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# The stimulative effect of an unconditional block grant on the decentralized provision of care

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# The stimulative effect of an unconditional block grant on the decentralized provision of care

## **Abstract**

Understanding the impact of central government grants on decentralized health care provision is of crucial importance for the design of grant systems, yet empirical evidence on the prevalence of flypaper effects in this domain is rare. We study the decentralization of home care in the Netherlands and exploit the gradual introduction of formula-based equalization to identify the effect of exogenous changes in an unconditional block grant on local expenditure and utilization. A one euro increase in central government grants raises local expenditure by twenty to fifty cents. Adjustments occur through the number of hours as well as through substitution between basic and more advanced types of assistance. These findings suggest that conditioning of grants is not required for the central government to retain a moderate degree of control over the decentralized provision of care.

**JEL classification:** H42, H51, H71, H75

**Keywords:** intergovernmental transfers, flypaper effect, decentralization of health care

# 1 Introduction

Developed countries across the globe face health expenses rising structurally at a higher pace than national incomes.<sup>1</sup> Decentralization to lower levels of government is one of the strategies that central governments may deploy to curb spending.<sup>2</sup> This strategy is not without its risks, though. Externalities such as interaction with nationally funded programs may induce subnational governments to underprovide health care, or undesired interjurisdictional variation in the level of provision may arise. These risks may be addressed through the grant system.<sup>3</sup> An important question is therefore how this system should be designed.

The use of unconditional block grants incentivizes subnational governments to curb spending and it imposes little administrative burden. However, it also limits the degree to which the central government can control decentralized health care provision through the grant system – at least in the conventional economic view, which holds that for grants to have a substantial stimulative effect, they should be made conditional on decentralized spending. Yet empirical evidence indicates that the stimulative effect of grants with a lump sum nature may also be large. This phenomenon – money sticks where it hits – has been dubbed the flypaper effect. The upshot is that conditioning of grants may not be necessary for the central government to retain some control over decentralized health care provision.

The tendency in the United States has been to reduce conditionality and in particular matching provisions in grants to the states. The reform of the welfare system in the 1990s involved the conversion of matching grants into block grants, notwithstanding the externalities involved in decentralized redistribution.<sup>4</sup> The House of Representatives has recently proposed to convert Medicaid into a block grant, although opponents fear that resources will be targeted away

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<sup>1</sup> Chernew and Newhouse (2012) provide an overview and discussion.

<sup>2</sup> Since World War II many European countries have decentralized health care policy to lower levels of government (Tedioli et al. 2009, Mosca 2006). For instance, in the Nordic countries administrative, managerial, and substantial political and fiscal responsibilities have been decentralized to municipalities. In Spain and Italy health care responsibilities have been decentralized to the regional level, yet fiscal responsibility has not been decentralized fully. (Tedioli et al. 2009, Rico and León, 2005).

<sup>3</sup> The externalities that arise when redistributive policies are decentralized are discussed in e.g., Pauly (1973), Boadway and Wildasin (1984) and Wildasin (1991). Essentially, by underproviding redistributive services, subnational governments externalize costs through two channels: needy households may move to other places in which provision is more generous and even if they stay, residents in other places may experience a utility cost when preferences for redistribution transcend jurisdictional boundaries. These externalities may be addressed through matching grants, where the matching rate corresponds to the magnitude of the externality.

<sup>4</sup> Brueckner (2000) reviews the debate on funding welfare provision in the United States. See Blank (2002) for a broad evaluation of the reform.

from individuals or communities with the greatest need toward those with greater political influence.<sup>5</sup> Block grants are already used to fund decentralized health care provision in several other countries.<sup>6</sup>

This paper studies how an unconditional block grant affects the local provision of care in the Netherlands. The particular type of care we consider is assistance in daily housekeeping activities (ADHA), which enables people with physical or mental health problems to stay in their home environments. Partly motivated by the need to curb expenses, this task was decentralized to the local level in 2007. Municipalities were funded by an unconditional block grant and the central government explicitly allowed spending of this grant on other items, in order to provide a maximum incentive to cut costs. However, this grant structure also induces a risk of underprovision, as ADHA is likely to interact with other types of home care and institutional long-term care, which remained a central government responsibility.<sup>7</sup> Furthermore, amongst the Dutch, there is a general dislike of intermunicipal variation in the level of health care provision.<sup>8</sup> A strong connection between municipal spending levels and grants determined on the basis of local needs measures would mitigate such concerns.

Our identification strategy exploits the gradual introduction of formula-based equalization. The grant was initially set at pre-existing spending levels, yet gradually evolved into an equalizing grant based on the variation in spending needs that could be explained by socioeconomic and demographic variables. The equalization scheme was revised in 2011. We test for the potential endogeneity of these two reforms by identifying on each of them separately and verify that results are unaffected. Furthermore, we verify robustness for entering vote shares, needs indicators or pre-existing spending levels – a proxy for local preferences – as controls.

We find that the unconditional block grant has stimulated the decentralized provision of care moderately. An exogenous one euro increase raises local expenditure by twenty to fifty cents.

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<sup>5</sup> Dilger and Boyd (2014) provide an overview of the political debate on block granting Medicaid in the United States.

<sup>6</sup> Block grants are used to fund decentralized health care provision in Denmark, Finland, Italy, Norway, Spain and Sweden (Rico and Leon 2005; Kim et al, 2009).

<sup>7</sup> As health care is redistributive in nature, decentralization may also induce underprovision through other channels, as discussed in Footnote 3.

<sup>8</sup> On the basis of a questionnaire, Allers et al. (2013) report that the majority of respondents view intermunicipal differences in the level of social services, such as health care, as socially undesirable and that tasks should remain a central government responsibility if decentralization gives rise to such differences.

Municipalities that receive more grants as a result of the reform also provide more hours of ADHA per capita. Substitution between basic and more advanced types of assistance turns out to be an important margin of adjustment. Hence, conditioning of grants does not appear to be required for the central government to retain a moderate degree of control over the decentralized provision of care.

The wider literature on the stimulative effect of grants on spending has produced broad support for the flypaper effect. While causal interpretation of some of the early work is troubled by identification concerns, several more recent papers that convincingly isolate the impact of exogenous changes in grants also find a considerable impact on spending.<sup>9</sup> This effect is reported for aggregate subnational spending (e.g. Dahlberg et al. 2008; Lundqvist 2015), as well as for spending on particular items (e.g. Evans and Owens 2007; Singhal 2008). For the Netherlands, Allers and Vermeulen (2016) find that local governments spend about eighty cents of each exogenous additional euro of general grants. Nevertheless, several other papers find that central government grants crowd out local spending, in line with conventional economic theory. In particular, Gordon (2004) reports that US federal grants to school districts based on child poverty are countered by reductions in local government spending within a 3-year period. Lutz (2010) finds that local governments used around 90 cents of court-mandated changes in school grants from the state New Hampshire to reduce taxes. Hence, the flypaper effect is not an empirical law and it likely depends on the institutional context.

Our paper extends this literature to the health care domain. We are not aware of earlier work that identifies the impact of exogenous changes in block grants on decentralized health care provision. However, federally-mandated changes in Medicaid spending have been found to crowd out other public welfare spending, which also indicates the stickiness of funds within budget categories. Baicker (2001) reports that mandatory spending on particular demographic groups crowds out spending on other demographic groups within the public welfare budget, rather than spending on the same group in different budgetary categories. Craig and Howard (2014) find evidence of crowding out effects even within the Medicaid program, although the response of state governments does depend on what demographic group is affected by the mandated spending change. Furthermore, Baicker and Staiger (2005) explore the impact of

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<sup>9</sup> See Hines and Thaler (1995) and Inman (2008) for an overview of the early literature, as well as a discussion of potential explanations for the flypaper effect.

the Medicaid matching grant on health outcomes and demonstrate that its effectiveness is hampered by the ability of state and local governments to misrepresent their contribution to the program. Policy debates on optimal design of grant systems, both for Medicaid and for decentralized health care provision in other countries, would benefit from more direct evidence on the stimulative effect of block grants.

## **2 Institutional context**

ADHA enables people with physical or mental health problems to stay in their home environment. It can be permanent or temporary (for instance, after hospitalization) and comes in two variants. In the basic variant, ADHA typically involves cleaning and shopping. People with limited mental abilities, such as elderly people suffering from dementia, may receive advanced ADHA, which also involves coordination of housekeeping activities.<sup>10</sup> Adults are eligible for ADHA if they cannot perform daily housekeeping activities on their own and if they cannot rely on others to do so. It is most widely used by the elderly and even within this group, use of ADHA increases strongly in age: 10 percent of the elderly aged 70 versus 60 percent of the elderly that are 90 (Pommer et al., 2009).

### *Organization of ADHA before the decentralization*

Before the decentralization to municipalities in 2007, the delivery of ADHA was organized by the central government under the Dutch Exceptional Medical Expense Act (EMEA), a national insurance scheme that covered all inhabitants of the Netherlands for long-term care services.<sup>11</sup> EMEA also covered more intensive home care, such as ‘personal care’ and nursing, and institutional care.<sup>12</sup>

A separate government assessment body determined the eligibility for EMEA care, including ADHA. On the basis of national guidelines, this body prescribed both the number of hours of ADHA a household was entitled to and the type (basic or advanced). The prescribed number of hours and type of ADHA would depend on the needs and characteristics of the

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<sup>10</sup> So, for example, basic ADHA could consist of cleaning the fridge, but a provider of advanced ADHA would also check expiry dates of products in this fridge and make an overview of stocks that need replenishing.

<sup>11</sup> EMEA also covered other health services, such as specialized hospital services.

