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Moral hazard and cash benefits in long-term home care

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Abstract

This paper tests empirically for moral hazard in a system based on demand-side subsidies. In the Netherlands, demand-side subsidies were introduced in 1996. Clients receive a cash benefit to purchase the type of home care (housework, personal care, support with mobility, organisational tasks or social support) they need from the care supplier of their choice (private care provider, regular care agency, commercial care agency or paid informal care provider). Furthermore, they negotiate with the care supplier about price and quantity. Our main findings are the following. 1) The component of the cash benefit a client has no residual claimant on, has a positive impact on the price of care. 2) In contrast, the components of the cash benefit a client has residual claimant on, have no or a negative impact on the price of care. Both results point at the existence of moral hazard in a system of demand-side subsidies.

Key words: long-term care, cash benefits, consumer directed services, demand-side subsidies, direct payments, moral hazard

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1. Introduction

Although home care is a crucial element of long-term care, it has not received much attention in (health) economics (McKnight, 2006). Home care is in many countries covered by health insurance. Provision of home care could be in kind or in cash and in a few countries people can choose between kind and cash. Cash benefits in long-term home care may involve a risk of moral hazard, because a cash benefit provides clients, instead of health care agencies, the money to purchase the care. Because in the Dutch system clients are the residual claimant for part of the cash benefit, there is a unique opportunity to test for moral hazard due to cash benefits in long-term home care.

In many countries, long-term home health care is financed and organised through a system of supplier regulation, in which (social) insurers pay providers of care directly. Clients get their care in kind from regular agencies (regular care) without having to pay for it at the point of use (except for an income-related co-payment in some cases). Furthermore, they may purchase care on the commercial market from independent care suppliers (private care) or from commercial agencies (commercial care). On top of that, they may get informal care from relatives, friends and neighbours.

Some countries have developed alternative systems of cash benefits in which clients get money (also called demand-side subsidies, consumer-directed services or direct payments) to purchase the care themselves instead of getting their care in kind (in which case they do not decide about the actual transaction of home care). There are no restrictions on the type of care nor on the care supplier the clients spend the cash benefit on. In this way, rather than providers of care, clients control their own health care in terms of quality, quantity and price.

Countries that have experimented with cash benefits include Austria, France, Germany, the Netherlands, the United Kingdom, and the United States (US). For a detailed description of the programs see (Tilly et al., 2000) and (Tilly and Wiener, 2001). All of these countries are currently in transition from a system of supplier regulation towards cash benefit, except for Austria, which has a system of cash benefit only. Supplier-regulation dominates the long-term care sector in the Netherlands and the US[1], while cash benefit dominates in France and Germany (Tilly et al., 2000, p.2) and (Tilly

[1] In the US, many states have experimented with demand-side subsidy, especially Arkansas, California, Colorado, Florida, Kansas, Maine, Michigan, New Jersey, Oregon, Washington, and Wisconsin (Tilly and Wiener, 2001, and Tilly et al., 2000).

and Wiener, 2001, p.2). Furthermore, the health care reform proposal of the Clinton administration dismissed in 1993 contained elements of cash benefit. It proposed to require all states to offer the option of cash benefit to people with a disability (Tilly and Wiener, 2001).

Basically, cash benefits have evolved differently across countries and states (in case of the US). Thus, in some countries clients get a cash benefit, whereas in other countries they receive a voucher. Policy makers are concerned for an uncontrolled rise of demand for long-term health care services and the concomitant rise of health care costs, especially in the case of cash benefits. (Tilly et al., 2000, p.4) Therefore, in all countries eligibility for cash benefits is based on strict rules. Thus, for instance only people with a severe disability are eligible and there is a maximum to the number of people with a cash benefit, to the cash benefit a person may get, and to the total cash benefit budget.

Despite its increasing use and popularity in many countries, empirical knowledge about the effects of cash benefits in health care on price has been absent in economic literature so far. The health services research literature reports that cash benefits reduce the burden of informal caregiving (Foster et al., 2005). This paper attempts to fill part of this gap, by getting empirical evidence about the economic consequences of cash benefits in the long-term home care market.

An implication of a cash benefit is that it could involve adverse selection. Especially in countries where clients can choose between a cash benefit and care in kind, different types of clients may opt for the cash benefit. For instance, mainly clients that are more willing to negotiate, search or that have a larger social network viz. potential source of caregivers opt for the cash benefit. Cash benefits could also lead to moral hazard. The focus of this paper is on moral hazard due to the introduction of cash benefits. Conditional upon have chosen for a demand-side subsidy, we will test for moral hazard, viz. do people buy more expensive care when they are not the residual claimant of the money compared with being the residual claimant.

The Dutch institutional setting provides a unique opportunity to test for moral hazard in terms of price paid, because the cash benefit consists of a part for which the client is residual claimant and another part for which the client is no residual claimant. In the Dutch system of demand-side subsidy, the cash benefit consists of three components, for which the client has different rights about the unspent residual. The client has no residual rights on the first component, the personal budget, but he is the residual claimant

of the lump sum, the second component, and the income-related co-payment, the third component. All three components together will be referred to as the cash benefit.

