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Long-Term Care, Wealth and Housing

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Abstract

We study long-term care demand in the Netherlands for a sample of elderly Dutch households using detailed administrative data. Long-term care in the Netherlands is provided by a public health care system that is generous in comparison to that in many other countries, but offers few possibilities for differentiation. Moving to a nursing home is generally postponed as long as possible because of the loss of privacy involved, while use of care at home increases. We test three hypotheses: i) wealthier people are better able to postpone a move to a nursing home, ii) those who own the house in which they live stay there longer when health deteriorates, and iii) those living in a house that is especially suitable for elderly are better able to postpone a move to nursing home. Results of our analyses confirm hypothesis i) but reject or do not find substantial evidence to confirm ii) and iii).

1 Introduction

During the last decades health care costs have outpaced GDP growth in Western countries. For instance, in 2011, the Netherlands spent 70.1 billion euro on health care, which corresponds to 11.9 percent of GDP (OECD, 2013). This is the second highest percentage among OECD countries after the United States, and the figures of a number of other European countries are close to those of the Netherlands. The high score of the Netherlands is mainly due to its system of long-term care (LTC). The costs of Dutch curative care as a percentage of GDP are close to the OECD average, but the costs of LTC are 3.7 percent of GDP in 2011, far above the average of 1.6 percent. More than 800,000 Dutch people, of a total of around 16 million, make use of LTC. About 15% of the total is care for disabled, another 15% is care for chronic psychiatric patients and the remaining 70% is care for elderly people (KVS Preadviezen 2012). Besides the high use of public LTC, the exceptionally low co-payments in the Netherlands are another important reason for the relatively sharp rise in government spending (Ministerie van Financiën, 2010).

In the upcoming years, the OECD expects that LTC expenditures in the Netherlands will continue to rise, due to population aging. Important determinants of the upward pressure on LTC expenditure are the increase in average age due to the decline in births since World War II and the continuing rise in life expectancy. The outflow of the baby-boom generation from the labor force started in 2011. Since that year the share of in the age group of 20 to 65 began to fall while that of people over 65 started to increase. According to a population forecast of Statistics Netherlands (CBS), aging will cause an increase in the relative proportion of 65+ from 16% in 2012 to 26% in 2040[1] and an increase in the absolute number of individuals aged 65 and older from 2.7 million in 2012 to 4.7 million in 2040 (van Duin & Stoeldraijer, 2012). Given this relative and absolute increase of elderly people and their high use of LTC, a further increase in LTC expenditures appears to be inevitable. This prospect has motivated the long-term care reform that is in currently underway in the Netherlands.

Since 2000 a number of legislative and regulatory changes governing LTC system have taken place resulting, among others, in an increase of compulsory co-payments for the use of LTC. Another important aspect is the emphasis on outpatient care, which refers to the shift from care provided in institutions to care provided at the client's home. Besides the reduction of high institutional costs, to which it is expected to lead, this is motivated by the wish of elderly people to stay in their own place as long as possible (Nieboer et al., 2010; Rouwendal & Thomese, 2013). The policy to postpone institutionalization and provide more care at home already started in 2013 and proceeds in stages. Since then, new patients need an assessment provided by a government agency for extramural care and support (in types and classes) in case patient's condition allows that. Recent changes include a greater responsibility and role of municipalities in provision of LTC, and in particular its extramural component. Besides, a part of LTC services will still be covered by general health insurance (called ZVW).

This paper aims to shed light on three potentially important aspects of the policy to encourage extra-muralization of long-term care. The first is the relationship to wealth. Although there are

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[1] In 1900 the share of persons aged 65+ in the population was only 6%.

many possibilities for making one's own arrangements for deteriorating health at older age, it may be reasonably conjectured that wealthier people have an advantage. For instance, they have the means to adjust the house in which they live in such a way that it becomes more suitable for old age. They are able to pay for additional care – that is not financed by the public health care system – to avoid a move to a nursing home, as many people would like to do as long as possible. And according to some analysts, there may be an implicit contract with the heirs to provide informal care, which would result in a similar effect.[2]

Second, one may expect there to be a relationship with homeownership. One may expect homeowners to be more eager to stay in their property as long as possible than renters to stay in their house when health deteriorates. This effect may be reinforced by the tendency of homeowners to be less mobile than renters, especially at older age, and therefore to be stronger rooted in their neighborhood and have a stronger resistance against moving.

Third, one would expect that some houses are more suitable for elderly people who experience deteriorating health than others. For instance, the need to climb stairs to reach the bedroom or bathroom from the living room causes problems when walking becomes more difficult. It may therefore be expected that those living in a house without stairs[3] have better possibilities to postpone a move to a nursing home by receiving more care at home. In the Netherlands particular types of housing qualify as 'elderly dwellings' (ouderenwoningen) and it seems probable that households living in such dwellings will be in a better position to postpone a move to a nursing home than others.

To address these issues, we make use of a unique combination of data about housing, LTC use and wealth. We consider Dutch households with at least one member aged 55 or more who participated in the WoON survey of 2009, and add information on their demand for long-term care in the 3 concurring years and their wealth, making use of administrative data.

Empirical assessment of the determinants of long-term care use and the associated expenditures are of great importance for health policy decisions. De Meijer has already put a great effort on this subject (De Meijer, 2012). For example, she showed that disability is an important determinant of long-term care use and the associated expenditures, while self-reported health and chronic conditions are less important. In this study, we like to expand this line of research. In addition to studied determinants such as demographic and health characteristics we are able also to take into account household wealth and housing characteristics. A better insight into the relationship between health- and housing characteristics of elderly people (55 years and older) with their long-term care utilization and associated expenditures is of great relevance to policy and practice of LTC reform and its transition to the higher degree of extramuralization.

