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Are substitute services a barrier to controlling long-term care expenditures?

Mark Kattenberg
Pieter Bakx

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Mark Kattenberg^{a,*}, Pieter Bakx^b

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Abstract

In many developed countries long-term care expenditures are a major source of concern, which has urged policy makers to cost reductions. However, long-term care financing is highly fragmented in most countries and hence reducing total costs is complicated: spending reductions in one type of care may have spillover effects elsewhere in the system. These spillovers may be substantial, as we show using a reform in the financing of one type of publicly financed home care in the Netherlands, domestic help. We show that this reform not only affected consumption of this care type, but also the consumption of three other types of long-term care that are financed through another public scheme.

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^a CPB Netherlands Bureau for Economic Policy Analysis, the Netherlands; * Corresponding author: m.a.c.kattenberg@cpb.nl; ^b Erasmus School of Health Policy and Management, Erasmus University Rotterdam, the Netherlands.

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1. Introduction

Government intervention to ensure equal access to long-term care (LTC) and to limit financial risk is heavy, and hence the majority of spending on LTC comes from the public purse, even in the US (OECD 2018). Rising expenditures on long-term care for the elderly (LTC) are a major concern in all OECD countries (OECD 2011). In the Netherlands, for example, rising LTC costs have been identified as the most important threat to the sustainability of overall public finance (CPB 2016). Furthermore, the financing and organization of LTC is highly fragmented in virtually all these countries, which means that curbing spending growth requires concerted action from a number of organizations, whose incentives may not be well-aligned with each other (OECD 2011; Bakx et al. 2015). Consequently, the appropriate amount and the appropriate mix of services may not be achieved. This may also have an effect on other, more expensive types of care such as nursing home care and hospital care.

These spillover effects are shown by studying whether types of LTC financed from different sources are substitutes.¹ The effect is likely to be the largest for similar types of LTC, i.e. among types of home care, rather than between home care and institutional care, for instance. However, most of the previous studies have estimated substitution effects between broad classes of LTC – formal home care, informal home care and institutional care – and between LTC and other types of health care (Ettner 1994; Pezzin et al. 1996; McKnight 2006; Stabile et al. 2006; Stuck 2008; Bonsang 2009, Orsini 2010; Weissert and Frederick 2013; Guo et al. 2015; Karlsberg Schaffer 2015; Goncalves and Weaver 2017; Hollingsworth et al. 2017). These studies disregard substitution among different types of home care, possibly because survey data usually contain only a limited amount of detail on LTC use.² Consequently, not much is known about the forces driving the composition of home care, despite the important role assigned to home care when it comes to the containment of rising health care costs.

We fill this gap in the literature by studying spillovers across five types of home care (domestic help, individual assistance, group assistance, nursing and personal care). We study whether a reform in the grant that Dutch municipalities received for domestic help also affected use of the other types of home care, which are financed through another scheme.

¹ Cross-price elasticities of demand in other health care setting have been studied extensively since the 1970s (e.g. Hill and Veney 1970, Davis and Russell 1972, Helms et al. 1978). Recently, most studies are about prescription drugs, see Goldman et al. (2007) and Glazer and McGuire (2012) for overviews of this strand of the literature.

² Bonsang (2009) does however show that informal care differentially affects different types of home care: it is a complement to nursing but a substitute for domestic help.

Evidence of such effects would indicate that changing the level of LTC spending by changing subsidies on one type of care at a time may not be very effective.

To this end, we use administrative panel data containing much more details about home care use than typical household surveys. We observe the use of LTC provided at home (domestic help, individual assistance, nursing and personal care) as well as the use of LTC provided outside the home environment (group assistance and institutional care). Moreover, we exploit that the magnitude of the reform in the subsidies for domestic help varied across the 400 municipalities which generates substantial variation within regions.

Our results suggest that the domestic help grant reform had substantial spillovers to other types of home care targeted at elderly. This spillover effect means that the reform in the grant for domestic help had a smaller effect on total home care use than is apparent from studying the change in domestic help use alone. Also the reform of the grant for domestic help did not affect total LTC expenditures: the change in spending on domestic help is cancelled out by decreases on the other types of LTC provided at home, and we cannot reject the null hypothesis that aggregate LTC expenditures remained unaffected. As Belgium and Switzerland have the same split in home care funding as the Netherlands (Bakx et al. 2015) - and in many other countries LTC financing is split between separate schemes in other ways (OECD 2011) - these findings suggest that similar spillover effects might occur elsewhere.

2. Home care in the Netherlands

In this section we describe the types of home health care in the Netherlands and how they are organized. We end the section showing how the various types of home health care could be influenced by changing the funding for domestic help.

Types of home health care

Elderly in the Netherlands can use five types of home care³ – domestic help, individual assistance, group assistance, personal care and nursing– which enable them to live at home despite their need for assistance. Elderly often use multiple types of home care.⁴ Domestic

³ Group assistance is not provided in the home of the care recipient and hence is, strictly speaking, not home care. Nonetheless, we include it here because its goal is closely related to the other types of home care and because it is funded and organized in the same way.

