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Hendrik Schmitz
Magdalena A. Stroka

Do Elderly Choose Nursing Homes by Quality, Price or Location?

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Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Rheinisch-Westfälisches Institut für Wirtschaftsforschung (RWI)
Hohenzollernstr. 1-3, 45128 Essen, Germany

Editors

Prof. Dr. Thomas K. Bauer
RUB, Department of Economics, Empirical Economics
Phone: +49 (0) 234/3 22 83 41, e-mail: thomas.bauer@rub.de

Prof. Dr. Wolfgang Leininger
Technische Universität Dortmund, Department of Economic and Social Sciences
Economics – Microeconomics
Phone: +49 (0) 231/7 55-3297, e-mail: W.Leininger@wiso.uni-dortmund.de

Prof. Dr. Volker Clausen
University of Duisburg-Essen, Department of Economics
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Phone: +49 (0) 201/1 83-3655, e-mail: vclausen@vwl.uni-due.de

Prof. Dr. Roland Döhrn, Prof. Dr. Manuel Frondel, Prof. Dr. Jochen Kluve
RWI, Phone: +49 (0) 201/81 49-213, e-mail: presse@rwi-essen.de

Editorial Office

Sabine Weiler
RWI, Phone: +49 (0) 201/81 49-213, e-mail: sabine.weiler@rwi-essen.de

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Hendrik Schmitz and Magdalena A. Stroka[1]

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Abstract

Quality report cards addressing information asymmetry in the health care market have become a popular strategy used by policymakers to improve the quality of care for elderly. Using individual level data from the largest German sickness fund merged with institutional level data, we examine the relationship between nursing home quality, as measured by recently introduced report cards, nursing home prices, nursing home's location and the individual choice of nursing homes. Report cards were stepwise introduced as of 2009 and we use a sample of 2010 that includes both homes that had been evaluated at that time and that had not yet been. Thus, we can distinguish between institutions with good and bad ratings as well as non-rated nursing homes. We find that the probability of choosing a nursing home decreases in distance and price. However, we find no significant effect of reported quality on individuals' choice of nursing homes.

JEL Classification: I10

Keywords: Nursing home choice; quality report cards; quality information; demand

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[1] *Hendrik Schmitz, University of Paderborn and CINCH; Magdalena A. Stroka, RUB, RWI and WINEG.* *- Financial support by the Deutsche Forschungsgemeinschaft (DFG) is gratefully acknowledged. We are grateful to Thomas Bauer and participants of the World Congress on Health Economics and the Meeting of the German Society for Health Economics for helpful comments and to our colleagues from the WINEG and the Techniker Krankenkasse for the access to the data of the Techniker Krankenkasse.* *– All correspondence to Magdalena A. Stroka, Ruhr-Universität Bochum, Universitätsstr. 150, 44801 Bochum, Germany, e-mail: Magdalena.Stroka@rub.de*

1 Introduction

As a consequence of ever increasing health care expenditures, health care markets in most countries are constantly subject to reform. The long-term care sector plays an important role as long-term care expenditures are among the fastest growing areas of health care costs.[1] Hence, the organization and financing of this sector are challenging political and economic problems. One idea to reduce costs is an increase in efficiency by the implementation of competition components like increased price or quality transparency of health care providers. This is supposed to equip demanders of health services with possibilities to make a better informed choice of hospitals, nursing homes or physicians. This, in turn, should increase the pressure on the providers to improve their product.

The importance of quality information in the health care market is essential as health care is a classic example of asymmetric information, because patients usually are not able to fully evaluate the quality of provided care (Arrow, 1963). Moreover, the fear of poor market outcomes is particularly acute in this field (Hirth, 1999; Chou, 2002). In particular, information deficits either on the demand or supply side, might lead to market failure (Akerlof, 1970).

However, such reforms to increase transparency only work if demanders of health care services are sensitive to prices or quality. Thus, in order to find out what works, empirical evidence on consumer behavior in health care markets is necessary. In a comparably young field of study, the stationary nursing home sector, not very much is known about the behavior of a particular type of consumers, the old and oldest old individuals in need of care.

This paper adds to the scarce literature on determinants of nursing home choice. Using individual claims data from the Techniker Krankenkasse (TK), the largest sickness fund in Germany, we analyze how prices, distance to the home and officially reported quality measures affect the nursing home choice in Germany in 2010. Since December 2009 quality report cards are published in the German long-term care market in order to convey information about providers. We take advantage of exogenous variation in the publication dates of the

[1] See, e.g., the World Alzheimer Report which expects publicly funded costs of long-term care in the European Union (EU 27) to increase from 1.2% of GDP in 2007 to 2.5% in 2060 (Alzheimer's Disease International, 2013).

quality report cards, giving us a unique opportunity to evaluate the importance of information in the health care market. Due to the stepwise conduction of the quality assessments by an independent authority, we can distinguish between rated and nonrated nursing homes without worrying about any selection problems considering provision of quality information. In particular, we distinguish between positively, negatively and non-rated nursing homes.

A growing body of literature investigates the impact of report cards on health care markets and consumer behavior. While several studies estimate the relationship between public quality information and hospital demand (see e.g. Beckert et al., 2012, Goldman and Romley, 2008, Howard, 2006, Tay, 2003, Epstein, 2010, Pope, 2009, Varkevisser et al., 2012, Wang et al., 2011) and predominantly find positive relationships between reported quality and individual's choice, so far there is only one study analyzing the impact of quality report cards on nursing home choice. Werner et al. (2012) analyze the impact of the introduction of quality report cards on changes in the market share of nursing homes in the United States. In their market-level demand model they do not take prices and distance into account and they restrict their analysis to a sample of short-stay residents of nursing homes. We build upon the existing literature and analyze the relationship between quality of nursing homes and the individual demand.

