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**Working Paper**

## When Health Trumps Money: Economic Incentives and Health Equity in the Provision of Nursing Homes

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# When Health Trumps Money: Economic Incentives and Health Equity in the Provision of Nursing Homes

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# When Health Trumps Money: Economic Incentives and Health Equity in the Provision of Nursing Homes

## Abstract

The allocation of public care services should be determined by individual needs but can be influenced by economic factors. This paper examines the impact of economic incentives on the allocation of nursing home care in the Norwegian long-term care system. The study uses a theoretical model and empirical data from the municipality of Oslo to determine if nursing home spots are allocated based on income, which would be financially advantageous for the provider. We do not find evidence that the economic incentives of the care provider play a role in the allocation of nursing homes. Thus, in this setting, needs seems to be the dominant factor for allocation of nursing home care, while economic incentives seem to play no significant role.

JEL-Codes: I140, I180, H510.

Keywords: long-term care, economic incentives in health care, health care equity.

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# 1 Introduction

In countries with universal health care systems, the allocation of care services is supposed to be determined based on individual needs and needs only.<sup>2</sup> However, it may be challenging to determine the optimal care service to be offered to an individual, given the availability of different care options, such as family care, home services, sheltered housing, nursing homes, and hospital services, which to some extent are interchangeable. In these situations, economic factors may play a role in the allocation of care.

We ask whether the economic incentives of a long-term care provider affect how publicly financed nursing home care is allocated. To answer this question, we analyze the economic incentives generated by the Norwegian long-term care system. In this system, municipalities responsible for providing long-term care are incentivized to opt for nursing home care for high-income users because of user fees that are dependent on income. The user fee is approximately 80% of the users' income, capped by the actual cost of the service.

We start with a theoretical model, to comprehend the decision-making process of the care provider when choosing between nursing home care and home services for an individual in need of care services. The model considers both the health implications for the individual of providing different services and the budget constraints of the care provider. In many cases, there is no doubt about what types of care services a frail person should receive. However, in cases where both home services and a nursing home may improve the person's health and well-being, other factors like income may matter for the municipal choice of care services. The model studies the trade-offs between health and income in these cases, and provides hypotheses about how the income of the individual in need of care may affect the decisions made by the care provider.

The hypotheses are tested in the empirical part of the study using comprehensive data from the municipality of Oslo. Combining administrative data covering, e.g., income, family situation, and residency with data on care provision and other health and functional status measures allow us to study these questions in detail. In particular, we argue that the function scores, set by public care workers, enable us to estimate an individual's health-based need for a nursing home spot and thus break the confounding link between income and health. We conclude that we do not find evidence that the economic incentives of the public nursing home provider play a role in this setting. Nursing home spots seem to be allocated based on needs only.

There is an extensive literature studying how economic incentives within insurance schemes will affect the distribution and consumption of health services (Brot-Goldberg et al., 2017; Einav et al., 2018; Moscelli et al., 2018). There is a smaller literature on the impact of economic incentives and inequity in home-based care (García-Gómez et al., 2015; Non, 2017; Roquebert et al., 2017), and a much smaller literature on economic incentives and equitable access to nursing home care (Takahashi, M. (2019); Tenand et al., 2021). Tenand et al. (2021) state that the lack of literature on nursing home care in this field is the limited availability of individual data on out-of-pocket (OOP) payments and care services utilization.

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<sup>2</sup> In Norway, this is regulated by law, see Section 3 below.

We contribute to this literature using a high-quality register on recipients of public long-term care in Oslo municipality. This data includes detailed information on the functional status and service receipt of all persons who receives public long-term care in Oslo. These data cover virtually all users of long-term care services since a private non-subsidized market is almost non-existent (Karlsson et al., 2012). Our study is closest to Tenand et al. (2021), who studied a reform in the Netherlands that increased the OOP payment of nursing home care for individuals with wealth above an administrative set threshold. They use a difference-in-differences model and find a marginal decrease in nursing home utilization in the group that experienced the increase in OOP payments compared to the group that did not experience any changes in co-payments.

Our study is also related to the empirical and theoretical analysis of provider incentives and bed blocking in nursing home and hospital care. Kümpel (2019) found that nursing homes in Germany responded to economic incentives as a way of lowering bed-blocking. Kverndokk and Melberg (2021) found that introducing a fee for bed-blocking in hospitals in Norway reduced bed-blocking significantly, as long-term care providers took the patients home earlier. It also reduced the treatment time set by the hospitals. Thus, long-term care providers responded to economic incentives to reduce bed blocking. This is in contrast to our study, which finds that long-term care providers do not respond to economic incentives when it comes to allocating nursing home spots. In the final section, we discuss possible reasons for this.

The paper is organized in the following way. In Section 2, we present a theoretical framework to discuss the mechanism behind the decisions taken by the municipality when an individual applies for care services. We then test the conclusions on data for Oslo. To do this, we first describe the institutional framework in Norway in Section 3. Then we present the data used in the empirical analysis in Section 4, while section 5 presents the empirical model and the results. Finally, Section 6 discusses the results and concludes.