⁴ 50 percent of the elderly using personal care or nursing also uses domestic help (Jonker et al., 2007).

help is the most common type of home care⁵ and persons receiving it can be helped in cleaning their house, in getting groceries or in cooking. People with mental disabilities are also eligible for domestic help when they need help planning or organizing housekeeping activities. The latter form of domestic help can therefore overlap with (individual) assistance, a form of LTC in which patients receive *general* assistance in organizing their lives.⁶ Other types of LTC are personal care (i.e. assistance with daily activities like dressing, showering or assistance in eating) and nursing (i.e. nursing tasks like cleaning wounds or providing medicine) and group assistance (i.e. learning to perform daily activities despite their functional limitations). Of these, personal care is closely related to domestic help, although the tasks do not overlap. For instance, cooking or laying the table are domestic help while assistance with eating is personal care.

Because of these types of overlapping or complementary tasks, a change in the budget for domestic care may have spillover effects to personal care, nursing and individual assistance. Indeed, the majority of nurses who provide personal care, individual assistance or nursing report they sometimes perform housekeeping activities to lower the burden on informal caregivers when no immediate domestic help is available (Kuiken and Pronk, 2016). In addition, there may be an indirect effect of on the use of other types of home care because increased domestic care use may help to postpone a nursing home admission (cf. Guo et al. 2015) and thus increase rather than decrease the use of other types of home care.

Organization of home care

Despite the similarity of tasks carried out as domestic help, individual and group assistance, personal care and nursing, these types of home care are organized through a different financing scheme. In the study period, nursing, personal care and individual and group assistance were paid for through a universal and mandatory public LTC insurance scheme, the Exceptional Medical Expense Act (EMEA). Hence, we refer to these health care services as “EMEA-financed care at home”. By contrast, domestic help has been organized by municipalities under the Social Support Act (SSA). The EMEA and SSA differ in the way the care is funded, eligibility is assessed and providers are contracted, among other things (Table 1).

⁵ Our data shows domestic help makes up about 40 percent of all home care.

⁶ This overlap sometimes makes it difficult to distinguish whether someone should be eligible for domestic help or for individual assistance (CIZ 2010).

Domestic help had been funded through the EMEA scheme but was made a responsibility of municipalities under the SSA in 2007. This change was intended to curb LTC expenditures (Tweede Kamer, 2004) and municipalities were given the means and incentives to do so. First, municipalities have considerable freedom in setting eligibility rules as long as they adequately compensate inhabitants who cannot perform daily housekeeping activities on their own and who cannot rely on others in their network to do them. By law municipalities do not have to provide domestic help if informal caregivers can assist the patient (Tweede Kamer, 2004).

Second, municipalities are compensated by an unconditional block grant and spending it on other things is explicitly allowed (Department of the Interior, 2007). The grant that municipalities received for domestic help in 2007 was based on expenditures in 2005. However, the way in which the grant was calculated was reformed in 2008. From this year onwards, a risk-adjustment formula has been used to determine the amount that each of the municipalities received. The formula makes use of information about the composition of the population and the need for care, which can arguably not be affected by the municipalities themselves, or the regional single payers that organize the EMEA-financed care (see appendix for details).

Municipalities indeed kept use of domestic help in check as was intended: it increased by only 1% per year between 2007 and 2013, while total LTC spending increased by 30% over the same period (CBS 2014).

3. Methods and data

Methods

To find out whether spillover effects matter when changing spending on one type of home care, we investigate how the reform in the financing of domestic help affected the use of each of the LTC. We do so by estimating Equation (1) for each of the four types home care. In this equation the change in use (Δh_i) is explained by the change in the grant for domestic help (ΔG_i) between the years 2007 and 2013:

$$\Delta h_i = C + \beta \Delta G_i + E_r + \varepsilon_i \quad (1)$$

We take first differences to deal with time-invariant differences at the municipal level. To deal with time-variant differences, we proceed in three steps. First, the constant C controls for

time-variant effects that are common to all municipalities, including national-level reforms.⁷ The EMEA-region specific effects E_r capture any deviation from this time trend at the EMEA-region level at which regional single payers organize other types of home care. Second, to make sure the estimate on the grant is not biased by unobserved changes in demand for LTC, we follow Kattenberg and Vermeulen (2017) and only use the part of the change in the grant for domestic help caused by the reform. Specifically, we replace the difference between 2007 and 2013 with the change in grants that would result when the indicators in the allocation formula were held constant at their 2005 levels (the appendix contains a detailed description). Hence, the variable ΔG_i only contains variation caused by the reform of the grant allocation and no variation caused by the change in local demand for LTC.⁸ Another advantage is that the grant reform did not affect the EMEA scheme directly; any effect on health care that can be attributed to the grant reform should run via changes in municipal policies. Third, as the reform itself might be targeted towards specific municipalities⁹, in a series of robustness checks, we include control variables for i) pre-reform demand for LTC and political preferences at the municipal level and ii) changes in these characteristics.¹⁰