The remainder of the paper is organized as follows. In the next section we discuss some aspects of the Dutch long-term care system. In section 3 we discuss the data and in section 4 we present some preliminary results on the joint distribution of wealth, homeownership and

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[2] Compare the 'strategic bequest motive of Bernheim et al. (1985)
[3] In Dutch referred to as a 'nultreden woning.'

LTC expenditure. Sections 5 and 6 report an econometric analysis of this expenditure using a two-part model. Section 7 concludes.

2 The Dutch long-term care system

In 1968, the Netherlands was the first OECD country that introduced a universal mandatory insurance system for medical expenses that were difficult to insure on the market, the Extraordinary Medical Expenses Act, abbreviated in Dutch as AWBZ. Long-term care (LTC) was covered entirely by this law. An important purpose of the system was to provide a broad coverage of LTC services to all who need it through a collective insurance scheme. The system mainly serves elderly, chronic mentally handicapped and disabled persons. It was originally funded exclusively through mandatory premium payments based on the income of workers. [4] At a later stage additional funding from other tax revenues was added. Adults who make use of the system also have to pay an income-dependent co-payment. Since 2007, the provision of domestic help like household work, aiding tools (such as wheel chairs) and home adjustments is decentralized to municipalities. This responsibility is formalized in the Social Support Act (WMO) which as of 2015 was extended to all care provided at home. The AWBZ was replaced in 2015 by the Wet Langdurige Zorg (Law on LTC), but since our data stop in 2011, there is no need to relate the recent developments in Dutch LTC provision here.[5]

In the course of time expenditure covered by the AWBZ increased considerably and several attempts to improve control were introduced. An important change occurred in 2004: since that year eligibility for AWBZ care must be assessed by the Care Assessment Centre (CIZ) that uses national standardized indication procedures. CIZ decides on eligibility for care in an institution or at home on the basis of request filed by patients, their relatives or their health care providers. The amount and sort of care is specified in standard units called Care Intensity Packages (ZZPs).[6] Patient can then consume the care from a care office (for care at home) or a nursing home that is part of the public health care system and receive the care in kind. Alternatively, they have the possibility to opt for a cash benefit ("personal budget", abbreviated as PGB) and purchase care themselves outside the public health care system.[7] The analysis that follows refers only to patients who make use of the public health care system.[8]

3 Data, study population and costs of LTC

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[4] For those whose income exceeds a minimum, y^{min}, the AWBZ premium is determined a share of $[y^* - y^{min}]$ where $y^* = \min \{y, y^{max}\}$, y is one's actual income and y^{max} is a maximum set by the government. Additional funding from other means was thought desirable in order to prevent the marginal rate to become to high.

[5] For a more detailed description of the health care services in the Netherlands before the long-term care reform happening at the moment of writing, the reader is referred to two reports of the Leyden Academy (Rolden & Van der Waal, 2012, 2013).

[6] for sectors in Nursing & Care (VV), Disabled Care (GHZ) and Mental Health Care (GGZ). Care at home has distinctions between Personal Care (PV), Nursing (VP) and Individual Assistance (BGI).

[7] This possibility was introduced in 1996.

[8] Cash benefits accounting for 11% of total expenditures (Schut, Sorbe, & Høj, 2013).

As indicated above, we combine information from several datasets. The core of the data we analyse is derived from the Netherlands Housing Research 2009 (WoON 2009), a survey that contains information about the living situation and dwelling characteristics, but also about the self-reported health status and standardised ADL/HDL indicators. We selected the persons aged 55 and above. The resulting dataset was supplemented with administrative data available from Statistics Netherlands (CBS). This concerns in the first place information about personal and household characteristics from the Dutch Municipal Register (GBA), such as date of birth and death, having a partner for everyone registered in a Dutch municipality. Below we present more detailed information about the datasets we use. Moreover, through a unique anonymous identification key the WoON respondents could be combined with information from the Care Assessment Centre (CIZ) about indications for long-term care in the three years that follow (2009-2011) as well as with data from the Central Administration Office (CAK) about actual long-term care use. Finally, we were able to add information about (household) wealth from the Tax Office (Belastingdienst). In what follows we discuss these data in greater detail and explain how we approximated the cost of long-term care consumed.

3.1 Netherlands Housing Research (WoON)

The Netherlands Housing Research (WoON) is the successor of the Housing Needs Survey (WBO), a series of cross sections that started before 1981. It is the largest nationwide study in the Netherlands in the field of housing, households and their overall life situation. The target population is the Dutch population living in private households – thus excluding institutionalized persons. The survey contains a wealth of information on housing characteristics such as whether the house is suitable for elderly people, and health such as ADL/HDL indicators. WoON consists of three-yearly cross-section samples of at least 40,000 respondents. The samples are drawn from all persons of 18 years and older in the GBA. Questionnaires by telephone, face-to-face or internet are conducted for the data collection.[9] As indicated above, for this study we use the WoON survey conducted in 2009. We select respondents aged 55 years and older who are (partner of) the main tenant/owner of the house.

3.2 Care Assessment Centre (CIZ)

This dataset contains all valid indications – which give access to AWBZ-funded long-term care – issued by the CIZ to persons who are registered in the GBA. Indications are usually issued with a maturity of five years.[10]

It is important to note that a CIZ-indication is a necessary condition for being able to receive AWBZ-funded care, but that there does not exist a one-to-one relationship between the indication and actual use of LTC in the data. Persons having an indication who do not always show up in the data about actual use might pay their care from a personal budget (PGB) or might still be waiting to receive care. It should be noted that our data about actual use of long-

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[9] Sampling was not spatially uniform because some municipalities and regional partnerships were deliberately oversampled. The sample weights are present in the data.

[10] Indications issued before 2003 are missing in our data and indications in the period of 2003-2005 are incomplete. It is therefore possible that indications valid in 2009 or 2010 are missing in our data because they were issued in 2004 or 2005.

term care also cover WMO-funded domestic help for which no indications are issued by the CIZ. In our analyses we shall only use the actual use of LTC as a dependent variable.