<sup>12</sup> Personal care consists of assistance in daily activities such as preparations of meals or assistance in taking a shower. People who give personal care sometimes perform activities that typically fall under advanced ADHA.

household.<sup>13</sup> Nevertheless, there was considerable geographical variation in the uptake of ADHA that could not be accounted for on the basis of the sociodemographic composition of the populations.<sup>14</sup> Eligible households could choose between in-kind delivery by pre-selected suppliers – the most common option – and a cash benefit that allowed them to contract a health care supplier of their own choice. Users bore part of the expenses themselves through a user fee.

People opting for in-kind delivery obtained ADHA through one of the 32 ‘health care purchasing agencies’ that were responsible for the acquisition of EMEA care within their geographical boundaries.<sup>15</sup> These agencies determined which suppliers were allowed to deliver care in their region and they negotiated about price and quantity of care delivered by each supplier. Purchasing agencies were funded by the central government. There was a cap on the total amount of expenses the central government would reimburse – introduced in 2004, but additional funds were provided if the budget was exceeded due to exceptional circumstances.

Because purchasing agencies got by and large refunded for the health care expenditures made, their incentive to economize on expenses was weak. This, together with ageing of the population, resulted in a substantial growth in EMEA expenditures. Between 1991 and 2005, EMEA expenditures increased from 2.9 percent of GDP to 4.6 percent of GDP (CPB, 2005).<sup>16</sup> This trend prompted the central government to decentralize the provision of ADHA to municipalities (Tweede Kamer, 2004). At that time, expenditures on ADHA were (and are) small compared to GDP (about 0.3 percent), but they formed a significant part of expenditures on long term health services covered by EMEA (about 6.8 percent).

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<sup>13</sup> For instance, household requiring cleaning of their home would receive between one and 1.5 hours of ADHA. Typical activities that should be done in this timeframe are cleaning up after meals, doing the dishes, dusting and changing bedsheets. Households with children older than twelve receive less hours of ADHA, as teenagers are expected to clean their own room. Households who need assistance in grocery shopping would receive one hour of ADHA per week for this task. This could be extended to two times one hour per week when the household has children younger than thirteen or when the household is large. Household are eligible for an additional half an hour of ADHA if the distance to shops is large. See CIZ (2006).

<sup>14</sup> Geographical variation in health care utilization is a well-known phenomenon – see Skinner (2012) for a discussion of causes and consequences. One potential explanation in the context of ADHA provision is that regional purchasing agencies acquired ADHA largely on the basis of uptake in the past, rather than an estimate of current needs (CEBEON, 2005).

<sup>15</sup> Often the largest private health care insurer within an EMEA region acts as health care purchasing agency.

<sup>16</sup> Long-term care provided under EMEA has been the fastest growing type of health care as total public expenditure on health care costs in the Netherlands has been growing from 6 to 8.2 percent of GDP between 1991 and 2005 (CPB, 2005).



### *Organization of ADHA after the decentralization*

With the passing of the ‘Social support act’ the responsibility for the organization of ADHA was decentralized from the central government to municipalities. While all other long-term care remained part of EMEA, municipalities thus became responsible for both determination of eligibility and for the acquisition of ADHA. Guidelines were provided similar to the ones used by the government assessment body before decentralization, but these guidelines were neither legally binding nor centrally enforced. The only legal requirement was that municipalities ‘adequately compensate’ those inhabitants who cannot perform daily housekeeping activities on their own and who cannot rely on others to do them. However, concepts like adequate compensation or the availability of help in the personal network of an applicant are difficult to objectify and to enforce. Instead, the central government relied on local democratic accountability to prevent underprovision of ADHA (Tweede Kamer, 2004).

Municipality used their considerable leeway to reduce the hours of advanced ADHA provided, which fell from 70 percent of total hours of ADHA in 2007 to 30 percent in 2013. Furthermore, suppliers of ADHA services were selected through public procurements. This promoted competition, as many health care suppliers expanded their services of ADHA to municipalities in which they were not yet active. As a result, prices fell considerably relative to what the regional purchasing agencies paid (Pommer et al., 2009).

Users of ADHA continued to have a choice between in-kind delivery and cash benefit. This cash benefit in general equals about 75 percent of the in-kind ADHA expenditures they are eligible for (Botter, 2010). Hence, providing ADHA using cash benefits is cheaper for municipalities than providing this assistance in-kind. This provides municipalities with a financial incentive to stimulate the use of cash benefits, although easy access to cash benefits may increase demand for ADHA and controlling the quality of ADHA services bought with a cash benefit is difficult (VNG, 2011).

Municipalities could also charge a user fee and usually set the maximum amount they are allowed to charge. This maximum is determined by the central government and depends on income and the composition of the household. User fees cover about 20 per cent of ADHA expenses on average, but they can be substantial relative to the price of ADHA – especially for non-elderly households with high incomes. Hence, these households more often contract

home help without municipal interference – either formal services that by cleaning companies or services that are offered by individuals (Pommer et al., 2009).

In order to provide a maximum incentive to curb expenses, the central government funded municipal ADHA provision through a new block grant. While labelled ‘grant for social support’, this grant was unconditional and spending it on other items was explicitly allowed (Department of the Interior, 2006).<sup>17</sup> It amounted to about ten percent of the (total) general purpose grant municipalities received from central government, which is the major source of funding for municipalities in the Netherlands. Hence, the introduction of the grant for ADHA provided a substantial increase in grant money that could be spent unconditionally.

### *The flypaper effect*

Although the grant for ADHA is unconditional, the sizeable empirical literature on the flypaper effect predicts it to be spent mainly on ADHA. However, as noted in the previous section, the flypaper effect is not an empirical law and it likely depends on the institutional context. One relevant feature in this respect is that in the Netherlands, municipal tasks and budgets are typically divided over different aldermen. ADHA is usually part of a portfolio that also comprises other social policies. Aldermen are assigned a budget and if it is exceeded, funds have to be reallocated and the alderman responsible for finances has to agree. This constitutes a barrier which enforces budgetary discipline on spending within each portfolio.<sup>18</sup> A flypaper effect arises when these budgets are based on central government grants. In particular, the budget a priori allocated to ADHA would typically be based on the grant for social support, which may well be the most accurate ex ante estimate of ADHA expenses available to a municipality.<sup>19</sup> This explanation accords well with the behavioral explanation put forward by Hines and Thaler (1995) that voters and governments tend to think in non-fungible budgets.<sup>20</sup> Note, however, that as portfolios are generally broader than ADHA provision, alderman may also accommodate changes in this grant through changes in expenses on other items.

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<sup>17</sup> Hence, in the OECD classification, it corresponds to the definition of a block grant (Bergvall et al. 2006).

<sup>18</sup> This mechanism is discussed in for instance Tirole (1994).

<sup>19</sup> As municipalities gained experience with ADHA provision, their knowledge about local expenditure needs has likely improved and the budgeting process may have become less dependent on information embedded in the grant amount.

<sup>20</sup> An alternative explanation, put forward by Baicker (2001) for budget stickiness of state spending on Medicaid in the US, is fear of a reduction in future grants if decentral governments do not spend current grants on the corresponding item – see also Brennan and Pincus (1996). The fact that the grant allocation for ADHA is formula based and not discretionary limits the applicability of this explanation.

A second feature that bears on the strength of the flypaper effect in our institutional setting is the considerable leeway that municipalities have in determining eligibility for ADHA and the number of hours. They may also influence expenditure through substitution of the type of assistance. Basic ADHA costs about 20 euro per hour and for advanced ADHA, a ten percent premium is paid.<sup>21</sup> Moreover, municipalities negotiate the costs of providing ADHA through the procurement process, they set user fees and may also influence the use of cash benefits. This considerable range of instruments enables municipalities to adjust provision and spending levels to grant changes, which is necessary condition for a flypaper effect to arise.

### **3 Reforms in the grant for ADHA**

The grant that municipalities received for ADHA was subject to two reforms that changed the distribution of the grant, but let the total amount of grant money distributed largely unaffected. As we will derive our identification from these reforms, this section provides more background. Figure 1 illustrates the timing of events. In 2004, when the decentralization of ADHA to municipalities was officially announced, it was decided that the grant for ADHA in 2007 would be equal to the indexed expenses made within municipal boundaries in 2005 and that the grant for ADHA would be distributed according to an allocation formula from 2008 onwards (Tweede Kamer 2004; Department of the Interior, 2006). The method used to develop the allocation formula and the weights and indicators that have been used are detailed in an appendix.

While a preliminary version of the formula was published in September 2005, the definite grant amount for 2008 and level of the first supplementary grant were published for the first time in 2007 (Department of the Interior, 2007). The supplementary grant enabled municipalities to smooth the change in ADHA expenses. It was set to 66% of the total change in 2008 and 33% of it in 2009.<sup>22</sup>

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<sup>21</sup> Based on a survey collected from 391 municipalities, Van der Torre et al. (2011) report an average price of ADHA of 20.71 per hour for basic assistance and 23.25 euro per hour for advanced assistance, yielding a weighted average about 23 euro per hour.

<sup>22</sup> These supplementary grants also smoothed the loss of general grant money due to a change in the rules for the municipal subsidy on VAT and the revision of money received for municipal expenditures on public order and safety (Department of the Interior, 2007).

For some municipalities, the introduction of the allocation formula increased or reduced the grant for ADHA substantially. In 2008 and 2009, several critical reports were published that claimed that the first allocation formula did not adequately compensate municipalities for differences in social-economic characteristics and differences in population health.<sup>23</sup> Hence, the central government decided to improve the allocation formula in April 2009 (Department of the Interior, 2010). An indicator for health of the population and interaction terms for relative income and the number of single person elderly households were introduced and the weights for other needs indicators changed significantly – details are provided in the appendix. The reform was accompanied with a supplementary grant in 2011, equal to 50 percent of the change in grant for ADHA. The new allocation formula and second supplementary grant were officially published in June 2010 (Department of the Interior, 2010).

