, adequate risk adjustment is a necessary precondition for managed competition.

The extent to which this precondition may be fulfilled is examined in **chapter six.** There is little experience with risk adjustment for LTC insurance and the experience with risk adjustment in health insurance may not be easily transferable because there are fewer LTC users than there are health care users and because expenditures conditional on any use are high and persistent, which makes it easy and attractive for insurers to detect enrollees who are expected to yield a loss for them. Furthermore, LTC expenditures heavily depend on the supply of informal care and information on informal care use is often not available for risk adjustment.

For many subgroups of enrollees that generate a predictable loss for insurers, a risk adjustment model based on prior use of LTC and health care and on demographic information reduces this predictable loss. However, a substantial loss persists for some large groups of enrollees who used LTC or health in the prior year. This finding means that further

refinements of the risk adjustment model may improve the incentives for insurers to act as prudent buyers of LTC.

While the use of information on prior LTC use in a risk adjustment model reduces the insurers' incentives for risk selection, it also reduces the insurers' incentives for efficiency because it means that in some cases expenditures are fully or partially paid for through increased risk adjusted subsidies in subsequent years. Hence, in this form, reducing the insurers' incentives for risk selection comes at the cost of reduced incentives for efficiency. This tradeoff may be avoided i) by replacing information on prior LTC use by information on the underlying determinants of LTC or ii) by only including information on prior use that cannot be manipulated easily.

*LTC expenditure growth is at least partly a choice*
This thesis shows how LTC financing influences the incentives for individuals and for insurers. In turn, incentives for individuals and insurers are associated with how much LTC is used and which types are used by whom. These findings mean that the LTC expenditure growth rate may be influenced through policy reforms. Therefore, while population ageing is expected to increase LTC expenditures, the LTC expenditure growth rate is at least partly a choice. Future research may show how recent LTC financing reforms in the Netherlands affect LTC use and expenditures, both in the short run and the long run. These reforms may also be used to study how LTC expenditures affect the health of the elderly and their demand for health care. The evidence on the impact of LTC financing that this research would provide may shed light on whether the Dutch outlier position with respect to LTC financing is sustainable and on whether it is justified.

# Nederlands

*Moeten we de manier waarop de ouderenzorg gefinancierd wordt heroverwegen?*

Langdurige zorg helpt ouderen en gehandicapten om met hun beperkingen te leven en hun zelfstandigheid zoveel mogelijk te behouden. Langdurige zorg wordt thuis of in een zorginstelling geboden door professionals (formele zorg) of door familieleden, vrienden of buren (mantelzorg). De grootste groep gebruikers van langdurige zorg zijn de ouderen. Aangezien als gevolg van de vergrijzing het aantal ouderen sterk toeneemt, stijgen naar verwachting ook de uitgaven aan langdurige zorg voor ouderen (vanaf nu: ouderenzorg).

In veel landen wordt een groot deel van de ouderenzorg publiek gefinancierd. Als de uitgaven aan ouderenzorg sneller groeien dan de economie gaan de extra uitgaven ten koste van andere publieke uitgaven, moet er meer belasting worden betaald of komt de rekening ten laste van toekomstige generaties. In alle drie de gevallen leidt de stijging mogelijk tot een afname van de steun voor de omvangrijke herverdeling die het gevolg is van publieke uitgaven aan ouderenzorg. De stijging van de publieke uitgaven aan ouderenzorg bedreigt de steun hiervoor in alle landen maar de dreiging is bijzonder groot in Nederland omdat Nederland een bijzondere positie inneemt wat betreft de financiering van de ouderenzorg: de publieke ouderenzorgverzekering biedt zeer omvangrijke dekking en de publieke uitgaven aan ouderenzorg zijn de hoogste van alle oeso-landen.

Ondanks de vergrijzing is een sterke stijging van de uitgaven aan ouderenzorg wellicht vermijdbaar. Mogelijk kan de ouderenzorg betaalbaar te blijven door bijvoorbeeld de financiering ervan aan te passen. De manier waarop de ouderenzorg wordt gefinancierd beïnvloedt namelijk voor gebruikers van ouderenzorg, verzekeraars, aanbieders van formele zorg en (potentiele) mantelzorgers hoe aantrekkelijk elk van de typen ouderenzorg in financieel opzicht voor hen is. Uiteindelijk beïnvloedt de financieringsvorm zo mogelijk ook welke keuzes ze maken.