We contribute to the existing literature in several respects. We are the first to analyze the individual demand for nursing homes using individual claims data instead of deriving the impact of quality report cards on demand from aggregate information such as market shares. Market-level demand models are based on the aggregation of individual demands into a market-level demand system which may lead to concerns about the preciseness of the estimated parameters of interest. Micro-level choice models are associated with higher degrees of freedom and sometimes seen to be based on less restrictive assumptions compared to market-level demand models (Berry et al., 1995). Moreover, we are the first to take the price, the distance and the explicit role of quality information into account, distinguishing between both different levels of quality as well as missing quality information. Finally, we

base our analysis on a larger data set than the previous literature analyzing the determinants of choice of any kind of health care providers (i.e. nursing homes and hospitals).

Our results suggest a negative relationship between the individual nursing home choice and both, travel time as well as nursing home reimbursement rates. Hence, the lower the nursing home price and the closer the location of the nursing home to the previous household, the more likely are the elderly to choose this nursing home. However, nursing homes with positive or negative quality ratings do not attract more or less patients than nursing homes without quality information.

The outline of this paper is as follows. In Section 2, we provide background information about the German nursing home market. While Section 3 describes the data, Section 4 provides the empirical strategy that we employ. The results are presented in Section 5. Section 6 concludes.

2 Background

The German nursing home market is characterized by about 12,000 nursing homes engaging about 661,000 employees who care for about 743,000 dependent individuals (Statistisches Bundesamt, 2011). As in many other countries, nursing homes in Germany have been suspected to provide poor quality of care for decades (see e.g. Roth, 2002, Dowideit, 2012, Institute of Medicine, 1986, Institute of Medicine, 2001, Fahey et al., 2003, Kirkevold and Engedal, 2006). However, only after a series of public scandals about very poor quality in some German nursing homes, health insurance providers and nursing home owners took joint action to improve the transparency of nursing home quality. Until then, nursing homes had to undergo quality evaluations. However, the results of these inspections were difficult to be assessed by patients looking for an appropriate nursing home.

2.1 Quality Report Cards

As a result of the joint initiative, the quality of all German nursing homes has been evaluated according to a standardized catalogue of 64 criteria since August 2009. Evaluation is unannounced by trained inspectors of the association of statutory health insurances (MDK, Medizinischer Dienst der Krankenkassen). By the year 2011 all German nursing homes had been tested followed by a yearly update thereafter.

Each of the 64 criteria is defined such that it is supposed to be fulfilled for each patient in the nursing home. The inspectors test on a subgroup of patients in the nursing home whether a particular criterion is fulfilled and calculate the percentage of individuals for whom it holds. Then, the percentage value is translated into a grade according to the German system of school grades from 1.0 (= excellent) to 5.0 (= inadequate or failed). This mapping is done rather arbitrarily resulting in 64 single grades. The grades, not the exact percentage values, are published. See Table A1 in the Appendix for all 64 criteria and Table A2 for the mapping.

The quality report cards are made publicly accessible via consumer-oriented health care portals (see e.g. www.pflegelotse.de, literally "care pilot"). The goal of these portals is to enable individuals in need of nursing home care to easily judge the quality of nursing homes in order to make an informed nursing home choice.[2] Comparability of nursing homes among each other is guaranteed because the same 64 criteria are tested in all nursing homes and exposure of the results is standardized.

Since comparison over 64 grades is rather unfeasible, an overall grade of the nursing home is generated by simply averaging over all single grades. Apart from the overall grade, average grades of four officially defined subcategories are presented, again by calculating the average over the respective subgroup of grades. The subcategories are "Care and medical care", "Treatment of patients with dementia", "Social care and the arrangement of the daily routine" and "Board and lodging, hygiene". The presented average overall grade in the

[2]Print-outs of report cards are also displayed in the respective nursing home. Thus, visiting the home enables individuals without access to the internet to compare homes. Moreover, given typically, it is not the frail elderly who decides by herself about the home but that their children help to decide, we do not regard is a problem that the oldest old do not use the internet in Germany.

respective federal state provides a guideline of comparison to evaluate the relative meaning of single grade outcomes in a regional context. See Figure A1 in the Appendix for an exemplary first page of a report card.

While there is no doubt that aggregation strongly facilitates the comparison, the aggregation method is subject to critique. The unweighted average of all 64 grades into the overall grade is problematic, because more important criteria like outcome quality measures have the same weight as arguably less decisive factors like the offer of cultural activities in the nursing home. Moreover, the mapping into school grades is arbitrary and a 2.0 or "good" according to the German school grades, is not necessarily what individuals understand as good quality.[3]

Although the mentioned aspects might render the aggregate grade a potentially uninformative measure of real quality of care in a nursing home, taking the perspective of a person seeking to choose the best nursing home, we utilize the overall grade in our analysis as we believe that given the presentation of the aggregated grades on the first page of the report cards (see Figure A1 in the Appendix) consumers compare nursing homes regarding the aggregated results instead of considering certain very detailed single criteria.

2.2 Reimbursement Rates

Nursing home prices, to be shared by sickness funds and out-of-pocket payments of cared individuals, consist of three components: the rate for nursing services, the fee for accommodation and catering, as well as the investment costs that have not been publicly financed. The rate for nursing services depends on the care level of the person needing care who is classified into three care levels by the MDK subject to the severity of care dependency. Care level 1 represents need of care going along with an average of at least 90 minutes of nursing demands per day, while care level 2 stands for a higher need of care with, on average, at least 180 minutes of daily nursing. Level 3 is the highest need of care and includes on aver-

[3]This obviously reflects the fact that the mapping is the result of an extensive bargaining process between the MDK and the nursing home owners before the care transparency agreement became effective.

age over 300 minutes of daily care. Individuals moving into a nursing home with less than 90 minutes of nursing demands per day are considered as not care dependent and classified into care level 0. Since the fee for accommodation and catering as well as the investment costs are fixed for all residents of a given nursing home, the individual costs for care only vary by the respective care level.