Because of the difference in residual claimancy right, clients may have different incentives to spend the various cash benefit's components. This is moral hazard[2] because the client is no residual claimant of the personal budget (the first component). Moral hazard means that consumers purchase more expensive care than they would purchase if they were the residual claimants, ceteris paribus. We consider moral hazard in price, rather than in quantity. Partly, it has a technical reason, as both the indicators of the client's health and the scarcity of care will be endogenous in a regression that has quantity of care as a dependent variable. Furthermore, a cash benefit enables clients to pay their family for the care they deliver. Therefore, paying higher prices when they are not the residual claimant of the money makes that they, in an indirect way via their family, become the residual claimant of it.

The aim of this paper is to investigate whether the residual claimant component of the cash benefit has an upward effect on the price of care,[3] ceteris paribus because of moral hazard.[4]

To address the research question, we will use information from a unique survey. The survey contains information on 404 clients with a cash benefit, for the sub-category nursing and caring. Next to the amount and types of care they purchase, the survey provides information on the price of care and the amount of the cash benefit (for each of the three components), the amount of care clients can legally claim (proxy for care needs), and information on scarcity in the care supply. Data were collected in the period end 2001 and beginning of 2002.

The outline of this paper is as follows. Section 2 describes the Dutch institutional context in more detail as well as the rules concerning cash benefits. Section 3 gives the

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[2] For an overview of different forms of moral hazard and of empirical studies in health care, see Zweifel and Manning (2000).

[3] In this paper, we distinguish hourly and monthly prices because there is information available on hourly and on monthly prices. This enables to test for reliability of the reported answers. We will present regression results of hourly and monthly prices separately. For convenience we do not distinguish them in the text of the paper.

[4] In addition, in a system of demand-side subsidy, quality of care could be increased because of the larger potential of care suppliers and because of an increase in consumer's market power due to the cash benefit. However, problems of validity make it impossible to investigate empirically improvements in quality. For instance, from the client's perspective care provided by lower or unskilled care suppliers could be of a higher quality, although it may lead to care of a lower quality from a health care professional point of view, for example, measured in terms of education of the provider of care (Stiglitz, 2001). Quality of care is also experienced very subjectively among consumers of care. In this paper we abstract from a change in quality.

empirical model to test for moral hazard in terms of price of care in a system of demand-side subsidies. Section 4 describes the data set and Section 5 discusses the estimates, while Section 6 presents conclusions.

2. Institutional setting

Long-term care, which is an important part of the Dutch health care sector, can be distinguished into home care and institutional care. This article focuses on home care. Long-term home care is financed by means of compulsory social insurance. A regional indication organ (RIO, in Dutch "Regionaal Indicatie Orgaan") determines independently the amount of regular home care client may claim as a result of his health problems. The RIO determines the size of the cash benefit, using the indicated amount of care needed. In an interview with the client, the RIO determines how many hours of different care types (parts or products) per week or per month a client needs. The different products are skilled and unskilled housework, personal care, specialised personal care, nursing, and specialised nursing. A main distinction between unskilled and skilled housework is that for unskilled housework the client is able to give housework tasks to the care supplier, while this is not the case for skilled housework needs. For instance, when a client cannot manage his own household, he needs skilled housework, which means that the house worker not just follows the client's instructions but also determines that certain tasks need to be done. Algra et al. (2003) evaluated and described the RIO and the Dutch needs assessment.

After a RIO has determined that a client is eligible for a certain amount of home care, he can opt for either care in kind or a cash benefit. This article is a test of moral hazard in price for the clients who opted for a cash benefit. It does not consider adverse selection among clients who opted for care in kind instead of a cash benefit.

With the cash benefit, clients are free to purchase the care they want from the care supplier of their choice. Main categories of care suppliers include professional care distinguished in regular care (agencies that mainly provide the care in kind on a not-for profit basis) and commercial care, informal care (people from the social network of the client), and private care (independent operating caregivers).

The cash benefit consists of three components: (1) personal budget (In Dutch 'trekkingsrecht'), (2) lump sum, and (3) income-related co-payment. The personal budget is the part of the cash benefit that the client does not get directly. The Social Insurance

Bank (SVB)[5] manages the personal budget. A client can instruct the SVB to pay his care provider, but he has to justify the expenditures of this part of the cash benefit.[6] The lump sum is used to compensate the client for transaction costs (overhead, unexpected costs, and cash payments) he makes in the very short run. Clients get the lump sum on their banking account, and they do not have to justify their spending afterwards. In 2001, the lump sum was 10 percent of the cash benefit with a maximum of 1,089 euro annually. Finally, there is an income-related co-payment. Appendix A contains a description of the scheme.

The cash benefit, which consists of the three components, is equal to the indicated need of home care converted in an amount of money. The size of the personal budget is equal to the indicated need of home care (which is converted into an amount of money), net of the income-related co-payment and the lump sum. The system leads to exogenous variation in the personal budget, since the co-payment is income related and the lump sum has a maximum.

Clients may have different preferences as to how they spend each of the three components of the cash benefit. They may be more inclined to spend carefully the lump sum and the co-payment, as they may keep the remaining amount of money that has not been spent. In contrast, clients may be indifferent in their way of spending the personal budget, since they cannot claim the unspent residual. Consequently, it may lead to moral hazard in price.

