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Determinants of nursing home choice: Does reported quality matter?

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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 older people. Using individual level data from the largest German sickness fund merged with institutional level data, we examine the relationship between reported 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 above and below average ratings as well as nonrated nursing homes. We find that the probability of choosing a nursing home decreases in distance and price. However, we find no economically significant effect of reported quality on individuals' choice of nursing homes.

KEYWORDS

demand, nursing home choice, quality information, quality report cards

JEL CLASSIFICATION

I10

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. 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 (Chou, 2002; Hirth, 1999). In particular, information deficits either on the demand or supply side, might lead to market failure (Akerlof, 1970).

However, 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.

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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 January 2010, quality report cards are published in the German long-term care market in order to convey information about providers. Due to the stepwise conduction of the quality assessments in random order by an independent authority, we can distinguish between positively, negatively, and nonrated nursing homes.

A growing body of literature investigates the impact of report cards on health care markets and consumer behavior. Although several studies estimate the relationship between public quality information and hospital demand (see, e.g., Avdic, Moscelli, Pilny, & Sriubaite, 2019; Beckert, Christensen, & Collyer, 2012; Epstein, 2010; Goldman & Romley, 2008; Gutacker, Siciliani, Moscelli, & Gravelle, 2016; Howard, 2006; Pope, 2009; Tay, 2003; Varkevisser, van der Geest, & Schut, 2012; Wang, Hockenberry, Chou, & Yang, 2011) and predominantly find positive relationships between reported quality and individual's choice, much less is known about the impact of quality report cards on nursing home choice from the patient's perspective. Werner, Norton, Konetzka, and Polsky (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. He and Konetzka (2015) find an unintended effect of public reporting: high-quality nursing homes with capacity constraints have focussed more on profitable patients, reducing access of less profitable ones after 2002 in the United States.

We contribute to the existing literature in several ways. We are, to the best of our knowledge, 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 with market-level demand models (Berry, Levinsohn, & Pakes, 1995). Moreover, we are, to our knowledge, the first to take the price, the distance, and the explicit role of quality information into account, distinguishing between both different levels of reported 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 nursing home choice.

Our results suggest a negative relationship between the individual nursing home choice and both travel time as well as nursing home prices. However, nursing homes with above or below average quality ratings do not attract more or less patients than nursing homes without quality information. Thus, in the specific setting we analyze, quality report cards did not seem to affect consumer behavior. We discuss potential reasons for this empirical finding—such as low awareness or perceived insufficient content of the report cards—in the conclusion.

2 | BACKGROUND

The German nursing home market is characterized by about 14,000 nursing homes engaging about 765,000 employees who care for about 921,000 dependent individuals (Statistisches Bundesamt, 2018). 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, 2001; Fahey, Montgomery, Barnes, & Protheroe, 2003; Kirkevold & Engedal, 2006). However, only after a series of public scandals about very poor quality in some German nursing homes (e.g., Tscharnke, 2009), 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. They had not been standardized and were difficult to read for nonexperts.

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 (Medizinischer Dienst der Krankenkassen [MDK]). By the year 2011, all German nursing homes had been tested followed by updates 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 supporting information 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.¹ 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.

Because comparison over 64 grades is rather unfeasible for the patients, an overall grade of the nursing home is generated by simply averaging over all single grades. Yet Geraedts, Brechtel, Zöll, and Hermeling (2011) find in a survey from 2011 that 46% of those who had seen the report cards found it easy to find important information in the report cards, 35% that it is exactly the right information presented. The also presented average overall grade of all nursing homes in the respective federal state that provides a benchmark for comparison. See Figure A1 in the supporting information for an exemplary first page of a report card. While there is no doubt that aggregation strongly facilitates the comparison, the aggregation method was 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.² As a result, the report cards have been abandoned in this form recently. Currently, a revised and improved version is being tested but their results are not yet available.

Therefore, the report cards do not sufficiently measure quality of nursing homes.³ Yet we believe that they are a suitable instrument to analyze how patients react on *reported* quality. 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 supporting information), consumers compare nursing homes regarding the aggregated results instead of considering certain very detailed single criteria.

