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Paying for the view? How nursing home prices affect quality of care

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Paying for the View? How Nursing Home Prices Affect Quality of Care

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**Paying for the View? How Nursing Home
Prices Affect Quality of Care**

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Dörte Heger, Annika Herr, and Anne Mensen¹

Paying for the View? How Nursing Home Prices Affect Quality of Care

Abstract

Increasing long-term care demand raises the need of high quality care in nursing homes. This study analyses whether higher prices have a causal effect on quality of care in Swiss nursing homes and assesses the extent of cross-subsidization between different price components. We use administrative data collected by the Swiss Federal Office for Statistics from 2012 to 2016 on all nursing homes in the twelve Swiss cantons with canton-wide fixed reimbursement rates for nursing care. We apply multivariate linear regressions and two-stage least square estimation techniques to estimate the effect of nursing care prices and prices for accommodation and services on care quality, measured by registered staffing levels. Our estimates show a positive impact of all price components on care quality. Although nursing homes are prohibited to use revenues from accommodation and services to cover nursing care, a 10% increase in that price component increases certified staffing levels by 0.7 to 1.7 nurses or four to ten percent (full-time-equivalent) for an average sized nursing home (50 beds). Thus, limiting care prices implicitly sets a limit for care quality and induces care providers to pass on costs to the residents.

JEL Classification: I11, I18, J18

Keywords: Long-term care; nursing home; prices; care quality; staffing levels

December 2018

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Introduction

Demographic change and population aging will lead to a steep increase in the demand for long-term care (LTC) over the next decades. In light of this development, LTC systems worldwide face the challenge of how to provide and finance sufficiently high care quality. One key dimension of high care quality is the number of registered nurses per resident.¹ Insufficiently low nurse-to-resident staffing ratios are largely debated in health policy and research (see e.g. Harrington et al.²). The aim of our paper is to investigate to what extent quality of care can be improved by higher prices. Financing of LTC and quality of care may both be interrelated since higher financial resources enable nursing homes to pay for quality enhancing measures. While most developed countries introduced LTC systems that provide at least partial coverage for LTC expenditures, the U.S. stands out in that most care is financed privately. Insurance programs such as Medicare or Medicaid only finance short-term nursing home stays or step in when people in need do not have sufficient means. However, even with LTC systems in place, the high cost for nursing home care poses a considerable challenge for the sustainability of these systems as well as for high quality care provision.

To study the relationship between LTC financing and quality of care, this paper focuses on Switzerland, which is amongst the OECD countries with the highest supply of as well as demand for nursing home care. In 2016, 153,301 patients were cared for in 1,552 nursing homes, which is equivalent to 10.1 percent of the Swiss population aged 65 years or older^{3,4}. Spending on LTC amounted to 2.4 percent of gross domestic product⁵. For comparison, U.S. spending on LTC only amounted to 0.9 percent of GDP and only 2.4 percent of the population aged 65 years or older reside in nursing homes. Germany lies in between these two extremes: Inhabitants spend 1.8 percent of GDP on LTC and 4.1 percent of the population aged 65 years or older receive nursing home care⁵.

In our empirical analysis, we exploit the unique feature of the Swiss LTC system that financing of nursing care and financing of accommodation and services in nursing homes are strictly separated. In contrast, German nursing homes are also required to set separate prices for nursing care and for accommodation

and services, but this separation is only enforced ex ante. Thus, unlike in Switzerland, German nursing homes may use revenues from either source to finance their expenditures. Contrary, U.S. nursing homes only charge a single price to cover all nursing home costs. The unique strict separation of price components in Switzerland and the canton-specific fixed price for nursing care allow us to measure the causal impact of prices on quality of care. As subsidization across price components is a potential endogeneity concern when explaining quality, we draw from Forder and Allan⁶ as well as Herr and Hottenrott⁷ and apply a two-stage least squares approach and construct an instrument for the price for accommodation and services. Specifically, our paper addresses two questions: First, do higher prices increase quality of care? Second, is quality solely driven by the canton-specific price for nursing care or do nursing homes use prices for accommodation and services to subsidize higher quality of care? The first research question is more general and relevant for any LTC system in place. On the one hand, higher prices may facilitate higher quality as it is possible to employ more registered nurses. On the other hand, nursing homes can be classified as experience goods and higher prices may be used to signal high quality to potential residents irrespective of its actual level.⁸ The second question focusses specifically on the Swiss context. Nevertheless, it addresses the international debate about how to finance high quality long-term care in the most effective way.