Finally, to illustrate the policy relevance of the cash benefits a few figures. The cash benefits were introduced since 1996. Table 1 shows that the annual number of cash benefits increased rapidly after the introduction in 1996 from 5,401 to over 48,000 in 2002. To give an impression of the relative importance of cash benefits in the Dutch health care system, cash benefits accounted for 3.5 percent of the total expenditures in the sector nursing and caring in 1999. This sector accounts for about 20 percent of the long-term care sector. The long-term care sector accounts for 20 percent of the total annual health care expenditures of 36 billion euro.

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[5] The Social Insurance Bank is a social security agency.

[6] This was the actual situation when we collected the data between December 2001 and February 2002. From April 2003, clients get the personal budget on their bank account and manage it themselves. They have to justify their spending afterwards. Control occurs by means of random checks, since there were many complaints from clients about the way the SVB managed the personal budgets.

Table 1: Annual number of cash benefits in the Netherlands 1996-2002

	1996	1997	1998	1999	2000	2001	2002
Nursing and caring	4,000	6,045	7,184	9,408	16,282	26,753	34,544
Psychiatrically disabled	1,400	1,500	3,101	3,641	6,195	9,164	11,197
Mentally ill	1	100	125	120	141	608	2,203
Physically disabled	0	0	0	0	0	57	95
Total	5,401	7,645	10,410	13,169	22,618	36,582	48,039

Source: (Tweede Kamer der Staten Generaal, Meeting year 2002-2003).

Cash benefits are distinguished into four sub-categories: Nursing and caring, Psychiatrically disabled, Mentally ill, and Physically disabled. Each of these categories has a different type of cash benefit.[7] The categorization is made according to the client's health problems. For example, the sub-category nursing and caring is often used for elderly or people with a chronic disease who cannot care for themselves or for their household. The sub-category psychiatrically disabled differs also from the other three types with respect to the calculation of the amount of cash benefit. The largest sub-category is nursing and caring, which accounts for about 70 percent of the total number of cash benefits (see Table 1). This article focuses on clients with a cash benefit nursing and caring.

3. Test for moral hazard in terms of paid price

We will investigate the factors that influence price of care in a system of demand-side subsidy. The size of the cash benefit (especially the personal budget part of the cash benefit) is determined by the care recipient's need for care. A higher budget simply means greater care needs. It could also imply the need for more specialised and therefore more expensive care. In our period of investigation, there were shortages in the supply of home care. Hence, we would expect prices to rise in a situation of excess demand. Furthermore, the price of care depends on the type of home care indicated. Our empirical analysis will control for all these influences (health status (care need), type of care, composition of care and shortage of care). As the co-payment is income related, we will correct for household income as well.

Then, we will focus on the effect of the three components of the cash benefit (personal budget, co-payment, and lump sum) on price to test for moral hazard. All

[7] The four sub-categories were mainly distinguished for bureaucratic reasons. Since 1 April 2003, the different types of cash benefit are integrated into one type of cash benefit.

clients receive a cash benefit in the system, for which they may decide how to spend it on what type and amount of care.

The clients' incentives differ for different components of the cash benefit. Clients may keep both the unspent lump sum and the unspent income-related co-payment. For both components the incentive system may lead to lower prices, ceteris paribus. Clients are not allowed to keep the unspent part of the component of the cash benefit, viz. the personal budget. Consequently, a personal budget may lead to moral hazard. With a higher personal budget, clients may consume care at higher prices compared with clients with a relatively smaller personal budget, ceteris paribus. We test for moral hazard by measuring the impact of the size of the personal budget on price, next to the effect of the co-payment and the lump sum. Since the co-payment is income related and the lump sum has a maximum, there is exogenous variation among the clients in the relative amount of the part of the cash benefit they are residual claimant on. Hence, the incentives to negotiate for a lower price of care differ among the clients as well.

The regression equation is a price equation. We specify the dependent variable as the logarithm of the mean price (*P*).[8]

$$\log(P_i) = \gamma_1 \log(PB_i) + \gamma_2 \log(CP_i) + \gamma_3 \log(For_i) + \lambda' X_i + \varepsilon_i \qquad i = 1,...,n \tag{1}$$

The three components of the cash benefit, the size of the personal budget, income-related co-payment and lump sum, are represented by the variables *PB*, *CP* and *For* (all of them are in logarithms in equation (1)). Clients have the residual claimancy right on *CP* and *For*, but not on *PB*. $\gamma_k, k = 1,2,3,$ are parameters and λ is a vector of parameters. *X* is a vector of control variables, which are age, gender, (the logarithm of) net monthly household income, marital status, and education. Furthermore, we control for type of care (distinguished by housework (skilled and unskilled), personal care, specialised personal care, and nursing per week) and the availability of care (regular and commercial), which picks up any shortages in the supply of care. Finally, we control for the amount of care that the client needs, as indicated by the independent RIO. Hence, we correct for the

[8] We will present estimates for both the hourly price and the monthly price. In case of hourly prices, it is weighed for the different types of care received. See for details Section 4.

client's health status. As a robustness check, we will consider whether the estimates change when we include the amount of purchased care as additional explanatory variable. With equation (1) we can test for moral hazard in price. A positive sign of γ_1 means that clients may pay a higher price when they are not the residual claimant of the unspent personal budget. In contrast, γ_2 are γ_3 non-positive, since clients are the residual claimant of the two remaining components of the cash benefit. Hence, there is an incentive to spend their money carefully.