The total sample for this study – consisting of the people from WoON 2009 aged 55 years and older who can be classified as (partner of) the head of the household or (partner of) the main tenant/owner of the house, and excluding the persons that have an indication but do not show up in the data about actual LTC use – consists of 28,270 respondents.

3.2 Central Administration Office (CAK)

For those who obtained an indication from CIZ, CAK registers the care that is actually consumed from the public system. This information is collected in two datasets.

AWBZ-funded care with residence

This dataset contains all care with residence funded by the AWBZ. The data refer to long as well as short institutionalized stays. Persons aged 18 years and older making use of this type of care are legally obliged to make co-payments.[11] This is usually from the first day of institutionalization or the issue of an indication for an institutionalization until the last day of institutionalization. The data is recorded with number of days as a measurement unit.

Care in kind without residence

This dataset contains data of persons who received care in kind without residence which is funded by the AWBZ or WMO and for which one has to pay an own contribution. WMO-funded care without residence includes Domestic Help and AWBZ-funded care without residence includes Personal Care, Nursing and since 2011 also Individual Assistance. For this study we focus on AWBZ-funded care, thus excluding domestic help. The data is recorded with hours of care as a measurement unit.

3.4 Wealth

Wealth indicators used in our analyses come from the Consolidated Wealth Account.[12] It includes various wealth components split according to the Dutch tax system. Housing wealth is computed as net housing wealth, i.e. the value of an owned property excluding the mortgage. Residual financial wealth is taken as wealth reported in box 3 of Dutch income declaration form, and comprises all financial wealth assets beyond the owner-occupied house (and may include a second dwelling owned)[13] and income from material interest[14]. Al wealth data are taken as of 2009.

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[11] Persons younger than 18 years do not have to pay an own contribution and are thus not included in the dataset. As we focus on respondents aged 55 years and older this is no limitation for this study.

[12] In Dutch: Integraal Vermogens Bestand.

[13] Our information originates from the tax authority, which implies that residual wealth (or wealth reported in Box 3 of the tax system) is only observed if it exceeds a tax-free threshold. Wealth tax redemption in 2009 amounted to 20,661 €for single individuals and double of that for households consisting of fiscal partners. For

3.5 Computing the cost of long-term care

Our data inform us about the assessments for long-term care provided by CIZ since 2009 and about the consumption of care in hours (for care without residence) or days (for care with residence). Prices for the different types of inpatient care and the different functions of outpatient care are provided by the Dutch Healthcare Authority (NZa), and we use this information to estimate individual costs. We use the prices of 2014, see (NZa, 2014a, 2014b).

For persons who received AWBZ-funded care without residence in kind we calculate the total costs as multiplying the time of care used in hours by the associated price according to the NZa prescriptions. Costs of several types of care per person are summed up. Denoting the cost of care without residence as C_{ZZV}, the price per hour of care type i as α_i and the number of hours (minutes/60) per type of received care in kind as ZZV_i we thus compute:

$$C_{ZZV} = \sum_{i=1}^{3}(\alpha_i * ZZV_i). \tag{1}$$

For persons who received AWBZ-funded care with residence (ZMV), we similarly multiply the price per day of the relevant care type with the number of days it has been received:

$$C_{ZMV} = \sum_{k=1}^{M} p_k * D_k . \tag{2}$$

C_{ZMV} denotes the total cost of care with residence, p_k is the cost per day of type k of such long-term care, D_k is the number of days that the person has consumed care k with residence and the indication for care of type k was valid. That is, we simply multiply the number of days care with residence was consumed with the associated price per day of the particular care intensity package according to the NZa price list (NZa, 2014a). However, in practice computation of the costs could be more involved because persons may simultaneously have more than one indication for care intensity packages (CIP) and we do not always know the one that is actually consumed. In such cases we have used the average price per day of the CIPs that were valid on a day when care with residence was consumed.[15]

Over the time span of three years that we consider (2009-2011), individuals can have used both care with and without residence. The total cost of the consumed long-term care is the sum of the costs of long-term care with and without residence for each person:

$$C_{LTC} = C_{ZZV} + C_{ZMV} . \tag{3}$$

4 The distribution of health, wealth and housing

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elderly individuals of age 65 and above, extra tax redemption was applicable for households with low income up to 26,892€per person per year.

[14] Material or substantial interest is reported in box 2 of the Dutch income declaration and refers to income from partnerships, firms or companies where one has a substantial interest of at least 5% in a company (as owner, part-owner, senior partner, major shareholder etc.).

[15] In a few cases persons have received institutional care while there was no indication for a CIP known by us. We have calculated the average cost of care per day of the other periods of this person (if any) and used as it as an approximation to the daily costs. For persons for who no indication for a CIP was recorded in the dataset at all, while they did receive care we have calculated an overall average price of institutional per day of and multiplied this amount by their individual amount of days.

4.1 Descriptives

Table 1 shows the descriptive statistics of the study population concerning personal characteristics and wealth. For reference, we provide overall sample statistics, but we shall concentrate on the description of two types of households that appear to have distinctive features. Single person households (or singles, for simplicity) make up 40,5% of the sample, out of who 29% are males. Average household age in our sample is above 65 years (67.28); with 70,5 for single person households and 65 for couples. The proportion of college education or higher is higher among multi-person households (or couples for simplicity) with 35% vs 20% among singles. 81% of couples are both of native Dutch origin and 86% of singles. Data on health status reveals that according to ADL/HDL standardised measurement, almost ¾ of the couples do not have any disabilities (72%), but only 62% of singles. Across the distribution of ADL/HDL indicators, single elderly people are more likely to be in a worse health condition compared to the worst condition of at least one of the household members among the couples. The same holds for chronic diseases, with 34% of at least one member for couples and 46% for singles. Almost a quarter of singles resides in an elderly dwelling (same level accommodation with all rooms and utilities on the same level), while only one tenth of the couples does. Couples are more often home owner (63%) compared to singles (34%).