Total costs are on average 2,199€ (min.: 789€; max.: 6,386€) per month for care level 1, 2,618€ (min.: 932€; max.: 6,566€) for care level 2 and 3,065€ for care level 3 (min.: 1,172€; max.: 6,838€). However, as the numbers in parentheses (minimum and maximum values) suggest, there are strong variations. Since 1995, long-term care insurance has been part of the German social insurance system, resulting in virtually all Germans having insurance coverage for care needs. However, there is a considerable copayment, on average, individuals pay about 52 percent out of pocket.[4] If demand is price-elastic, providers have an incentive to compete in terms of the reimbursement rates. However, as the price setting is not flexible but highly regulated by the price negotiation system (explained in the next paragraph), the competition regarding prices to promote efficiency is somewhat constrained.

Prices are determined in advance for a certain period of time through negotiations between nursing home owners and the sponsors, i.e. representatives of the long-term care insurance and the social assistance office. The price negotiations are held separately by each nursing home and beside the mentioned contractual partners, only their associations (i.e. associations of the long-term care insurance fund etc.) are allowed to take part. The negotiations are based on the disclosure of proofs of past, current and expected costs of the nursing home. The disclosure of the costs has to be carried out in advance of the price negotiations, which in turn have to be finished before the beginning of a particular financial year. During the negotiations the disclosed costs are compared by the sponsors with national average costs. If the nursing home price cannot be agreed on within six weeks of negotiations, an arbitration board defines the price. This is also the case if the social insurance vetoes the negotiated price within two weeks after the end of the negotiations. Having the power of veto, the

[4] If care recipients and, where appropriate, their adult children cannot bear the costs, social assistance steps in. This is the reason why representatives of the social assistance office are involved in the price negotiations.

social assistance can request that the chairman of the arbitration board states the nursing home price by himself or in cooperation with the other negotiating parties.

3 Data

Our principal data source provides us with detailed individual level information of all insured from the largest sickness fund in Germany – the Techniker Krankenkasse (TK). This sickness fund, which also acts as a long-term care insurance fund, has about 8.3 million enrollees, corresponding to a share of about 12 percent of the entire population. The data from the year 2010 provides us with 2,534 elderly above the age of 65, who newly moved into a nursing home. For each insurant in the sample we observe the care level, the zip code before moving into the nursing home and the chosen nursing home.

We supplement the individual level data by two data sources on the institution level, namely the report card information and data including prices and the number of places. The data on the quality report cards obtained from the portal www.pflegelotse.de include the date of the quality assessment and the overall quality grade. Nursing homes were tested in the course of the years 2009 to 2011. The cards were published four weeks after the assessment but earliest on January 1, 2010. That is, a home that was assessed on, say, September 1, 2009 got its report published on January 1, 2010 while a home that was assessed on September 1, 2010 got its report published by October 1, 2010. Thus, individuals that moved into a nursing home in 2010 were faced with some homes with quality information and others without.

We assume that final choices for a nursing home were made two months before individuals actually moved in.[5] Hence, having the information on the day individuals moved into the homes (minus two months) we can assign each home into one of the tree mutually exclusive categories "positively rated", "negatively rated", and "no quality information available" in order to evaluate the importance of information. As there is no clear rule which grades are

[5]The results are robust to choosing one or three months.

accepted as "good" or "poor quality", the differentiation by means of the average overall grade at the federal state level seems reasonable. Note, that the federal state average is presented directly next to the home's grade on the first page of the report card, enabling an easy comparison. Hence, above average quality is considered as a positive signal, while below average is expected to be a negative one. Nevertheless, as a robustness check, we perform the analysis with the four categories "good quality" (overall grade between 1.0 and 1.9), "satisfactory quality" (overall grade between 2.0 and 2.9), "poor quality" (overall grade 3.0 and worse), and "no quality information available".[6] Overall, the chosen procedure of classification of grades into the three quality classes allows us to analyze whether individuals respond to certain kind of quality information and if they do so, whether they react more sensitive to positive or negative information.

Our report card data only include the 5,688 nursing homes whose report cards were published until September 23, 2010, the date of our data collection.[7] Hence, we restrict our sample to individuals moving into nursing homes between January 1, 2010 and November 23, 2010. Note that due to the assumption that the final choice for a nursing home was made two months prior to the individual moving into a nursing home, the choice sets of those individuals in the sample who moved to a nursing home prior to March 1, 2010 included only nursing homes without quality information.

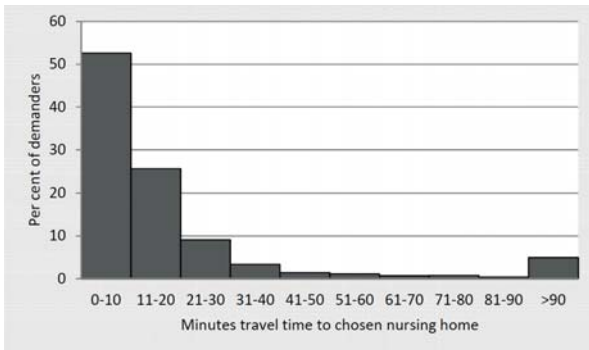
Information on the reimbursement rate and the nursing home size, i.e. data on all price components (including the rates for nursing services depending on the care level, the fee for accommodation and catering as well as the investment costs) and the number of beds is obtained from the Association of Health Insurance Companies. We calculate the per resident daily reimbursement rate of the nursing homes as the sum of the care level specific rate depending on the individual care level plus the fee for accommodation and catering as well as investment costs.

[6] Note again, that our labels of categories are completely arbitrary. It is hard to judge whether a grade of, say, 2.5 is generally accepted as a satisfactory quality. The labels just allow easier interpretations of the results.

[7] Due to limitations in merging the data (mainly different names and addresses of nursing homes in the underlying data sets), we can use in our analysis the quality information of 5,078 nursing homes.

The distance from the previous household to all possible nursing homes is measured by the travel time by car in minutes from the center of the zip code of the place of residence before moving to the nursing home and the center of the zip code of the institutions. To get a sense of distances travelled in the data, Figure 1 shows that about 52 percent of individuals were admitted to nursing homes within 10 min. travel time to their previous households. Thereby, the average distance to the chosen nursing home is 9.58 minutes travel time.