Equation (1) is a reduced form estimate of the effect of the reform on the five types home care, which means we are agnostic about the adjustment processes driving the results.¹¹ The result could be driven by changes in use of domestic help, the use of other municipal social services and there may be direct and indirect effects (e.g. through informal care or other types of formal care). Although we cannot separately identify the drivers of adjustments, the results are still informative as reforms in these type of grants are a major policy instrument for national governments in shaping the mix of home care that the elderly receive, especially in the context of home care, which is often organized at the local or regional level and financed through a patchwork of schemes (Bakx et al. 2015; OECD 2011).

Data

⁷ All other health care is organized at the national level.

⁸ Data on assistance is only available for the years 2010 and 2013. For the analyses with the use of assistance as the outcome, the endogenous variable represents changes in the use of domestic help over these years. We instrument this variable with the reform in the grant for domestic help over the years 2007 and 2013.

⁹ For instance, Knight (2002) shows that the US federal government grants for highways is biased towards states with a large demand for highways.

¹⁰ These changes may be influenced by the reforms, making them bad controls, and hence are not included in the main specification (cf. Angrist and Pischke, 2008).

¹¹ It would be tempting to use the grant reform as an instrument for use of domestic help, However, the exclusion restriction for such a specification does not hold as municipalities are not obliged to spend additional funds on domestic help and they may spend part of the money on other services for frail elderly.

To study the effects of the reform, we link the following administrative data sets. Information on the domestic help grant in 2007 and 2013 comes from the Department of the Interior (2007, 2014).¹² This information is linked to data on the use of each of the types of home care (in hours per capita)¹³ and use of institutional care (in days per capita) in these years from administrative records from the Central Administration Office. The use is aggregated at the municipal level, because this is the level at which the reform of interest occurred. We rescale size of the grant, and the LTC use using pre-reform population estimates to mitigate the influence of population changes (see appendix for details). Population characteristics and voting shares come from Statistics Netherlands and the Electoral Council, respectively.

5. Results

Descriptive statistics

Table 2 shows that the average per capita grant for domestic help rose by 3.48 euro per capita (3.8 percent). Part of this increase is caused by changes in the composition of the population, as illustrated by the lower average counterfactual grant change of (2.48 euro per capita on average). This average amount masks substantial changes at the municipal level, however, as for some municipalities the value of the counterfactual grant changed by more than 40 euro per capita (figure 1).

Trends in use differ by care type. Use of domestic help and institutional care rose moderately on average, whereas personal care use and individual assistance increased strongly and use of nursing fell substantially. The use of group assistance was virtually unchanged.

Regression results

Table 3 and Figure 2 summarize our main regression results. They suggest a ten-euro increase in grant for domestic help increases the use of domestic help with 0.13 hour, i.e. 8 minutes (column 1 of Table 3). At an average rate of 22 euro per hour (Van Eijkel et al., 2017), this means that municipalities spend about 3 euro on this specific service when the grant increases by 10 euro (column 2 of Table 3).

¹² Municipalities follow four-year electoral cycles; we use data from the 2006 and 2010 elections.

¹³ Except for group assistance, which is measured in the number of four-hour shifts. Use of domestic help is observed in 2007, 2010 and 2013, whereas use of assistance is observed in the last six months of 2010 and over 2013. Other types of health care are observed in 2007 and 2013. Eight municipalities granted inhabitants the right to a clean house and therefore hours of domestic help are not recorded by CAO. These municipalities are dropped and therefore we have data on 400 out of the 408 municipalities.

Next, we find evidence that the grant reform also affected the use of EMEA-financed types of LTC, notwithstanding the fact that they are financed through another system which is not affected by the funding reform. Table 3 shows that a ten-euro increase in the grant for domestic help leads to a decrease in the use of personal care of 3 minutes per capita (ten times 0.005 hour times 60 minutes) and of individual assistance of 1 minute per capita (ten times 0.002 hour times 60 minutes). Using listed maximum prices of these types of home care, these changes convert to a 2.6 euro decrease in expenditures on personal care and a 0.9 euro decrease in expenditures on assistance. For nursing we find evidence suggesting the opposite: a ten euro increase in the grant for domestic help increases the use of nursing by 2 minutes per capita implying a 2.0 euro increase in expenditures. We do not find evidence that the use or expenditures on group assistance are affected by the reform in the grant for domestic help (table 3). As group assistance is related to the other types of LTC, yet provided outside of the home environment, this strengthens our belief that our estimates reflect substitution of LTC provided at home.