Concerning wealth indicators, Table 3 shows that couples possess on average double the wealth of single elderly individuals with total wealth amounting to as high as €306,32 for

Table 1. Descriptive statistics of the sample (N = 28,216), by household type. Standard deviations in parentheses.			
	ALL HOUSEHOLDS	SINGLE PERSON HSH's	MULTI-PERSON HSH's
Household characteristics			
1 person household	40,50%	---	---
Male	42,79%	29,23%	---
Ave household age	67,28	70,45	65,12
	(8,89)	(9,55)	(7,71)
College education (any in a household)	28,83%	20,39%	34,57%
Ethnicity (only Dutch in household)	82,77%	85,62%	80,82%
ADL/HDL disability (any in a household)			
none	68,14%	62,24%	72,16%
mild	6,55%	7,46%	5,93%
moderate	19,23%	23,17%	16,54%
severe	6,08%	7,12%	5,37%
Chronic disease (any in a household)	39,02%	45,92%	34,33%
Home owners	51,31%	33,93%	63,14%
Elderly dwelling	15,77%	24,27%	9,98%
Household wealth			
Total household wealth *	€ 245.015	€ 154.953	€ 306.322
	(700.554)	(487.476)	(808.603)
Net home equity	€ 124.232	€ 77.275	€ 156.196
	(195.576)	(158.524)	(211.331)
Residual household wealth	€ 120.784	€ 77.678	€ 150.127
	(622.416)	(418.414)	(727.897)

N households in the sample	28.216	11.428	16.788

couples and €154,95 for singles. Total wealth is divided about equally between home equity and residual wealth.

Table 2 reports average costs of long-term care, by type of care, and by wealth possession and household type. This cross-tabulation consists of pairs of columns that refer to households for which a particular wealth component (home equity or residual financial wealth) is positive and for which it is zero, respectively.

The first of these panels refers to sample average of household LTC costs by type of care. Columns 2 and 3 show that households with positive residual wealth realize on average 3 to 5 times lower health care expenditures compared those without any wealth. Notably, the vast majority of individuals in our sample, both home owners and renters, possess some positive wealth beyond home equity (the share of individuals with residual wealth is 91.6%). In columns 3 and 4 we consider housing wealth and distinguish renters (zero home equity) and home owners (positive home equity). The differences between these two groups of households are smaller but reveal statistically significantly higher LTC costs for renters compared to home owners. This confirms the findings of Rouwendal and Thomese (2013) who used a different dataset (the longitudinal aging study Amsterdam, LASA data). When we compare LTC costs by household type (columns 6 and 7), we find again marked differences among single person and multi-person households in both institutional and non-institutional LTC costs.

Our data thus show a large amount of heterogeneity in LTC costs, and a clear negative correlation between wealth and LTC expenditure, as well as between household size and LTC expenditure. It may be conjectured that the heterogeneity is in large part due to the fact that many households do not consume any LTC while for those who do, expenditure is often high. To explore this issue, Table 3 presents information on the LTC expenditure conditional on its being positive. The differences among household groups are now less pronounced than in Table 2, but they remain statistically significant. In addition to higher user costs made by households without residual financial wealth, by renters and single person households, we notice an additional effect here. Namely, the prevalence rate, i.e. the proportion of households making use of LTC, differs among elderly households by (residual) wealth possession (columns 2 and 3 in Table 3); as well as by the type of household (columns 6 and 7, ibid). More than double the percentage of households without residual wealth makes use of non-residential LTC compared to those with wealth; for the single person households vs couples the prevalence rate for institutional LTC use amounts to a factor above three. At the same time, there is barely any difference in the use of LTC of renters and home owners (columns 4 and 5, ibid), where prevalence rates are about the same for all LTC types.

Table 2. Cross-tabulations for mean LTC costs (in euros in the period of 2009-2011) by household wealth and type (std. in parentheses)

	ALL HOUSEHOLDS	RESIDUAL HSH WEALTH[#]		HOME EQUITY		HOUSEHOLD TYPE	
		zero	positive	no (renters)	yes (owners)	single pers.	multi pers.
	1	2	3	4	5	6	7
Total LTC costs	€ 3.250	€ 4.998	€ 1.590	€ 4.016	€ 3.180	€ 5.739	€ 1.556
	(15.238)	(18.952)	(10.298)	(18.553)	(14.896)	(20.153)	(10.330)
Costs of non-institutional LTC	€ 1.549	€ 2.257	€ 878	€ 1.994	€ 1.509	€ 2.672	€ 785
	(8.559)	(10.219)	(6.540)	(11.540)	(8.232)	(11.363)	(5.815)
Costs of institutional LTC	€ 1.509	€ 2.455	€ 612	€ 1.868	€ 1.477	€ 2.741	€ 671
	(10.586)	(13.724)	(6.167)	(13.049)	(10.331)	(14.129)	(7.122)
N	*28.216*	*13.739*	*14.477*	*2.367*	*25.849*	*11.428*	*16.788*

total hsh wealth = hsh home equity + residual hsh wealth

Table 3. Cross-tabulations for mean LTC costs (in euros in the period of 2009-2011) conditional on LTC use, by household wealth and ownership (std. in parentheses)