In mijn proefschrift beschrijf ik hoe de financieringsvorm de financiële gevolgen van keuzes beïnvloedt en hoe de financiële gevolgen van keuzes op hun beurt de besluiten van individuen en verzekeraars beïnvloeden. Dit onderzoek bestaat uit twee delen. In het eerste deel onderzoek ik de associatie tussen de manier waarop ouderenzorg gefinancierd wordt en het gebruik van ouderenzorg. In het tweede deel van dit proefschrift beschrijf ik hoe de overheid de betaalbaarheid en doelmatigheid van de ouderenzorg kan beïnvloeden door een publieke verzekering

in te stellen die een omvangrijke dekking biedt tegen uitgaven
aan ouderenzorg.

*Deel 1: Hoe hangen de manier waarop de ouderenzorg gefinancierd
wordt en het gebruik ervan met elkaar samen?*
Om de relatie tussen de manier waarop de ouderenzorg gefinancierd
wordt en het gebruik van ouderenzorg in kaart te brengen, analyseer
ik eerst welke persoonlijke kenmerken in Nederland gerelateerd zijn
aan (veranderingen in) het gebruik van ouderenzorg **(hoofdstuk twee).**
Uit de analyse in hoofdstuk twee concludeer ik dat beperkingen een
goede voorspeller zijn voor wie mantelzorg of formele zorg gebruikt,
net als de aanwezigheid van een mantelzorger. Daarnaast gebruiken
vrouwen vaker formele zorg dan mannen en is ook de relatie tussen
het gebruik van formele zorg en leeftijd positief. De analyse van veran-
deringen in het gebruik van ouderenzorg laat zien dat de kans dat res-
pondenten formele zorg beginnen te gebruiken stijgt als hun algehele
gezondheid verslechtert, als het aantal beperkingen toeneemt en de
echtgenoot of partner wegvalt, wat er mogelijk op wijst dat een echt-
genoot een belangrijke bron van steun en zorg is.

De in hoofdstuk twee beschreven determinanten van het gebruik
van ouderenzorg komen overeen met de criteria die bepalen wie in
aanmerking komt voor publiek gefinancierde ouderenzorg. Die criteria
bepalen dat de toegang tot zorg alleen afhankelijk is van de beperkingen
en de gezondheid van de aanvrager en van de aanwezigheid van een
potentiele mantelzorg binnen het huishouden van de aanvrager.

In **hoofdstuk drie** vergelijk ik de determinanten van het gebruik van
ouderenzorg in Nederland en Duitsland om te laten zien hoe verschillen
in het gebruik van ouderenzorg gerelateerd zijn aan verschillen in de finan-
ciering ervan. Hoewel de prevalentie van het gebruik van ouderenzorg
in Nederland en Duitsland gelijk is, gebruiken ouderen in Nederland
vaker formele zorg, terwijl in Duitsland ouderen vaker alleen mantelzorg
gebruiken. Dit verschil kan mogelijk verklaard worden door verschillen
in de manier waarop de ouderenzorg in deze twee landen gefinancierd
wordt want de financieringsvorm beïnvloedt hoe aantrekkelijk elk van
de typen ouderenzorg in financieel opzicht is voor gebruikers en beïn-
vloedt op die manier mogelijk ook wie ouderenzorg gebruikt, en of dat
mantelzorg, formele zorg of een combinatie daarvan is.

De manier waarop ouderenzorg gefinancierd en georganiseerd wordt
in Nederland en Duitsland is grotendeels vergelijkbaar, maar niet vol-
ledig identiek. De dekking die de Nederlandse publieke verzekering
biedt is namelijk veel omvangrijker dan die van de Duitse publieke
verzekering. Daarnaast zijn de criteria op basis waarvan bepaald

wordt wie toegang heeft tot publiek gefinancierde ouderenzorg verschillend: in Duitsland spelen alleen de gezondheid en de beperkingen van de aanvrager een rol terwijl in Nederland het voor sommige typen ouderenzorg ook van belang is of er in het huishouden een potentiele mantelzorger woont.

Uit de decompositie-analyse blijkt dat het verschil tussen beide landen in het gebruik van ouderenzorg kan niet verklaard worden aan de hand van verschillen in de samenstelling van de gebruikte steekproeven; het is gerelateerd aan verschillen in de omvang van de dekking die de publieke verzekering biedt en in de criteria voor toegang tot publiek gefinancierde zorg. De resultaten van deze analyse wijzen daarnaast erop dat een publieke verzekering die slechts weinig dekking biedt en toegangsbeslissingen die geen rekening houden met de aanwezigheid van mantelzorg leiden tot oneerlijke verschillen in de toegang tot ouderenzorg: terwijl het gebruik van formele zorg in Nederland niet gerelateerd is aan het inkomen van de respondent, maken in Duitsland de relatief arme respondenten minder vaak gebruik van formele zorg dan de rijkeren.