Outcome quality is difficult to measure in the LTC context due to a lack of objective and comparable data⁹. However, several studies have shown that staffing of registered nurses is a key mechanism to improve quality of care, see e.g. Hackmann¹, Schnelle et al.¹⁰ or Lin¹¹. In our paper, we follow Lin¹¹ and measure care quality by the case-mix adjusted number of registered nurses per 1,000 care days to account for differences in care needs.

To safeguard high quality will become increasingly difficult due to the lack of personnel in health care, especially in long-term care, observed in many countries.¹² Until 2030, the number of full-time equivalent nurses is predicted to increase by 44% in Swiss in nursing homes.¹³ For this reason, the Swiss Federal Council has started initiatives to attract registered nurses into long-term care and to create a more friendly

working atmosphere.¹⁴ Staffing requirements in Switzerland vary across cantons, but minimum staffing levels exist for all nursing homes. Most cantons define not only quantitative, but also qualitative minimum staffing levels that require a specific share of qualified personnel. In some cantons, e.g. in Bern, requirements are more flexible and staffing levels can fall below predefined thresholds in the short-run. Overall, certified staffing levels vary considerably across Swiss cantons.¹⁵

To answer our research questions, it is important to understand the Swiss reimbursement system. In short, the total reimbursement consists of three price components. First, the price for nursing care depends on the resident's intensity of care and is shared between the resident, the canton or municipality, and the obligatory health insurance, which also covers long-term care. The price for nursing care basically only depends on the person's care needs and varies across but not within cantons in our final sample. It can be defined as being exogenous for the single nursing home. Second, residents fully cover the price for accommodation and services, which is set freely by the nursing homes and varies significantly also within cantons. Third, subsidies only represent a small part of total nursing home prices and are paid by the municipalities, the cantons or foundations.

Fixed prices for nursing home care lead to the question how nursing homes cover higher cost if they provide higher quality, by, e.g., employing a higher number of registered nurses per resident. From a competition theory point of view, a fixed price combined with unobservable differences in quality may lead to convergence in quality across nursing homes. If asymmetric information is relevant, this convergence may result in overall lower quality, even lower than the residents would be willing to pay for. This problem, called adverse selection, has been identified in the market for used cars by Akerlof.¹⁶ To prevent this, Swiss nursing homes may use higher prices for accommodation and services either as a signal or as an actual subsidy for higher quality. This cross-subsidization is officially forbidden, but nevertheless stated frequently.^{17,18}

The existing literature points to a rather positive relationship between the reimbursement of care costs and care quality. Looking at Medicaid reimbursement rates in the US, Cohen and Spector¹⁹ as well as

Grabowski²⁰ find a positive impact of reimbursement ratios on staffing levels. A recent study by Hackmann¹ shows that a 10% increase in the Medicaid reimbursement rate leads to a 8.8% increase in registered staffing ratios. For the German context, Reichert and Stroka²¹ find some medical quality indicators to be positively correlated with prices while others do not show any significant effect. Likewise, Forder and Allan⁶ find that competition reduces prices, which in turn pushes down quality in English nursing homes. Herr and Hottenrott⁷ provide causal evidence on the direct link between prices and quality of German nursing homes. The relationship between for-profit and non-profit status and care quality has been examined in several studies. Conducting a meta-study, Comondore et al.²² find that, on average, non-profit nursing homes provide higher quality than for-profit nursing homes. Grabowski and Hirth²³ and Santerre and Vernon²⁴ conclude that a higher share of non-profit nursing homes would improve quality in the US. Furthermore, Grabowski et al.²⁵ identify a causal effect of non-profit ownership on higher quality using instrumental variable estimation.