We isolate the change in grants due to these reforms through a number of steps. First, we use the realization of needs indicators in 2005 and apply their weights in 2010 and 2013 to obtain the counterfactual grant amount that municipalities would have received in 2010 and 2013 if needs indicators had remained unchanged since 2005. Crucially, these amounts do not depend on the realization of needs indicators in 2010 or 2013. Next, we get rid of changes in the aggregate budget by scaling to the total budget available for the grant for ADHA in 2007.<sup>24</sup> Subtracting the ADHA grant in 2007 from this scaled counterfactual grant amount in 2010 yields Reform 1: the change in grants due to the transition from indexed expenses made within municipal boundaries in 2005 to the first allocation formula. Reform 2 is defined as the difference between the scaled counterfactual grant amounts in 2013 and in 2010 and it reflects the change in grants due to the transition from the first to the second allocation formula. Reform 1 and Reform 2 can simply be added to obtain the change in grants due to the transition from indexed expenses made within municipal boundaries in 2005 to the second allocation formula.

Figure 2 scatters Reform 1 against the grant per capita received in 2007. It illustrates that grant money was redistributed from municipalities with high initial expenditure to municipalities with low initial expenditure. Figure 3 plots Reform 2 against Reform 1,

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<sup>23</sup> See for instance APE (2008), BMC (2008) and Pommer et al. (2009).

<sup>24</sup> We scale by dividing through the aggregate counterfactual grant amounts over all municipalities and then multiplying by the total budget in 2007.

revealing a significant negative correlation. Municipalities who gained the most from the first reform were particularly negatively affected. Figure 4 illustrates that the combination of both reforms targets municipalities even more precisely with regard to initial expenditure levels.

#### 4 Identification strategy

Equation (1) presents our baseline specification in which the change in provision of ADHA by municipality  $i$  between the years 2007 and 2013 ( $\Delta h_i$ ) – as measured by either expenditure or the number of hours per capita – is explained by the change in its block grant receipts per capita ( $\Delta G_i$ ) over the same time period.

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

This specification accounts for all time-invariant determinants of municipal ADHA provision levels through first-differencing. The constant captures shocks that are common to all municipalities, such as the change in the aggregate budget. EMEA-region specific effects  $E_r$  are included to control for any variation due to former policies of the regional purchasing agencies. For instance, municipalities in an EMEA-region that used to be more lenient might find it easier to impose restrictions on the use of home health care, which could confound our estimate of the impact of the change in grants. The EMEA-region specific effects also control for any changes in the provision of other types of home care and institutional long-term care, which were still allocated at the level of regional purchasing agencies in our period of observation, as some of these types of care may have acted as substitutes for ADHA.

Estimation of Equation (1) with ordinary least squares (OLS) may produce biased results for a number of reasons. One obvious concern is that  $\Delta G_i$  is partly determined by changes in needs indicators that also influence the demand for ADHA. Changes in local sociodemographic composition that drive both changes in grants and changes in the provision of ADHA bias the OLS estimate of  $\beta$  upwardly. We deal with this particular threat to our identification by instrumenting  $\Delta G_i$  with the change in grants that would result when needs indicators were held constant at their 2005 levels – i.e. Reforms 1 and 2, as defined in the previous section.

Hence, the variation in the change of grants that drives our identification is the reform of the grant allocation and not the change in local demand for ADHA.

Reforms in the allocation of grants, alas, may also be endogenous. There are several papers that derive identification from grant allocation formulas and the need to account for their endogeneity is a common thread in this literature.<sup>25</sup> In particular, Knight (2002) demonstrates that the allocation of grants may be influenced by local preferences for public spending and that a failure to account for this endogeneity biases estimates of the flypaper effect. To the extent that preferences are constant over time and their effect is already incorporated in provision levels, first-differencing removes this source of endogeneity. However, as municipalities became responsible for ADHA only in 2007, it is plausible that some tailoring of provision to local preferences took place during our period of observation. A correlation of these preferences with the grant reform would then lead to bias.

Our strategy for dealing with this concern consists of two main elements. In the first place, we exploit the fact that after the gradual introduction of the original grant formula in the period 2007 – 2009, it was revised in 2011. We identify the flypaper effect on either Reform 1 or on Reform 2, including the other reform as a control variable. If our results are biased by an omitted variable that correlates differently with each of these two reforms, it will show up in a difference between the two estimates. Furthermore, the included reform should not affect provision of care in the second stage, as its impact runs entirely through the change in grants under our identifying assumption. For example, if Reform 1 is more favorable for municipalities with a high preference for home care than Reform 2 and municipalities are still in the process of tailoring provision to local preferences, the estimate of the flypaper effect identified on this reform should be larger and when included, it should show up with a positive and statistically significant coefficient in the second stage. This test would not be very meaningful if the two reforms were strongly positively correlated, because any relevant omitted variables would then likely push them in the same direction, but Figure 3 indicates that this is not the case. Nevertheless, it will not pick up any bias from omitted variables that correlate similarly with both reforms.

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<sup>25</sup> See for example Barrow and Rouse (2004), Gordon (2004), Brooks *et al.* (2011) and Allers and Vermeulen (2016). Each of these papers addresses this concern in a different way.

The second main element in our strategy for dealing with potential endogeneity of the grant reform is entering control variables in Equation (1) that relate as closely as possible to these concerns. In particular, we enter vote shares to left-wing, Christian-democratic and local parties as controls for local preferences. These controls pick up the bias that would arise for example when a reform favors left-leaning municipalities that are in the process of tailoring provision to a higher preference for home care. Alternatively, we enter needs indicators at their 2005 levels. These controls pick up the bias that would arise for example when a reform favors municipalities with more elderly or poor inhabitants that are in the process of tailoring provision to a higher preference for home care. Moreover, we also verify robustness of our findings to controlling for changes in vote shares and needs indicators.<sup>26</sup>

Another threat to identifying the causal effect of grants on the provision of ADHA is that the reform of the grant allocation coincides with the decentralization of this type of home care. This major policy shift may have induced changes in the provision of ADHA at the municipal level that correlate with the reform-induced change in grants and hence bias our estimate of the flypaper effect. Although our general strategy for dealing with endogeneity of the reform already provides a check, we deal with this specific threat in two additional ways. In the first place, we exploit the fact that the 2011 revision of the grant allocation formula occurred four years after the decentralization and that it did not concur with any major policy change. Insofar as the effects of the 2007 decentralization did already materialize in the years between 2007 and 2010, it should not affect estimates of the impact of the change in grants induced by the 2011 revision on the change in provision of ADHA between 2010 and 2013. If these estimates turn out to be of a similar magnitude as for the 2007 – 2013 window, this indicates that the bias through concurrence with the decentralization of ADHA is limited.

As a second check, we enter expenses on ADHA made within the boundary of each municipality in 2005 as a control. Perhaps the most obvious source of bias from concurrence of the grant reform and the decentralization of ADHA is that for municipalities in which pre-decentralization expenditure levels were highest, it was easiest to cut back expenses once they became for responsible ADHA. As seen in Figures 2 and 4, these were also the municipalities that saw their grants reduced by the largest per capita amount. Hence, it may have been the relative ease with which expenses on ADHA could be reduced that has driven both the change

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<sup>26</sup> It should be born mind, though, that changes in needs indicators and vote shares are potentially endogenous and may create a bad controls problem (Angrist and Pischke, 2008).

in grants and the change in provision. Controlling for expenses made within municipal boundaries in 2005 should largely remove this source of bias.

Our identification strategy may also be threatened by forward looking behavior by municipalities. Anticipation of future grant changes biases our estimate of the flypaper effect downwardly, if municipalities predict the grant change and already incorporate it into policy prior to the reform. We expect the empirical relevance of this potential source of bias to be limited in our setting. Prior to 2007, municipalities were not responsible for the provision of home care, so they could not have changed policies in anticipation of changes in grants. The 2011 revision was not foreseen in 2007 – at least not by the central government, or it would have been incorporated in the initial grant reform already. Nevertheless, the extent to which municipalities incorporated the 2011 revision already in the preceding years should show up in a difference between estimates for the period 2007 – 2013 and estimates for the period 2010 – 2013, identified on Reform 2.

As a final test for the possibility that our estimate of the flypaper effect is driven by a subgroup of municipalities not accounted for in one of our other robustness checks, we estimate the separate effects of positive and negative changes in grants.

## **5 Data**

We measure the provision of ADHA in two ways, either through expenditures or through the number of hours delivered to individual clients. Data on municipal expenditures on ADHA in 2007, 2010 and 2013 is collected from statistics on municipal budgets provided by Statistics Netherlands (CBS, 2014).<sup>27</sup> All expenses and grant amounts have been inflated to 2013 euros. These data should be treated with some caution, as municipalities provide their budget information voluntarily and no official audit is performed.<sup>28</sup> For instance, a minority of

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<sup>27</sup> The number of municipalities decreased from 443 in 2007 to 408 in 2013 due to municipal amalgamations. We treat municipal amalgamations in retrospect. Thus if municipalities A and B amalgamated into municipality C in 2008, we treat municipalities A and B as if they had amalgamated in 2007 already. We verify that results are robust to leaving the amalgamated municipalities out of our sample. These results are available from the authors upon request.

<sup>28</sup> The reliability of these data may be gauged by comparing them to the administrative records on the number of hours of ADHA provided per capita. The correlation equals 0.80 in 2007, 0.73 in 2010 and 0.66 in 2013.



municipalities reports zero expenditures on ADHA, whereas the user data reveals that ADHA has been delivered in all municipalities, so we drop these municipalities from our sample.