Figure 1: Minutes of travel time to the chosen nursing home

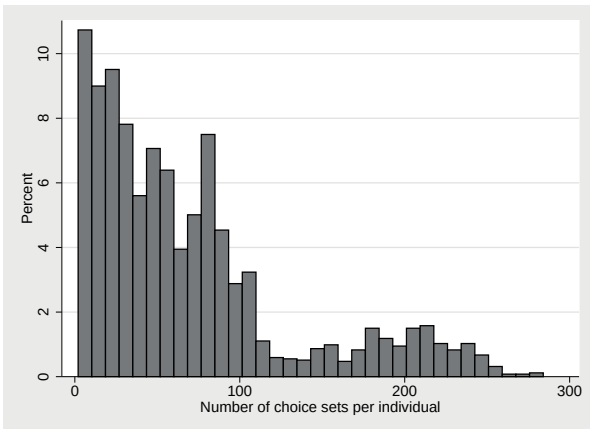


The calculation of the distance between each individual and each nursing home results in 33,828,810 individual nursing home pairs. First, as our choice set is characterized by more choice alternatives (i.e. 9,979 nursing homes) than individuals, we (need to) exclude nursing homes that were not chosen by any individual in the data. Second, as the literature suggests that the nursing home market has a local character (see e.g. Gertler, 1992), for individuals travelling extremely long distances we can assume that their decision was made for other reasons than those we control for, i.e. the nursing home price or quality. Moreover, in cases of extremely long distances, the observed home to nursing home travel time may also not measure the actually incurred travel costs as in such cases individuals may move to their family or a second place of residence before they moved to the nursing home. In order to avoid any such bias in our results, we exclude all individuals who have chosen nursing homes that are not reached within 40 minutes of travel time.[8]

[8]In doing so, the upper 7 percent of the travel time considering all chosen nursing homes are excluded. The results are, however, robust to not trimming the data (see Table A5 in the Appendix).

For each individual a set of nursing home alternatives is defined. Each individual's choice set consists of all nursing homes within 40 minutes travel time distance. Figure 2 presents the distribution of the number of nursing homes in individual choice sets. About 90 percent of the individuals in our sample have at least 48 nursing homes in their choice set. The mean number of choice alternatives is 70. As the minimum number of nursing homes in a choice set is two, no observations had to be excluded because of no given choices.

Figure 2: Number of choice sets per individual



Our final sample includes 2,534 individuals and 2,073 nursing homes resulting in 176,864 individual-nursing home combinations. The upper panel of Table 1 shows the characteristics of the observed elderly, 47.1 percent of which are female. Moreover, 52.8 percent of the individuals are classified as care dependent of care level 1, followed by 38.1 percent of care level 2, 4.4 percent of care level 3, and 4.7 percent of care level 0. The lower panel of Table 1 reports descriptive statistics regarding the nursing homes. The nursing home characteristics are considered at both the nursing home level as well as the combined level of nursing homes and individuals. Since the latter level mirrors the data composition within the individual choice sets, certain nursing homes are included in the data with frequencies depending on the number of choice sets they entered. Note that as the quality information varies with both nursing homes and individuals (i.e. depending on their date of moving into a nursing home) these variables are considered only on the combined level of individuals and nursing homes in this table. About 13.9 percent of the nursing homes in the choice sets

were rated with overall grades above the average overall grade on the federal state level. Another 15.2 percent of all nursing homes had overall grades below the average overall grade of the particular federal state. The remaining nursing homes in the choice sets had no quality grades two months prior to the individual entry into a nursing home.[9]

Table 1: Descriptive statistics on individuals and nursing homes

Variable	Mean	Std. Dev.	Min.	Max.	N
Individual level					
Female	0.471	0.4999	0.000	1.000	2,534
Care level 0	0.047	0.212	0.000	1.000	2,534
Care level 1	0.528	0.499	0.000	1.000	2,534
Care level 2	0.381	0.486	0.000	1.000	2,534
Care level 3	0.044	0.205	0.000	1.000	2,534
Nursing home level					
Nursing home price care level 1	75.670	10.879	34.930	121.430	2,073
Nursing home price care level 2	90.468	12.462	45.930	135.670	2,073
Nursing home price care level 3	105.869	14.372	56.950	168.360	2,073
Number of beds	102.761	55.966	1.000	950.000	2,073
Nursing-home-individual level					
above average quality	0.139	0.346	0.000	1.000	176,864
Below average quality	0.152	0.359	0.000	1.000	176,864
No quality information	0.709	0.454	0.000	1.000	176,864
Nursing home price care level 1	79.326	10.258	34.930	121.430	176,864
Nursing home price care level 2	95.662	11.606	45.930	135.660	176,864
Nursing home price care level 3	112.472	13.523	56.950	168.360	176,864
Number of beds	111.860	60.802	1.000	950.000	176,864

4 Empirical Strategy

The choice of which nursing home to move in can be made either by the frail person, their family and friends or by all these persons together. The latter option seems to be the most likely. However, as it does not matter for the purpose of this paper, we refer to this person regardless of who they are as the individual.[10] We use a discrete choice model to formulate an individual's nursing home choice and adopt a utility maximization framework where price,

[9] It comes as no surprise that the share of above average rated nursing homes is not equal to the share of below rated institutions. As explained above, the frequency of certain nursing homes in the data set differs due to the construction of individual choice sets. Another reason is the exclusion of not chosen institutions of our analysis (including also rated nursing homes).

[10] We do not observe in the data who the actual decision maker is.

quality and travel time are the main determinants of nursing home choice. When selecting an institution, individuals are assumed to behave rationally and to weight costs related to the reimbursement rate as well as the travel time against the quality of the nursing home in order to maximize utility. Assuming linearity, the utility of individual i from nursing home j is specified as:

$$U_{ij} = \beta_0 \mathrm{t}_{ij} + \sum_{k=1}^{n} \alpha_k \mathrm{NH}_{kj} + \varepsilon_{ij}, \tag{1}$$

where t_{ij} denotes travel time from individual i's home to nursing home j, NH_{kj} is a vector of k observed nursing home j's attributes (including the reimbursement rate and information on quality), and ε_{ij} reflects the idiosyncratic part of individual i's evaluation of nursing home j. The key behavioral assumption is that individual i will choose nursing home j when any other nursing home in their choice set would have resulted in lower utility due to its attributes, i.e. $U_{ij} > U_{im}$ for $m \in J_i$, $m \neq j$.