It should be mentioned that the report cards are no instrument of the regulator to close down badly performing nursing homes. Thus, it is no surprise that there is no indication whatsoever that certain sectors of the market were evaluated first (which could induce concerns of endogeneity of existing quality information), for example, nursing homes that may have been known to have bad quality by the MDK. Their only purpose is to improve transparency for customers. Moreover, we do not claim that report cards are the only possible source of quality information. Patients may receive quality signals from their physicians, from friends or, most importantly, by visiting nursing homes. However, taken at face value, the report cards strongly reduced information costs and offer an objective and independent source of information, and the huge public echo in Germany after their introduction allows to assume that many people took them very seriously.

2.2 | Prices

Nursing home prices, to be shared by sickness funds and out-of-pocket payments of consumers, consist of three components: the rate for nursing services, the fee for accommodation and catering, and 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 dependence. Higher care levels imply a higher need for care and go along with higher rates. Because the fee for accommodation and catering as well as the investment costs are

¹Print-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 that, typically, it is not the frail individual who decides by herself about the home but that their children help to decide, we do not regard it a problem that the oldest old do not use the internet in Germany.

²This 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.

³This is not to say that they do not measure quality at all. Yet, unlike recently shown for the United States (Cornell, Grabowski, Norton, & Rahman, 2019), there is no evidence so far in Germany that homes with better grades indeed improve patient outcomes.

TABLE 1 Descriptive statistics on individuals and nursing homes

Variable	Mean	SD	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 reported quality	0.139	0.346	0.000	1.000	176,864
Below average reported 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

Note. Nursing home prices are total prices per day.

fixed for all residents of a given nursing home, the individual costs for care only vary by the care level. From the patient's perspective, the three single price components should not matter as they care for the total price.

Total costs in our data set are on average 2,301€ (min.: 1,062€; max.: 3,693€) per month for care level 1, 2,752€ (min.: 1,397€; max.: 4,127€) for care level 2, and 3,220€ for care level 3 (min.: 1,732€; max.: 5,121€), see Table 1 below. As the numbers in parentheses (minimum and maximum values) suggest, there are strong variations in prices. In the regressions below, depending on their own observed care level, we assign all individuals the specific prices, either for care level 1, care level 2, or care level 3.

Social long-term care insurance partly covers the total costs and comes in the form of an “indemnity insurance,” that is, it consists of a monthly lump-sum depending on the care level. In 2010, this was 1,023€ for care level 1, 1,279€ for care level 2, and 1,510€ for care level 3. The difference between total costs and long-term care insurance benefits needs to be paid out of pocket without spending max. Thus, whereas, on average, insurance covers around 50% of the nursing home costs, price differences between nursing homes are completely borne by the residents. There is one exception: if care recipients and, where appropriate, their adult children cannot bear the costs, social assistance steps in. Individuals first need to spend down their assets before they qualify for social assistance to cover the out-of-pocket costs.⁴ Unfortunately, we do not observe social assistance eligibility in the data. Thus, estimates of price responsiveness might turn out to be underestimated.⁵ If demand is price-elastic, providers have an incentive to compete in terms of prices. However, as the price setting is not flexible but highly regulated by the price negotiation system (explained in the supporting information), the competition regarding prices to promote efficiency is somewhat constrained.

3 | DATA

Our principal data source provides us with detailed individual level information of all insured from the largest sickness fund in Germany—the 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% of the entire population. The data from the year 2010 provide us with 2,534 individuals 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

⁴It is possible but quite unlikely that individuals willingly choose better (and more expensive) nursing homes because ultimately social assistance might cover the costs. If social assistance steps in, individuals may be forced to choose a cheaper facility.

⁵Yet please note the discussion below that prices might also capture other aspects, potentially leading to an overestimation of the price effect.