Next we consider the effect on overall EMEA-financed home care. Our results present some evidence that a ten-euro per capita increase in the grant for domestic help causes a drop in EMEA-financed home care of 4 minutes per capita (ten times 0.06 hours), but it had no significant effect on total expenditures on these types of care. This difference occurs because the prices of EMEA-financed types of care differ.

Taken together, the effects of the reform of the grant for domestic help on i) the use of domestic help and ii) on EMEA-financed home care show that a ten-euro increase in the grant for domestic help increases the use of home care by about 5 minutes (ten times 0.008 hour times 60 minutes) per capita. This estimate is almost 40 percent lower than the effect of the reform on domestic help alone. In fact, the change in aggregate home care spending, which is the sum of the changes in the use of each of the types of home care multiplied by their respective prices, is not significantly different from zero. Finally, we do not find evidence that the reform in the grant for domestic help influenced institutional care use.

The robustness checks show that the results are largely unaffected after including four sets of lagged level or changes of variables that proxy for preferences for LTC policy (Table 4 – Columns 2 and 3), proxies for LTC demand (Columns 4 and 5), changes in the other funds that municipalities receive from the central government (Column 6) and changes in the hourly co-payment for domestic help (Column 7). The effects on individual types of home care are the same or similar in all specifications, while the total spillover effect is significant at the 10-

percent level in all but two specifications. The effect on the total number of hours of home care used is significant and equal in all specifications.

6. Conclusion

In most countries, LTC is subsidized and organized through a patchwork of public schemes. Changes to one scheme have implications for use of the care subsidized through other schemes and these spillover effects need to be accounted for when evaluating the effects of a reform. This article exploits detailed administrative records on LTC use and exogenous changes in the grant that municipalities in the Netherlands receive to organize domestic help to estimate the spillover effects on other types of home care and on institutional care, which are financed through a separate financing scheme.

Prior research has treated home care as a single type of care, possibly because of data limitations, focusing on substitution with institutional care and informal care. Yet, substitution between different types of home care financed through separate systems is at least as likely, and equally relevant when seeking to limit public spending and ensuring an effective and equitable allocation.

The reform in the grant for domestic help changed the use of domestic help: municipalities spend on average 30 percent of the additional funds on domestic help. In addition, the results show that there are substantial spillovers from the reform: it decreased the use of personal care and individual assistance while it increased the use of nursing. At best more than a third of the change in domestic help use is undone by the changes in the other types of home care. In monetary terms, the spillover effects on the other, more expensive, types of home care are even more striking as the effect on total home care spending is insignificant.

Like McKnight (2006) but unlike a couple of other studies (Ettner 1994; Pezzin et al. 1996; Orsini 2010; Guo et al. 2015), we do not find an effect of changes in home care subsidies on use of institutional care. A potential explanation for the absence of an effect on institutional care is that formal care delivered at home or informal caregiving is a closer substitute than institutional care for domestic help.

The increase in nursing associated with the increase in the grant for domestic help may have many reasons. We speculate that it might for instance be that domestic help enables patients with severe functional limitations to leave the hospital sooner and that these patients need more nursing, or that increase domestic help enables the regional authorities that organize

EMEA-financed care to restructure the home care that they provide. Highly specific data – or qualitative research – may shed light on which mechanisms may play a role. However, the distinction between nursing and personal care is abolished after the 2015 reform, meaning that the aggregate spillover effect matters most for policymakers.

Our results are of direct relevance to policymakers in the Netherlands as well as in other OECD countries. In 2015, a broad set of LTC reforms included a 30 percent reduction in the budget that municipalities received for domestic help (Department of the Interior 2014) as well decentralization of assistance to municipalities. Our results lend credibility to the belief that these cuts had important spillovers to other types of home care, but not to institutional care or group assistance.

Next, although it can be optimal to finance related health care services in separate schemes, our results show that such a split can reduce the ability to keep total spending in check because of coordination problems. As LTC financing is split between separate schemes in many countries (OECD 2011, Bakx et al. 2015), these findings suggest that similar spillover effects might occur elsewhere too.

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Table 1: public LTC financing in the Netherlands

	Public LTC insurance	Public provision of LTC
Legal basis	Exceptional Medical Expenditure Act	Social Support Act
Period	1968-2015 ^a	2007-current
Home care benefits (2013 spending in billion euros) ^b	Nursing (0.447), personal care (2.144), individual assistance (0.73), group assistance (0.49)	Domestic help (1.612)
Scheme also pays for:	Institutional care, long-term mental health care, assistance and transportation	Social work, social policy , home adaptations
Funded through	Designated insurance premium (73%) general taxation (18%), cost sharing (9%)	Lump sum grant paid from general taxation (80%), cost sharing (20%)
Organizer	32 regional single payers	408 municipalities (in 2013)
Financial risk	National government sets binding ceiling for care expenditures	408 municipalities determine expenditures on care
Eligibility decisions	10 regional agencies, based on national guidelines	408 municipalities, based on local guidelines (provided compensation for ADL problems is 'adequate')
Insured population	Universal	Universal