**Hoofdstuk vier** beoogt de daling in het gebruik van intramurale zorg in Nederland tussen 2000 en 2008 te verklaren. De Nederlandse overheid probeert er al decennia voor te zorgen dat ouderen langer thuis kunnen wonen en dat ze thuiszorg in plaats van intramurale zorg gebruiken. Om die reden voerde de overheid tussen 2000 en 2008 een serie beleidswijzigingen door. Om erachter te komen of de veranderingen en de beleidswijzigingen gerelateerd waren, deel ik de veranderingen over tijd in het gebruik van institutionele zorg en in het gebruik van thuiszorg op in twee delen: i) het deel dat samenhangt met veranderingen in de samenstelling van de populatie ouderen en ii) het deel dat samenhangt met veranderingen in de relatie tussen het gebruik van ouderenzorg en persoonlijke kenmerken. De relatie tussen het gebruik van ouderenzorg en persoonlijke kenmerken wordt mogelijk beïnvloedt door de rol die die kenmerken spelen bij het bepalen van wie toegang krijgt tot zorg.

Deze decompositie van het verschil laat zien dat, zonder de veranderingen in de rol die elk van de persoonlijke kenmerken speelt in de toegang tot ouderenzorg, stijgingen in de prevalentie van beperkingen en de gemiddelde leeftijd binnen deze subgroep van de populatie ertoe zouden hebben geleid dat meer ouderen gebruik zouden hebben gemaakt van intramurale zorg in 2008 dan in 2000. Veranderingen in de relatie tussen het gebruik van intramurale zorg en persoonlijke kenmerken hadden echter het tegenovergestelde effect en dit negatieve effect was groter, waardoor het gebruik van intramurale zorg daalde. Een groot deel van die daling wordt veroorzaakt door een daling van het gebruik

van intramurale zorg binnen de subpopulatie met geen of slechts matige beperkingen.

Deze resultaten laten zien dat het gebruik van intramurale zorg in 2008 sterker geconcentreerd was binnen de groep die deze zorg het hardste nodig had dan in 2000. Daarnaast laten ze zien dat overheidsbeleid dat ouderen faciliteert en stimuleert om langer thuis te wonen, bijvoorbeeld door het aanbod van thuiszorg te vergroten, mogelijk een effectieve manier is om de uitgaven aan ouderenzorg te beperken.

*Deel twee: hoe kan de overheid ingrijpen om haar doelen te halen?*
In het tweede deel van dit proefschrift beschrijf ik hoe de overheid de betaalbaarheid en doelmatigheid van de ouderenzorg kan beïnvloeden door een publieke verzekering in te stellen die een omvangrijke dekking biedt tegen uitgaven aan ouderenzorg. Maar net als private ouderenzorgverzekeringen gaat een publieke ouderenzorgverzekering gebukt onder de negatieve gevolgen van moral hazard: hoge uitgaven en een suboptimale allocatie. Deze negatieve gevolgen kunnen ingeperkt worden door de vraag naar of het aanbod van ouderenzorg in te perken.

In **hoofdstuk vijf** beschrijf ik hoe vier Europese landen met een universele publieke ouderenzorgverzekering de uitgaven aan ouderenzorg beperken door middel van beleidsmaatregelen gericht op de vraagzijde: i) maatregelen gericht op consumenten, zoals eigen betalingen en uitgavenbeperkingen, en ii) gereguleerde concurrentie, waarmee verzekeraars gestimuleerd worden om doelmatige ouderenzorg in te kopen voor al hun verzekerden.