## 2 The theory model

Below, we present an analytical model for the choices of the municipality when an individual applies for nursing home care. The municipality offers two types of services, a room in a nursing home or municipal home services. The alternative to municipal services is family care. However, we assume that municipal home services are offered before nursing home care is considered, so the choice of the municipality is between home care services and nursing home services.<sup>3 4</sup>

To study this, we base on Kverndokk and Melberg (2021), who let the following function describe the health of a representative individual in need of care services:

$$(1) \quad h = h(x, y), \text{ where } h'_x \geq 0, h'_y \geq 0.$$

Here  $h$  is the health level (or functional level),  $x$  is the level of nursing home services, and  $y$  is the level of home care services. These terms are broadly defined and cover services the individual

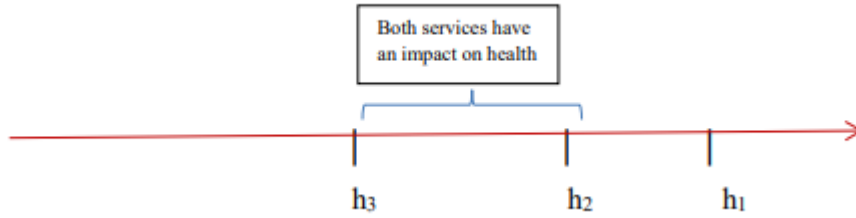
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<sup>3</sup> This is based on the practice in Oslo, where municipal home services are usually offered before nursing home care is considered.

<sup>4</sup> We could also introduce family care in our model as the family will usually provide help even if the municipality is involved. In our setting, we have set this to a constant value and it is therefore, ignored in equation (2).

needs to recover or maintain their health level. We assume that health is increasing (or non-decreasing) in both services. However, the individual can only receive one service at a time; it receives home care or moves to a nursing home.

We divide the health level into different segments; see Figure 1.

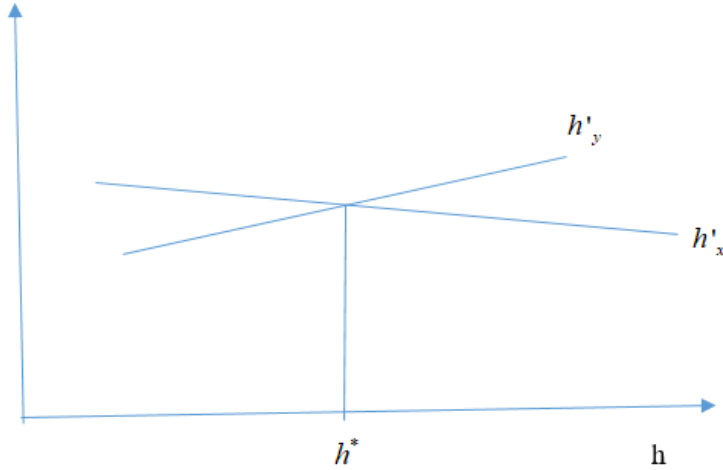


**Figure 1.** The health thresholds of an individual

Assume that the individual needs municipal care services if their health level is below a certain value;  $h_1$ . If  $h < h_3$ , where  $h_3 < h_1$ , a room in a nursing home is needed, which would violate ethical guidelines not to provide it in this case. Likewise, if  $h > h_2$ , where  $h_2 < h_1$ , there is no need for the individual to stay in a nursing home as it will manage well if care services are provided at home. Thus, in the interval  $h_2 < h < h_1$ , only municipal care services at home are offered. However, there is also an interval,  $h_3 \leq h \leq h_2$ , where a nursing home room and care services at home will positively impact health. Thus, in this interval, there is scope for the municipality to offer both types of care services. The different services will, however, not necessarily have an equal impact on health, as one may be more productive than the other. It is reasonable to believe that home services will have a more significant health impact than a nursing room the closer the health is to  $h_2$  and that a nursing home will have a more substantial effect the closer the health level is to  $h_3$ . This is illustrated in Figure 2, where the individual would ideally benefit from staying in a nursing home if the health is lower than  $h^*$ .<sup>5</sup>

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<sup>5</sup> The lines in the figures are linear for convenience, but they will in general depend on the specification of the health function. Note also that the marginal health curves are drawn relatively flat to illustrate the small health differences between the two care options in the interval  $h_3 \leq h \leq h_2$ .



**Figure 2.** The marginal impact on the health of the different care services in the interval  $h_3 \leq h \leq h_2$ .

However, the municipality may not use  $h^*$  as the level that determines the type of care service for at least two reasons. First, it may face capacity constraints<sup>6</sup>, and second, the municipality must consider its budget when offering care services. The latter can be illustrated by the following simple additive linear utility function of the municipality, where it cares about the health condition of a frail individual as well as its budget:

$$(2) \quad U = h(x, y) + \beta \left[ (b_2(I) - p)x + (b_1 - q)y \right]$$

Here,  $b_2$  is the user payment for nursing home care, which depends on the person's income,  $I$ .<sup>7</sup>  $b_1$  is the user payment for municipal home services.<sup>8</sup>  $p$  is the municipal cost of offering a nursing home room, while  $q$  is the cost of providing home care services, where  $p > q$ .

As seen from equation (2), the municipal income and costs are included in the utility function in addition to the individual's health level, where the health condition is valued in monetary units. Thus, the agent faces a trade-off between the individual's health and financial situation. Note that we have introduced a parameter,  $0 \leq \beta \leq 1$ , representing how much weight the municipality puts on the budget. This can be interpreted as the municipality facing a soft budget constraint.

<sup>6</sup> Note that in our empirical analysis for Oslo, we can disregard capacity constraints in the districts, as the different sections order a nursing room from a central unit. They must pay the room to the leading team a given amount but keep the user payment.

<sup>7</sup> The user payment of staying in a nursing home is usually between 75 and 85% of the income of the user. However, the user payment should not exceed the municipal costs, which we assume is the case in our analysis.

<sup>8</sup> Municipal home services consist of home nursing and practical assistance. There is a user payment only for the latter, and it is dependent of income. However, the payment interval is much smaller than for users living in a nursing home, so we set this to be constant.