^a Replaced by the Health Insurance Act (2006-current) and the new Long-Term Care Act. ^b In-kind provision only. Source: CBS 2017, Zorgcijfers 2015

Table 2: descriptive statistics

	Mean	Standard deviation	Minimum	Maximum	N
<i>LTC use per capita: change over time</i>					
Domestic help	0.15	0.62	-3.36	1.82	400
Personal care	0.91	0.56	-0.58	3.10	400
Nursing	-0.26	0.18	-1.21	0.39	400
Individual assistance (2010 – 2013)	0.00	0.23	-1.55	0.86	394
Group assistance (2010-2013)	0.10	0.20	-0.56	1.03	394
Institutional care	-0.10	0.71	-4.00	3.81	400
<i>Domestic help grant (euros per capita): change over time</i>					
Change grant for domestic help 2007-2013	3.48	18.06	-55.12	61.15	400
Reform of the grant for domestic help	2.58	15.97	-47.10	52.28	400
<i>Lagged control variables</i>					
Vote share left wing parties	26.83	15.04	0.00	73.75	400
Vote share Christian democratic parties	26.75	13.16	0.00	86.92	400
Vote share local and other parties	29.97	17.63	0.00	100.00	400
Share of the population aged 75 or older	6.29	1.53	2.61	13.16	400
Average personal income	14.60	1.59	10.21	23.06	400
Share of the population belonging to a minority group	12.38	7.16	2.29	50.89	400
Mortality rate	0.82	0.19	0.31	1.87	400
Population density	763.56	931.59	25.00	5711.00	400
<i>Change in control variables</i>					
Vote share left wing parties	-7.82	8.36	-60.01	17.56	400
Vote share Christian democratic parties	-3.90	8.85	-62.61	23.33	400
Vote share local and other parties	7.73	19.82	-27.19	99.30	400
Share of the population aged 75 or older	1.09	0.59	-0.81	3.01	400
Average personal income	-1.33	0.86	-9.06	2.93	400
Share of the population belonging to a minority group	0.27	0.38	-0.53	2.88	400
Mortality rate	0.07	0.11	-0.25	0.61	400
Population density	12.42	73.24	-471.35	430.00	400

Changes in LTC use are for the period 2007-2013, unless specified otherwise. Assistance in 2010 observed from week 25 onwards. Therefore the change in uptake of individual assistance and group assistance between 2010 and 2013 is computed after multiplying the 2010 observations with $1/(52-25)*52$. Domestic help, individual assistance, nursing and personal care are measured in total hours divided by the municipal population in 2000, group assistance and institutional care are measured in total shifts and total days divided by the population in 2000 respectively. Lagged control variables are measured in 2005, except for the vote shares, which are the outcome of the 2006 election. Change in control variables are the change over the period 2007 – 2013, except for the vote share, which are the change between 2006 and 2010.

Table 3: Regression results

Dependent variable	(1) Effect of grant reform on per capita use in hours	(2) Effect of grant reform on per capita spending	N
Δ Domestic help	0.013 (0.003)***	0.290 (0.056)***	400
<i>EMEA-financed care</i>			
Δ Personal care	-0.005 (0.002)**	-0.257 (0.107)**	400
Δ Nursing	0.003 (0.001)***	0.197 (0.058)***	400
Δ Assistance (group)	-0.001 (0.001)	-0.017 (0.011)	394
Δ Assistance (individual)	-0.002 (0.001)**	-0.090 (0.036)**	394
Total spillover effect	-0.006 (0.003)*	-0.172 (0.150)	394
<i>All home care</i>			
Total change in LTC	0.008 (0.004)*	0.122 (0.169)	394
<i>Nursing home care</i>			
Δ Institutional care	-0.000 (0.003)	-	400