		ALL HOUSEHOLDS	RESIDUAL HSH WEALTH		HOME EQUITY		HOUSEHOLD TYPE	
			zero	positive	no (renters)	yes (owners)	single pers.	multi pers.
		1	2	3	4	5	6	7
Total LTC costs| LTC use	mean	€ 18.707	€ 21.170	€ 13.887	€ 23.296	€ 18.290	€ 22.254	€ 13.360
	s.d.	*(32.366)*	*(34.338)*	*(27.488)*	*(39.380)*	*(31.625)*	*(34.753)*	*(27.550)*
	N users	4.902	3.244	1.658	408	4.494	2.947	1.955
	prevanlence	*17,37%*	*23,61%*	*11,45%*	*17,24%*	*17,39%*	*25,79%*	*11,65%*
Costs of non-inst. LTC | LTC use	mean	€ 10.057	€ 10.877	€ 8.496	€ 13.076	€ 9.784	€ 11.801	€ 7.493
	s.d.	*(19.750)*	*(20.239)*	*(18.690)*	*(27.017)*	*(18.935)*	*(21.507)*	*(16.509)*
	N users	4.347	2.851	1.496	361	3.986	2.588	1.759
	prevanlence	*15,41%*	*20,75%*	*10,33%*	*15,25%*	*15,42%*	*22,65%*	*10,48%*
Costs of inst. LTC | LTC use	mean	€ 28.209	€ 30.748	€ 21.465	€ 33.505	€ 27.702	€ 29.750	€ 24.657
	s.d.	*(36.629)*	*(38.601)*	*(29.794)*	*(44.804)*	*(35.727)*	*(36.935)*	*(35.702)*
	N users	1.510	1.097	413	132	1.378	1.053	457
	prevanlence	*5,35%*	*7,98%*	*2,85%*	*5,58%*	*5,33%*	*9,21%*	*2,72%*

These findings show that the households with and without wealth do not only differ in the intensive margin, but also in the extensive margin (as indicated by the prevalence rates in Table 3). The numbers in the Table 3 also show that the variance in LTC expenditure among those who use it, remains large.

The numbers presented in this section give a first impression of the distribution of wealth, homeownership and LTC expenditure by type of household. In the next section we give a more elaborate econometric analysis of the determinants of LTC expenditure.

5 Econometric analysis

5.1 A two-stage model

It is conventional for the type of data at hand to distinguish between prevalence and intensity of LTC use through a two-step approach.[16] The first step refers to prevalence, that is, the probability that LTC-use is positive. We use a binomial logit model:

$$Prob(y_i > 0 | x) = \frac{\exp(x_i \alpha)}{1 + \exp(x_i \alpha)}$$

where y_i denotes LTC-use of individual i, x_i is a vector of explanatory variables and α the coefficients to be estimated. In the second step LTC-use is analyze further in the linear specification:

$$y_i = x_i \beta + \varepsilon_i, \quad \text{if } y_i > 0$$

where β is another vector of coefficients and ε is an error term.

We estimate different models for singles en two-person households. Estimation results are reported in the next two subsections.

At this stage we only consider our estimates as giving a description of LTC expenditure, therefore the models presented in this section are meant to reflect the level of association between LTC and a selection of independent variables and controls, without an intention to make claims about causality. The reason is that as Tables 1 and 2 show, correlation is detected between wealth and household type on the one hand, and use and expenditure of LTC on the other hand. Therefore, in this section we shall estimate statistical models as explained in Section 5, where we shall test for association between wealth, ownership and LTC, controlling for other factors, such as demographics and health status. Because single person and multi-person households appear to have different LTC use patterns, and possess different demographic characteristics we expect that also determinants of LTC use and costs may be

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[16] Econometric methods for the analysis of such data have been discussed extensively. See Blough, Madden, & Hornbrook, 1999; Diehr, Yanez, Ash, Hornbrook, & Lin, 1999; Duan, Manning, Morris, & Newhouse, 1982; Griswold, Parmigiani, Potosky, & Lipscomb, 2004; Jones, Rice, Bago d'Uva, & Balia, 2007; Manning, 1998; Mullahy, 1998, 2009.

different by household type. Therefore, we shall estimate separate models for singles and couples.

5.2 Estimates: single person households

Table 4 presents 4 models for single person households. The first two refer to non-institutionalized care, the last two to institutionalized care. Models 1 and 3 do not incorporate wealth and housing as explanatory variables, whereas models 2 and 4 do.

The table shows that the prevalence of non-institutionalized LTC is not significantly different for males and females, but males are more likely to become institutionalized. Age has a positive impact on the prevalence of either type of medical care, but only on the costs of care consumed at home. The college educated are less likely to consume LTC at home, but otherwise there are no differences. The native Dutch do not differ from immigrants in the LTC consumption.

The disabilities that we use as explanatory variables are those reported in WoON2009. We find a positive impact of ADL/HDL on the prevalence of either type of care increasing with the severity of disability. Mild disabilities have no impact on the amount of care consumed. Presence of a chronic disease increases the prevalence of impatient LTC use but is not associated with LTC costs.

Introducing the variables referring to wealth and housing causes only modest changes in the coefficients of the variables discussed so far. Non-housing wealth has a small but significant negative impact on the consumption of institutionalized care and a weakly significant positive impact on the cost of institutionalized care. This appears to be consistent with such households postponing the transition to institutionalized care when health deteriorates, perhaps by privately organizing additional care at home.

Being a homeowner has a weakly significant positive impact on the use of LTC at home, which is consistent with such households staying longer in their house when health deteriorates. More surprising is the large and strongly negative impact of being a homeowner on the costs of institutionalized care. A possible explanation is that homeowners are institutionalized for shorter periods compared to tenants. For example, home owners consuming institutionalized care have used on average 90 days of such care in 2009, whereas tenants did so for almost 130 days.

Living in a house that is especially suitable for elderly people is associated with more consumption of LTC at home, but has no impact on the prevalence or costs of LTC provided in nursing homes. There are several possible explanations for this finding. One is that individuals with a high risk of LTC consumption for reasons not observed by us, self-select in such dwellings. Another is that such houses are often related to nursing homes and have better facilities for receiving long-term care in place than many other houses. This may result in a higher consumption of long-term care without residence for households in elderly dwellings under *ceteris paribus* conditions. We return to this issue in 5.4.

