When health trumps money:
Economic incentives and health equity in the public provision of nursing homes in Norway

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 public nursing home care in the Norwegian long-term care system. In Norway, municipalities and city districts have economic incentives for choosing nursing home care for high-income individuals in need of care and home-based care in sheltered housing for low-income individuals. 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 city districts. 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 seem to be the dominant factor for allocation of nursing home care, while economic incentives seem to play no significant role. The clear legal mandate to provide services based on needs only is likely an important factor in this.

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

JEL codes: I14, I18, H51

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. 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.

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.[1][2]

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) $h = h(x, y)$, 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 needs to recover or maintain their health level. We assume that health is increasing (or non-

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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.

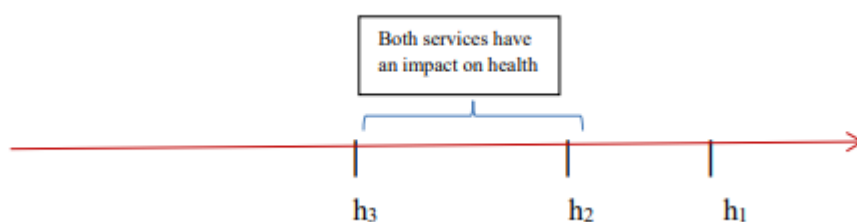We divide the health level into different segments; see Figure 1.

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^*. 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, and second, the municipality must consider its budget when offering care services. 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. Focusing on the budget considerations, this 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) $\quad U = h(x, y) + \beta \left[\left(b_2(I) - p \right) x + \left(b_1 - q \right) y \right]$

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Here, b_2 is the user payment for nursing home care, which depends on the person's income, I, see Section 3 below. b_1 is the user payment for municipal home services (home nursing and practical assistance), which we for simplicity have set independent on income, even if the user payment for some services may be income dependent, but with little variation compared to nursing home payments. 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.

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) $\qquad y + x = 1$

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) $\qquad h'_x - h'_y = \beta\left[(p-q) - \left(b_2(I) - b_1\right)\right]$

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 β. As $(p - q) > 0$, and it is reasonable to assume that $\left(b_2(I) - b_1\right) \geq 0$, 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) $\qquad h'_x - h'_y \geq \beta\left[(p-q) - \left(b_2(I) - b_1\right)\right],$

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   Institutional setting

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.

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). 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 determination of nursing home charges cannot rely on an individual's wealth level. However, wealth indirectly enters the equation through the inclusion of interest on wealth as part of residents' after-tax income. The user fees cover approximately 12 percent of total nursing home expenses (Hagen et al., 2011). Concerning home-based care, municipalities have the authority to impose an income-dependent user fee for practical home-based care, while home nursing services are provided without any charges. The user fees for practical home-based care account for approximately 1.7 percent of the average unit cost of home-based care. Given that practical home-based care cannot directly replace nursing home care, and considering the relatively low user fees in home-based care compared to those in nursing home care, we simplified the theoretical model in the previous section by assuming a user fee of zero for individuals receiving home-based care. Long-term care expenditures are the largest component of municipal spending (Hagen et al., 2011).

The Norwegian pension system consists of state pensions, occupational pensions and other types of private savings. The income of old people in Norway as a percentage of average income is somewhat higher than the OECD average (OECD, 2021). The state pension includes a minimal state pension scheme, and Norway has among the lowest old-age poverty rates in the OECD. As the state pension is lifelong, all pensioners in Norway have relatively substantial income their whole life and can afford to the user fee.

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 care in Oslo

Oslo operates under a two-tier government structure. The central parliamentary government consists of the City Council -- the highest political authority -- and the city government. The local government is composed of 15 city districts. The City Council has delegated primary responsibility for nursing home care, as well as other significant health and social services, to the city districts. To finance these services, the City Council allocates need-weighted block grants to the districts. These grants are determined based on objective criteria, including factors such as size and population composition. The purpose of this budget allocation system is to ensure that districts facing higher objective needs receive a proportionately higher allocation of funds. This approach aims to guarantee that individuals with similar levels of need and preferences have equal access to services, regardless of their place of residence (Halvorsen et al., 2015).