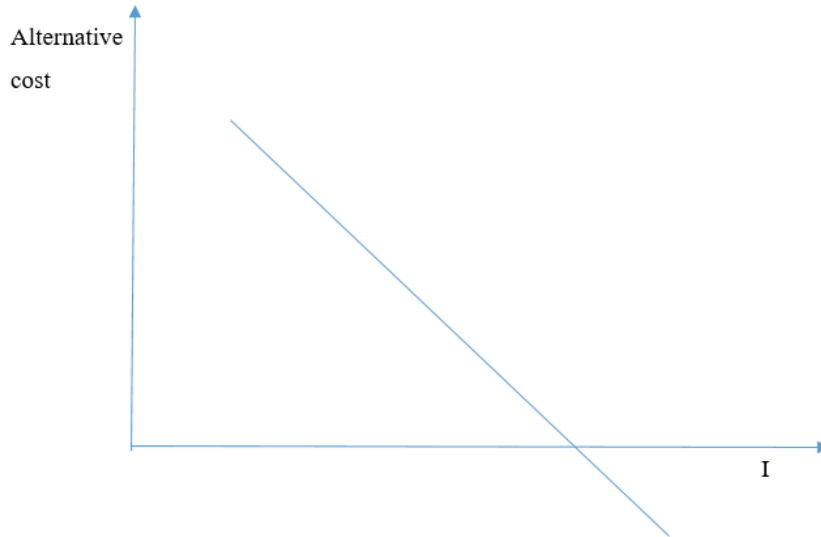
The individual can only receive one service from the municipality at a given point in time, meaning that it either moves to a nursing home or receives municipal home services. We can specify this as:

$$(3) \quad y + x = 1$$

From (3) we find  $y = 1 - x$ . By inserting this in (2) and maximizing with respect to  $x$ , we find the following first order condition for nursing home services:

$$(4) \quad h'_x - h'_y = \beta[(p - q) - (b_2(I) - b_1)]$$

The left-hand side is the health gain of the individual from staying in a nursing home compared to receiving home care services. This may be negative or positive (see Figure 2). The right-hand side is the alternative cost of offering a room in a nursing home instead of offering home care services, weighted by  $\beta$ . As  $(p - q) > 0$ , and it is reasonable to assume that  $(b_2(I) - b_1) \geq 0$ , the sign of the alternative cost can be negative or positive, but it will be negative for sufficiently large levels of income,  $I$ , given that  $\beta > 0$ . This is illustrated in Figure 3.

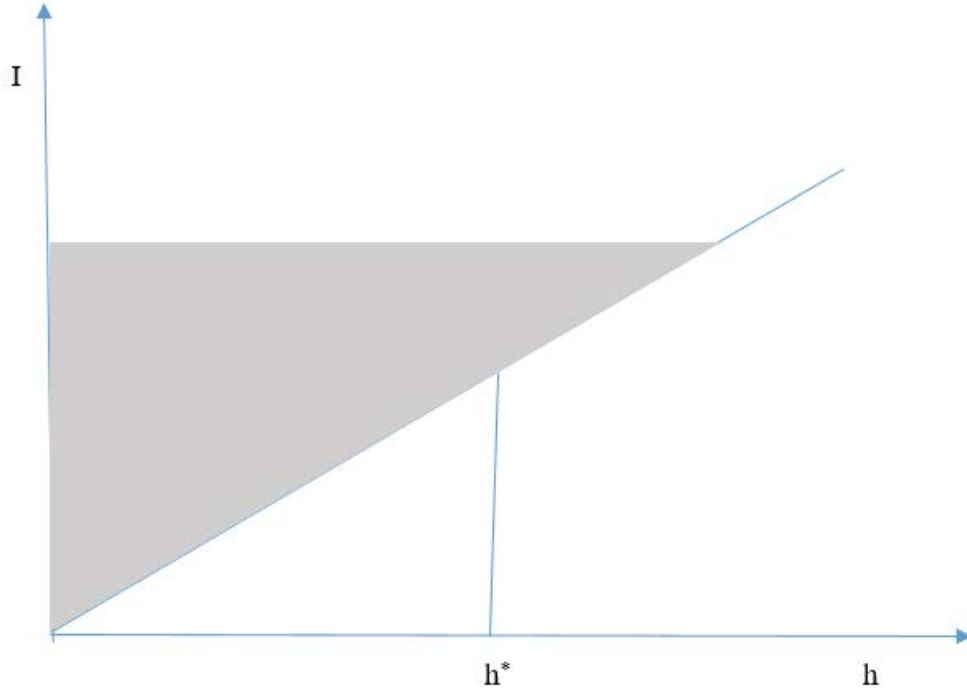


**Figure 3.** The alternative cost of offering a nursing home

Based on this, the municipality will choose to offer a room in a nursing home as long as

$$(5) \quad h'_x - h'_y \geq \beta[(p - q) - (b_2(I) - b_1)],$$

i.e., as long as the health gain for the individual living in a nursing home compared to receiving home care services is equal or larger than the alternative cost for the municipality. How this depends on the income of the individual is illustrated in Figure 4 for  $\beta > 0$ .



**Figur 4.** The combination of health and income and the choice of the municipality

The area above the line in the figure (colored grey) shows the combination of health condition and income where the individual is offered a place in a nursing home. In contrast, the area below the line shows a similar combination when home services are offered. If  $\beta = 0$ , the individual's income is not taken into account when the decision is made in the municipality, and a nursing room is offered for  $h \leq h^*$ , where  $h^*$  is determined by  $h'_x - h'_y = 0$ , see Figure 2. Thus, the most effective service for the health condition is not necessarily provided to the individual if the alternative cost for the municipality of offering this service is sufficiently high.