Our other measures of municipal ADHA provision are based on administrative records from the Central Administration Office (CAO) – the office that collects all user fees and transfers them to municipalities, and therefore is highly reliable. The CAO registers both the type and the hours of ADHA delivered in-kind. We categorize ADHA into basic and advanced assistance. Eight municipalities had to be dropped from the analysis as they did not consistently record utilization of ADHA.<sup>29</sup> In total, this leaves us with a regression sample of 380 municipalities for which both expenses and hours of ADHA are consistently measured in each year. Summary statistics for this sample are reported in Table 1. On average, the municipalities in our sample spent almost 100 euro per capita on ADHA and they provided 3.2 hours of ADHA per inhabitant in 2013. Notwithstanding a decrease in the hours of advanced ADHA provided, the total hours of ADHA provided increased slightly by 0.16 hours in between 2007 and 2013.

The CAO also records how many persons use a cash benefit instead of ADHA in-kind. This information allows us to verify whether the reforms induced a change in the use of cash benefits. Table 1 shows that the share of the population that uses a cash benefit has increased over time. Furthermore, we observe the total amount of user fees for ADHA that municipalities received in 2008 and 2013.<sup>30</sup> The average user fee is low, about 6 euro per hour in 2013, yet it has increased by about 2 (real) euro per hour between 2007 and 2013 (see Table 1). This information allows us to verify whether the reforms induced a change in user fees, which in turn may have affected the uptake of ADHA

Data on the block grant is recorded from overviews of the municipality grant system that have been published by the national administration, see Department of the Interior (2007; 2014). Note that with an average amount of almost 94 euro per capita, the grant received is somewhat lower than reported expenditures on ADHA (see Table 1). We use the grant receipts and underlying allocation formulas, in combination with the realization of needs

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<sup>29</sup> These municipalities moved from a system based on entitlements to inputs (hours of ADHA) to a system based on entitlements to outcomes. Hence, in 2007 they assigned clients a certain number of ADHA, yet in 2013 they assigned clients the right to ‘a clean house’. As a result CAO no longer registers the provided hours of ADHA in these municipalities. These municipalities are Alblasserdam, Dordrecht, Emmen, Hendrik-Ido-Ambacht, Papendrecht, Rotterdam, Sliedrecht and Zwijndrecht.

<sup>30</sup> Due to a change in their administrative system, the CAO could not deliver the user fees collected in 2007.

indicators in 2005, to construct our instruments. The realization of need-indicators in 2005 is collected from Statistic Netherlands. This information is based on municipal administrative records, checked by Statistics Netherland and therefore very reliable.<sup>31</sup> Expenditure on ADHA by purchasing agencies in 2005 is derived from Department of the Interior (2007).

Finally, we add several control variables that might be correlated with the grant reform and provision of ADHA: the share of elderly people, the average income, the share of minority groups, the mortality rate and population density. These data are obtained from Statistics Netherlands. We use data on municipal elections provided by the Electoral Council (2014) to construct the share of votes going to right-wing parties, left wing parties, Christian-democratic parties and local or other parties in the 2006 and 2010 municipal elections – on which the composition of the municipal councils in 2007 and 2013 were based.<sup>32</sup>

## 6 Results

Table 2 reports our main estimation results with regard to the impact of grants on decentralized ADHA provision. The effect on expenses is shown in Panel A and Panel B contains the effect on the number of hours. The first column reports OLS estimates, whereas all other columns show IV results. The estimate in the second column is identified on the sum of Reform 1 and Reform 2 – i.e. on the change in grant allocation from indexed expenses made within municipal boundaries in 2005 to the formula after its 2011 revision, based on 2005 values of needs indicators. Results for a specification in which Reform 1 is excluded and Reform 2 is controlled for are shown in the third column and the fourth column reports results for a specification in which Reform 2 is excluded and Reform 1 is controlled for. Panel C contains the corresponding first stage results.

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<sup>31</sup> We collect 2005 values of all variables in the allocation formula, except average income and information on beds in nursing homes and hospitals. The former is first measured at the municipal level in 2006 and the latter is only observed for 2004. For three municipalities average income has not been reported by Statistics Netherlands. For these municipalities the relative income-indicator is set to the municipal average.

<sup>32</sup> We define votes for left-wing parties as the votes going to Groen Links, PvdA or SP. We consider D66 and VVD to be right-wing parties. Votes to Christian-democratic parties are votes to CDA, CU or SGP. Finally, we group together votes going to local parties and combinations of parties. At the local level, it sometimes happens that right-wing and left-wing parties work together and provide one list of candidates. Such combinations are not separately controlled for as it would inflate the number of indicators and often parties decide to work together because they are expected to collect a very small share of the votes on their own.

Our baseline result in Column 2 is that 37 cents of each additional euro of grant money are spent on ADHA, while we cannot reject this amount to be between 21 and 52 cents with 95 percent confidence. Furthermore, a change in grant of one euro per capita increases hours of ADHA provided by 0.8 minutes ( $0.0142 \text{ hours per capita} \times 60 \text{ minutes}$ ) per capita. With an average price of about 23 euro per hour, this amounts to 33 cents ( $0.0142 \text{ hours per capita} \times 23 \text{ euro per hour}$ ), which is slightly below our estimate for expenses, yet well within its 95 percent confidence interval. The effect on number of hours is estimated with more precision, which in all likelihood reflects the greater accuracy of these data. As expenditures on ADHA are equal to about 0.3 percent of GDP, both estimates imply an effect of the grant for ADHA on service delivery which is considerably larger than conventional economic theory implies, thus indicating the presence of a flypaper effect.<sup>33</sup>

Neither the OLS estimates in the first column, nor the estimates identified on either of the two reforms separately in the final two columns, differ statistically significantly from our baseline estimates in Column 2. Similarity of the OLS and IV estimates indicates that the bias through correlation of changes in grants and ADHA provision with changes in needs is negligible. The finding that our results are robust to identifying on either of the two reforms separately is an important validation of our empirical approach. The statistical insignificance of the reforms that are included in the second stage also supports the assumption that their impact on expenditure runs entirely through the change in grants and not through other channels. It should be noted that our estimate of the effect on expenditure in Column 4 is quite imprecise, which limits the strength of this test, yet the same limitation does not apply to the estimates on the more accurately measured number of hours.

In all IV-equations the instrument is highly relevant, as indicated by the Kleibergen-Paap F-statistic. Also, in the first stage reported in Panel C, parameter estimates are significant at the one percent level and close to one.<sup>34</sup> Thus a change in our instrument with one euro leads to a change in grant of about one euro. This also validates our identification strategy, as an estimated parameter different from one would imply that part of the variation in grants would be due to other factors that correlate with the reform and that might be endogenous (see e.g.

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<sup>33</sup> Assuming an income elasticity of demand for ADHA of one, an increase in the grant for ADHA by one euro should result in an increase in ADHA expenditures by 0.3 cent. See e.g. Inman (2008).

<sup>34</sup> For completeness, the first column of Appendix Table A1 shows results based on a reduced form specification in which the change in expenditure is directly regressed on both reforms. We cannot reject the hypothesis that the effect of the first and second reform is equal to our preferred estimate in Table 2.

Lundqvist, 2015). The high R-squared of the first stage regressions indicates that most of the variation in changes in grants comes from the reforms and not from changes in needs indicators, which evolve only slowly over time (see also Table 1). This probably also explains the strong similarity of OLS and IV results.

Table 3 verifies robustness of our baseline estimates for entering several groups of controls. The first column includes controls vote shares for left-wing, Christian-democratic and local parties in the 2006 local elections, the second column includes needs indicators at their 2005 level and the third column includes the level of expenditure on ADHA within the boundaries of each municipality in 2005. Panel A reports results for expenditure and results for the number of hours are shown in Panel B. First stage results are reported in panel C. The vote share to local parties correlates positively with the subsequent change in ADHA provision, so it does appear to pick up municipal preferences, but controlling for vote shares leaves our estimates of the impact of changes in grants unaffected. Appendix Table A2 shows that the same holds for controlling for changes in vote shares between 2007 and 2013.

As needs indicators, Column 2 includes the share of elderly people, the average income and the share of minority groups as sociodemographic variables. The mortality rate is informative about the health of the population. Population density is a cost shifter – providing ADHA is cheaper when houses are in closer proximity – and it may also pick up other aspects of urbanity. The appendix documents that these indicators correlate strongly with the most important indicators of the allocation formulas in both 2010 and 2013. While their effect on the level of ADHA provision is fairly straightforward, what matters here is the impact on its change between 2007 and 2013. What we verify in this table is whether the process of tailoring provision to municipal characteristics during this period correlates with the grant reform and thus biases our findings. However, the estimated impact of the change in grants is almost identical to our baseline estimates in Table 2, so this does not turn out to be the case. Appendix Table A2 demonstrates that controlling for changes in needs indicators between 2007 and 2013 leaves our findings unaffected as well.

The third column in Table 3 shows that our results are robust to including pre-decentralization expenditure levels on ADHA in 2005, which may pick up the ease with which budgets cuts in the subsequent period could be realized.

As a further check for possible bias through the concurrence of the grant reform with the decentralization of ADHA, Table 4 presents estimation results for the 2010 – 2013 period. The first column is based on OLS and Reform 2 is used as an instrument in the second column, while Reform 1 is entered as a control variable. Otherwise, this table has the same setup as Table 2. Neither estimates of the effect on expenditure nor of the effect on number of hours differs statistically significantly from our baseline estimates, although as in Column 4 of Table 2, estimates for expenditure are quite imprecise. Moreover, the similarity of these estimates with Column 4 in Table 2 indicates that most of the adjustment to the 2011 revision of the grant allocation formula took place in the period 2010 – 2013 and not in preceding years, thus countering concerns about bias through anticipatory municipal behavior.