Our study contributes to this literature in two important ways. First, it explores the unique Swiss reimbursement system that allows us to causally measure the impact of nursing care prices and thus addresses endogeneity concerns in previous studies. Second, it uses registered nurse staffing ratios to measure care quality which allows comparability between findings from different countries.

Our results show that a 10% increase in nursing care prices, increases the number of registered nurses per resident by 3.4% to 4.1%. Furthermore, a 10% increase in the price for accommodation and services increases quality by up to 11%, when accounting for endogeneity, which is in line with the cross-subsidization theory. Hence, higher prices for accommodation and services may serve as a signal for higher quality within a canton since care prices do not vary within a canton.

The rest of the paper is organized as follows. In section 2, we give a more detailed overview of the institutional background before we turn to the data and estimation strategy in sections 3 and 4. In section 5, we present our main results. Finally, the implications of our main findings are discussed in section 6.

Institutional Background

Switzerland is divided into 26 cantons that have large-scale autonomy. In 1996, long-term care insurance was introduced as part of the obligatory health insurance in Switzerland to protect its citizens from growing financial risks in old age.

In 2008, the Swiss parliament passed a law to implement a new financing system that regulates payments of the obligatory health insurance and caps private contributions for nursing care. Moreover, as of January 2011, private contributions for nursing care are limited and fixed across cantons. The amount paid by the obligatory health insurance is set at the national level and has not yet been adjusted. Cantons were given a time limit of three years to implement the uniform level. Most cantons had adapted the uniform levels by 2012, though. The canton is responsible for any remaining nursing care costs, where the cantonal government may delegate the financing responsibility to the municipal level. The patient's need for care, which is measured in twelve care levels, defines the payments. Three different systems that assess the patient's need for care coexist in Switzerland. While the different systems may lead to different average care levels across cantons, within canton comparisons remain unaffected. The first care level corresponds to a time demand of up to 20 minutes per day. The time demand increases with each care level in 20 minute intervals up to a time demand of more than 220 minutes for care level 12. The price paid by the health insurance equals 9.00 CHF per day and level of care and is capped at 108.00 CHF per day for the 12th care level. The patient contributes up to a limit of 20% of the maximal reimbursement by the insurance, i.e. the patient's contribution is capped at 21.60 CHF per day and is fixed across cantons.

Most cantons have limited the nursing care prices by setting an upper bound to their paid contribution or by defining so called "norm costs", which define the total reimbursement per level of care. The canton or municipality covers the difference between this predefined threshold of total reimbursement per level of care and the amount paid by the resident plus the health insurance. Table 1 gives an example of how the price for nursing care is shared between the resident, the health insurance and the canton. Other cantons have community-based or provider-specific regulations that vary across nursing homes within one canton.

These cantons are dropped from the analysis. The other two price components are not regulated at a regional level but negotiated with regional communities at the nursing home level. Residents need to cover the price for accommodation and services privately, which on average amounts to nearly 150% of the price for nursing care.

[Table 1 about here]

This price setting leaves little to no room for competition based on quality of care, measured in certified staffing levels, as the additional quality is not reimbursed. Although subsidizing nursing care through higher prices for accommodation and services is illegal, cross-subsidization, paid by the residents, is expected to be common practice.^{17,18} For further details on the Swiss long-term care system we refer to Bonoli et al.²⁶

Data

Our analysis is based on administrative data from the Federal Office of Public Health (FOPH) covering all Swiss nursing homes for the years 2012 to 2016. We limit our sample to the 14 Swiss cantons that have limited their nursing care prices by defining fixed norm costs (12 cantons) or by setting an upper bound (2 cantons).^{15,18} Thus, the care prices are predetermined for all nursing homes per level of care intensity in our sample. Furthermore, we exclude the smallest cantons that have less than 10 nursing homes, resulting in a total sample of 4,700 nursing home-year observations from the following 12 cantons: Aargau, Appenzell Ausserrhoden, Bern, Basel-Landschaft, Basel-Stadt, Grisons, Jura, St. Gallen, Solothurn, Thurgau, Vaud and Valais.