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 4 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, whereas 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 2 months before individuals actually moved in.⁶ Hence, having the information on the day individuals moved into the homes (minus 2 months) we can assign each home into one of the three mutually exclusive categories *above average reported quality*, *below average reported quality*, and *no quality information available* in order to evaluate the importance of reported quality information. Above average reported quality is defined as follows: 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. Above average reported quality equals one if the nursing home's average rating is as good as or better than the federal state average and zero otherwise. Below average reported quality takes on the value one if the home's grade is below the federal state average. No quality information available takes on the value one if the home had not been graded yet. We assume that above average quality is considered as a positive signal, whereas 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*.⁷

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.⁸ 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 2 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 prices and the number of beds is obtained from the Association of Health Insurance Companies. We calculate the per resident daily price of the nursing homes as the care level specific price plus the fee for accommodation and catering as well as investment costs.

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% of individuals were admitted to nursing homes within 10-min travel time to their previous households. The average distance to the chosen nursing home is 9.58 min travel time.

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, that is, 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 such cases, we exclude all individuals who have chosen nursing homes that are not reached within 40 min of travel time.⁹

For each individual, a set of nursing home alternatives is defined. Each individual's choice set consists of all nursing homes within 40-min travel time distance. Figure 2 presents the distribution of the number of nursing homes in individual choice sets. About 90% 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.

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 individuals, whereas the lower panel

⁶The results are robust to choosing 1 or 3 months.

⁷Note, however, 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.

⁸Due 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.

⁹In doing so, the upper 7% of the travel time considering all chosen nursing homes is excluded. The results are, however, robust to not trimming the data (see Table A3 in the supporting information).

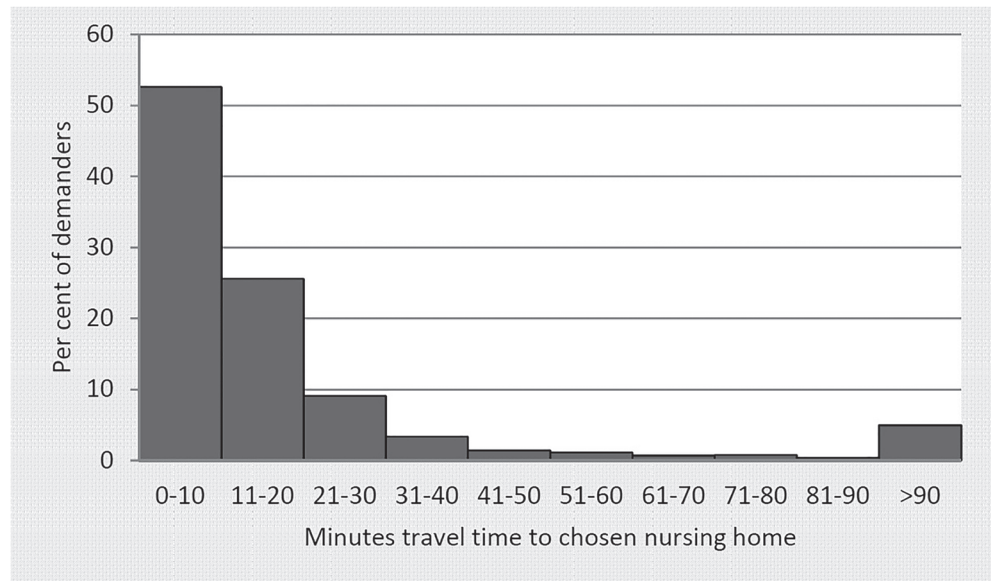


FIGURE 1 Minutes of travel time to the chosen nursing home

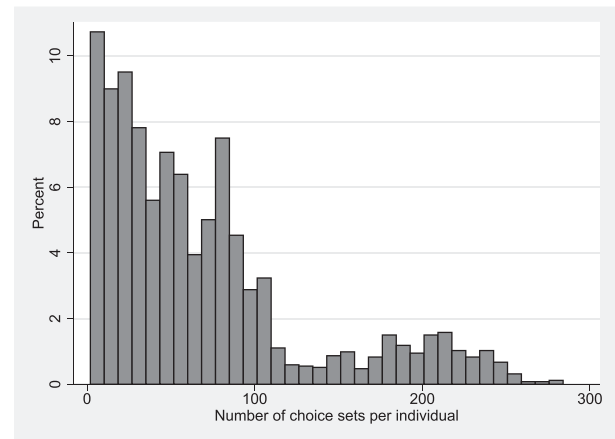


FIGURE 2 Number of choice sets per individual

reports descriptive statistics of 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. 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.