The city districts are responsible for making decisions on resource allocation and ensuring that the funds are directed towards areas of greatest need within their respective districts. By empowering the city districts with local decision-making power and budget responsibility, the system aims to enhance local accountability and knowledge to enable tailored service delivery based on local needs and preferences, and costs. The responsibility of allocating nursing home care and other long-term care services according to need while adhering to budgetary constraints lies with the city districts' "purchaser unit".

3.3 Nursing home placement in Oslo

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 working in the purchaser unit. The care manager, who does not have budget responsibility, is responsible for assessing the health needs of the applicants assigned to them. care managers are typically highly educated in health sciences and have extensive work experience in health and social care. The care managers 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 care manager 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. The meetings are held every or every other week (Moland, 2011). In these meetings, care managers 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). 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).

The authority to commit the district financially lies with the head of the purchasing unit, and the decision has to be taken within limited financial constraints outlined in a detailed budget. 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. Moland (2011) interviewed and surveyed health care staff in Oslo's purchaser units to understand the decision-making processes, perspectives, and experiences of healthcare staff involved in the assessment and allocation of care resources. The informants described conflicting pressures to approve nursing home care. On the one hand, they often felt

pressure from users and their families to approve services, while on the other, they felt budgetary pressure from district directors to decline. Also in a survey, leaders and care managers in the purchaser units were asked if they would have approved more nursing home beds if the budget had allowed it. Half of them stated that they would have approved more beds. These statements indicate that financial constraints and budgetary considerations do play a role in the decision-making process.

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.

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. If some kind of non-personal aid is required, a score of 2 should be given. Thus, the scoring takes into account the reliance on adaptions and assistive devices, which might potentially differ between persons with different income. 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.

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. The shares for practical assistance and home nursing together exceed 1, as one individual may receive both these types of services. 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). 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.

Table 2. Descriptive statistics

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, …, 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 (β_{ga}), fixed effects for an individual's number of children (γ Children), fixed effects for marital status (δ

Civil status[3]) and year fixed effects (ζ 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 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 β, 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 healh $h > h^*$ 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.

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[3] Unmarried, Married, Widow/widower, Divorced, Separated, Registered partner, Separated partner, Divorced partner, Surviving partner.

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.

As explained in section 3.1, city districts get allocated funds partially based on indicators of need for long-term care services. This may potentially create a situation with varying budget constraints between rich and poor districts, in which for a given level of need, it could be easier to get a nursing home in a poor than in a rich district. To investigate whether such a relationship might "mask" a true income gradient, we have estimated results for districts with different income levels. The results are robust to this specification. particular, we see that also within different district-income groups, we do not find that those with low income receive less nursing home then those with high income. We conclude that it does not seem that differential budget constraints explain the lack of an income gradient. Furthermore, we investigate whether for given need, it is easier to receive a nursing home place in a poor than in a rich district. We find that for a given level of need, at the horizontal axis, actual receipt is very similar, thus it does not seem easier to receive a nursing home place in the poorer area than the richer. The full set of results from these investigations is included in the appendix.

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.

The strength of this study is that we start with a theory model that gives predictions that we can test on a high-quality register on recipients of public long-term care in Oslo municipality. The data includes detailed information on the functional status and service receipt of all persons who receives public long-term care in Oslo. 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.