The number of beds includes long-term, short-term, and acute care beds. Since our focus lies on long-term care, we exclude 31 observations without any beds for long-term care. To reduce the potential influence of outliers, we restrict the sample to observations where our main variables (number of registered nurses,

price components, number of beds) lie within the 1st and the 99th percentile, which leads to the exclusion of 271 further observations. In addition, due to the construction of our instrument, we only include nursing homes with comparable competitors within a specified region. This leads to our final sample of 3,377 pooled observations from 779 nursing homes over five years.

Descriptive Statistics

Table 2 shows the average values and standard deviations of our main variables for the whole sample as well as by canton.

[Table 2 about here]

On average, Swiss nursing homes employ slightly less than one registered nurse per 1,000 care days or 0.35 registered nurses per patient (full-time equivalent (FTE)). We adjust both, the number of registered nurses as well as the price for nursing care by the case-mix since nursing homes that have a higher share of care intensive residents require more qualified staff and get higher reimbursement rates. We adjust both variables by multiplying them with the average intensity of care within each canton divided by the intensity of care of the respective nursing home. While unweighted differences in absolute staffing levels of registered nurses may just reflect differences in the population of nursing home residents, these case-mix weighted differences are likely to represent differences in the quality of care. The average case-mix weighted number of registered nurses per 1,000 care days of nursing homes in e.g. Bern varies from 0.5 to 2.4, which implies large quality differences between nursing homes.

We are able to differentiate between three types of prices: i) the price for nursing care, ii) the price for accommodation and services, and iii) subsidies. All prices are measured per care day. The price for accommodation and services accounts for the largest part of the total reimbursement in all cantons and varies between 118.46 and 205.79 CHF. The average cantonal price for nursing care varies between 81.07 and 125.68 CHF per care day. In addition, Figure 1 shows the variation in prices and quality on the nursing-home level. More precisely, it displays the cantonal averages of the yearly variation in quality of care and the price components within nursing-homes where the size of the circles reflects the underlying number

of nursing homes in the canton. The average yearly increase in prices for nursing care and for accommodation and services are 2.3% and 2.6%, respectively. The increase in quality of care is on average larger (4.3%). The figure suggests that there is a positive relationship between increases in prices and increases in quality. Furthermore, subsidies (0.82 to 13.46 CHF) involve all kind of financial support from the public sector or private organizations. The average nursing home has around 50 beds and 30% of all nursing homes are in private ownership.

[Figure 1 about here]

Estimation Strategy

The empirical strategy exploits the geographical and time variation of nursing care prices in Switzerland. As a first step, we use ordinary least square (OLS) estimation to regress quality of care in nursing home i in year t , defined by the case-mix weighted number of registered nurses per 1,000 care days, on the different price components and our remaining nursing home specific control variables X_{it} :

$$Quality\ of\ care_{it} = \beta_0 + \beta_1 \ln(P_{it}^{NC}) + \beta_2 \ln(P_{it}^{AS}) + \beta_3 \ln(P_{it}^S) + \beta_2 X_{it} + \gamma_t + \delta_c + u_{it} \quad (1)$$

Here, P_{it}^{NC} denotes the daily case-mix adjusted price for nursing care, P_{it}^{AS} refers to the daily price for accommodation and services and P_{it}^S denotes subsidies, which are also measured daily. Moreover, γ_t captures year fixed effects, δ_c refers to canton fixed effects, and u_{it} denotes the error term.