4. Data

We used information from a data set of respondents with a cash benefit to estimate equation (1). We reached the respondents through Per Saldo, which is the Dutch association for people who receive a cash benefit. Table 1 showed that there were four types of cash benefits. It was not possible to stratify the population with respect to these types, because Per Saldo did not have information on the clients' type of cash benefit. Between December 2001 and January 2002, we[9] sent a postal survey to 3,000 people with a cash benefit who are associated with Per Saldo. As can be calculated from Table 1, 73.1 percent of the Dutch population has a cash benefit nursing and caring. Hence, about 2200 respondents of Per Saldo have such a type of Cash Benefit. 609 respondents with a cash benefit returned a completed survey of which 404 respondents were clients with the cash benefit nursing and caring (66.3 percent). This makes a response percentage of 18.4 percent for nursing and caring, which is comparable with other comparable Dutch surveys regarding health topics; see for example Van den Berg et al. (2005). Baarsma (2003) claims that in the Netherlands the non-response in surveys is relatively high compared with for instance the United States. There are no indications that the members of Per Saldo are not representative for the whole population of clients with a cash benefit in The Netherlands in the period of our investigation.[10] Comparing our sample characteristics, as presented in Table 2, with sample characteristics of other policy research by means of a sample drawn from governmental records (Dragt et al., 2004) does not show remarkable differences. The only major difference, given e.g. the

[9] For privacy reasons Per Saldo distributed the surveys so we can not guarantee that all 3,000 surveys were actually distributed.

[10] Between 1996 and 1999, all clients were obliged to become a member of an association like Per Saldo.

definition differences, concerns the age of the clients, who below 18 are under represented in our sample 1.5% versus 26% (Dragt et al., 2004).

The data set gives detailed information on clients' cash benefits. The questionnaire contains information on the clients' spending on care at two different places and the amount over different periods of time. A first general question was about their aggregated *monthly* spending to purchase care during the month of the research. The second way of questioning was much more detailed and asked for *hourly* prices for different types of care and various care suppliers, including the belonging weekly amount of care purchased. With both different questions we can construct both the monthly price and the hourly price of care. There could be a difference between weekly and monthly information because of normal fluctuations, such as holidays. Clients are, however, only eligible for a cash benefit when they have long-term care needs, so it is not likely that there are large differences.

We selected three different samples of the 404 respondents with a cash benefit nursing and caring. First, we selected the clients who provided the information needed to calculate both the monthly and the hourly price. In addition, the clients answered all relevant questions in the survey, in other words their surveys did not suffer from item non-response. It results in a net sample of 134 respondents. The advantage of this data set is that we can examine whether a different way of constructing the price information leads to other conclusions (we will demonstrate that it does not, actually). Next to the net sample of 134 respondents, we will use two other selections of respondents: those who gave the information for the monthly (hourly) price, but not necessarily of the hourly (monthly) price. These samples contain information from 158 and 180 clients, respectively.

Table 2: Descriptives of the data set: clients with a cash benefit for Nursing and caring

	Net sample		Hourly price		Monthly price	
Dependent variables	**Mean**	**Standard deviation of mean**	**Mean**	**Standard deviation of mean**	**Mean**	**Standard deviation of mean**
Hourly price of care (in euros)	18.33	1.20	18.81	1.12		
Monthly price of care (in euros)	1062.45	138.80			1031.41	76.88
Independent variables						
Monthly personal budget (in euros)	1236.90	122.17	1292.92	116.19	1241.85	92.56
Monthly co-payment (in euros)	129.20	11.52	125.10	10.78	127.63	9.51
Monthly lump sum (in euros)	156.72	20.35	161.71	19.41	142.83	10.65
Monthly cash benefit (in euros)						
Age (in years)	51.60	1.41	52.08	1.41	51.82	3.86
Dummy gender (woman = 1; man = 0)	0.78	0.04	0.78	0.03	0.78	0.06
Net monthly household income (in Euros)	1664.26	66.61	1633.32	61.72	1635.12	121.87
Dummy married (married = 1; unmarried = 0)	0.70	0.04	0.69	0.04	0.70	0.05
Education (in years)	13.01	0.28	12.75	0.27	12.95	0.97
Care supplier:						
Proportion informal care	0.63	0.03	0.61	0.03	0.68	0.05
Proportion regular care	0.03	0.01	0.03	0.01	0.02	0.00
Proportion commercial care	0.10	0.02	0.12	0.02	0.09	0.01
Proportion private care	0.24	0.03	0.24	0.02	0.20	0.02
Purchased hours of care (per week)						
Hours of purchased informal care	7.69	1.25	7.66	1.11	9.91	0.74
Hours of purchased regular care	0.22	0.10	0.20	0.09	0.16	0.01
Hours of purchased commercial care	1.02	0.26	1.68	0.65	0.86	0.06
Hours of purchased private care	2.36	0.35	2.43	0.35	1.90	0.14
Total hours of purchased care	11.29	1.34	11.97	1.31	12.83	0.96
Type of care:						
Dummy housework (housework = 1; elsewhere = 0)	0.99	0.01	0.99	0.01	0.99	0.07
Dummy personal care	0.70	0.04	0.71	0.04	0.70	0.05