As a final check on the identification of our baseline estimates in Table 2, Appendix Table A3 shows results for specifications in which the effect of grants is allowed to differ between municipalities who saw grants increase due to the reform and those who faced a decrease in grant receipts. We cannot reject the null hypothesis that positive and negative shocks have a similar effect on expenditures. This provides a further indication that the overall effect is not driven by a subgroup of municipalities, such as the losers from the grant reform.

## **7 Adjustment channels**

Results in the previous section indicate that municipalities have used their leeway in determining eligibility and hours to adjust expenses on ADHA to changes in grants. This section explores further channels, with a focus on the substitution between basic and advanced ADHA – the main difference being the required level of coordination of housekeeping tasks. Table 5 provides evidence on the effect of grants on the provision of hours of basic assistance (Panel A) and advanced assistance (Panel B). First stage results are identical to the results reported in Panel C of Table 2 and hence suppressed. In our baseline specification in Column 2, the impact of changes in grants on changes in hours of basic assistance is statistically insignificant, whereas the impact on changes in hours of advanced assistance is statistically significant at the 1 percent level and quantitatively comparable to the baseline effect in Table 2. This indicates that the change in hours of ADHA reported in Table 2 is predominantly driven by the impact of grants on the provision of ADHA of the advanced type.

The sensitivity checks reported in the third and fourth columns of this table indicate that these estimates should be considered with caution. Identification on Reform 2 produces estimates that are statistically distinct from estimates identified on Reform 1, or on the sum of both reforms. Apparently, omitted variables correlate with one of these reforms and with changes in the provision of basic and advanced assistance.<sup>35</sup> As a further check, we estimate the effect on change in hours of basic and advanced ADHA for the period 2010 – 2013 in Table 6. The IV results in Column 2 do not differ statistically significantly from those in Column 2 in Table 5. Hence, while the results for adjustments in the composition of ADHA with respect to the type of care are somewhat mixed, the stimulative effect of grants turns out consistently larger for advanced ADHA than for basic ADHA. This indicates that substitution between these types of assistance has been an important margin of adjustment.

We also verify the role of cash benefits and user fees as a channel of adjustment. In-kind delivery may have been substituted for cash benefits in response to a change grant, so that the impact of grants on the overall number of hours of ADHA per capita is overestimated. However, Appendix Table A4 shows that we cannot reject the null hypothesis that there is no relationship between the change in grants and the change in the percentage of people in a municipality who receive ADHA in cash rather than in kind. This result is robust to identification on the first reform, the second reform or the sum of both reforms. Hence, cash benefits do not appear to have been substituted for in-kind service delivery in response to changes in grants on a substantial scale.

The final channel considered here is that municipalities may have altered the user fee for ADHA in response to changes in grants. A negative relationship between the change in the average fee per hour of ADHA and the change in grant would suggest that part of the grant money is transferred to users of ADHA in the form of lower contributions. Appendix Table A5 presents no evidence in favor of such a relationship, irrespective of the reform used for identification. Hence, it appears that user fees have not been substantially adjusted in response to a change in grant either.

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<sup>35</sup> The third and fourth columns of Appendix Table A1 shows results based on a reduced form specification in which the change in hours per capita of basic and advanced ADHA is directly regressed on both reforms, which are consistent with results reported in Table 5.

## **8 Conclusions and implications for policy**

We exploit the gradual introduction of formula-based equalization to identify the effect of exogenous changes in an unconditional block grant on local provision of ADHA in the Netherlands. A one euro increase in grants raises local expenditure by twenty to fifty cents. Adjustments occur through the number of hours as well as through substitution between basic and more advanced types of assistance. These empirical findings are robust to a range of sensitivity checks.

If municipalities base the provision of care by and large on the need-based funds they receive from the central government – even if these funds are provided as a lump sum – then underprovision and undesired interjurisdictional variation in provision levels may be less of a concern. We find a rather moderate impact of grants on provision, which suggests that the flypaper effect may not be relied upon to fully counter concerns about local provision levels. Whether or not alternative policy measures are necessary depends on their effectiveness and on the magnitude of externalities.

A moderate flypaper effect, however, also means that the incentive to curb expenses is only moderately hampered by stickiness of grants to budget categories. Hence, funding decentralized care through an unconditional block grant may indeed help to reduce overall health care expenses, which is good news in view of concerns about its large and rising share of national income. Unconditional block grants have other advantages. They give subnational governments leeway in the allocation of funds over programs and instruments, while minimizing the administrative burden. Our findings indicate that the central government may reap these advantages without fully giving up control over decentralized health care provision.

Empirical evidence on the prevalence of flypaper effects in the health care domain is rare. Although our finding naturally depend on the Dutch institutional context, they may inform policy debates about decentralization and funding of care in other countries. After all, the Netherlands is far from the only country considering decentralization as remedy to sizeable and rising health expenses.

## **Appendix: The grant allocation formulas**

This appendix provides more detail on the grant allocation formulas used in 2010 and 2013. In Appendix Table A6 we list the indicators and the weights that were used in the ADHA allocation formulas in 2010 and 2013 (Columns one and three).<sup>36</sup> Column two reports the average share of the total grant for ADHA that each indicator allocated in 2010. Column four does so for 2013. The indicators of the allocation formulas are measured in levels. Multiplication of the weights with the realized indicators yields the size of the grant for ADHA municipalities receive. As the national budget the central government distributes using the grant for ADHA varies from year to year, the weights in 2008 and 2009 are very similar to the 2010 weights presented in Appendix Table A6, but not exactly identical.<sup>37</sup> The same holds for the weights in 2011, 2012 and 2013.

In 2011 the allocation formula was substantially revised. Four new indicators were added to the allocation formula. These were the number of people in a municipality who are chronically ill and three indicators that interact the relative income of a municipality with the number of households in various age groups. These new variables allocated more than half of the grant for ADHA on average (see Column four). Note that before 2011, more than half of the ADHA grant was allocated based on indicators measuring the number of people with low incomes and households with heads aged 75 or older, the number of people on social support, and the number of single person households with heads aged between 75 and 84. Municipalities with many people on social support and many old single person households thus lost from the reform in 2011, whereas municipalities with many people who are chronically ill or with a relatively low average income gained.

Table A7 presents pairwise correlation coefficients for our control variables (measured in 2005) and the main indicators of the allocation formula in 2010 and in 2013. They indicate that the most important indicators of the allocation formula (in both 2010 and 2013) correlate strongly with especially the share of the population that was older than 75, average personal

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<sup>36</sup> The allocation formulas were constructed using the so-called “analysis of differences”. The idea behind this method is that municipal costs for the provision of ADHA can be divided into costs that are the result of exogenous or endogenous cost drivers. An allocation formula is constructed based on the exogenous costs and exogenous cost drivers only. Municipalities have been grouped according to income (high, low) and share of elderly (high, low) and relevant cost drivers and their weights have been selected by their ability to explain cost differences within and between these groups of municipalities (see Huigsloot, 2007). The allocation formulas have been presented to municipalities before officially being published.

<sup>37</sup> As an example, the weight for population size was 0.30 in 2008 and 0.31 in 2010.



income and the mortality rate in 2005. For these controls, the correlation coefficients often exceed fifty percent. Surprisingly, the share of the population that belongs to a minority group in 2005 correlates strongly ( $\rho > 0.4$ ) with the indicators that are a function of households with low income and the number elderly households in the municipality. Population density does not correlate strongly with the main indicators of the allocation formula in 2010 or 2013. Nonetheless, we use it as a control because provision of ADHA is believed to be more expensive in remote areas with low population density because of travel costs.

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## TABLES

*Table 1*  
*Summary Statistics: Regression Sample*

	Obs.	Mean	Std. Dev.	Min.	Max.
2013					
Expenditures ADHA	380	99.33	27.49	41.65	205.16
Hours ADHA	380	3.20	0.89	1.21	6.24
Grant	380	93.74	18.24	42.74	154.31
Hours basic ADHA	380	2.27	0.88	0.00	5.30
Hours advanced ADHA	380	0.93	0.81	0.00	4.87
Users cash benefit (per 10,000)	380	1.40	5.03	0.00	39.61
User fee (per hour ADHA)	376	6.30	1.58	3.43	14.91
Change 2007 - 2013					
Expenditures ADHA	380	7.24	21.71	-66.87	81.73
Hours ADHA	380	0.16	0.65	-3.49	1.76
Grant	380	3.12	17.92	-54.64	57.01
Hours basic ADHA	380	1.29	0.89	-1.67	4.18
Hours of advanced ADHA	380	-1.12	0.82	-3.51	1.72
Users cash benefit (per 10,000)	380	1.22	5.04	-16.82	39.61
User fee (per hour ADHA, 2008-2013)	373	2.13	1.80	-11.28	11.56
Population aged 75 or more (1=1%)	380	1.08	0.59	-0.81	3.01
Average personal income (in 1000 euro)	380	-1.35	0.81	-9.06	0.36
Share population belonging to minority group (1=1%)	380	0.28	0.39	-0.53	2.88
Mortality rate (1=1%)	380	0.07	0.11	-0.25	0.61
Population density (inhabitants per km <sup>2</sup> )	380	11.68	73.96	-471.35	430.00
Change 2010 - 2013					
Expenditures ADHA	380	-12.86	17.78	-86.78	64.67
Hours ADHA	380	-0.10	0.51	-3.92	1.67
Grant	380	-4.46	9.56	-52.94	17.73
Hours basic ADHA	380	0.31	0.71	-3.04	3.12
Hours of advanced ADHA	380	-0.41	0.64	-3.02	1.77
Instruments					
Reform 1	380	1.46	19.56	-54.88	65.75
Reform 2	380	1.06	8.43	-58.99	16.51
Reform 1 + Reform 2	380	2.52	18.17	-51.95	57.72
Lagged control variables					
Share population aged 75 or more (1=1%)	380	6.29	1.56	2.61	13.16
Average personal income (in 1000 euro)	380	12.74	1.41	8.90	20.10
Share population belonging to minority group (1=1%)	380	12.49	7.20	2.29	50.89
Mortality rate (1=1%)	380	0.82	0.19	0.31	1.87
Population density (inhabitants per km <sup>2</sup> )	380	750.19	898.80	25.00	5711.00
Expenditures on ADHA (by EMEA purchasing agencies)	380	84.31	25.55	37.25	170.95
Share of votes to left wing parties (Groen-Links, PvdA, SP)	380	26.84	15.07	0.00	73.75
Share of votes to Christian democrats (CDA, CU, SGP)	380	26.95	13.35	0.00	86.92
Share of votes to local parties or combinations of parties	380	29.77	17.77	0.00	100.00

Note: All expenses and grant amounts have been inflated to 2013 euros. All variables per inhabitant in 2005 unless indicated otherwise. Lagged control variables take their value in 2005, except vote shares that come from the 2006 or 2010 municipal election.