Although the majority of facilities had not been tested at the point of nursing home choice, 2,200 out of 2,534 choice sets had at least one facility with above average reported quality, below average reported quality, or no quality information.

4 | EMPIRICAL STRATEGY

We would like to test whether good reported quality increases the nursing home demand compared with worse or no reported quality. Nursing home demand is proxied by observed choices made. 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 older individual. We use a discrete choice model to formulate an individual's nursing home choice and adopt a utility maximization framework where price, 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 price 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 follows:

$$U_{ij} = \beta_0 t_{ij} + \sum_{k=1}^n \alpha_k NH_{kj} + \varepsilon_{ij}, \quad (1)$$

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, that is, $U_{ij} > U_{im}$ 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 & Train, 2000; Train, 2009).

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

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

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 is denoted as β and varies 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 .¹⁰

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. We do not assume a log-normal distribution for any coefficient 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 A5 and A6 in the supporting information 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, and the nursing home choice may be done under high time pressure. However, individuals in lower care levels (i.e., care levels 0 and 1) can be expected to have more time to take different nursing home characteristics 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.¹¹

¹⁰The mixed logit model is fitted by using maximum simulated likelihood (Hole, 2007).

¹¹Table A4 shows the results from a traditional conditional logit model as a robustness check.

TABLE 2 Mixed logit estimates of nursing home choice

Variable	Mean	SD	Marg. effect in %-points
Travel time	-0.212*** (0.005)	0.084*** (0.006)	-0.416*** (0.010)
Nursing home price	-0.008*** (0.003)	0.027*** (0.010)	-0.018*** (0.007)
Number of beds	0.001*** (0.000)	0.002** (0.001)	0.003** (0.001)
Above average reported quality	-0.145 (0.119)	0.821** (0.309)	-0.058 (0.047)
Below average reported quality	-0.048 (0.077)	0.153 (0.415)	-0.061 (0.098)
Number of individuals	2,534		
Number of observations	176,864		

Note. Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual chooses the nursing home represented in that individual-nursing-home-pair. Standard errors are reported in parentheses. Marginal effects are averages of the own effects (i.e., effects on choice probabilities of home *A* when characteristics of home *A* are changed and those in the other homes are kept constant) over all nursing homes. Bootstrap standard errors of simulated marginal effects with 100 replications. ** Significant at 5%. *** Significant at 1%.

5 | RESULTS

Table 2 reports the estimated means and standard deviations of the coefficients from the mixed logit model and marginal effects. Marginal effects are simulated by comparing the differences in probabilities to choose a home before and after one characteristic is increased by one unit in this home and held fixed for all others. We report averages of these “own effects” over all nursing homes. To calculate the marginal effects of the categorical variable *Above average reported quality*, we compare the baseline probability in each home with the predicted one after setting *Above average reported quality* to one and *Below average reported quality* to zero (and vice versa for the marginal effect for *Below average reported quality*).

We find that a 1-min increase in travel time between the place of residence and the nursing home reduces the probability of choosing the nursing home on average by 0.416 percentage points. 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. The results ($\Phi(0.212/0.084) = 0.994$) suggest that basically all individuals place a negative value on travel time when choosing a nursing home.

A price increase by 1 Euro per day (365 Euro per year) goes along with a decrease in 0.018 percentage points to choose a nursing home. To put this magnitude into perspective, note that the average market share of nursing homes in our sample is 1.43%—if the relevant market is defined by our 40-min radius. An increase in prices by one standard deviation, which is around 12 Euro, goes along with an average decrease in probability to choose this home by 0.216 percentage points. This is not a small effect relative to the average market share. Yet the marginal effect of only one additional minute distance is twice as large.