In alle vier de landen (België, Duitsland, Nederland en Zwitserland) worden maatregelen gebruikt die zijn gericht op verzekerden. Maar er zijn wel verschillen tussen deze vier landen in het type maatregelen dat gebruikt wordt en in de vormgeving ervan. De verschillen in de vormgeving beïnvloeden mogelijk de invloed van de maatregelen op de doelmatigheid van de zorg en op de universele toegang tot ouderenzorg. Alle vier de landen berekenen bijvoorbeeld door middel van eigen betalingen een deel van de kosten van de gebruikte ouderenzorg door aan de gebruikers maar verschillen in de wijze waarop de hoogte van de eigen betalingen berekend wordt. Omvangrijke eigen betalingen remmen de vraag naar ouderenzorg waarschijnlijk sterker dan kleine eigen betalingen en hebben op die manier wellicht ook een sterker effect op de doelmatigheid. Maar omvangrijke eigen betalingen zorgen er mogelijk ook voor dat verzekerden die baat hebben bij formele zorg deze zorg niet afnemen en op die manier zou de doelmatigheid juist afnemen. Het totale effect van de omvang van eigen betalingen op de doelmatigheid van de ouderenzorg is daarom vooraf onduidelijk. Tegelijkertijd

leiden omvangrijke eigen betalingen mogelijk wel tot onrechtvaardige verschillen in de toegang tot zorg, zeker als bij het vaststellen van de hoogte ervan geen rekening wordt gehouden met het inkomen en het vermogen van de zorggebruiker.

Terwijl alle vier de landen maatregelen gericht op verzekerden gebruiken, hebben alleen België en Zwitserland gereguleerde concurrentie ingevoerd in de ouderenzorg. Het effect van gereguleerde concurrentie op de doelmatigheid van de ouderenzorg is niet bekend en hangt mogelijk af van de mate waarin aan een aantal voorwaarden kan worden voldaan, bijvoorbeeld of de financiële prikkels voor verzekeraars hen stimuleren tot doelmatigheid, of verzekeraars voldoende instrumenten hebben om moral hazard tegen te gaan en of er voldoende verzekerden zijn die op zoek gaan naar de verzekering die het beste bij hen past.

Alleen als verzekeraars financieel risico op zich nemen, hebben ze prikkels om de ouderenzorg doelmatig te organiseren. Maar financieel risico is niet afdoende want als verzekeraars financieel risico lopen maar ook een acceptatieplicht hebben en verplicht zijn om een doorsneepremie voor hun verzekeringspolis te vragen, is het aantrekkelijk voor ze om verzekerden te selecteren voor wie de verwachte zorguitgaven lager zijn dan de doorsneepremie. Door middel van risicoverevening wordt geprobeerd om deze situatie te voorkomen. Een randvoorwaarde voor een positief effect van gereguleerde concurrentie op de doelmatigheid van de ouderenzorg is dus dat er een adequaat risicovereveningssysteem is.

In **hoofdstuk zes** onderzoek ik de mate waarin aan deze randvoorwaarde kan worden voldaan. Er is weinig ervaring met risicoverevening voor de ouderenzorg en het risicovereveningssysteem voor zorgverkeringen is om een aantal redenen niet zomaar te kopiëren. Uitgaven aan ouderenzorg zijn namelijk sterker geconcentreerd binnen een kleine groep gebruikers dan uitgaven aan curatieve zorg en gebruikers hebben vaak gedurende meerdere jaren hoge uitgaven. Dat maakt het voor verzekeraars eenvoudig én aantrekkelijk om verzekerden op te sporen op wie ze naar verwachting verlies lijden. Tot slot zijn uitgaven aan ouderenzorg sterk afhankelijk van het aanbod van mantelzorg terwijl informatie over het aanbod van mantelzorg niet op grote schaal beschikbaar is en dus niet gebruikt kan worden om het vereveningssysteem te verbeteren.

Een vereveningsmodel dat gebaseerd is op het gebruik van ouderenzorg en gezondheidszorg in voorgaande jaren en op demografische achtergrondkenmerken beperkt het voorspelbare verlies dat verzekeraars zouden lijden voor veel subgroepen van verzekerden. Voor een aantal subgroepen van verzekerden die in het verleden zorg hebben gebruikt blijft echter een substantieel verwacht verlies bestaan. Dit resultaat

betekent dat verdere verbeteringen van het verevingsmodel leiden tot sterkere financiële prikkels voor verzekeraars om doelmatige ouderenzorg in te kopen.

Hoewel het gebruik van informatie over het gebruik van ouderenzorg en gezondheidszorg in voorgaande jaren in het verevingsmodel de prikkels voor verzekeraars verkleint om bepaalde verzekerden te selecteren, verkleint het gebruik van deze informatie ook de prikkels voor doelmatigheid voor verzekeraars: het gebruik van deze informatie betekent dat in sommige gevallen een verzekeraar extra zorguitgaven in een later jaar deels of volledig terugkrijgt in de vorm van een hogere verevings- bijdrage. Deze afruil tussen prikkels voor doelmatigheid en prikkels voor risicoselectie kan vermeden worden door i) de informatie over het gebruik van ouderenzorg in voorgaande jaren te vervangen door informatie over de persoonlijke kenmerken van gebruikers van ouderen- zorg en ii) door alleen informatie uit voorgaande jaren op te nemen voor typen zorg waarvan het gebruik voor de verzekeraar moeilijk te beïnvloeden is.