*Table 2*  
*Effect on expenditures and service provision*

PANEL A – Second stage. Dependent variable: Change expenditures ADHA				
	(1)	(2)	(3)	(4)
	OLS	IV	IV	IV
Change Grant	0.3985*** (0.0719)	0.3679*** (0.0785)	0.3789*** (0.0815)	0.2380 (0.1571)
Reform 1				0.1314 (0.1523)
Reform 2			-0.1525 (0.1780)	
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.1989			
Kleibergen-Paap F		1878	1772	753
PANEL B – Second stage. Dependent variable: Change hours ADHA				
Change Grant	0.0136*** (0.0023)	0.0142*** (0.0024)	0.0142*** (0.0025)	0.0142*** (0.0038)
Reform 1				-0.0000 (0.0034)
Reform 2			0.0000 (0.0040)	
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.3449			
Kleibergen-Paap F		1878	1772	753
PANEL C – First stage. Dependent variable: Change grant				
Reform 1 + Reform 2		0.9431*** (0.0218)		
Reform 1			0.9330*** (0.0222)	0.9330*** (0.0222)
Reform 2			1.0825*** (0.0394)	1.0825*** (0.0394)
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>		0.927	0.930	0.930

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA and grant over the period 2007-2013.

Table 3

*Effect on expenditures and service provision, conditional on lagged controls*

PANEL A – Second stage. Dependent variable: Change expenditures ADHA			
	(1)	(2)	(3)
	IV	IV	IV
Change Grant	0.3776 <sup>***</sup> (0.0780)	0.3551 <sup>***</sup> (0.0766)	0.4756 <sup>***</sup> (0.1227)
Share population 75 or older in 2005		1.0908 (1.5543)	
Average personal income in 2005		1.1317 (1.4770)	
Share minority groups (allochtoon) in 2005		-0.0295 (0.2014)	
Mortality rate in 2005		-9.8135 (13.5812)	
Population density in 2005		0.0014 (0.0017)	
Expenditures on ADHA in 2005			0.0931 (0.0895)
Share of votes to left-wing parties in 2006	0.1995 (0.1882)		
Share of votes to Christian democrats in 2006	0.1143 (0.1647)		
Share of votes to local and other parties in 2006	0.2052 (0.1828)		
EMEA-region fixed effects	YES	YES	YES
Kleibergen-Paap F	1770	1759	593
PANEL B – Second stage. Dependent variable: Change hours ADHA			
Change Grant	0.0144 <sup>***</sup> (0.0024)	0.0137 <sup>***</sup> (0.0024)	0.0123 <sup>***</sup> (0.0034)
share population 75 or older in 2005		-0.0506 (0.0383)	
Average personal income in 2005		0.0608 <sup>**</sup> (0.0256)	
Share minority groups (allochtoon) in 2005		-0.0156 <sup>***</sup> (0.0057)	
Mortality rate in 2005		0.1742 (0.2979)	
Population density in 2005		0.0001 <sup>**</sup> (0.0000)	
Expenditures on ADHA in 2005			-0.0016 (0.0022)
Share of votes to left-wing parties in 2006	-0.0016 (0.0046)		
Share of votes to Christian democrats in 2006	-0.0052 (0.0043)		
Share of votes to local and other parties in 2006	-0.0012 (0.0039)		
EMEA-region fixed effects	YES	YES	YES
Kleibergen-Paap F	1770	1759	593



*Table 3 (continued)*  
*Effect on expenditures and service provision, conditional on lagged controls*

PANEL C – First stage. Dependent variable: Change grant			
	(1)	(2)	(3)
Reform 1 + Reform 2	0.9474 <sup>***</sup> (0.0225)	0.9511 <sup>***</sup> (0.0227)	1.0021 <sup>***</sup> (0.0411)
share population 75 or older in 2005		-0.5583 (0.4477)	
Average personal income 2005		-0.9869 <sup>***</sup> (0.3695)	
Share minority groups (allochtoon) 2005		0.1027 (0.0672)	
Mortality rate 2005		4.1241 (3.1852)	
Population density 2005		-0.0012 <sup>**</sup> (0.0006)	
Expenditures on ADHA in 2005			0.0541 <sup>*</sup> (0.0297)
Share of votes to left-wing parties in 2006	0.1293 <sup>***</sup> (0.0486)		
Share of votes to Christian democrats in 2006	0.0968 <sup>**</sup> (0.0408)		
Share of votes to local and other parties in 2006	0.1163 <sup>***</sup> (0.0447)		
EMEA-region fixed effects	YES	YES	YES
R <sup>2</sup>	0.914	0.918	0.913

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA and grant over the period 2007-2013. Missing observations for average personal income in 2005 set to sample mean for the municipalities Schiermonnikoog, Teylingen and Utrechtse Heuvelrug.

*Table 4*  
*Effect on expenditures and service provision 2010-2013*

PANEL A – Second stage. Dependent variable: Change expenditures ADHA		
	(1)	(2)
	OLS	IV
Change Grant	0.2117 (0.1891)	0.2678 (0.1777)
Reform 1	0.2957*** (0.0727)	0.3030*** (0.0735)
EMEA fixed effects	YES	YES
R <sup>2</sup>	0.1909	
Kleibergen-Paap F		67
PANEL B – Second stage. Dependent variable: Change hours ADHA		
Change Grant	0.0090*** (0.0028)	0.0127*** (0.0032)
Reform 1	0.0117*** (0.0020)	0.0122*** (0.0019)
EMEA fixed effects	YES	YES
R <sup>2</sup>	0.3391	
Kleibergen-Paap F		67
PANEL C – First stage. Dependent variable: Change grant		
Reform 1		-0.0038 (0.0229)
Reform 2		0.8221*** (0.1006)
R <sup>2</sup>		0.722
EMEA-region fixed effects	YES	YES

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA and grant over the period 2010-2013.

*Table 5*  
*Effect on provision of basic and advanced ADHA*

PANEL A – Second stage. Dependent variable: Change hours basic ADHA				
	(1)	(2)	(3)	(4)
	OLS	IV	IV	IV
Change Grant	0.0016 (0.0030)	-0.0001 (0.0030)	0.0011 (0.0030)	-0.0151*** (0.0056)
Reform 1				0.0152*** (0.0049)
Reform 2			-0.0176*** (0.0054)	
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.417			
Kleibergen-Paap F		2097	1973	738
PANEL B – Second stage. Dependent variable: Change hours advanced ADHA				
Change Grant	0.0120*** (0.0027)	0.0143*** (0.0028)	0.0130*** (0.0028)	0.0293*** (0.0048)
Reform 1				-0.0152*** (0.0040)
Reform 2			0.0176*** (0.0042)	
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.471			
Kleibergen-Paap F		2097	1973	738

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. First stage results are equal to those reported in panel C of Table 2. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA and grant over the period 2007-2013.