Moreover, there seems to be more variability in tastes when we consider prices. The estimated mean and standard deviation of the coefficients indicate that only 61.41% of the individuals in our sample seem to place a negative value on nursing home prices. A potential explanation for this is that some individuals may interpret higher prices as signal for better quality and are happy to pay higher prices. Yet the more likely interpretation is that we are unable to estimate the clean causal effect of prices. For instance, given that many nursing homes in our sample do not yet have published report cards, prices might just capture different aspects of better quality. Thus, we estimate a correlation between prices and nursing home choice (or put differently, the estimated price effect is biased). Although not ideal, we argue that this is of minor importance given that the major focus of this study is on the effect of the report cards.

Considering the report cards, we find no significant relationship between reported quality and the individual nursing home choice, neither economically nor statistically. The marginal effects of both indicators fluctuate around zero. The standard errors of the marginal effects are comparably large but even the boundaries of the confidence intervals are

TABLE 3 Marginal effects in other specifications

Variable	(1) Without full capacity	(2) Max distance 20 min	(3) Choice 0 month for those with 0 LTC days before	(4) Choice 0 months before for all	(5) Incl. market share	(6) Incl. capacity util.
Travel time	-0.483	-1.426	-0.483	-0.492	-0.407	-0.415
Nursing home price	-0.029	-0.080	-0.026	-0.026	-0.017	-0.017
Number of beds	0.004	0.011	0.003	0.003	0.004	0.003
Above av. reported quality	0.038	0.169	-0.071	-0.054	-0.047	-0.038
Below av. reported quality	-0.003	-0.066	-0.064	-0.081	-0.069	-0.071
Market share					0.054	
Capacity utilization						0.002
Number of observations	99,064	21,610	99,356	99,356	176,864	176,864
Average choice probability (%)	1.9	7.1	1.9	1.9	1.4	1.4

Note. Each observation represents a unique individual-nursing-home-pair. The dependent variable is an indicator that equals 1 if the individual chooses the nursing home represented in that individual-nursing-home-pair. Marginal effects are averages of the own effects (i.e., effects on choice probabilities of home *A* when characteristics of home *A* are changed and those in the other homes are kept constant) over all nursing homes. Marginal effects reported in %-points as in Table 2. That is: -0.483 means 0.483 percentage points. Columns 2 to 4 also delete facilities with full capacity. The samples in columns 5 and 6 are the ones from the baseline regressions. The only difference here is that market share/capacity utilization (in percentage points) is included here.

not very large in economic terms.¹² Thus, we tend to interpret these effects as zeros (and are not too concerned about the unexpected negative sign for above average reported quality) and conclude that we find no evidence that above- or below-average-rated nursing homes are preferred or avoided compared with nursing homes without quality reports.

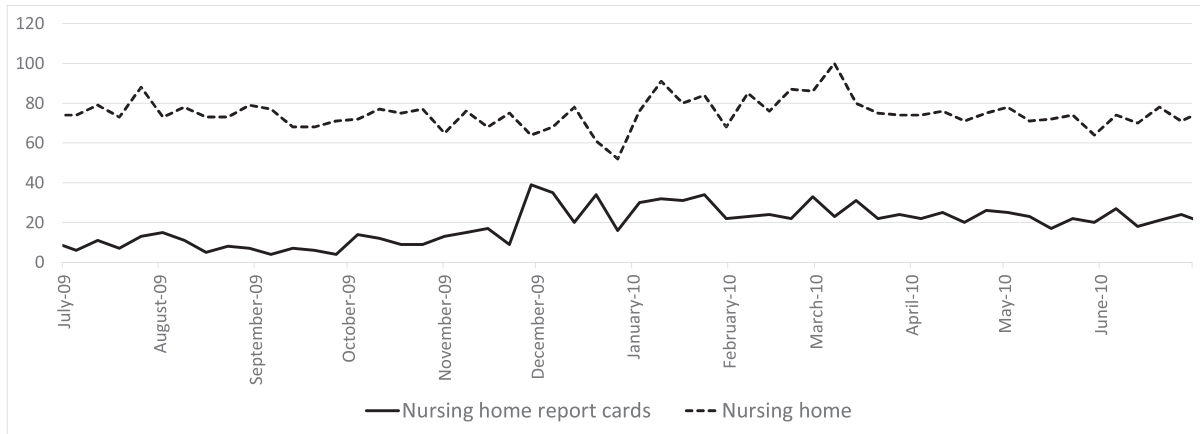
We carry out some robustness checks. The first one takes potential capacity constraints into account. It may well be that care dependent individuals would have liked to enter a nursing home with a high reported quality but were refused due to capacity constraints, and, therefore, had to move into a nursing home with lower reported quality. We observe the number of patients on facility level in 2009 before the report cards were published and can create an—admittedly crude—measure of capacity utilization which is patients 2009 divided by beds 2009. We then delete the 25% of all nursing homes that have a degree of capacity utilization of 99% or more from the choice sets and then re-estimate.¹³ Column (1) of Table 3 reports the marginal effects that do not differ very much from those before. In column (2), we change the assumed maximum distance to a nursing home in a choice set to 20 min. In columns (3) and (4), we modify the assumption that the decision on a nursing home is made 2 months before moving in. The data include a variable on the number of days received long-term care before entering the nursing home. Those who have 0 days can be assumed to have directly move in from a hospital after an acute event. Thus, for these 27% of all observations, we assume that the decision for a nursing home was made immediately before moving in. In column (4), we assume this for all individuals. These modifications change the sizes of the choice sets and, thus, the average probabilities to choose a nursing home. Therefore, marginal effect sizes may differ. Yet the main findings stay the same.