Our study is related to Tenand et al. (2021), who studied a reform in the Netherlands that increased the OOP payment of nursing home care for individuals with taxable wealth. They found 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. The key difference compared to our study is that Tenand et al. (2021) study the financial incentives of the potential entrants into care, whereas we study the financial incentives of the admitter. Our study is also related to the analysis of provider incentives and bed blocking in nursing home and hospital care. Kümpel (2019) found that when a federal law in Germany made reimbursement of hospitalized residents more generous, nursing homes responded by inreasing hospitalizations. Thus, the nursing homes responded to economic incentives. A key difference with our setting is likely the absence of a clear legal mandate regarding the decision of whether to hospitalize a user. Deciding whether to treat in-house or hospitalize a user is a more regular and short-term occurrence than admitting someone to long-term care, thus it is reasonable that it is less regulated. In consequence, the nursing homes have more discretion in this case, which might explain why they also respond more clearly. In the introduction, we also 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. One reason for this is the

Oslo 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, as referred to in Chapter 3 above. In that case, we may be in a situation where only the health levels below h_3 in Figure 1 are considered for nursing homes. In this segment of health, no tradeoffs between health and budgetary concerns should be done. 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, at least how it is practiced in Oslo, 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, especially in countries with universal public health care systems. The clear legal mandate to allocate services based on needs is probably an important factor in our setting. The role of private care suppliers differs among countries, and the larger this sector is, the higher is the possibility that other factors than needs determine who receives a room in a nursing home. However, as the city districts in our study do face some of the same economic trade-offs as private providers, we believe that our study indicates that regulations may have an effect on allocations also in systems with more private provision of long term care services.

An important avenue for future research would be to examine the role of private care services, which we do not presently have data on. In addition, at least in the Nordic countries, it has been a trend over several years that people should stay at home as long as possible. Thus, we may have a situation where people who would benefit more from staying in a nursing home than receiving home care services, still live at home. Thus, while we focus on the allocation of the nursing home rooms available, an interesting project could be to study whether the number of rooms allocated is the optimal number. Finally, 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.

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Appendix

Estimates by city district income level

In section "3.2 Nursing home care in Oslo", we describe the system of allocation of grants to the city district. To investigate whether this resource allocation rule might underlie the lack of an income gradient, we constructed an alternative way of displaying the results, in the form of the following three figures. Figure A.1 first provides our main results in this alternative representation. The figure plots the relationship between predicted nursing home need (horizontal axis) and actual nursing home receipt (vertical axis) for the five quintiles of the income distribution. Regarding the theoretical predictions from the model, we can see that, as in the paper:

A) Need is extremely strongly predictive of receipt,

B) People with good health, i.e. low predicted need, rarely receive a nursing home spot, no matter their income, and

C) For a given level of need, people in the highest income group (income percentiles 81-100) are not more likely to receive a nursing home spot. If anything, they are less likely.

Figure A.1. Need and care by income quintile.

This alternative representation of the results lends itself more easily to a further analysis of whether potentially differential budget constraints might "mask" an underlying income gradient. Following your suggestion, we have divided the data into subsamples of city district. Based on the income and residency of everyone in the sample, we have constructed four different groups of city districts: A. Low income, B. Medium-Low income, C. Medium-High, and D. High income. We then construct the equivalent of Figure A.1 for each of these groups. This is shown in Figure A.2. The results are very similar as in Figure A.1. In particular, we see that also within these district-income groups, we do not find that those with low income receive less nursing home then those with high income. We conclude that it does not seem that differential budget constraints explain the lack of an income gradient.

Figure A.2. Need and care by income quintile and district type.

We can build on the previous representation to compare different city districts. In Figure 3, the lines now correspond to different types of districts. We see that for a given level of need, at the horizontal axis, actual receipt is very similar, thus it does not seem easier to receive a nursing home place in the poorer area than the richer.

Figure A.3. Need and care by district type.

Figures

Figure 1. The health thresholds of an individual

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

Figure 3. The alternative cost of offering a nursing home

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

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.

Tables

Functional scores	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

Demographics	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
Income		
Income, in G	4.01	3.72
Long-term care, per year		
Nursing home, share	0.10	0.30
Home nursing, share	0.54	0.50
Practical assistance, share	0.63	0.48
Functional level, 1-5		
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
Specialist care, per year		
Days in hospital	5.24	11.74
DRG points	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
Primary care, per year		
Visits to GP	13.1	11.01
Number of procedures	29.5	27.32
N		
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. 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.