From the discussion above, we reach the following Proposition:

**Proposition:** *As long as the municipality takes the alternative cost of offering the individual a nursing room into account ( $\beta > 0$ ), we find*

- *An individual with low health,  $h \leq h^*$ , can be provided a nursing home room, even if the income is not very high.*
- *An individual with relatively good health  $h > h^*$ , will be offered a nursing home room if the income is sufficiently large, i.e.,  $b_2(I) > p - q + b_1$ .*
- *An individual can be given priority in a nursing home instead of a more frail individual if the income of the first individual is sufficiently large.*

### 3 Nursing home care in Norway (and Oslo)

#### 3.1 Nursing home placement in Norway

To test the Proposition on data for Norway, we first need to understand the institutional settings that constitute the framework for care services. In Norway, nursing home care is part of the extensive public health care system. This system has universal access to a wide range of highly subsidized health- and care services (“universal health coverage”). Oslo, and the other 355 municipalities, are responsible for primary care, nursing home care, and other long-term care services (Helsedirektoratet, 2020; Hagen et al., 2011; Syse, 2018). This is regulated in the Act on Municipal Health and Care Services (HOL). HOL states that municipalities are responsible for providing nursing home care to patients who, after a needs assessment, are found to be in need of 24-hour health and care services. Nursing homes are usually the highest level of care for older adults with physical and/or cognitive impairment.<sup>9</sup> Nursing homes are required to have an attending physician and nurse responsible for the medical and nursing care, and sufficient health care staff to secure needed health care and patient safety.

The municipalities are funded by needs-weighted block grants and earmarked grants from the central government and regulated local taxes and user fees. They can only charge user fees for health and care services if this is explicitly regulated. For long-term nursing home stays, they are allowed to demand an income-dependent user fee, constrained upwards by roughly 80 percent of residents’ after-tax income and the actual operator cost of the service. The user fees cover approximately 12 percent of total nursing home expenses (Hagen et al., 2011). Long-term care expenditures are the largest component of municipal spending (Hagen et al., 2011).

Within the centrally determined requirements and principles, the municipalities have extensive discretion in how to organize their nursing home care sector. Oslo has decentralized the responsibility of providing and funding home-based and nursing home care to 15 city districts. In the following sub-section, we describe how nursing home care is allocated.

#### 3.2 Nursing home placement in Oslo

The 15 city districts are responsible for assessing needs and purchasing nursing home care for eligible residents. To be evaluated for nursing home care, an individual, or a person who represents the individual, sends an application to the “purchasing unit” in the individual’s home district. An individual can also be evaluated for nursing home care after a doctor’s referral or after an inquiry from someone close to the individual who is concerned about the individual’s health and well-being.

Applications are distributed among care managers (CM) working in the purchaser unit. The CM is responsible for assessing the health needs of the applicants assigned to them. CMs are typically highly educated in health sciences and have extensive work experience in health and social care.

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<sup>9</sup> Over time, nursing home care has almost exclusively become a service for older people with severe physical or cognitive impairment. This is driven by a principle that people with functional disabilities should be given services at the “lowest level of efficient care” to be able to live at home as long as possible (Ministry of Health and Care Services, 2010; Holm, 2017). The municipalities should take this principle into account when assessing needs for nursing home care (Ministry of Health and Care Services, 2010).

The CM should gather all relevant information to determine whether nursing home care is appropriate. Relevant information typically regards the applicant's living conditions, mental condition, functional status, and health condition. Home visits and interviews/talks with the applicant and the applicant's closest relatives usually gather information on living conditions and daily functioning. To assess the health and mental condition, the needs assessors usually confer with other health professionals that care for the applicant, like the applicant's general practitioner (GP) or home nurse, and review primary and specialized health care records. The CM is required to assess the applicant's functional status according to a standardized assessment instrument. The instrument is a Norwegian version of the Physical Self-Maintenance Scale and consists of 18 indicators of Personal Activities of Daily Living (ADL) and Instrumental ADLs. The system uses a 5-point scale for each indicator that ranges from total independence to total dependence. We have access to the written records (primary and specialized health records and the functional status scores) from this needs assessment. As detailed below, we will use this information for risk adjustment when estimating the income gradient in nursing home placement.

After the needs assessment is completed, the application is reviewed in regular application review meetings.<sup>10</sup> In these meetings, CMs present their applications and offer their viewpoints on whether the health needs justify a permanent nursing home admission for the leadership of the purchasing unit. The final decision on whether to grant nursing home care lies with the head of the purchasing unit, and that decision is taken during or after the application review meetings (Moland, 2011). Therefore, the authority to commit the district financially lies with the head of the purchasing unit, and the decision should be taken within fairly detailed budget guidelines. The decision should follow the City Council's directive that permanent nursing home placement should only be considered if the functional and cognitive impairment implies that nursing home care is the only safe option. The decision is also required to take into account the preferences and wishes of the applicant. The decision and its justification are required to be in writing (Weber, 2018). If rejected, the applicant is informed about her right to appeal, and should receive help to complete and submit the appeal (Moland, 2011; NKRF, 2007).