Table 4. Prevalence and costs of institutional and non-institutional LTC (2009-2011), for single person households only

	Model 1 Non-inst. LTC		Model 2 Non-inst LTC		Model 3 Inst LTC		Model 4 Inst. LTC	
	Prev.	Costs	Prev.	Costs	Prev.	Costs	Prev.	Costs
Dummy male	0.0891	830.9	0.0962	789.0	0.171 **	6,086 **	0.172 ***	6,248 **
	(0.0594)	(972.7)	(0.0595)	(973.8)	(0.0827)	(2,711)	(0.0829)	(2,699)
Average hsh age	0.0824 ***	126.2 ***	0.0801 **	132.6 ***	0.0878 ***	86.94	0.0887 ***	64.33
	(0.00304)	(48.39)	(0.00308)	(49.10)	(0.00437)	(145.3)	(0.00444)	(147.1)
Dummy college education	-0.264 ***	-245.8	-0.257 ***	-427.2	-0.140	-3,301	-0.0663	-1,886
	(0.0736)	(1,254)	(0.0752)	(1,283)	(0.106)	(3,520)	(0.108)	(3,651)
Dummy Dutch national	-0.00719	-0.0251	-0.00719	-1,107	0.163	-448.5	0.174	-824.9
	(0.0749)	(1,225)	(0.0752)	(1,228)	(0.112)	(3,764)	(0.112)	(3,756)
Dummy mild disability	0.504 ***	1,604	0.501 ***	1,699	0.444 ***	2,625	0.431 ***	1,856
	(0.0930)	(1,576)	(0.0931)	(1,578)	(0.137)	(4,594)	(0.137)	(4,577)
Dummy moderate disability	0.972 ***	3,051 ***	0.957 ***	3,203 ***	0.909 ***	7,271 **	0.889 ***	6,581 **
	(0.0646)	(1,060)	(0.0653)	(1,070)	(0.0933)	(3,017)	(0.0939)	(3,020)
Dummy severe disability	1.910 ***	18,255 ***	1.868 ***	18,449 ***	1.561 ***	20,371 ***	1.531 ***	19,287 ***
	(0.0948)	(1,303)	(0.0959)	(1,322)	(0.118)	(3,616)	(0.119)	(3,638)
Dummy chronic disease	0.311 ***	-244.5	0.306 ***	-199.7	0.0574	-4,346 *	0.0416	-5,143 **
	(0.0576)	(934.8)	(0.0577)	(937.4)	(0.0796)	(2,583)	(0.0798)	(2,583)
Residual hsh wealth			-4.83e-05	-0.919			-0.000606 **	17.80 *
			(6.19e-05)	(0.906)			(0.000245)	(9.303)
Dummy home owner			0.108 *	682.6			-0.0967	-9,495 ***
			(0.0617)	(1,011)			(0.0888)	(2,969)
Dummy elderly dwelling			0.287 ***	-408.1			0.0365	282.8
			(0.0588)	(910.0)			(0.0786)	(2,526)
Constant	-7.872 ***	-1,981	-7.797 ***	-2,521	-9.537 ***	16,990	-9.549 ***	21,078 *
	(0.232)	(3,815)	(0.234)	(3,842)	(0.340)	(11,524)	(0.343)	(11,581)
N observations	11,428	2,588	11,428	2,588	11,428	1,053	11,428	1,053
R-squared		0.105		0.105		*0.040*		0.052
LL								

***,**, * - estimated coefficients are statistically significant at the level of 10%, 5% and 1%, respectively.

Table 5. Prevalence and costs of institutional and non-institutional LTC (2009-2011), for multi-person households only

	Model 1 Non-inst. LTC		Model 2 Non-inst. LTC		Model 3 Inst. LTC		Model 4 Inst. LTC	
	Prev.	Costs	Prev.	Costs	Prev.	Costs	Prev.	Costs
Average hsh age	0.103 ***	103.9 **	0.101 ***	98.52 **	0.128 ***	-6.630	0.128 ***	-81.72
	(0.00362)	(44.43)	(0.0037)	(45.25)	(0.0067)	(214.2)	(0.0069)	(222.5)
Dummy college education	-0.254 ***	-2,036 **	-0.227 ***	-2,449 ***	-0.0992	-3,803	0.0446	-2,214
	(0.0643)	(884.1)	(0.0668)	(915.2)	(0.119)	(4,005)	(0.124)	(4,202)
Dummy Dutch national	0.179 **	-28.79	0.178 **	-280.8	-0.00757	8,087 *	0.0396	8,628 *
	(0.0744)	(1,014)	(0.0747)	(1,019)	(0.134)	(4,521)	(0.135)	(4,562)
Dummy mild disability	0.399 ***	558.6	0.393 ***	594.3	0.492 **	4,253	0.470 **	3,693
	(0.109)	(1,523)	(0.109)	(1,521)	(0.204)	(6,945)	(0.204)	(6,969)
Dummy moderate disability	0.832 ***	2,030 **	0.809 ***	1,991 **	0.772 ***	948.1	0.727 ***	517.8
	(0.0697)	(952.3)	(0.0704)	(957.7)	(0.134)	(4,426)	(0.135)	(4,456)
Dummy severe disability	1.752 ***	13,880 ***	1.713 ***	13,763 ***	1.708 ***	11,157 **	1.636 ***	9,623 **
	(0.0892)	(1,077)	(0.0906)	(1,096)	(0.147)	(4,722)	(0.149)	(4,864)
Dummy chronic disease	0.337 ***	-1,017	0.333 ***	-891.3	0.370 ***	1,570	0.340 ***	2,038
	(0.0597)	(800.1)	(0.0598)	(801.1)	(0.109)	(3,621)	(0.109)	(3,640)
Residual hsh wealth			-3.18e-05	0.469			-0.000595 **	4.194
			(5.87e-05)	(0.861)			(0.00028)	(11.19)
Dummy home owner			-0.0313	1,880 **			-0.337 ***	-4,314
			(0.0621)	(834.4)			(0.116)	(3,849)
Dummy elderly dwelling			0.195 **	2,204 **			-0.0693	3,955
			(0.0768)	(968.5)			(0.128)	(4,180)
Constant	-9.762 ***	-2,671	-9.64 ***	-3,428	-13.14 ***	14,411	-12.94 ***	19,835
	(0.257)	(3,206)	(0.265)	(3,286)	(0.489)	(15,844)	(0.504)	(16,363)
N observations	16,788	1,759	16,788	1,759	16,788	457	16,788	457
R-squared				0.122		0.029		0.035
LL								