(personal care = 1; elsewhere = 0)						
Dummy support with mobility (support with mobility = 1; elsewhere = 0)	0.70	0.04	0.70	0.04	0.71	0.05
Dummy organisational tasks (organisational tasks = 1; elsewhere = 0)	0.45	0.04	0.48	0.04	0.48	0.04
Dummy social support (social support = 1; elsewhere = 0)	0.57	0.04	0.57	0.04	0.59	0.04
Indicated hours of care (per week):						
Hours of skilled housework	5.61	0.50	5.47	0.45	4.99	0.37
Hours of unskilled housework	1.18	0.24	1.06	0.22	1.06	0.08
Hours of personal care	4.30	0.71	4.67	0.69	4.63	0.34
Hours of specialised personal care	0.07	0.05	0.25	0.15	0.13	0.01
Hours of nursing	2.45	0.54	2.40	0.49	2.00	0.15
Hours of specialised nursing					0.19	0.01
Total indicated hours of care	13.62	11.58	13.86	1.07	13.00	0.97
Indicated hours of care (per month)	51.07	4.13	53.18	4.06	48.29	3.60
Non-availability regular care (no = 0; yes = 1)	0.16	0.03	0.17	0.03	0.15	0.01
Non-availability commercial care (no = 0; yes = 1)	0.36	0.04	0.36	0.04	0.33	0.02
Number of clients	134		156		180	

Table 2 gives the descriptive statistics of the dependent variables and of the variables that were used as a control variable in the regression equation (1). It also gives the descriptive statistics of the net sample plus clients reporting only hourly or only monthly prices respectively. With one exception, there are no differences between the sub samples. Just the monthly price column contains the category indicated hours of specialized nursing per week, which is not reported in the net sample and hourly price sub sample

The hourly price of care is on average 18.33 euro[11] and the mean monthly price is 1,062.45 euro. Again, both were derived from different survey questions at different

[11] We constructed the mean hourly price of home care as follows:

$Hourly\ price = \sum_z p_z * (\frac{q_z}{\sum_z q_z})$, where p_z is hourly price of care type *z* and q_z is quantity of care of type *z*.

places in the questionnaire in order to test the answers for reliability. Multiplying the 18.33 euro per hour with the average monthly amount of purchased care, 49 hours, we get the 898.17 euro per month which cannot be distinguished statistically at the five percent level from the in Table 2 reported 1062 euro (i.e., both averages have overlapping confidence intervals). We will therefore estimate equation (1) with both hourly and monthly price as dependent variable to check for possible differences.

Also the indicated hours of care were measured by means of two different survey questions. One aggregated question on hours per month and six disaggregated questions regarding the weekly-indicated hours of care. The reported 51.1 hours per month is comparable with the 13.6 hours per week divided by seven days times 30.4 days per month resulting in 59.1 hours per month.

The monthly personal budget is about 1,240 euro, whereas the co-payment (about 130 euro) and the lump sum (about 155 euro) are substantially smaller. Clients paying their care suppliers on a monthly basis, spend on average 1,062 euro per month. This is 174 euro less than their monthly personal budget on which they do not have any residual claimant right.

On average, the clients purchase around 11 hours of care per week[12], far the most on informal care and the least on regular care. Table 2 gives also the proportions of purchased care. This is because we wish to correct for composition effects in equation (1) by including them as explanatory variables. To correct for the care needs of the care recipients, we use the indicated numbers of hours of care for the different care types, as determined by the independent agency. The number of indicated hours corrects for the health status of the client. For the various types of care, the indicated numbers of hours are on average around 5.5 (housework, skilled), 1 (housework, unskilled), 4 (personal care), 0.1 (specialised personal care), and 2.5 (nursing). Note that the sum of these components is around 13.5 hours a week, which is higher than the average number of 11 hours purchased.

The dummies indicating scarcity are defined as that a client attempts to get care from an agency for regular or commercial care, but that this type of care is not available yet.

[12] (11.29/7)*30.4 makes 49 hours purchased care per month.

Table 3: OLS regression of equation (1) with robust standard errors; dependent variables: log (hourly price) and log (monthly price)

Dependent variable	**Log (hourly price)**		**Log (monthly price)**		**Log (monthly price)**	
Independent variables:	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Log (cash benefit)	0.30	3.35	0.37	3.59	0.64	7.33
Log (co-payment)	-0.07	-1.50	0.03	0.44	-0.00	-0.03
Log (lump sum)	-0.01	-0.18	-0.15	-1.53	-0.04	-0.57
p-value F-test Log (co-payment) and Log (lump sum)[a)]	0.304		0.302		0.843	
Age (in years)	-0.00	-0.57	-0.01	-1.56	-0.01	-1.94
Dummy gender (woman = 1; man = 0)	0.09	0.47	-0.11	-0.45	-0.02	-0.12
Log household income	-0.05	-1.43	-0.12	-1.90	-0.07	-1.85
Dummy married (unmarried = 1; married = 0)	-0.17	-0.91	-0.51	-2.36	-0.18	-1.04
Education (in years)	0.02	0.66	-0.00	-0.03	-0.01	-0.26
Care supplier:						
Proportion informal care (ref. = proportion commercial care)	-1.11	-2.66	-0.76	-1.49	-0.36	-0.85
Proportion regular care (ref. = proportion commercial care)	-0.39	-0.86	-0.72	-0.49	-1.11	-0.86
Proportion private care (ref. = proportion commercial care)	-0.59	-1.75	-0.30	-0.58	0.02	0.05
p-value F-test care suppliers	0.047		0.271		0.128	
Type of care:						
Dummy housework (housework = 1)	1.28	3.32	-0.98	-2.43	-0.71	-2.35
Dummy personal care (personal care = 1)	0.00	0.02	-0.10	-0.35	0.16	0.64
Dummy mobility outside (mobility outside =1)	-0.13	-0.53	-0.16	-0.77	-0.24	-1.79
Dummy organisational tasks (organisational tasks = 1)	-0.18	-1.00	-0.21	-1.14	0.02	0.12
Dummy social care (social care = 1)	-0.41	-2.19	-0.24	-1.37	-0.05	-0.34
p-value F-test type of care	0.000		0.010		0.141	
Indicated hours of care (per week):						