## 4 Data

The primary dataset is administrative patient data for long-term care in Oslo. This data includes detailed information on home-based care and nursing home care utilization. The data is longitudinal and have exact dating of events like when care is provided, in what form (daily activities, medication, equipment, etc.), enrolment in institutions for rehabilitation or permanent residency, and functional status scores. This allows us to construct event history data for all elderly receiving care at home or in nursing homes. The patient administrative data include the official Norwegian identification number, which allows us to link the records to rich information on socioeconomic characteristics, including education, wealth and income by source (pensions), address of residence, marital status, including socio-Economic Status (SES) on spouse and children (gender, age, grandchildren, etc.) from various national administrative registers.

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<sup>10</sup> The meetings are held every or every other week (Moland, 2011).

We focus on individuals who already receive some care services, which aligns with the analytical model in Section 2. The reason is that for all such individuals, caretakers regularly record an evaluation of functional status in terms of the ability to perform daily life activities in 17 different dimensions (“functional levels”). The indicators are scored on a 1 to 5 scale, with higher scores indicating greater need for assistance. A score of 5 indicates that the individual is completely unable to perform the activity, while a score of 1 indicates that the individual can perform the activity independently without assistance. Activities of daily living (ADL) indicators are measures of an individual’s ability to perform basic tasks that are necessary for daily living, such as bathing, dressing, and eating. These indicators are often scored on a scale, with higher scores indicating a greater level of functional independence and lower scores indicating a greater need for assistance. This scoring range is often used to assess an individual’s overall level of functional independence and to identify any areas where they may require additional support or assistance. The 17 functional scores provide our measure of health. They are listed in Table 1.

<i>Functional scores</i>	ADL type
1 Social participation	Cognitive
2 Shopping	Instrumental ADL
3 Decision making	Cognitive
4 Take care of own health	Personal/physical ADL
5 Walking indoors	Personal/physical ADL
6 Housework	Instrumental ADL
7 Personal hygiene	Personal/physical ADL
8 Dressing	Personal/physical ADL
9 Preparing meals	Instrumental ADL
10 Eating	Personal/physical ADL
11 Toileting	Personal/physical ADL
12 Walking outdoors	Personal/physical ADL
13 Eyesight	Medical
14 Hearing	Medical
15 Memory	Cognitive
16 Communicating	Cognitive
17 Behavioral control	Cognitive

**Table 1.** Functional scores

Our estimation sample ( $N = 38\,177$ ) consists of all individuals aged 70 or above who were registered as residents in Oslo municipality at the beginning of the year in the period 2007-2016 and who received some care service the year before. When individuals transition to a nursing home, they are censored the following year, as long-term nursing home residency is an absorbing state in this context.

In Table 2, we present descriptive statistics of our sample of long-term care users. On average, the users are roughly 84 years old, 74 percent are women, and most are widowed. During a year, 63 percent receive practical assistance, 54 percent receive home nursing, and 10 percent have been residents in a nursing home. They have an average real income of 4 times the basic amount

(G), which is roughly equal to 445 788 Norwegian Kroner in 2022 (USD 44 583).<sup>11</sup> Looking at the functional scores, we see that our sample requires ongoing assistance with activities of daily living, such as housework, shopping, preparing meals, and outdoor mobility.

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<sup>11</sup> The basic amount is used to index social security benefits in the Norwegian National Insurance Scheme. It is set each year to keep pace with wage growth for benefits to reflect changes in purchasing power. The basic amount in 2022 is NOK 111 447 (USD 11 146).

<b><i>Demographics</i></b>	Mean	Standard deviation
Age, years	83.81	6.61
Woman, share	0.74	0.44
Norwegian born, share	0.93	0.25
Married/partner, share	0.23	0.42
Widow(er), share	0.51	0.50
Living alone, share	0.25	0.43
Has children, share	0.77	0.42
<b><i>Income</i></b>		
Income, in G	4.01	3.72
<b><i>Long-term care, per year</i></b>		
Nursing home, share	0.10	0.30
Home nursing, share	0.54	0.50
Practical assistance, share	0.63	0.48
<b><i>Functional level, 1-5</i></b>		
1 Social participation	1.60	0.89
2 Shopping	2.52	1.27
3 Decision making	1.63	1.00
4 Take care of own health	2.26	1.15
5 Walking indoors	1.83	0.90
6 Housework	3.22	1.14
7 Personal hygiene	1.99	1.08
8 Dressing	1.77	1.01
9 Preparing meals	2.10	1.26
10 Eating	1.21	0.54
11 Toileting	1.52	0.91
12 Walking outdoors	2.47	1.19
13 Eyesight	1.52	0.74
14 Hearing	1.48	0.76
15 Memory	1.70	1.02
16 Communicating	1.33	0.70
17 Behavioral control	1.29	0.69
<b><i>Specialist care, per year</i></b>		
Days in hospital	5.24	11.74
DRG points <sup>12</sup>	1.47	3.22
Hospital admission, acute, share	0.75	1.45
Hospital admission, planned, share	0.15	0.55
Day treatment, acute, share	0.66	2.06
Day treatment, planned, share	0.94	6.32
<b><i>Primary care, per year</i></b>		
Visits to GP	13.1	11.01
Number of procedures	29.5	27.32
<b><i>N</i></b>		
Number of persons	38 177	
Person-year observations	134 546	

**Table 2.** Descriptive statistics

*Note: Descriptive statistics for the sample. Woman, Norwegian born, widow(er), living alone, has children, nursing home, home care, practical help, hospital admissions and day treatments*

are based on dummy variables. The sample consists of individuals aged 70 or above who were registered as residents in Oslo municipality at the beginning of the year in the period 2007-2016 and who received some care service the year before. The data was collected from the Nursing Home Department in Oslo/Gerica, Norwegian patient register (NPR), Control and Payment of Health Reimbursements (KUHR), and the population registry. Data is at the individual level from 2007-2016. The function scores and variables from care services, specialist health services, and primary health services are per year.