***,**, * - estimated coefficients are statistically significant at the level of 10%, 5% and 1%, respectively.

5.3 Estimates: multi person households

Table 5 presents the results for of LTC use and costs for multi-person households. The setup of the Table is identical to that of Table 4. Average household age increases the prevalence as well as the costs of either type of LTC. The college educated are less likely to consume LTC at home. These findings are similar to those for singles. However, the native couples are different from the singles: they are more likely to consume LTC at home and once one of them becomes institutionalized, they consume more LTC in nursing homes. Disabilities and chronic disease have again a similar impact as on singles.

Similarly to singles, wealth decreases the probability of being institutionalised for couples. However, home ownership has a different effect for couples compared to singles. Home-owning couples consume more LTC at home and are less likely to move to a nursing home. If they live in a dwelling that is especially suitable for elderly people, they consume more and more often LTC at home, but not in nursing homes.

5.4 Endogeneity

A possible concern with the estimates just presented is that the dummy indicating that a household lives in an elderly dwelling suffers from endogeneity. The reason is that households suffering or expecting health problems for reasons that are unobserved by us, may tend to choose more often for such a dwelling type than others. If this happens, observed LTC expenditures reflect the selection and the coefficient for elderly dwellings cannot be interpreted as indicating the (causal) impact of living in such a dwelling on LTC demand. Indeed, the positive sign of the dummy for elderly housing is unexpected – as such housing is more suitable for people with health problems, or at least intended to be so and should therefore be expected *not* to increase LTC demand and perhaps decrease it by offering better possibilities for receiving care at home instead of in a nursing home. To deal with this issue we use the share of elderly dwellings in a zip-code area as an instrument. The idea is that this variable does not affect the demand for LTC by our respondents (and is therefore excluded from the demand equation), but is nevertheless correlated with the probability that someone lives in an elderly dwelling. This is the case if such dwellings are especially (although not necessarily exclusively) used by elderly households. A final requirement is that the share of elderly housing should not be correlated with the unobserved determinants of the de demand for LTC. This seems unlikely to be the case, indeed.

The most common approach to use instrumental variables is the use of 2SLS. However, this technique is only applicable to linear equations and our prevalence equation is nonlinear. We therefore use a control function approach (see Petrin and Train, 2010). That is, we start by estimating a 'first stage' equation in which we regress the dummy for living in an elderly dwelling on all the other explanatory variables of the model plus the instrument. We then compute the error terms of this regression and use them as an additional explanatory variable in both the prevalence and the cost equation. For linear equations the control function approach is equivalent to 2SLS.

Table 6. Prevalence and costs of institutional and non-institutional LTC (2009-2011) with instrumental variables, by type of household

	SINGLES				TWO-PERSON HOUSEHOLDS			
	Non-inst.LTC		Inst.LTC		Non-inst.LTC		Inst.LTC	
	Prev.	Cost	Prev.	Cost	Prev.	Cost	Prev.	Cost
Dummy male	0.124 **	1,048	0.181 **	5,823 **				
	(0.0607)	(989.7)	(0.0844)	(2,765)				
Average hsh age	0.0619 ***	-40.25	0.0826 ***	307.2	0.0596 ***	215.2	0.118 ***	-881.0
	(0.00844)	(128.3)	(0.0116)	(372.3)	(0.0122)	(159.0)	(0.0226)	(722.4)
Dummy college education	-0.205 ***	81.88	-0.0484	-2,609	-0.156 **	-2,637 ***	0.0605	-713.3
	(0.0786)	(1,330)	(0.113)	(3,791)	(0.0698)	(947.8)	(0.129)	(4,394)
Dummy Dutch national	-0.122	-2,053	0.141	465.3	-0.00687	275.6	-0.00490	5,103
	(0.0860)	(1,384)	(0.126)	(4,173)	(0.0910)	(1,252)	(0.166)	(5,476)
Dummy mild disability	0.461 ***	1,333	0.417 ***	2,480	0.251 **	976.6	0.436 **	1,069
	(0.0948)	(1,598)	(0.139)	(4,662)	(0.116)	(1,601)	(0.218)	(7,322)
Dummy moderate disability	0.815 ***	1,839	0.841 ***	8,563 **	0.379 ***	3,231 *	0.624 **	-8,062
	(0.0893)	(1,421)	(0.126)	(4,112)	(0.140)	(1,882)	(0.260)	(8,618)
Dummy severe disability	1.490 ***	14,814 ***	1.403 ***	24,460 ***	0.792 ***	16,398 ***	1.415 ***	-8,623
	(0.189)	(2,821)	(0.252)	(8,142)	(0.274)	(3,614)	(0.498)	(16,425)
Dummy chronic disease	0.276 ***	-449.3	0.0318	-4,798 *	0.365 ***	-984.3	0.347 ***	2,603
	(0.0591)	(952.7)	(0.0816)	(2,629)	(0.0605)	(810.3)	(0.110)	(3,671)
Residual hsh wealth	-3.63e-05	-0.797	-0.0006 **	17.76	-1.51e-05	0.427	-0.00059 **	4.529
	(6.21e-05)	(0.910)	(0.000245)	(9.306) *	(5.78e-05)	(0.863)	(0.00028)	(11.19)
Dummy home owner	0.582 ***	5,230	0.0630	-15,895 *	0.843 ***	-585.7	-0.129	12,452
	(0.214)	(3,278)	(0.292)	(9,487)	(0.253)	(3,329)	(0.464)	(14,921)
Dummy elderly dwelling	2.334 ***	19,207	0.727	-27,394	7.066 ***	-17,223	1.569	136,489
	(0.886)	(13,482)	(1.204)	(39,047)	(1.934)	(25,407)	(3.537)	(114,039)
Estimated residual (IV)	-2.057 **	-19,702	-0.694	27,746	-6.887 ***	19,478	-1.642	-132,845
	(0.888)	(13,511)	(1.207)	(39,063)	(1.937)	(25,454)	(3.542)	(114,231)
N observations	11,428	2,588	11,428	1,053	16,788	1,759	16,788	457
R-squared		0.106		0.053		0.123		0.038
LL								