Dependent variables measured in total hours divided by municipal population in 2000. The grant reform is measured as total euro divided by municipal population in 2000. Changes in dependent and independent variables are calculated as the difference between 2013 and 2007 values, except for the analyses with the change in the use of assistance as the dependent variable for which the difference is between 2013 and 2010. Expenditures on LTC computed by multiplying use of care times prices of LTC (listed in table A1). All specifications contain indicators for EMEA regions. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Additional covariates included	Main specification	Initial vote shares	Change in vote share	Initial population composition	Change in population composition	Change in total grant	Change in domestic help co-payment
<i>Dependent variable (in hours)</i>							
Δ Domestic help	0.013 (0.003)***	0.013 (0.003)***	0.013 (0.003)***	0.013 (0.003)***	0.013 (0.003)***	0.013 (0.003)***	0.013 (0.002)***
<i>EMEA-financed care</i>							
Δ Personal care	-0.005 (0.002)**	-0.005 (0.002)**	-0.005 (0.002)**	-0.006 (0.002)***	-0.005 (0.002)**	-0.006 (0.002)**	-0.005 (0.002)**
Δ Nursing	0.003 (0.001)***	0.003 (0.001)***	0.003 (0.001)***	0.003 (0.001)***	0.002 (0.001)***	0.003 (0.001)***	0.003 (0.001)***
Δ Assistance (group)	-0.001 (0.001)	-0.002 (0.001)*	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)*	-0.001 (0.001)	-0.001 (0.001)
Δ Assistance (individual)	-0.002 (0.001)**	-0.002 (0.001)**	-0.002 (0.001)**	-0.002 (0.001)**	-0.001 (0.001)*	-0.002 (0.001)**	-0.002 (0.001)**
Total spillover effect	0.008 (0.004)*	0.008 (0.004)*	0.008 (0.004)*	0.007 (0.004)	0.008 (0.004)*	0.007 (0.004)	0.007 (0.004)*
<i>All home care</i>							
Total change	-0.006 (0.003)*	-0.006 (0.003)*	-0.006 (0.003)*	-0.006 (0.003)**	-0.005 (0.003)*	-0.006 (0.003)**	-0.005 (0.003)*
<i>Nursing home care</i>							
Δ Institutional care	-0.000 (0.003)	-0.001 (0.003)	-0.000 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.000 (0.003)

Changes in dependent and independent variables are calculated as the difference between 2013 and 2007 values, except for the analyses with the change in the use of assistance as the dependent variable for which the difference is between 2013 and 2010. All specifications contain indicators for EMEA regions. Robust standard errors in parentheses.

* p<0.1, ** p<0.05, *** p<0.01.

Figure 1: Distribution of reform in grant for domestic help (2007-2013)