## 5 Empirical investigation

### 5.1 Empirical model

Our goal for the empirical section is to investigate the relationship between income and nursing home receipt at different degrees of needs to evaluate the Proposition obtained from the theoretical model. The main challenge is to account for an individual's need for care. We do this by using the function scores. To enable us to evaluate the model's predictions, conditional on the case when the districts care about their budget, we take the following steps: First, we estimate the relationship between health (measured by function scores) and nursing home receipt. This is estimated with a logistic model, where nursing home receipt the following year is the outcome.  $Y=1$  denotes the situation where the individual receives a nursing home spot. We omit the subscripts for individual and time for simplicity.

$$(6) \text{Logit}(Y_{t+1}) = \sum_1^{17} \alpha_f F_f + \varepsilon$$

Our main set of independent variables here are the 17 function scores  $F_1, F_2, \dots, F_{17}$ , as these are the variables accounting for the need for a nursing home. We have also estimated a linear version of the model with an extensive set of control variables:

$$(7) Y_{t+1} = \sum_1^{17} \alpha_f F_f + \beta_{ga} + \gamma \text{Children} + \delta \text{Civil status} + \zeta \text{year} + \varepsilon$$

This regression controls for a full set of interacted gender times age fixed effects ( $\beta_{ga}$ ), fixed effects for an individual's number of children ( $\gamma \text{Children}$ ), fixed effects for marital status ( $\delta \text{Civil status}^{13}$ ) and year fixed effects ( $\zeta \text{year}$ ). This makes essentially no difference for the results, so in the following, we present results from the simpler model for ease of interpretation.

We use the results of this regression to predict all individuals' propensity to receive nursing home in the current period. This prediction constitutes a measure of an individual's need for a nursing home spot that is based on objective measures of function that should be independent of income.

Next, we partition this propensity into 9-quantiles, i.e. nine groups with an equal number of people in each group. These groups thus have different predicted need for a nursing home spot, with group 1 having the greatest need/worst health, up to group 9 having the least need/the best health. Admittedly, the choice of 9 health status groups is somewhat ad hoc. We have chosen 9

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<sup>12</sup> DRG is a patient classification system for the activity at somatic health institutions. A higher score means more activity at the institution to serve the patient.

<sup>13</sup> Unmarried, Married, Widow/widower, Divorced, Separated, Registered partner, Separated partner, Divorced partner, Surviving partner.



groups as this allows for a graphical inspection of the income gradient that is detailed without being too noisy. Finally, for each of the 9 health status groups, we graph the income gradient for (observed) nursing home receipt.

## 5.2 Results

Figure 5 displays the results graphically. Recall that in the theoretical model in Section 2, we have a key parameter  $\beta$ , representing how much weight the municipality puts on the budget. Given  $\beta > 0$ , i.e., that the municipality does care about the budget, we had the following Proposition:

- A) *An individual with low health,  $h \leq h^*$ , can be offered a nursing home room, even if the income is not very high.*
- B) *An individual with a relatively good health  $h > h^*$  will be offered a nursing home room if the income is sufficiently large, i.e.,  $b_2(I) > p - q + b_1$ .*
- C) *An individual can be given priority in a nursing home instead of a more frail individual if the income of the first individual is sufficiently large.*

Below, we confront the different parts of the Proposition with our empirical results.

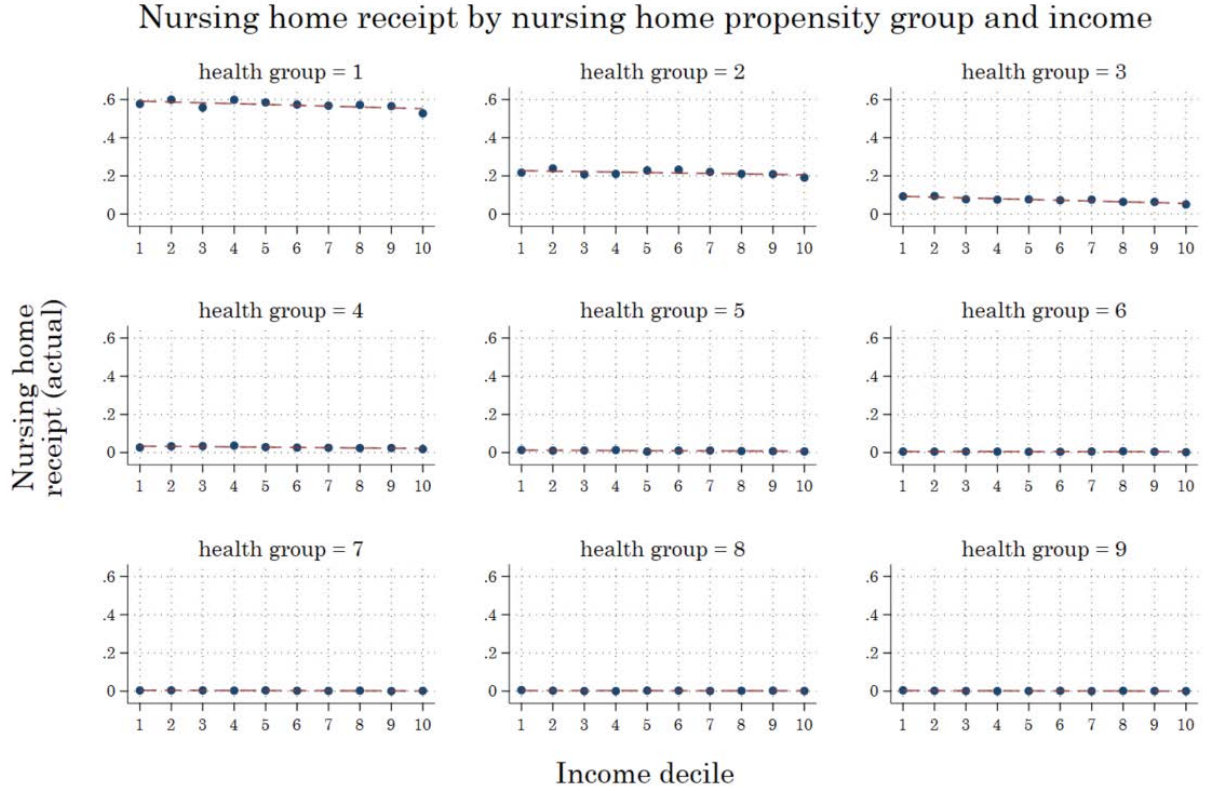
A) This relates to the level of actual receipt between the different panels. The average actual nursing home receipt is clearly higher for worse health; thus the prediction is confirmed. However, it would have been very surprising if individuals with sufficiently high need did not receive a nursing home spot.