We estimate a mixed logit model also known as the random parameter (or coefficient) logit model. The specification of this model equals the one in the standard (conditional) logit, except that the coefficients are allowed to vary by individuals rather than being fixed. As this discrete choice model can approximate any random utility model, it is a flexible extension of the more traditional conditional logit model. Moreover, the mixed logit model relaxes the independence of irrelevant alternatives assumption by estimating random coefficients on the object characteristics in the indirect utility function and thereby allowing for random taste variations (McFadden, 1974; McFadden and Train, 2000; Train, 2009).

The mixed logit model has choice probabilities that are expressed as:

$$Pr_{ij} = \int \left(\frac{e^{\beta_0 t_{ij} + \sum_{k=1}^{n} \alpha_k NH_{kj}}}{\sum_j e^{\beta_0 t_{im} + \sum_{k=1}^{n} \alpha_k NH_{km}}} \right) f(\beta) d\beta, \tag{2}$$

where Pr_{ij} represents the probability that person i chooses nursing home j. The vector of coefficients representing the individual's tastes for the distance of the nursing home to the previous place of residence and the nursing home attributes are denoted as β and vary with

decision makers in the sample with density $f(\beta)$. The log likelihood function of Equation (2) is maximized to yield estimates of both the mean and variance of β.[11]

In our model, all coefficients are assumed to be random and normally distributed as we believe that individuals might have different preferences regarding all included nursing home attributes. Especially in case of missing information on nursing home quality, the other observable nursing home attributes might be correlated with certain assumptions regarding quality. In particular, in case of absent quality information, higher nursing home prices might be suspected to be related to better quality of care. Also, smaller or larger nursing homes might be expected to provide better care services, i.e. due to a rather familiar environment or due to synergy effects, respectively. Moreover, as choosing a nursing home might be associated with finding a residence for the last stages of the life rather than choosing a temporary care treatment, some individuals might prefer certain neighborhoods with attractions like a lake or sea or other aspects we do not control for. Due to such aspects they might be willing to take longer distances from their previous households into account. Hence, individual preferences considering all observable nursing home attributes might vary between individuals, justifying the mixed logit approach. We do not assume a log-normal distribution for any coefficients (e.g. the travel time) as we do not expect the coefficients to have the same sign for all individuals. Nevertheless, the estimated results are robust to variations on these aspects (i.e. fixed or log-normally distributed coefficients of nursing home size and/or log-normally distributed coefficients of travel time). Tables A3 and A4 in the Appendix show the results for a mixed logit model with fixed coefficients of nursing home size and log-normally distributed coefficients of travel time.

In order to analyze the heterogeneity of nursing home choice, we also estimate the mixed logit model separately by care levels. This allows us to take the urgency in choosing a nursing home into account. As in many cases the need of inpatient care might occur due to a sudden impairment of the health status or serious disease outbreak, the nursing home choice may be done under high time pressure. However, individuals in lower care levels (i.e. care level 0 and 1) can be expected to have more time to take different nursing home character-

[11] The mixed logit model is fitted by using maximum simulated likelihood (Hole, 2007).

istics into account. As suggested by Train (2009) individual level conditional distributions are preferred to including individual attributes directly into the equation as the mixed logit model of individual choice allows the estimated coefficients to vary between individuals and adding individual characteristics to the estimation equation requires the effect to be additive and homogenous across individuals, which is needlessly restrictive. However, as we are more interested in the overall effects of quality information, reimbursement rates and distances than knowing how preferences vary with demographic characteristics no other conditional distributions beside the care severity are considered.

5 Results

Table 2 reports the basic results from the mixed logit model. The means and standard deviations of the random coefficients provide information on the share of patients that place a positive value on the nursing home attribute and the share that places a negative value (Train, 2009). These shares are given by $\Phi(-m/s)$, where Φ is the cumulative standard normal distribution, m and s are the mean and standard deviation, respectively. Considering travel time, the results suggest that individuals are less likely to choose nursing homes with long travel time from the previous place of residence. Moreover, the standard deviation of this coefficient is highly significant, indicating that dependent persons' willingness to travel does vary. Some are thus significantly more reluctant to travel than others. As $\Phi(0.212/0.084)$ equals 0.994, basically all individuals, place a negative value on travel time when choosing a nursing home. Moreover, individuals are less likely to choose nursing homes with high reimbursement rates. The significant standard deviation indicates that 61.41 percent of the individuals in our sample place a negative value on nursing home reimbursement rates. A possible explanation for the high share of 38.59 percent of individuals placing a positive value on reimbursement rates is the possible consideration of the price as a signal for quality in case of absent quality information or prices that have already incorporated the quality. Considering the quality, we find no significant relationship between quality and the individual nursing home choice. Hence, we find no evidence that above or

below average rated nursing homes are preferred or avoided compared to nursing homes without quality reports. A robustness check with differently defined quality classes (i.e. excellent, good, bad and not available quality information, see Table A6 in the Appendix) confirms these results. Regardless of the classification of quality grades the results are very similar and robust.

Table 2: Mixed logit estimates of nursing home choice

	Mean	**S.D.**
Travel time	-0.212***	0.084***
	(0.005)	(0.006)
Nursing home price	-0.008***	0.027***
	(0.003)	(0.010)
Number of beds	0.001***	0.002**
	(0.000)	(0.001)
Above average quality	-0.145	0.821**
	(0.119)	(0.309)
Below average quality	-0.048	0.153
	(0.077)	(0.415)
Number of individuals	2,534	
Number of observations	176,864	

Notes: Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual choses the nursing home represented in that individual-nursing-home-pair. **: Significant at 5%. ***: Significant at 1%. Standard errors are reported in parentheses.