*Hoe snel de ouderenzorguitgaven stijgen is deels een keuze*
Dit proefschrift laat zien hoe de manier waarop de ouderenzorg ge- financierd wordt invloed heeft op hoe aantrekkelijk elk van de typen ouderenzorg in financieel opzicht is voor gebruikers en verzekeraars. Het proefschrift laat daarnaast zien dat de keuzes wat betreft het gebruik van ouderenzorg inderdaad samenhangen met de financiële gevolgen ervan voor gebruikers en verzekeraars. Deze resultaten betekenen dat de overheid door middel van beleidswijzigingen invloed uit kan oefenen op de snelheid waarmee de uitgaven aan ouderenzorg groeien: hoewel die uitgaven naar verwachting verder zullen stijgen als gevolg van de vergrijzing, is de snelheid waarmee ze stijgen dus deels een keuze. Verder onderzoek zou uit kunnen wijzen wat het effect is van de recente hervormingen van de financiering en organisatie van de ouderenzorg in Nederland op de uitgaven aan zorg voor ouderen, zowel op de korte als op de lange termijn. Die hervormingen kunnen ook gebruikt worden om de invloed te achterhalen van hogere uitgaven aan ouderenzorg op de gezondheid en levensverwachting van de ouderen die gebruik maken van die zorg. De kennis over deze effecten van hervormingen van de financiering van de ouderenzorg in Nederland draagt bij aan het beantwoorden van de vraag: is de uitzonderingspositie die Nederland inneemt als het gaat om de financiering van ouderenzorg houdbaar en gerechtvaardigd?

# Curriculum Vitae
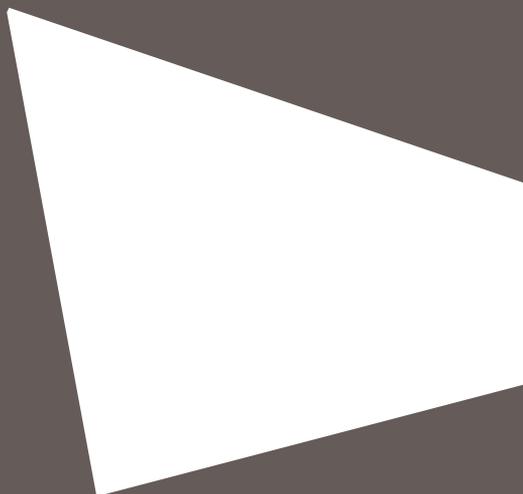
Pieter Bakx (1985) attended Radboud University Nijmegen, where he completed a BSc in economics and a BSc in public administration in 2007. He subsequently completed a MA in economics at Boston University in 2008. After he returned the Netherlands, he first enrolled in the MSc program Health Economics, Policy and Law and then became a PhD student at the Institute of Health Policy and Management, Erasmus University Rotterdam.

At the Institute of Health Policy and Management, Pieter studies and teaches about health care financing. His research on the financing and organization of long-term care in the Netherlands, which resulted in this thesis, was funded by an IBMG grant for innovative PhD research and was part of the Netspar project Health and Income, Work and Care across the Life Cycle II. From March 2013 through February 2014, he was involved in the Impact of Medical Technology project at the National Institute for Public Health and the Environment (RIVM). After he graduates, Pieter continues to be affiliated with Erasmus University Rotterdam.

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There are these two young fish swimming along, and they happen to meet an older fish swimming the other way, who nods at them and says, 'Morning, boys, how's the water?' And the two young fish swim on for a bit, and then eventually one of them looks over at the other and goes, 'What the hell is water?'

From: This is water, David Foster Wallace (2005)

I have been working at Erasmus University for five years now and some of you I have known for even much longer. Of all the traditions surrounding the graduation, writing the acknowledgment is dearest to me because it is a good occasion to think and to write about '[…] the most obvious, ubiquitous, important realities [which are also] often the ones that are the hardest to see and talk about' (Wallace, 2005). I am glad I have this opportunity now.

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