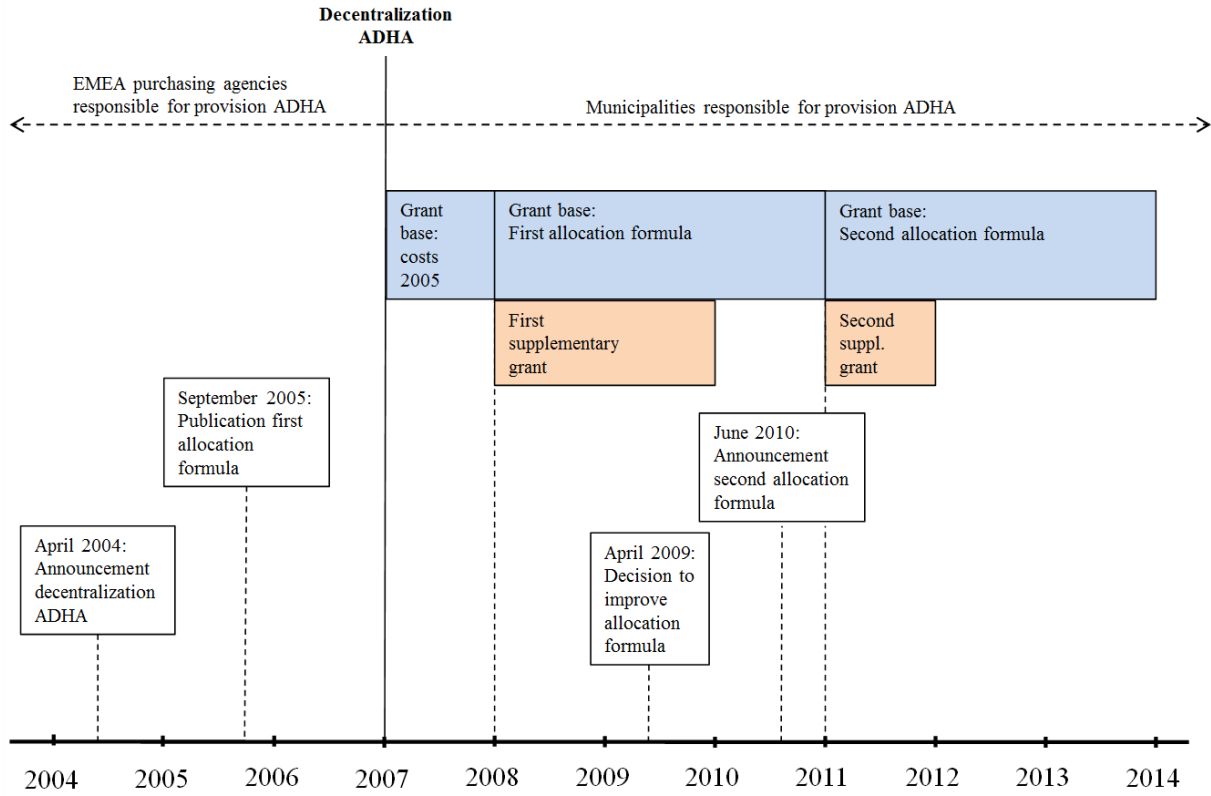
*Table 6*  
*Effect on provision of basic and advanced ADHA 2010 - 2013*

PANEL A – Second stage. Dependent variable: Change hours basic ADHA		
	(1)	(2)
	OLS	IV
Change Grant	0.0030 (0.0039)	-0.0075 (0.0062)
Reform 1	0.0082 <sup>***</sup> (0.0027)	0.0068 <sup>***</sup> (0.0026)
EMEA-region fixed effects	YES	YES
R <sup>2</sup>	0.373	
Kleibergen-Paap F		67
PANEL B – Second stage. Dependent variable: Change hours advanced ADHA		
Change Grant	0.0059 <sup>*</sup> (0.0036)	0.0202 <sup>***</sup> (0.0063)
Reform 1	0.0035 (0.0022)	0.0054 <sup>**</sup> (0.0022)
EMEA-region fixed effects	YES	YES
R <sup>2</sup>	0.398	
Kleibergen-Paap F		67

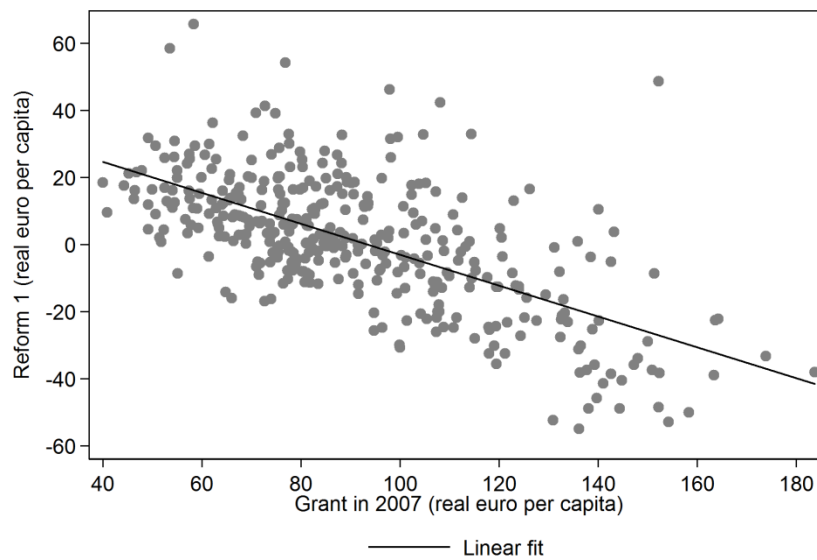
Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. First stage results are equal to those reported in panel C of Table 4. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA and grant over the period 2010-2013.

## FIGURES

*Figure 1*  
*Timeline decentralization of ADHA*

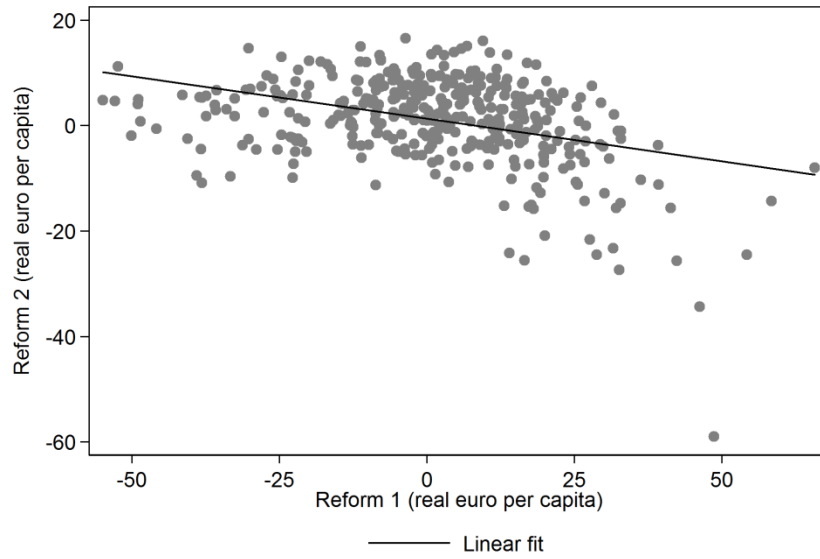


*Figure 2*  
*Reform 1 to initial grant*



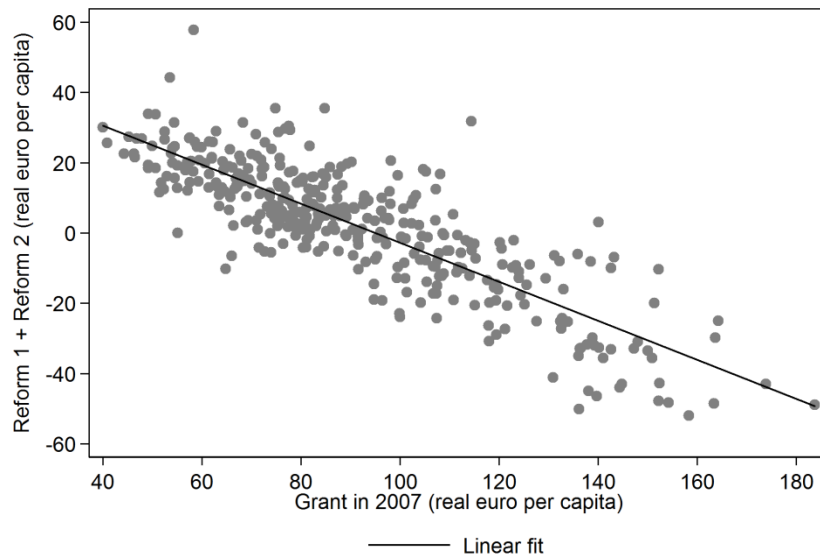
Note: unit of observation is the municipality. All amounts in real euro of 2013 divided by population in 2005.

*Figure 3*  
*Reform 2 to Reform 1*



Note: unit of observation is the municipality. All amounts in real euro of 2013 divided by population in 2005

*Figure 4*  
*Reform 1 + Reform 2 to initial grant*



Note: unit of observation is the municipality. All amounts in real euro of 2013 divided by population in 2005

## APPENDIX TABLES

*Table A1*  
*Reduced form equations*

Dependent variable:	Change expenditures	Change hours ADHA	Change hours basic ADHA	Change hours advanced ADHA
	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Reform 1	0.3535*** (0.0797)	0.0132*** (0.0024)	0.0011 (0.0030)	0.0122*** (0.0027)
Reform 2	0.2577 (0.1780)	0.0154*** (0.0044)	-0.0164*** (0.0062)	0.0317*** (0.0050)
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.1816	0.3406	0.4344	0.5102

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates. Expenditures and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Changes are over the period 2007-2013.

Table A2

*Effect on expenditures and service provision conditional on change control variables*

PANEL A – Second stage. Dependent variable: Change expenditures ADHA		
	(1)	(2)
	IV	IV
Change Grant	0.3532*** (0.0768)	0.3444*** (0.0787)
Share population 75 or older		2.4304 (2.4556)
Average personal income		-2.6935* (1.4826)
Share population belonging to minority group		6.4386* (3.4732)
Mortality rate		1.3431 (12.8659)
Population density		-0.0021 (0.0162)
Share of votes to left-wing parties	0.2517 (0.2129)	
Share of votes to Christian democrats	0.5391* (0.2769)	
Share of votes to local and other parties	0.3178** (0.1555)	
EMEA-region fixed effects	YES	YES
Kleibergen-Paap F	1823	2022
PANEL B – Second stage. Dependent variable: Change hours ADHA		
Change Grant	0.0141*** (0.0024)	0.0141*** (0.0025)
Share population 75 or older		-0.0110 (0.0686)
Average personal income		-0.0424 (0.0301)
Share population belonging to minority group		-0.0481 (0.0710)
Mortality rate		0.1415 (0.2994)
Population density		-0.0002 (0.0004)
Expenditures on ADHA	-0.0006 (0.0050)	
Share of votes to left-wing parties	0.0064 (0.0055)	
Share of votes to Christian democrats	0.0037 (0.0027)	
EMEA-region fixed effects	YES	YES
Kleibergen-Paap F	1823	2022



*Table A2 (continued)*  
*Effect on expenditures and service provision conditional on change control variables*

PANEL C – First stage. Dependent variable: Change grant		
	(1)	(2)
Reform 1 + Reform 2	0.9430 <sup>***</sup> (0.0221)	0.9264 <sup>***</sup> (0.0206)
Share population 75 or older		4.0986 <sup>***</sup> (0.6925)
Average personal income		0.2319 (0.4654)
Share population belonging to minority group		3.4303 <sup>***</sup> (0.8450)
Mortality rate		-2.0650 (3.6341)
Population density		-0.0010 (0.0045)
Share of votes to left-wing parties	0.0015 (0.0621)	
Share of votes to Christian democrats	0.0454 (0.0581)	
Share of votes to local and other parties	0.0035 (0.0367)	
EMEA-region fixed effects	YES	YES
R <sup>2</sup>	0.9118	0.9248

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant and EMEA-region fixed effects are partialled out in IV estimates. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA, grant and control variables over the period 2007-2013. Change in average personal income set to the average for De Friese Meren, Schiermonnikoog and Vlieland.