As the magnitudes of the estimated coefficients of the mixed logit model are not easily interpretable, simulations are used to translate the obtained results into marginal effects. In particular, the marginal effects are determined simulating the differences in predicted probabilities when changing one characteristic and keeping all else fixed. The changes in characteristics are one unit changes for continuous variables and changes from zero to one for dummy variables. While the marginal effects (i.e. own effects) are calculated for all observed nursing homes in the choice sets, Table 3 presents the marginal effects averaged across all institutions. We find that a one minute increase in travel time between the place of residence and the nursing home reduces the probability of choosing the nursing home on average by 0.198 percentage points. Moreover, an increase in the daily reimbursement rate by one Euro is predicted to go along with a decrease of the probability of choosing the nursing home by 0.089 percentage points. An increase in the size of the nursing home by ten beds results in an

increase in the probability of choosing the nursing home by 0.001 percentage points. Overall, given the high number of possible nursing homes in the choice sets, leading to rather small probabilities of choosing a particular institution, changes in the considered variables have a relatively strong impact on the nursing home choice. Moreover, the marginal effects of positive and negative quality information, have the expected signs, i.e. above average quality has a positive and below average quality a negative sign. Considering all variables, there is a high range between the minimum and maximum changes predicted for single nursing homes.

Table 3: Average marginal effects on nursing home demand

	Mean	**S.D.**	**Min.**	**Max.**
Travel time/100	-0.198	0.596	-5.401	0.030
Nursing home price/100	-0.089	0.266	-2.455	0.000
Number of beds/1000	0.013	0.0346	-0.009	0.393
Above average quality/100	0.001	0.282	-5.945	2.002
Below average quality/100	-0.035	0.112	-1.503	0.099

Notes: Averages of the own effects (i.e. effects on choice probabilities of home A when characteristics of home A are changed instead of cross effects, i.e. effects on choice probabilities of home A when characteristics of other homes are changed.) over all nursing homes. Standard errors of marginal effects are not calculated as bootstrapping is infeasible given the large set of alternatives.

Table 4 exhibits the results from the conditional logit model, which serves a robustness check and for comparison with the results from the mixed logit model. The obtained results from the conditional logit model generally confirm the estimates from the mixed logit model showing that individuals are less likely to choose more distant and more expensive nursing homes while they seem not to care about quality.

When estimating separately for each care level, the results do not change significantly (see Table 5). The standard errors change due to the reduced sample size leading to partly insignificant coefficients of the price parameters. Their size, however basically stays the same. Regardless of the care level, the additional considerations confirm our result on the insignificant role of nursing home quality report cards.

The procedure of estimating results for the whole sample as well as subsamples provides a diagnostic check for the mixed logit model specification. The means and standard deviations

Table 4: Conditional logit estimates of nursing home choice

	M.E.
Travel time/100	-0.072***
	(0.018)
Nursing home price/100	-0.003***
	(0.000)
Number of beds/1000	0.001***
	(0.000)
Above average quality/100	-0.010
	(0.024)
Below average quality/100	-0.009
	(0.025)
Number of individuals	2,534
Number of observations	176,864

Notes: Marginal effects are marginal own effects. Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual choses the nursing home represented in that individual-nursing-home-pair. ***: Significant at 1%. Standard errors are reported in parentheses.

from the unconditional sample should be similar to the means and standard deviations of the conditional samples if the mixed logit model is correctly specified (Train, 2009). As the mixed logit estimates from the samples including all observed individuals and subgroups of individuals depending on their care level are very similar, validity of our mixed logit specification is supposed to be given.

Table 5: Mixed logit estimates of nursing home choice for elderly in care level 0-3

	Care level 0		**Care level 1**		**Care level 2**		**Care level 3**	
	Mean	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Travel time	-0.206***	0.077**	-0.209***	0.085***	-0.228***	0.100***	-0.198***	0.021
	(0.021)	(0.027)	(0.007)	(0.008)	(0.009)	(0.010)	(0.020)	(0.070)
Nursing home price	0.006	0.030	-0.009**	0.022**	-0.008	0.032**	-0.008	0.011
	(0.015)	(0.045)	(0.004)	(0.018)	(0.005)	(0.014)	(0.012)	(0.056)
Number of beds	0.000	0.000	0.001**	0.002	0.001	0.004**	-0.001	0.000
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
Above average quality	0.194	0.133	-0.132	0.670	-0.264	1.220***	-0.001	0.507
	(0.315)	(0.960)	(0.161)	(0.525)	(0.215)	(0.408)	(0.424)	(1.371)
Below average quality	-0.100	0.002	-0.123	0.839*	-0.194	0.310	0.083	0.196
	(0.352)	(0.987)	(0.189)	(0.487)	(0.151)	(0.644)	(0.349)	(1.623)
Number of individuals	152		1,757		1,299		179	
Number of observations	7,582		94,364		68,542		6,376	

Notes: Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual choses the nursing home represented in that individual-nursing-home-pair. **: Significant at 5%. ***: Significant at 1%. Standard errors are reported in parentheses.

6 Discussion and Conclusion

This study adds to the literature analyzing consumer behavior in choosing in-patient health care institutions. Our data sources include considerable individual-level information about both demanders and suppliers, enabling a detailed empirical analysis. The results suggest that the reimbursement rate and the distance have a negative impact on nursing home choice while the reported quality does not have a significant effect.

On the one hand, the results are good news. Decision makers for nursing home choice take prices and distances into account. Thus, in principal, they are open for measures to improve efficiency in the market and ready to search for the best alternatives. One such improvement should be a more flexible price setting scheme for nursing home owners. Currently, as the nursing home prices are highly regulated, this channel of possible competition and efficiency increase is not fully adopted. Given the current regulation, nursing home owners are not able to change prices without negotiating them in advance for a fixed period of time. However, incentive problems arise from the price setting system as cost savings in one period may deteriorate bargaining power as the cost disclosure might lead to a budget cut in the next period. In addition, since not all cost types are considered in the prices negotiations, inefficient factor allocations might occur.