In columns (5) and (6), we return to the sample from the baseline specification. Yet we add a measure of market share or capacity utilization as an additional control variable. Market share is defined here as the share of patients in 2009 among all nursing homes within a 40-min radius. Both variables may be seen as measures of popularity that capture facility characteristics that might otherwise be captured by the prices or the report cards. Indeed, the marginal effect of prices slightly decreases (but is still of significant size). By and large, however, the results are robust to this exercise. As regards market share, this is probably because it is highly correlated with nursing home size (number of beds) that is also included in the baseline regressions.

In the supporting information, we also report results with differently defined quality classes (i.e., good, satisfactory, poor, and not available quality information, see Table A7). Regardless of the classification of quality grades, the results are very similar and robust. The same holds when we estimate separately for each care level (see Table A8). 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

¹²For instance, the 95% confidence interval for the marginal effect of above average reported quality is (-0.150; 0.035).

¹³This also implies that individuals that chose these nursing homes also need to be dropped.



Notes: Search terms for the group Nursing home report cards are (in German): *Pflegenoten, Pflegelotse, Transparenzberichte, Pflegeheime Bewertung, AOK Pflege Navigator, vdek Pflegelotse*. Search queries are per week, scale to 100 for the most popular week. All other queries relative to that one.

FIGURE 3 Google trend data

mixed logit model specification. The means and standard deviations 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). By and large, this is the case here. Finally, we rerun the mixed logit estimations with data from the year 2009 instead of 2010 (without the indicators of reported quality, as these were published in 2010 only), see Table A9. The utility weights for distance, prices, and beds hardly differ compared with 2010 which makes us confident that reported quality does not affect nursing home choice in our application.

6 | DISCUSSION AND CONCLUSION

This study adds to the literature analyzing consumer behavior in choosing inpatient health care institutions. Our data sources include individual-level information about both demanders and suppliers, enabling a detailed empirical analysis. The results suggest that price and distance have a negative impact on nursing home choice, whereas the reported quality does not have an 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, because not all cost types are considered in the prices negotiations, inefficient factor allocations might occur.

However, consumers in our sample do not respond to the quality information as disclosed in the report cards, which might be interpreted as bad news. We offer a couple of possible explanations for this. First, 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. Yet information diffusion was far from perfect. Figure 3 reports Google trend data (relative search volume) for the following search queries: the term *nursing home* compared with the sum of other terms that are related to the report cards. We do see a spike in December 2009 shortly before the report cards were published and when media frequently reported about them. Yet this spike is small in magnitude. In spring 2011, Geraedts et al. (2011) asked a representative sample of individuals between 18 and 79 about their experience with these report cards. 41% had heard about the report cards, and 22% had had a look at at least one. Note that their sample is not restricted to individuals that are faced with the choice of a nursing home (only 24% have a friend or family member in a nursing home), implying that knowledge of the report cards among those who actively searched for a nursing home might have been much larger.