The next two predictions more directly concern the hypothesis about the role of economic incentives in nursing home provision.

B) Good health here corresponds to a low estimated propensity to transition to a nursing home, thus from around health group 4 and up to group 9. Practically none of these groups is receiving a nursing home room (vertical axis), even when they have very high income (income decile 9 or 10). Thus, this prediction is falsified.

C) This prediction concerns the income gradient in each of the panels. For a given propensity group, which corresponds to a given level of need, is there a positive relationship between income (horizontal axis) and actual nursing home receipt (vertical axis)? Not at all, in fact, for the four groups with the worst health (health group 1-4), the income gradient is negative. In other words, in these groups, individuals from higher income deciles tend to actually receive nursing home care to a lower degree. Thus, this prediction is falsified.

Summing up, we do not find evidence that the nursing home provider puts positive weight on its budget, i.e.,  $\beta = 0$ . In other words, we do not find evidence that economic incentives play a role in this setting. Nursing home spots seem to be allocated based on need.



**Figure 5.** Nursing home receipt by nursing home propensity group and income decile

*Note: Each panel corresponds to one 9-quintile of the predicted receipt of nursing home. Health group = 1 is the group with greatest need (worst health), whereas health group = 9 is the group with the least need (best health). Income deciles are computed on the overall sample.*

## 6 Discussion and concluding remarks

Our study examined the influence of economic incentives in the allocation of publicly financed nursing home care in Norway. By utilizing a theoretical model and comprehensive data from the municipality of Oslo to account for the care needs at the individual level, we found that nursing home spots were allocated based on needs rather than the economic incentives of the public nursing home provider. This result suggests that the Norwegian long-term care system is functioning as stipulated in this dimension and is ensuring that individual needs determine the allocation of care services. In fact, for individuals with poor health, nursing home receipt decreases with higher income, which is the opposite of what one might fear if economic incentives influenced the allocation. In other words, individuals with high incomes have a lower probability of receiving a nursing home spot than those with low incomes. A potential mechanism for this is that people in higher income classes have a greater ability to purchase private care services, and thus may be able to stay longer at home before moving to a nursing home.

A potential concern is whether we have captured individuals' need for nursing homes well enough. We have chosen to measure health status by functional scores. However, if there are assessments of need that these indicators do not capture, or if they are socioeconomically skewed, this could affect our results. We cannot know this for sure, though we can note that the

scores are supposed to be independent. Furthermore, from the level differences between the panels in Figure 5, we see that the estimated propensity, which formed the basis of the partition into the 9 panels/health groups, is quite predictive of actual receipt. Another limitation of the study is that it only focuses on one urban municipality – Oslo – so the results may not be generalizable to, e.g., more rural settings. Finally, the study only examines the allocation of nursing home care, not other care options such as family care, home services, or hospital services.

In the introduction, we referred to Kverndokk and Melberg (2021) who found that Norwegian municipalities do respond to economic incentives to reduce bed-blocking in hospitals. In particular, the municipalities return patients back from the hospitals to the nursing homes earlier than they did before the fee for bed-blocking was introduced. Why would the municipalities respond to some economic incentives for nursing homes and not to others? To answer this, we need to emphasize the differences between the studies as well as the different institutional settings. First, while Kverndokk and Melberg (2021) was a national study using data for all inpatient hospitalizations in Norway, our study only uses data for Oslo. How municipalities take decisions may vary, and we cannot rule out that a data set for all municipalities would give a different result. Second, while a fee for bed-blocking gives a strategic game between hospitals and long-term care providers, the economic incentive giving by the user payments for nursing homes does not create a game. Thus, the municipalities do not have to respond to the actions taken by another part. Third, while a fee for bed-blocking was an economic incentive with the intention of reducing bed-blocking, the system of user payments for financing nursing homes only gave an unintentional economic incentive. Finally, while provision of municipal long-term care services is regulated by law, there is no law regulating bed-blocking days in hospitals.

The findings suggest that the Norwegian long-term care system is functioning well in terms of allocating nursing home care based on needs. This result can be used to support the continuation of the current system. The results also suggest that the Norwegian long-term care system may have some features that could be valuable for other countries to consider when developing their own long-term care systems.

An important avenue for future research would be to examine the role of private care services, which we do not presently have data on. Future research could also focus on the impact of economic incentives on the quality-of-care services and the well-being of individuals in need of care.