*Table A3*  
*Effect on expenditures and service provision, asymmetric response*

PANEL A – Second stage. Dependent variable:	Change expenditures		Change hours ADHA	
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
Change Grant, pos. shock	0.4041 <sup>***</sup> (0.1277)	0.4021 <sup>***</sup> (0.1240)	0.0122 <sup>***</sup> (0.0032)	0.0110 <sup>***</sup> (0.0034)
Change Grant, neg. shock	0.3931 <sup>***</sup> (0.1321)	0.3371 <sup>**</sup> (0.1470)	0.0150 <sup>***</sup> (0.0041)	0.0171 <sup>***</sup> (0.0045)
EMEA-region fixed effects	YES	YES	YES	YES
Observations	380	380	380	380
Method	OLS	IV	OLS	IV
R <sup>2</sup>	0.1987		0.3455	
Kleibergen-Paap F		498		498
PANEL B – First stage. Dependent variable: Change grant, positive shock				
Reform 1 + Reform 2, pos. shock		1.0128 <sup>***</sup> (0.0322)		1.0128 <sup>***</sup> (0.0322)
Reform 1 + Reform 2, neg. shock		-0.0064 (0.0212)		-0.0064 (0.0212)
EMEA fixed effects		YES		YES
R <sup>2</sup>		0.8630		0.8630
PANEL C – First stage. Dependent variable: Change grant, negative shock				
Reform 1 + Reform 2, pos. shock		-0.0341 (0.0233)		-0.0341 (0.0233)
Reform 1 + Reform 2, neg. shock		0.9208 <sup>***</sup> (0.0263)		0.9208 <sup>***</sup> (0.0263)
EMEA-region fixed effects		YES		YES
R <sup>2</sup>		0.8967		0.8967

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. Expenditures, grant and reforms measured in real euro per inhabitant in 2005. Hours ADHA measured in hours per inhabitant in 2005. Change in expenditures ADHA, hours ADHA and grant over the period 2007-2013.

*Table A4*  
*Effect on user rate of cash benefits*

Second stage results. Dependent variable: Change user rate of cash benefits				
	(1)	(2)	(3)	(4)
	OLS	IV	IV	IV
Change Grant	0.0096 (0.0224)	0.0174 (0.0210)	0.0226 (0.0216)	-0.0444 (0.0380)
Reform 1				0.0625* (0.0361)
Reform 2			-0.0725* (0.0419)	
EMEA-region fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.174			
Kleibergen-Paap F		1878	1772	753

Note:  $N = 380$ . Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates. First stage results reported in table 2. Grant and reforms measured in real euro per inhabitant in 2005. User rate of cash benefits measured in users of cash benefits per inhabitant in 2005. Changes in grant and user rate of cash benefit are over the period 2007-2013.

*Table A5*  
*Effect on user fee per hour of ADHA, 2008-2013*

PANEL A – Second stage. Dependent variable: Change user fee per hour of ADHA				
	(1)	(2)	(3)	(4)
	OLS	IV	IV	IV
Change Grant	-0.0080 (0.0059)	-0.0090 (0.0061)	-0.0093 (0.0063)	-0.0055 (0.0092)
Reform 1				-0.0036 (0.0086)
Reform 2			0.0042 (0.0100)	
EMEA fixed effects	YES	YES	YES	YES
R <sup>2</sup>	0.160			
Kleibergen-Paap F		2061	1943	719

PANEL B – First stage. Dependent variable: Change grant				
Reform 1 + Reform 2		0.9521*** (0.0210)		
Reform 1			0.9425*** (0.0214)	0.9425*** (0.0214)
Reform 2			1.0851*** (0.0405)	1.0851*** (0.0405)
EMEA-region fixed effects		YES	YES	YES
R <sup>2</sup>		0.926	0.929	0.929

Note:  $N = 373$ . Grant and reforms measured in real euro per inhabitant in 2005. Out of pocket expenditures measured as total receipts of out of pocket expenditures by municipalities divided by the number of hours ADHA provided. Changes in grant over the period 2007-2013, changes in out of pocket expenditures over the period 2008 - 2013. Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Constant not shown in OLS estimates, constant and EMEA-region fixed effects are partialled out in IV estimates.

*Table A6*  
*Allocation formula for ADHA*

Indicator	2010		2013	
	Weight	Share <sup>(a)</sup> (in %)	Weight	Share <sup>(a)</sup> (in %)
	(1)	(2)	(3)	(4)
Indicators with similar weight before and after 2011 reform				
Population size	0.31	0.32	0.32	0.42
Population younger than 19	0.26	0.06	0.26	0.08
Households with low income	0.96	0.13	0.98	0.17
Population belonging to a minority group	0.81	0.06	0.83	0.09
Potential number of people visiting from nearby municipalities	1.45	1.48	1.49	1.96
Local capacity health care <sup>(b)</sup>	1.01	1.40	1.01	1.80
Indicators with new weight after 2011 reform				
Population younger than 65	0.38	0.33	8.17	8.92
Population aged 65 or older and younger than 75	46.56	3.99	0.23	0.03
Population aged 75 or older and younger than 85	175.13	9.11	0.23	0.01
Population 85 or older	260.48	4.74	0.23	0.00
Single person households with head aged 65 or older and younger than 75	262.98	5.31	31.77	0.92
Single person households with head aged 75 or older and younger than 85	584.79	12.06	127.06	3.38
Single person households with head aged 85 or older	756.95	7.05	222.36	2.92
Number of people who receive social support excluding those on welfare	297.27	17.07	80.36	5.82
Municipal housing density times housing stock over 1000	-2.02	1.8	-0.44	0.51
Function of people with low incomes times the number of households with head aged 65 to 74 <sup>(c)</sup>	610.11	6.29	263.20	3.93
Function of people with low incomes times the number of households with head aged 75 to 84 <sup>(c)</sup>	2440.44	17.15	1052.82	9.73
Function of people with low incomes times the number of households with head aged 85 or older <sup>(c)</sup>	4270.77	10.07	1842.43	6.1
Lump sum transfer	58658.22	1.56	24263.31	0.78
New indicators as of 2011 reform				
Function of relative average income times the number of households with head aged 65 to 74 <sup>(d)</sup>	0	0	226.90	8.31
Function of relative average income times the number of households with head aged 75 to 84 <sup>(d)</sup>	0	0	907.61	20.5
Function of relative average income times the number of households with head aged 85 or older <sup>(d)</sup>	0	0	1588.31	12.71
Function of number of people who are chronically ill <sup>(e)</sup>	0	0	239.60	10.92

<sup>(a)</sup> 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.

<sup>(b)</sup> 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.

<sup>(c)</sup> Function equal to the maximum of zero or [(the number of people with low income divided by the housing stock) minus 0.1].

<sup>(d)</sup> Function equal to the average municipal income over municipal income minus 0.55.

<sup>(e)</sup> Function equal to (share of population who is chronically ill minus 0.11) times population size

Table A7

Correlation coefficients main indicators allocation formula and control variables

	Control variables measured in 2005				
	Percentage population older than 75	Average personal income	Mortality rate	Minority rate	Population density
Main indicators in 2010					
Single person households with head aged 75 or older and younger than 85	0.88***	0.40***	0.74***	0.37***	0.23***
Number of people who receive social support excluding those on welfare	0.09*	-0.41***	0.30***	0.22***	0.02
Function of people with low incomes times the number of households with head aged 75 to 84 <sup>(a)</sup>	0.55***	-0.22***	0.60***	0.40***	0.23***
Function of people with low incomes times the number of households with head aged 85 or older <sup>(a)</sup>	0.66***	-0.11**	0.64***	0.42***	0.28***
Main indicators in 2013					
Function of relative average income times the number of households with head aged 65 to 74 <sup>(b)</sup>	0.18***	-0.62***	0.34***	0.02	-0.16***
Function of relative average income times the number of households with head aged 75 to 84 <sup>(b)</sup>	0.40***	-0.51***	0.48***	0.09*	-0.09*
Function of relative average income times the number of households with head aged 85 or older <sup>(b)</sup>	0.61***	-0.30***	0.57***	0.18***	0.05
Function of number of people who are chronically ill <sup>(c)</sup>	0.40***	-0.20***	0.52***	0.09*	-0.07

Note: Indicators of the allocation formula have been scaled using population size in 2005. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

<sup>(a)</sup> Function equal to the maximum of zero or [(the number of people with low income divided by the housing stock) minus 0.1].

<sup>(b)</sup> Function equal to the average municipal income over municipal income minus 0.55.

<sup>(c)</sup> Function equal to (share of population who is chronically ill minus 0.11) times population size