Consumers do not respond to the quality information as disclosed in the report card, which might be interpreted as bad news. We offer a couple of explanations for this. First of all, it should be noted that the introduction was accompanied by a considerable media response and, in particular, individuals at the point of deciding for a home should have been well aware of the existence of the new report cards. Nevertheless, acceptance of these cards might not be immediately established and take a while. Moreover, the oldest old are certainly not the target group used to the internet. Although we argue that they most likely get help from their family and that by visiting the homes in person the report cards can be viewed this might add to the results.

Second, quality might be incorporated in the prices and consumers take the price as a better quality signal than the report cards. This could also explain the heterogeneous responses to prices, where some 40% of individuals seems to prefer higher prices.

The most important point (also linked to the previous one), however, might be the content of the report cards. Shortly after introducing the report cards they were criticized by researchers for not adequately measuring nursing home quality. As discussed in Section 2 and can be verified by looking at the 64 criteria in Table A1 in the Appendix, outcome quality only plays a minor role and there is a too strong focus on process quality, service quality, and documentations. Moreover, bad grades in important criteria can be outweighed by good grades in less important criteria. While all single criteria are reported and it is not fully necessary to only compare the aggregated overall grades, we think that most individuals actually do so and, thus, might be discouraged to use the report cards at all by the critique regarding the overall grades.

Thus, to enable consumers to identify and choose high-quality providers and thereby give homes stronger incentives to compete on quality it is necessary that information about quality is tailored to the users' needs, is broad in scope, and easily accessible. The introduction of report cards was a very important first step in the German nursing home sector. However, there is need for reforming these cards to focus much more on outcome quality and life satisfaction of care recipients. This would strengthen the credibility and, potentially, the acceptance of the report cards among the decision makers. An important condition for competition in promoting quality in health care is that individuals take quality into account when choosing providers. However, without reliable information on quality this aim can be hardly reached. With insufficient quality transparency, a price competition could be carried out at the expense of quality standards and actually have deteriorating effects.

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Appendix

Figure A1: Example of a report card (first page out of four)

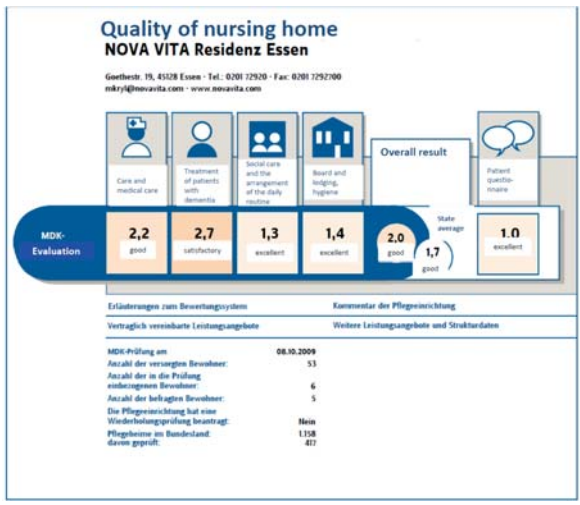

Table A1: Full list of report card questions

Area 1: Nursing and medical care	
1	Is an active communication with a physician comprehensible if required?
2	Does the application of the nursing treatments correspond to the physician's orders?
3	Does the supply of medicines correspond to the physician's orders?
4	Is the use of medicines appropriate?
5	Are compression stockings put on properly?
6	Is the individual pressure sore risk being assessed?
7	Are pressure ulcer prevention measures being applied?
8	Are place and time at which the chronic wound/pressure ulcer occurred verifiable?
9	Is a differentiated documentation in case of chronic wounds or pressure ulcer being carried out (in terms of actuality, verifiability of development, size, position, depth)?
10	Are the applied measures to treat chronic wounds or pressure ulcer based on state-of-the-art knowledge?
11	Are documents regarding the treatment of chronic wounds or bedsores analyzed and, if necessary, the measures adjusted?
12	Do residents with chronic pains receive the prescribed medication?
13	Are individual nutritional resources and risks documented?
14	Are necessary measures taken in case of restrictions regarding independent supply of food?
15	Is the nutritional status appropriate given the conditions set by the institution?
16	Are individual resources and risks regarding the supply of fluids documented?
17	Are necessary measures taken in case of restrictions regarding independent supply of fluids?
18	Is the supply of fluids appropriate given the conditions set by the institution?
19	Is the sense of taste of residents with feeding tubes being stimulated?
20	Are systematic pain assessments conducted?
21	Does the nursing home cooperate closely with the treating physician?
22	Are individual risks and resources of residents with incontinence or a bladder catheter assessed?
23	Are necessary measures for residents with incontinence or a bladder catheter taken?
24	Is the individual risk of falling assessed?
25	Are fall incidents being documented?
26	Are necessary prophylaxes against fall incidents taken?
27	Is the individual risk of contracture collected?
28	Are necessary contracture prophylaxes taken?
29	Do measures restricting the individual freedom require consent?
30	Is the necessity of freedom restricting measures checked regularly?
31	Are individual needs and habits of the residents regarding personal hygiene taken into account and being carried out accordingly?
32	Are individual needs and habits of the residents regarding oral and dental hygiene taken into account and being carried out accordingly?
33	Is nursing care usually being carried out by the same nurse?
34	Are workers regularly trained regarding First Aid and emergency measures?
35	Do written procedural instructions regarding First Aid and emergency measures exist?
Area 2: Care of residents suffering dementia	
36	Is the biography of residents suffering dementia taken into account and being considered when planning daily activities?
37	Are accompanying and caring persons of residents suffering dementia incorporated into the nursing and caring process?
38	Is self-determinantion of residents suffering dementia taken into account in the nursing and caring process?
39	Is well-being of residents suffering dementia determined and documented, and appropriate measures for improvement deducted from that information?
40	Do suitable exercise and recreational areas for particular target groups exist (at night time also) ?
41	Do secured recreational areas outside exist?
42	Do identification facilitating arrangements regarding design of surroundings exist in rooms and recreation rooms?
43	Are individual guidance measures, e.g. photographs, used?
44	Are residents suffering dementia offered adequate activities, e.g. regarding exercise, communication, or perception?
45	Are residents suffering dementia offered suitable food?
Area 3: Social care and the arrangement of the daily routine	
46	As part of social care, is group counseling available?
47	As part of social care, is individual counseling available?
48	Does the nursing home have annual celebrations?
49	Are there activities together with the local community?
50	Are there measures to promote contact with relatives?
51	Are the social care measures justified by the residents' composition and needs?
52	Is assistance or information provided to familiarize new residents with the nursing facility (e.g., contact person, support during the orientation, assessment interviews after six weeks)?
53	Is the orientation phase systematically evaluated?