Log (indicated hours housework (skilled) per week)	0.05	0.70	-0.10	-1.09	-0.07	-1.07
Log (indicated hours housework (unskilled) per week)	-0.01	-0.11	-0.02	-0.14	0.00	0.00
Log (indicated hours personal care per week)	0.00	0.00	0.12	1.19	0.06	0.70
Log (indicated hours specialised personal care per week)	0.57	2.66	0.24	1.36	0.02	0.14
Log (indicated hours nursing per week)	0.22	2.50	0.14	1.15	0.11	1.01
Scarcity of care:						
Availability regular care (yes = 1)	-0.01	-0.04	-0.48	-1.61	-0.65	-2.64
Availability commercial care (yes = 1)	-0.21	-1.05	-0.10	-0.47	0.15	0.90
p-value F-test scarcity of care	0.532		0.201		0.029	
Log (hours purchased care per week)	-		-		-0.74	-8.42
Intercept	1.25	1.21	8.35	7.02	6.01	6.35
Number of clients	134		134		134	
R^2	0.44		0.45		0.67	

a) Null hypothesis is that coefficients on both explanatory variables are jointly equal to zero.

Table 4: OLS regression of equation (1) with robust standard errors; dependent variables: log (hourly price) and log (monthly price)[a)]

Dependent variable	Log (hourly price)		Log (monthly price)		Log (monthly price)	
Independent variables:	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Log (cash benefit)	0.32	4.38	0.41	4.05	0.66	8.47
Log (co-payment)	-0.08	-1.79	0.01	0.09	0.00	0.05
Log (lump sum)	-0.03	-0.39	-0.16	-1.96	-0.05	-0.75
p-value F-test Log (co-payment) and Log (lump sum)[b)]	0.163		0.149		0.752	
Age (in years)	-		-0.01	-1.37	-0.01	-2.05
Dummy gender (woman = 1; man = 0)	-		-		-	
Log household income	-0.06	-1.92	-0.11	-2.05	-0.07	-2.07
Dummy married (unmarried = 1; married = 0)	-		-0.40	-1.94	-0.15	-0.93
Education (in years)	-		-		-	
Care supplier:						
Proportion informal care (ref. = proportion commercial care)	-0.98	-3.71	-0.76	-1.78	-0.39	-0.90
Proportion regular care (ref. = proportion commercial care)	-0.42	-1.32	-0.71	-0.55	-1.09	-0.88
Proportion private care (ref. = proportion commercial care)	-0.41	-1.90	-0.25	-0.58	-0.02	-0.04
p-value F-test care suppliers	0.004		0.160		0.109	
Type of care:						
Dummy housework (housework = 1)	1.01	4.91	-1.00	-2.57	-0.57	-1.88
Dummy personal care (personal care = 1)	-0.03	-0.17	0.02	0.06	0.21	0.97
Dummy mobility outside (mobility outside =1)	-0.15	-0.64	-0.22	-1.04	-0.25	-2.03
Dummy organisational tasks (organisational tasks = 1)	-0.21	-1.18	-0.26	-1.34	0.03	0.24
Dummy social care (social care = 1)	-0.37	-2.13	-0.29	-1.67	-0.05	-0.36
p-value F-test types of care	0.000		0.004		0.238	
Indicated hours of care (per week):						
Log (indicated hours	-		-0.10	-1.18	-0.06	-1.12

housework (skilled) per week)						
Log (indicated hours housework (unskilled) per week)	-		-		-	
Log (indicated hours personal care per week)	-		0.08	0.83	-	
Log (indicated hours specialised personal care per week)	0.49	3.13	0.21	1.36	-	
Log (indicated hours nursing per week)	0.19	2.32	0.11	1.00	0.11	1.06
Scarcity of care:						
Availability regular care (yes = 1)	-				-0.63	-2.64
Availability commercial care (yes = 1)					0.17	1.08
p-value F-test scarcity of care					0.023	
Log (hours purchased care per week)	-				-0.75	-8.88
Intercept	1.38	2.30	7.92	8.18	5.68	6.94
Number of clients	134		134		134	
R^2	0.42		0.42		0.67	
p-value F-test for exclusion[c)]	0.931		0.647		0.954	

a) Best-fitted model from specification in Table 3.
b) Null hypothesis is that coefficients on both explanatory variables are jointly equal to zero.
c) Test of exclusion of insignificant explanatory variables in Table 3. Null hypothesis is that the coefficients on the omitted explanatory variables are jointly equal to zero, which are calculated from the regressions of Table 3.