## References

- Brot-Goldberg, Z. C., Chandra, A., Handel, B. R., & Kolstad, J. T. (2017). What does a deductible do? The impact of cost-sharing on health care prices, quantities, and spending dynamics. *The Quarterly Journal of Economics*, 132(3), 1261-1318.
- Colombo, F. et al. (2011), Help Wanted? Providing and Paying for Long-Term Care, OECD Health Policy Studies, OECD Publishing.
- Einav, L., & Finkelstein, A. (2018). Moral hazard in health insurance: what we know and how we know it. *Journal of the European Economic Association*, 16(4), 957-982.
- García-Gómez, P., Hernández-Quevedo, C., Jiménez-Rubio, D., & Oliva-Moreno, J. (2015). Inequity in long-term care use and unmet need: two sides of the same coin. *Journal of Health Economics*, 39, 147-158.
- Gjevjon E R, Romøren T I, 2010, Vedtak om sykehjemsplass : hvor høye er tersklene?. Høgskolen i Gjøviks rapportserie, 10/2010
- Godager, G. And T. Iversen (2013): Empirisk litteratur om sosial ulikhet i bruk av helsetjenester i Norge, Underlagsrapport til Sosial ulikhet i helse: En norsk kunnskapsoversikt, Høgskolen i Oslo og Akershus.
- Hagen, T. P., Negera Amayu, K., Godager, G., Iversen, T., & Øien, H. (2011). *Utviklingen i kommunenes helse-og omsorgstjenester 1986-2010* (No. 2011: 5). Oslo University, Health Economics Research Programme.
- Helsedirektoratet (2020): Pasient- og brukerrettighetsloven med kommentarer, Kapittel 2. [Rett til helse- og omsorgstjenester og transport](#), Helsedirektoratet.
- Holm, S. G., Mathisen, T. A., Sæterstrand, T. M., & Brinchmann, B. S. (2017). Allocation of home care services by municipalities in Norway: a document analysis. *BMC health services research*, 17(1), 1-10.
- Karlsson, M., Iversen, T., & Øien, H. (2012). Scandinavian long-term care financing. *Financing long-term care in Europe: institutions, markets and models*, 254-278.
- Kverndokk, S. and H. O. Melberg (2021): Using fees to reduce bed-blocking: A game between hospitals and long-term care providers, *European Journal of Health Economics*, 22(6), 931-949.
- Kümpel, C. (2019): Do financial incentives influence the hospitalization rate of nursing home residents? Evidence from Germany, *Health Economics*, 28: 1235-1247.
- Ministry of Health and Care Services (2015): White paper on primary care. In Norwegian
- Minsitry of Health and Care Services (2010). Lovpålagt krav om 17ocale avtaler mellom kommuner og helseforetak, Chapter 28 in Proposition 91 L to the Storting (2010-2011)
- Moland, L. (2011). Praksis ved tildeling av sykehjemsplasser i Oslo. *FAFO, Oslo. Rapport*, (17).
- Moscelli, G., Siciliani, L., Gutacker, N., & Cookson, R. (2018). Socioeconomic inequality of access to healthcare: Does choice explain the gradient? *Journal of Health Economics*, 57, 290-314.
- NKRF (2007). Bydelenes behandling av søknad om fast plass i sykehjem. The Norwegian Association of Local Government Auditors, report no. 7/2007
- Non, M. (2017). *Co-payments in long-term home care: Do they affect the use of care?* (No. 363). CPB Netherlands Bureau for Economic Policy Analysis.
- Romøren, T. I. (2003). NOVAs rapport, in Pleie- og omsorgstjenesten i kommunene: tjenestemottakere, hjelpebehov og tilbud. Rapport 10/2003. SOU 2004.
- Roquebert, Q., & Tenand, M. (2017). Pay less, consume more? The price elasticity of home care for the disabled elderly in France. *Health economics*, 26(9), 1162-1174.
- Statistics Norway (2015) Table: 2 Long-term care services 2014. September 24th 2015 <http://ssb.no/helse/statistikker/pleie/aar-forelopige/2015-06-24?fane=tabell&sor t=nummer&tabell=231288>
- Syse, A. (2018). «Kommentar til Pasient- og brukerrettighetsloven.» i Norsk lovkommentar. Gyldendal rettsdata 2020 hentet 10.11.2020.
- Syse, A., Øien, H., Bugge Solheim, M. and Jakobsson, N. (2015). Variasjoner i kommunale tildelingsvurderinger av helse- og omsorgstjenester til eldre. *Tidsskrift for Velferdsforskning*, 18(3): 212-234.
- Takahashi, M. (2019). The Behavioral Effects of Insurance Coverage and Its Health Consequences: Evidence from Long-Term Care.
- Tenand, M., Bakx, P., & Wouterse, B. (2021). *The impact of co-payments for nursing home care on use, health, and welfare* (No. 430). CPB Netherlands Bureau for Economic Policy Analysis.
- Weber, S. (2018). Long-Term Care Benefits and Services in Norway. *Long-Term Care in Europe: A Juridical Approach*, 353-379.
- Øien, H. (2013), Do Local Governments Respond two (Perverse) Financial Incentives in Long-Term Care Funding Schemes? *The BE Journal of Economic Analysis & Policy*, 14, 2: 525-549.
- Øien, H., M. Karlsson and Tor Iversen, (2012), The Impact of Financial Incentives on the Composition of Long-term Care in Norway, *Appl. Econ. Perspect. Pol.* 34 (2): 258-274