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 seemingly 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 supporting information, 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. An alternative interpretation of this paper's results could be, that is, bad quality report cards do not work.

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. Improved report cards need to focus much more on outcome quality and life satisfaction of care recipients. However, our study is not to say that report cards are useless apart from offering a first step into more transparency. Herr, Nguyen, and Schmitz (2016) provide some evidence of quality improvements in German nursing homes after (and possibly due to) the introduction of the report cards. In the United States, Zhao (2016) finds that an increase in transparency fosters the positive effect of competition on quality.

A major limitation of the study is its data availability. We only have access to the first round of public report cards. We, therefore, cannot evaluate the effects of changes in reported quality over time that might (or not) be more relevant to some individuals who make the nursing home choice. Moreover, we do not have access to other sources of quality information such as recommendations of physicians or other experts in the field that probably also play a role. Thus, this study can only speak about short-term effects of quality as indicated on the report cards on nursing home choice.

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REFERENCES

- Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488–500.
- Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. *American Economic Review*, 53(5), 941.
- Avdic, D., Moscelli, G., Pilny, A., & Sriubaite, I. (2019). Subjective and objective quality and choice of hospital: Evidence from maternal care services in Germany. *Journal of Health Economics*, 68, 102229
- Beckert, W., Christensen, M., & Collyer, K. (2012). Choice of NHS-funded hospital services in England. *The Economic Journal*, 122(560), 400–417.
- Berry, S., Levinsohn, J., & Pakes, A. (1995). Automobile prices in market equilibrium. *Econometrica*, 63(4), 841–890. <http://ideas.repec.org/a/ectm/emetrp/v63y1995i4p841-90.html>
- Chou, S.-Y. (2002). Asymmetric information, ownership and quality of care: An empirical analysis of nursing homes. *Journal of Health Economics*, 21(2), 293–311.
- Cornell, P. Y., Grabowski, D. C., Norton, E. C., & Rahman, M. (2019). Do report cards predict future quality? The case of skilled nursing facilities. *Journal of Health Economics*, 66, 208–221. <http://www.sciencedirect.com/science/article/pii/S0167629618304107>
- Dowd, A. (2012). *Endstation altenheim: Alltag und missstände in der deutschen pflege*. München: Redline.
- Epstein, A. J. (2010). Effects of report cards on referral patterns to cardiac surgeons. *Journal of Health Economics*, 29(5), 718–731.
- Fahey, T., Montgomery, A., Barnes, J., & Protheroe J. (2003). Quality of care for elderly residents in nursing homes and elderly people living at home: Controlled observational study. *British Medical Journal*, 326(7389), 580.
- Geraedts, M., Brechtel, T., Zöll, R., & Hermeling, P. (2011). Beurteilungskriterien für die Auswahl einer Pflegeeinrichtung. In Böcken, J., Braun, B., & Repschläger, U. (Eds.), *Gesundheitsmonitor 2011. Bürgerorientierung im gesundheitswesen* (pp. 155–172). Gütersloh, Germany: Bertelsmann Stiftung und Barmer GEK.
- Gertler, P. J. (1992). Medicaid and the cost of improving access to nursing home care. *The Review of Economics and Statistics*, 74(2), 338–345.
- Goldman, D., & Romley, J. A. (2008). Hospitals as hotels: The role of patient amenities in hospital demand. (NBER Working Papers 14619): National Bureau of Economic Research Working Paper Series. Cambridge, Massachusetts.
- Gutacker, N., Siciliani, L., Moscelli, G., & Gravelle, H. (2016). Choice of hospital: Which type of quality matters? *Journal of Health Economics*, 50, 230–246. <http://www.sciencedirect.com/science/article/pii/S0167629616301370>