Table 5: OLS regression of equation (1) with robust standard errors; dependent variables: log (hourly price) and log (monthly price), larger sub samples

Dependent variable	**Log (hourly price)**		**Log (monthly price)**		**Log (monthly price)**	
Independent variables:	**Coefficient**	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Log (cash benefit)	0.26	3.48	0.31	2.12	0.57	4.35
Log (co-payment)	-0.04	-1.03	-0.01	-0.22	-0.04	-0.80
Log (lump sum)	0.05	0.66	-0.24	-2.52	-0.03	-0.50
p-value F-test Log (co-payment) and Log (lump sum)[b)]	0.483		0.041		0.616	
Age (in years)	0.00	-0.98	-0.01	-1.50	0.00	-1.13
Dummy gender (woman = 1; man = 0)	0.06	0.40	-0.17	-0.75	-0.22	-1.13
Log household income	-0.05	-1.54	-0.07	-1.20	-0.03	-0.85
Dummy married (unmarried = 1; married = 0)	-0.20	-1.18	-0.30	-1.15	0.01	0.05
Education (in years)	0.00	-0.23	0.00	0.09	-0.01	-0.34
Care supplier:						
Proportion informal care (ref. = proportion commercial care)	-1.04	-2.90	-0.57	-1.23	-0.24	-0.65
Proportion regular care (ref. = proportion commercial care)	-0.29	-0.70	-0.60	-0.42	-1.41	-1.06
Proportion private care (ref. = proportion commercial care)	-0.44	-1.54	-0.44	-0.88	-0.31	-0.77
p-value F-test care suppliers	0.015		0.676		0.690	
Type of care:						
Dummy housework (housework = 1)	0.12	0.18	-1.15	-2.24	-0.79	-1.69
Dummy personal care (personal care = 1)	-0.09	-0.59	-0.28	-1.16	-0.02	-0.10
Dummy mobility outside (mobility outside =1)	-0.14	-0.77	-0.15	-0.67	-0.08	-0.47
Dummy organisational tasks (organisational tasks = 1)	-0.23	-1.50	-0.34	-1.40	-0.18	-0.86
Dummy social care (social care = 1)	-0.35	-2.34	-0.38	-2.27	-0.11	-0.86
p-value F-test types of care	0.001		0.006		0.447	
Indicated hours of care (per week):						

Log (indicated hours housework (skilled) per week)	0.07	0.98	-0.07	-0.66	-0.01	-0.09
Log (indicated hours housework (unskilled) per week)	0.00	-0.05	-0.03	-0.20	0.00	0.00
Log (indicated hours personal care per week)	0.01	0.11	0.18	1.77	0.14	1.53
Log (indicated hours specialised personal care per week)	0.32	1.79	0.53	2.72	0.10	0.69
Log (indicated hours nursing per week)	0.26	3.30	0.19	1.35	0.14	1.02
Log (indicated specialised nursing)	n.a.		-0.33	-0.77	-0.16	-0.50
Scarcity of care:						
Availability regular care (yes = 1)	-0.12	-0.61	-0.17	-0.59	-0.44	-1.92
Availability commercial care (yes = 1)	-0.11	-0.62	-0.25	-1.17	0.05	0.27
p-value F-test scarcity of care	0.595		0.294		0.141	
Log (hours purchased care per week)					-0.82	-10.50
Intercept	2.53	2.36	8.84	5.50	6.26	4.33
Number of clients	156 [b)]		180 [c)]		180 [c)]	
R^2	0.46		0.36		0.59	

a) Null hypothesis is that coefficients on both explanatory variables are jointly equal to zero.
b) In this sub-sample, there is information on hourly price, but not necessarily on the monthly price.
c) In this sub-sample, there is information on monthly price, but not necessarily on the hourly price.

5. Application of the test

We present the OLS-estimates (with robust standard errors) of equation (1). We are especially interested in the effects of the (logarithm of the) three components of the cash benefit on the (logarithm of the) price. Table 3 gives the estimated coefficients for the hourly and monthly price separately on the net sample of 134 clients. Subsequently, Table 4 presents a parsimonious specification of equation (1), in which non-significant variables are excluded. Finally, Table 5 gives the estimated coefficients on the net

samples of 156 clients reporting hourly prices of purchased care and 180 clients reporting monthly prices.

The clients are no residual claimant for the component personal budget. Definitely, for this component the cash benefit has a positive impact on the price of care. For the equation estimated with hourly prices, the estimated coefficient on the logarithm of personal budget has a value of 0.30 and is significantly different from zero at the 1 percent level (for the estimate with monthly prices the coefficient is 0.37). Its value implies that a 1 percent increase in the personal budget leads to a 0.30 percent higher hourly price of care. Notice that the average hourly price is 18.33 euro and the monthly personal budget is on average 1062.45 euro (Table 2).

The two remaining components for which the client is a residual claimant, the (log) income-related co-payment and the (log) lump sum, have statistically insignificant coefficients. Also, an F-test on joint significance of the (log) co-payment and the (log) lump sum gives the same conclusion. Since we do not find positive coefficients for all three components jointly we can conclude that the estimates point at the prevalence of moral hazard.

There is some evidence that for the hourly price equation the proportion of paid informal care and private care seems to have a downward effect on the hourly price, relative to the proportion of commercial care. For two types of care (specialized personal care and nursing in the hourly price equation) the number of indicated hours has an upward effect on the price. Two dummy variables indicating scarcity of care (regular and commercial care) seem to have no influence on the hourly prices paid, except in the monthly price regression controlled for hours of purchased care availability of regular care seems to have a downward pressure on the price purchased.