Continued on next page

Table A1 – Continued

54 Are there guidelines with respect to the provision of terminal care?
55 Does the nursing facility have a system for managing complaints?

Area 4: Accommodation, provision, household management, and hygiene

56 Are residents allowed to decorate and design their rooms with their own furniture, personal effects, and memorabilia?
57 Do residents have a say in the design and decoration of the communal areas?
58 Does the facility give a good overall impression in terms of cleanliness and hygiene? For example, does it appear clean? Is it in order? Are there unpleasant odors?
59 Within a specified time slot, are residents free to choose when to eat?
60 Is appropriate food provided for people with special dietary requirements (e.g., residents with diabetes)?
61 Is the food plan made available to the residents in a legible format?
62 Is the presentation of food and drinks tailored to the needs of each individual resident? For example, to facilitate eating and digestion, some residents require food to be precut into smaller pieces or pureed.
63 Are the portions tailored to the preferences of the residents?
64 Are the food and drinks for the residents provided in a pleasant environment and relaxing atmosphere?

Table A2: Mapping of grades

Category	Grade	Percentage range	Category	Grade	Percentage range
	1	97.4 - 100.0		3.5	57.6 - 58.9
Excellent	1.1	94.8 - 97.3		3.6	56.2 - 57.5
quality	1.2	92.2 - 94.7		3.7	54.8 - 56.1
	1.3	89.6 - 92.1		3.8	53.4 - 54.7
	1.4	87.0 - 89.5	Poor	3.9	52.0 - 53.3
			quality	4	50.6 - 51.9
	1.5	85.6 - 86.9		4.1	49.2 - 50.5
	1.6	84.2 - 85.5		4.2	47.8 - 49.1
	1.7	82.8 - 84.1		4.3	46.4 - 47.7
	1.8	81.4 - 82.7		4.4	45.0 - 46.3
Good	1.9	80.0 - 81.3			
quality	2	78.6 - 79.9		4.5	43.6 - 44.9
	2.1	77.2 - 78.5		4.6	42.2 - 43.5
	2.2	75.8 - 77.1	Failed	4.7	40.8 - 42.1
	2.3	74.4 - 75.7		4.8	39.4 - 40.7
	2.4	73.0 - 74.3		4.9	38.0 - 39.3
				5	0.0 - 37.9
	2.5	71.6 - 72.9			
	2.6	70.2 - 71.5			
	2.7	68.8 - 70.1			
	2.8	67.4 - 68.7			
	2.9	66.0 - 67.3			
Fair quality	3	64.6 - 65.9			
	3.1	63.2 - 64.5			
	3.2	61.8 - 63.1			
	3.3	60.4 - 61.7			
	3.4	59.0 - 60.3			

Source: Pflege-Transparenzvereinbarung (2008)

Table A3: Mixed logit estimates of nursing home choice with fix size and log travel time

	Mean	**S.D**
Log travel time	-1.621***	0.481***
	(0.022)	(0.039)
Nursing home price	-0.009***	0.020*
	(0.003)	(0.012)
Number of beds	0.002***	
	(0.000)	
Above average quality	-0.141	0.827***
	(0.113)	(0.286)
Below average quality	-0.069	0.404
	(0.104)	(0.428)
Number of individuals	2,534	
Number of observations	176,864	

Notes: Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual choses the nursing home represented in that individual-nursing-home-pair. **: Significant at 5%. ***: Significant at 1%. Standard errors are reported in parentheses.

Table A4: Point estimates of lognormal coefficients

	Median	**Mean**	**S.D.**
Travel time	-0.200	-0.225	0.116

Notes: In case of log-normal distributions of the coefficients the estimated parameters in the mixed logit model are the natural logarithm of the coefficients. Point estimates of the corresponding coefficients are calculated using the following formulas: mean is $exp(m + s/2)$; median is $exp(m)$ and variance is $exp(2m + s) + [exp(s) - 1]$, with m defined as the mean and s as variance of β^k (Train, 2009). To undo the sign change introduced in the estimation process, the calculated values are multiplied with minus one (Varkevisser et al., 2012)

Table A5: Mixed logit estimates of nursing home choice with not trimmed data

	Mean	**S.D.**
Travel time	-0.189***	0.093***
	(0.004)	(0.002)
Nursing home price	-0.008***	0.005
	(0.003)	(0.011)
Number of beds	0.001**	0.002**
	(0.000)	(0.001)
Above average quality	0.000	0.248
	(0.071)	(0.325)
Below average quality	-0.087	0.163
	(0.069)	(0.283)
Number of individuals	2,793	
Number of observations	5,820,612	

Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual choses the nursing home represented in that individual-nursing-home-pair. **: Significant at 5%. ***: Significant at 1%. Standard errors are reported in parentheses.

Table A6: Mixed logit estimates of nursing home choice with three grade classifications

	Mean	**S.D.**
Travel time	-0.211***	0.082***
	(0.005)	(0.006)
Nursing home price	-0.008***	0.025
	(0.003)	(0.010)
Number of beds	0.001**	0.002
	(0.000)	(0.001)
Excellent quality grade (1.0-1.9)	-0.116	1.347
	(0.095)	(1.077)
Good quality grade (2.0-2.9)	-0.163	1.510
	(0.172)	(1.203)
Poor quality grade (3.0-5.0)	-0.394	1.922
	(0.352)	(1.314)
Number of individuals	2,534	
Number of observations	176,864	

Notes: Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual choses the nursing home represented in that individual-nursing-home-pair. **: Significant at 5%. ***: Significant at 1%. Standard errors are reported in parentheses.