- He, D., & Konetzka, R. T. (2015). Public reporting and demand rationing: Evidence from the nursing home industry. *Health Economics*, 24(11), 1437–1451.
- Herr, A., Nguyen, T.-V., & Schmitz, H. (2016). Public reporting and the quality of care of German nursing homes. *Health Policy*, 120(10), 1162–1170.
- Hirth, R. A. (1999). Consumer information and competition between nonprofit and for-profit nursing homes. *Journal of Health Economics*, 18(2), 219–240.
- Hole, A. R. (2007). Fitting mixed logit models by using maximum simulated likelihood. *Stata Journal*, 7(3), 388–401.
- Howard, D. H. (2006). Quality and consumer choice in healthcare: Evidence from kidney transplantation. *Topics In Economic Analysis & Policy*, 5(1), 1349.
- Institute of Medicine (1986). *Improving the quality of care in nursing homes*. Washington and D.C: National Academy Press.
- Institute of Medicine (2001). *Improving the quality of long-term care*. Washington D.C: National Academy Press.
- Kirkevold, O., & Engedal, K. (2006). The quality of care in Norwegian nursing homes. *Scandinavian Journal of Caring Sciences*, 20(2), 177–183.
- McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In Zarembka, P. (Ed.), *Frontiers in econometrics*. New York: Academic Press, pp. 105–142.
- McFadden, D., & Train, K. (2000). Mixed MNL models for discrete response. *Journal of Applied Econometrics*, 15(5), 447–470.
- Pflege-Transparenzvereinbarung (2008). Pflege-Transparenzvereinbarung In Vereinbarung nach § 115 Abs. 1a Satz 6 SGB XI über die Kriterien der Veröffentlichung sowie die Bewertungssystematik der Qualitätsprüfungen der Medizinischen Dienste der Krankenversicherung sowie gleichwertiger Prüfergebnisse in der stationären Pflege -Pflege-Transparenzvereinbarung stationär (PTVS)- vom 17. Dezember 2008. Available at: <http://www.vdek.com/vertragspartner/Pflegeversicherung/grundlagen/transparenzvereinbarung.html>. Accessed August 06, 2013. <http://www.vdek.com/vertragspartner/Pflegeversicherung/grundlagen/transparenzvereinbarung.html>
- Pope, D. G. (2009). Reacting to rankings: Evidence from “America's best hospitals”. *Journal of Health Economics*, 28(6), 1154–1165.
- Roth, G. (2002). *Qualität in pflegeheimen: Expertise im auftrag des bundesministeriums für familie, senioren, frauen und jugend*. Dortmund: Univ., Inst. für Gerontologie, Forschungsgesellschaft für Gerontologie.
- Statistisches Bundesamt (2018). *Pflegestatistik: Pflege im rahmen der pflegeversicherung* (2018th ed.). Bonn: Statistisches Bundesamt.
- Tay, A. (2003). Assessing competition in hospital care markets: The importance of accounting for quality differentiation. *The RAND Journal of Economics*, 34(4), 786–814.
- Train, K. (2009). *Discrete choice methods with simulation* (2nd ed.). Cambridge, MA: Cambridge University Press.
- Tscharnke, K. (2009). Pflegekandal: Diakonie um schadensbegrenzung bemüht. <http://www.merk>
- Varkevisser, M., van der Geest, S. A., & Schut, F. T. (2012). Do patients choose hospitals with high quality ratings? Empirical evidence from the market for angioplasty in the Netherlands. *Journal of Health Economics*, 31(2), 371–378.
- Wang, J., Hockenberry, J., Chou, S.-Y., & Yang, M. (2011). Do bad report cards have consequences? Impacts of publicly reported provider quality information on the CABG market in Pennsylvania. *Journal of Health Economics*, 30(2), 16.
- Werner, R. M., Norton, E. C., Konetzka, R. T., & Polsky, D. (2012). Do consumers respond to publicly reported quality information? Evidence from nursing homes. *Journal of Health Economics*, 31(1), 50–61.
- Zhao, X. (2016). Competition, information, and quality: Evidence from nursing homes. *Journal of Health Economics*, 49, 136–152. <http://www.sciencedirect.com/science/article/pii/S016762961630025X>

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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