The regression presented in Table 3 controls for severity of the illness by means of the indicted hours of care per week. Therefore, our findings point at moral hazard and not just at an obvious relation between higher care needs likely resulting in more complex care demands and therefore higher paid price.[13]

The third column of Table 3 includes the logarithm of the weekly purchased care as additional explanatory variable for the equation with the (log) monthly price as

[13] Also controlling for health measured by means of the EQ-5D, a popular instrument to measure health in the health economics literature, see e.g. Dolan (1997), did not change our results. As the item non-response slightly increased by adding this instrument, we will not present these results in the paper.

explanatory variable.[14] The coefficient on the (log) cash benefit increases from 0.37 to 0.64, but both estimated coefficients cannot be distinguished statistically from each other.

Because of the possibility of over fitting due to the relatively small sample size and number of independent variables, we also present the estimates of a more parsimonious specification in Table 4, in which statistically insignificant variables are excluded (except for the co-payment and the lump sum). The high p-values of the F-test on exclusion of the explanatory variables (presented in Table 4) indicate that omission of these variables in Table 4 cannot be rejected. The pattern of the estimation results of the variables of interest in Table 4 is similar to that of the results in Table 3. Size of the estimated coefficients, signs of the variables and statistical significance are roughly similar. Only the logarithm of the co-payment is statistically significant in the second specification of the logarithm hourly price regression, while it was not in Table 3.

Table 5 shows that using more available information does not change our basic results. The coefficients on the logarithm of the cash benefit in the hourly price regression are 0.26 and 0.36. They are statistically different from zero. In the monthly price regression they are 0.31 and 0.57 and statistically different from zero. Moreover, the logarithm of the lump sum is statistically significant with a negative sign in the monthly price regression, but it is not significant when we control for weekly amount of purchased care.

6. Conclusion and discussion

In this paper we have investigated empirically the incentives regarding the negotiation about the price of care of clients with demand-side subsidies in long-term home care: A test for moral hazard. In the Netherlands, all respondents are compulsory insured for long-term home care. The specific Dutch institutional rules offered a unique possibility to test for moral hazard in terms of price of home care. We exploited the variation between respondents in the relative size of the part of the cash benefit they are residual claimant on, in which we corrected, inter alia, for the client's health status, the composition of care and the scarcity of health care supply. Hence, we could test whether the incentives to negotiate on the price of care differ between the part for which they are residual claimant on and the part for which they are no residual claimant on.

[14] Since the hourly price is weighted by means of the quantity of purchased care, we cannot include this variable in the equation based on the (log) hourly price.

Our main conclusion is that with respect to the price of home care, we find indication of an upward effect from the component of the cash benefit for which the client is no residual claimant. In contrast, for the two remaining components we find no indication of an upward effect on the price of home care. These outcomes indicate that there is moral hazard in a system of demand side transfers.

Various alternative explanations can be given for our empirical finding. One could argue that an explanation of our finding is that clients with greater care needs pay higher prices. However, we have controlled for care needs and the results remain unchanged when we add indicators of the client's health as explanatory variable. Another explanation is that the result is due to the set-up of the co-payment scheme, which is related to the household income. However, we have controlled for household income. Finally, inclusion of the amount of care purchased as additional explanatory variable does not change the conclusion with respect to moral hazard.

Overall, there may be important advantages of demand-side subsidies. They include client's freedom of choice, enlargement of client's market power, larger potential pool of care supplies, empowerment of people with long-term care needs, and relieving the burden of informal care. However, our estimates indicate that moral hazard, which makes home care more expensive, cannot be overlooked. We conclude that a scheme of cash benefits should be developed in such a way that it gives clients better incentives to purchase the care at lower prices. Making them the residual claimant of their total budget could be a solution.

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Appendix A

Cash benefit co-payments

Income related co-payments cash benefits.

Your age is 65 years or older. Below, you will find below your maximum weekly co-payment.

The co-payment will be calculated over the gross family income. The maximum hourly co-payment is € 4.60.

Gross family income in 2001 in categories	Living together or being married Maximum per week	Single person household Maximum per week
To €12,526	€ 2.20	€ 2.20
From €12,526 to €16,182	€ 3.00	€ 7.00
From €16,182 to €18,270	€ 10.80	€ 25.80
From €18,270 to €20,880	€ 29.60	€ 40.00
From €20,880 to €25,056	€ 59.00	€ 61.20
From €25,056 to €40,718	€ 89.60	€ 103.80
From €40,718	€ 118.00	€ 129.80

Your age is between 18 and 65 years. Below, you will find below your maximum weekly co-payment.

The co-payment will be calculated over the gross family income. The maximum hourly co-payment is € 4.60.

Gross family income in 2001 in categories	Living together or being married Maximum per week	Single person household Maximum per week
To €15,138	€ 2.20	€ 2.20
From €15,138 to €19,316	€ 3.00	€ 7.00
From €19,316 to €22,970	€ 10.80	€ 25.80
From €22,970 to €26,624	€ 29.60	€ 40.00
From €26,624 to €31,844	€ 59.00	€ 61.20
From €31,844 to €48,550	€ 89.60	€ 103.80
From €48,550	€ 118.00	€ 129.80