The results of estimating the IV models are presented in Table 6[17]. They are in many respects similar to results of the corresponding extended models in Tables 4 and 5. For the potentially endogenous variable, living in an elderly dwelling, we still find positive coefficients for non-institutionalized care, but they are now larger and significant, for singles as well as for multi-person households. This suggests that self-selection of the kind conjectured above does not explain the positive coefficient in the models for long-term care without residence found earlier. We interpret the results as underscoring the relevance of the 'supply effect': elderly dwellings are often better suited for receiving care in place than regular dwellings and this has a positive impact on its use. The positive coefficient for elderly housing in the model explaining the costs of long-term care without residence for multi-person household disappears when we control for endogeneity.

The models in Table 6 confirm the negative impact of residual wealth on the consumption and costs of LTC. Perhaps the most surprising results of Table 6 in comparison with Tables 4 and 5 is the significant positive impact of homeownership on the prevalence of non-institutionalized long-term care, for singles as well as multi-person households. This is consistent with a home-owners consuming more care in place than renters when health deteriorates, but we don't find the negative impact of homeownership on the prevalence or use of institutionalized long-term care. However, the negative impact of homeownership on the consumption of institutionalized long-term care is confirmed, although the t-value is now lower.

6 Conclusion

In this paper we looked at long-term care expenditure in connection with financial wealth and living in housing that is thought to be especially suitable for elderly people.

First, financial (or residual) wealth has a negative impact on the prevalence of institutionalized long-term care. This is consistent with more wealth people having better possibilities to postpone or avoid a move to a nursing home by making use of their better financial resources.

Second, although there is a clear negative relationship between home ownership and the prevalence of institutionalized long-term care, the results are much less clear after control variables are introduced. If we also correct for the possible endogeneity in the use of elderly dwellings the only significant effect of homeownership appears to be positively impact on the consumption of non-institutionalized long-term care.

Third, our hypothesis that living in an elderly dwelling, which should be expected to be more suitable for consuming long-term care in place if only because of the absence of stairs, was not confirmed. To the contrary, we found a strong positive effect on the consumption of non-

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[17] First stage results are available on request. To save space, we have not reported the constant in this table. The meaning of the asterisks is the same as in Tables 4 and 5.

institutionalized which appear to become larger after one controls for the possible endogeneity of living in such dwellings.

Our data do not confirm the hypotheses that being an owner-occupier or living in an elderly dwelling reduces the consumption of institutionalized care. Both results are somewhat surprising. It is well known that residential mobility among elderly owner-occupiers is extremely low compared to that of renters, which is generally attributed to a strong resistance against leaving their property. Moreover, elderly dwelling are especially suitable for people with deteriorating health who are no longer able to climb stairs and should therefore be expected to offer better possibilities to use non-institutionalized long-term care as a substitute for moving to a nursing home.

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Index of abbreviations (*afkortingen*)

AFBZ = Exceptional Medical Expenses Fund (*Algemeen Fonds Bijzondere Ziektekosten*)

AOW = State pension law (*Algemene Ouderdomswet*)

AWBZ = Exceptional Medical Expenses Act (*Algemene Wet Bijzondere Ziektekosten*)

AZR = AWBZ Care Registration (*AWBZ Brede Zorgregistratie)*

BIKK = Contribution to Reduction Expenses (*Bijdrage in de Kosten Kortingen*)

BKZ = Budget for Health Care (*Budgetair Kader Zorg*)

BSN = Citizen Service Number (*Burgerservicenummer*)

CAK = Central Administration Office (*Centraal Administratie Kantoor*)

CBS = Central Bureau for Statistics (*Centraal Bureau voor de Statistiek*)

CIZ = Centre for Needs Assessment / Care Assessment Centre (*Centraal Administratie Kantoor*)

CVZ = Health Insurance Board (*College Voor Zorgverzekeringen*)

GBA = Dutch Municipal Register (*Gemeentelijke Basis Administratie*)

IGZ = Health Care Inspectorate (*Inspectie voor de Gezondheidszorg*)

NZa = Dutch Health Care Authority (*Nederlandse Zorgautoriteit*)

PGB = Personal Budget (*Persoonsgebonden budget*)

SSB = Social Statistics Database (*Sociaal Statistisch Bestand*)

VWS = Ministry of Public Health, Welfare, and Sports (*Ministerie van Volksgezondheid, Welzijn en Sport*)

WMO = Social Support Act (*Wet Maatschappelijke Ondersteuning*)

WoON = Dutch Housing Survey (*Woon Onderzoek Nederland*)

ZMV = Residential care (*Zorg Met Verblijf*)

ZVW = Health Insurance Act (*Zorgverzekeringswet*)

ZZP = Care Intencity Package (*Zorgzwaartepakket*)

ZZV = Non-residential care (*Zorg Zonder Verblijf*)