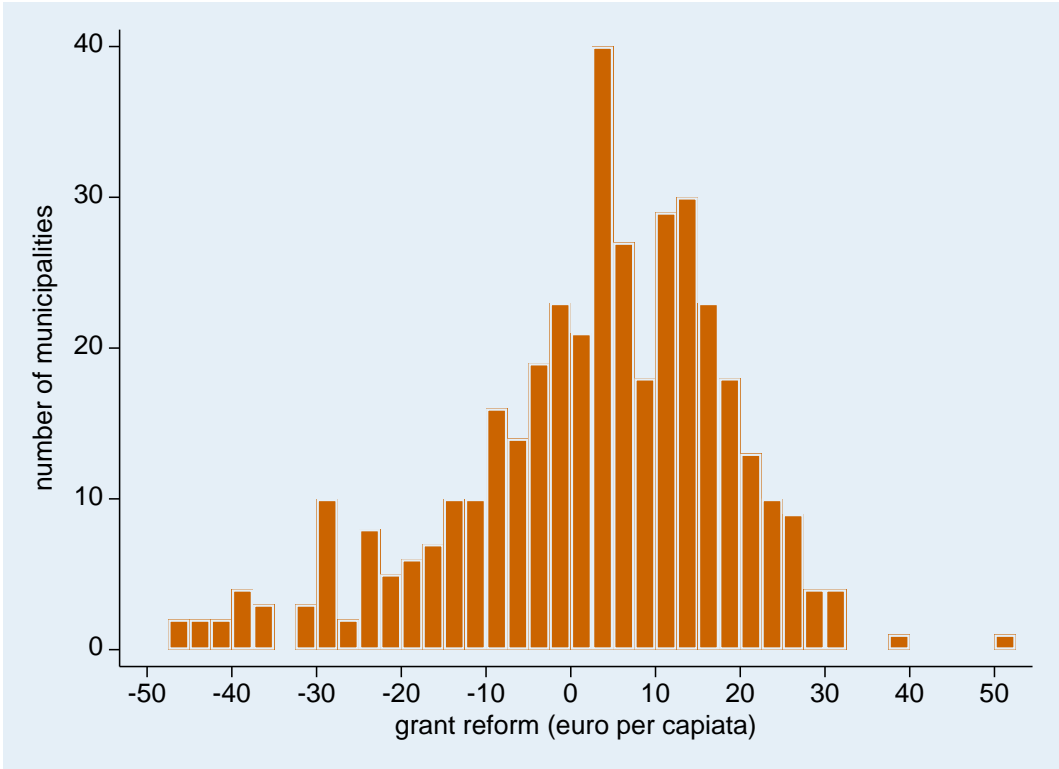
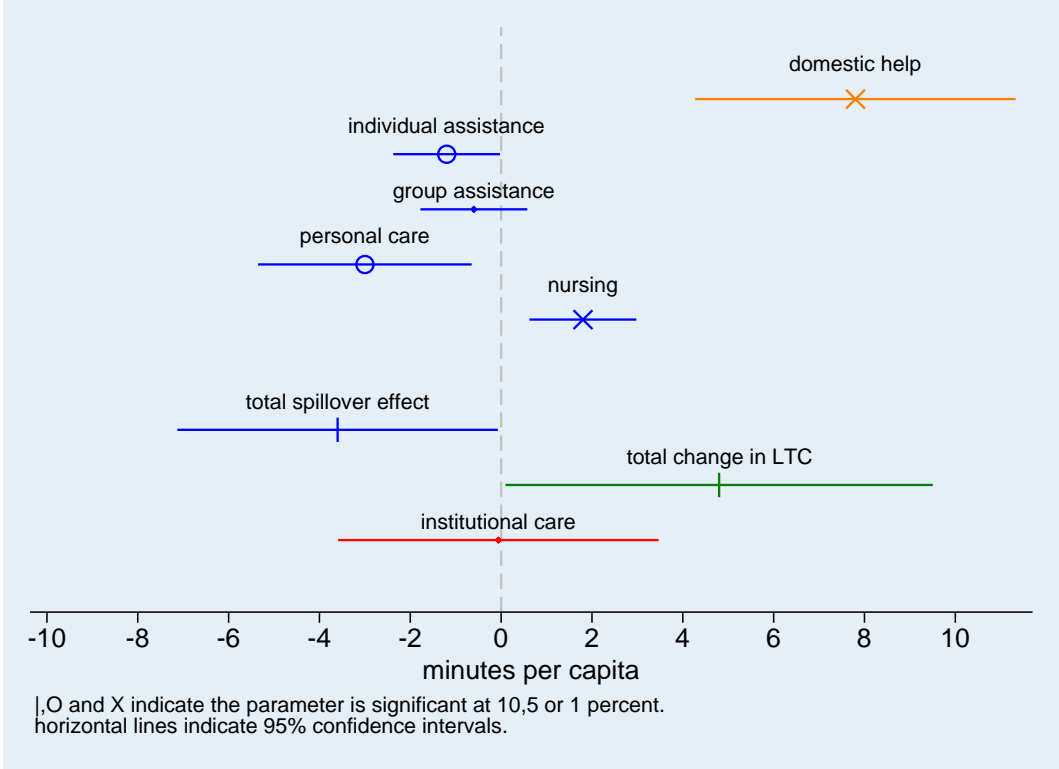
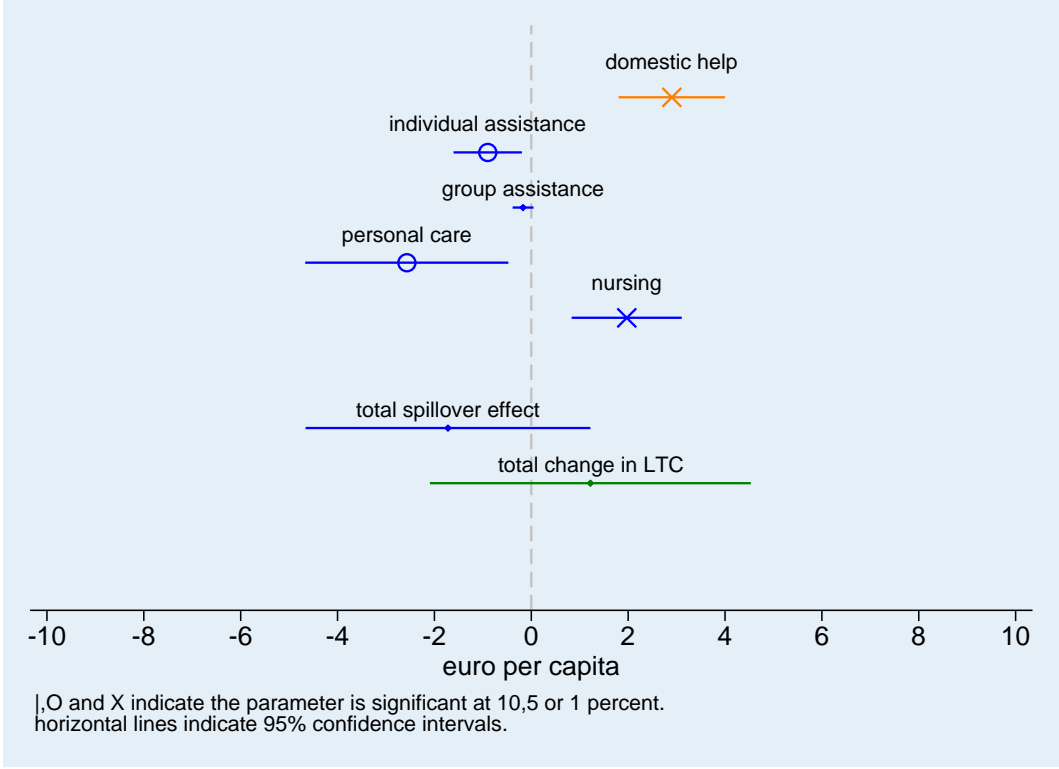


Figure 2: Illustration of main regression results in Table 3

Panel A: change in use following a 10 euro per capita increase in grant



Panel B: expenditures



Appendix

Description of the domestic help grant allocation

This appendix provides more detail on the grant allocation formula. The formula was developed for the Department of the Interior and was used for the first time in 2008. A revised version, implemented in 2011, attached more weight to indicators on income and health care demand and supply (see Kattenberg and Vermeulen, 2017). In Table A1, we list the 23 need indicators and the weights that were used to distribute the grant for domestic help to municipalities in 2013 (column 1). The size of the grant a municipality received in 2013 equaled the sum of the municipal score on the need-indicators times their weights.

Column 2 shows the average share of grant money distributed by a need-indicator. Clearly, not all need-indicators are equally important: the most important variable distributes about twenty percent of grant money on average, whereas the least important one distributes less than 0.1promille. We have ordered the need-indicators into four groups. This grouping shows that about two-third of the grant is distributed using eight indicators related to average income. Almost twenty percent of grant money is distributed using eleven variables on municipal population and about twelve percent is distributed using two indicators on health care demand and supply. The fourth group of other indicators distributed only about one percent.

The change in the grant for domestic help due to the reform is computed as follows: First, we take the 2013 weights of the allocation formula and multiply them with the corresponding demand indicators measured in 2005. We use this result to compute the share of total grant money that each municipality would have received in 2013 given the value of the demand indicators in 2005. Second, from this share we subtract the share of total grant money a municipality received in 2007. Third, this difference is multiplied by the total amount of grant money supplied in 2007 and divided by population of the municipality to express the grant change in euro per capita. Defining the instrument this way means that variation is only caused by pre-reform needs.

Table A1: Types of LTC

Type	Price	Brief description
Domestic help	23	Help with managing the household.
Group assistance	46.82	Assistance with maintaining a structured life by providing group activities.
Individual assistance	53.29	Assistance with activities of daily living and with maintaining a structured life; increasing self-reliance (including psychosocial self-reliance).
Personal care	49.45	Performing tasks that a person usually carries out herself (self-care)
Nursing	73.88	Performing nursing tasks; signaling, supporting and counseling; practicing self-care.

Descriptions based on CIZ (2012) van Van Eijkkel et al. 2017). Prices are maximum unit prices in euro in 2013, except for domestic help which is the average price (Van Eijkkel et al. 2017, NZA 2013a, NZA 2013b).

Table A2: Allocation formula for domestic help in 2013

Indicator	Weight	Percentage ^(a)
Indicators on composition of the municipal population		
Population size	0.32	0.42
Population younger than 19	0.26	0.08
Population younger than 65	8.17	8.92
Population aged 65 or older and younger than 75	0.23	0.03
Population aged 75 or older and younger than 85	0.23	0.01
Population 85 or older	0.23	0.00
Population belonging to a minority group	0.83	0.09
Potential number of people visiting from nearby municipalities	1.49	1.96
Single person households with head aged 65 or older and younger than 75	31.77	0.92
Single person households with head aged 75 or older and younger than 85	127.06	3.38
Single person households with head aged 85 or older	222.36	2.92
<i>Subtotal</i>		18,7
Indicators related to average income		
Households with low income	0.98	0.17
Number of people who receive social support excluding those on welfare	80.36	5.82
Function of people with low incomes times the number of households with head aged 65 to 74 ^(b)	263.20	3.93
Function of people with low incomes times the number of households with head aged 75 to 84 ^(b)	1052.82	9.73
Function of people with low incomes times the number of households with head aged 85 or older ^(b)	1842.43	6.1
Function of relative average income times the number of households with head aged 65 to 74 ^(c)	226.90	8.31
Function of relative average income times the number of households with head aged 75 to 84 ^(c)	907.61	20.5
Function of relative average income times the number of households with head aged 85 or older ^(c)	1588.31	12.71
<i>Subtotal</i>		67.3
Indicators on health care demand and supply		
Local capacity health care ^(d)	1.01	1.80
Function of number of people who are chronically ill ^(e)	239.60	10.92
<i>Subtotal</i>		12.7
Other indicators		
Municipal housing density times housing stock over 1000	-0.44	0.51
Lump sum transfer	24263.31	0.78
<i>Subtotal</i>		1.3

^(a) Share equal to the average value of the indicator times its weight divided by the sum of average values of indicators times their weights. As one weight is negative, we have used the absolute values of weights.
^(b) Function equal to the maximum of zero or [(the number of people with low income divided by the housing stock) minus 0.1].
^(c) Function equal to the average municipal income over municipal income minus 0.55.
^(d) Equal to 26 times the capacity in mental health care plus 132.3 times the capacity in nursing houses plus 365 times the capacity mentally disabled health care. Capacity measured in number of beds.
^(e) Function equal to (share of population who is chronically ill minus 0.11) times population size.



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CPB Netherlands Bureau for Economic Policy Analysis
P.O. Box 80510 | 2508 GM The Hague
T (088) 984 60 00

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