For the first component, the price for nursing care, exogeneity follows by definition as we limit our sample to cantons that assign fixed prices per care level. Subsidies are usually paid to help nursing homes with large investments, e.g. in new buildings, or to reduce an overall deficit. Hence, with respect to our research question, subsidies can be treated as exogenous as well. Finally, it is not permitted to use the third price

component, the price for accommodation and services, to finance care costs; i.e. quality and the price for accommodation and services are also ought to be exogenous. However, endogeneity concerns may exist if nursing homes that wish to provide higher quality of care by employing more registered nurses are more inclined to use the price for accommodation and services to subsidize nursing care. This is only possible for nursing homes that are able to charge prices for accommodation and services that are slightly above their actual costs. Nursing homes in attractive regions face higher rents. At the same time, they have a slightly higher chance to attract nursing staff. Other nursing homes in neighboring regions are also able to charge higher prices for accommodation and services although their actual costs are lower. Thus, these nursing homes are able to use their additional reimbursement to employ more nurses. The attractiveness is positively correlated with nursing staff and with the price for accommodation and services. Therefore, the coefficient of the OLS estimation is downward biased.

For this reason, we employ a two-stage least squares estimation in a second step. The IV estimation assumes $cov(\overline{p_{it}^{AS}}, v_{it}) = 0$, which means that the instrumented price must not be correlated with the error term in the second stage and must not have a direct effect on nurse staffing. To instrument the price for accommodation and services, we use the average price for accommodation and services of surrounding nursing homes that lie within the same canton, but outside a 15 minutes driving radius (henceforth called exclusion radius). Since the nursing home market is a very local market and most nursing home residents choose a nursing home close to their original home, nursing homes beyond the 15 minutes radius are unlikely to impact the price setting of the respective nursing home.²⁷ In addition, we differentiate between rural and urban areas as the price setting is likely to be different. Thus, the price for accommodation and services of nursing homes in large cities (> 100,000 inhabitants) is instrumented with surrounding nursing homes that also lie within an urban area. There are only five big cities in our sample, where this differentiation actually takes place. The exclusion radius is reduced to 5 minutes within cities as the nursing home market is even more local, as nearly all of them are reached in around 15 minutes within one city.

In addition to the geographical inclusion criteria, we only use “similar” nursing homes to construct our instrument. We define similar nursing homes as nursing homes that are of similar size, i.e. the number of beds does not vary by more than 10 beds. Furthermore, we only use surrounding nursing homes of the same ownership type (private vs. non-private). We test the sensitivity of our assumptions about the driving radius as well as about the “similarity” of nursing homes in different robustness checks.

Accordingly, our first stage estimation is given by

$$\ln(p_{it}^{AS}) = \alpha_0 + \alpha_1 \ln(\overline{p_{it}^{AS}}) + \alpha_3 \ln(p_{it}^{NC}) + \alpha_4 \ln(p_{it}^S) + \alpha_5 X_{it} + \gamma_t + \delta_c + v_{it} \quad (2)$$

where $\overline{p_{it}^{AS}}$ denotes the average price for accommodation and services of the surrounding homes that are assigned to nursing home i . Further, all variables from the second stage estimation are included and v_{it} denotes the error term. In addition, the instrument is only relevant if $cov(\overline{p_{it}^{AS}}, price_{it}) \neq 0$, which means that α_1 must be significantly different from zero. This holds true in our case, which we show below.

Results

Regression results

The estimation results of our main model are given in Table 3. The first column shows the OLS results for our variable of interest, the number of registered nurses per 1,000 care days. In that model, a 1% increase in nursing care prices, which represents an increase of approximately 1 CHF per day or 30 CHF per months, is associated with 0.004 additional registered nurses per 1,000 care days. While the effect seems small, it becomes more tangible with the following example: a 10% (or 11 CHF) increase in nursing care price for an average sized nursing home with 50 beds would imply 0.7 (or 4%) additional registered nurses ($0,416 * \ln(1.1) (365 \text{ days} * 50 \text{ beds}/1,000 \text{ days})$). Given that average prices for nursing care

vary between 80 CHF and 125 CHF per day across the included cantons, considering a price variation of 10% seems plausible.

[Table 3 about here]

As argued above, the number of registered nurses should be independent of the price for accommodation and services since it is not permitted to use it for the financing of nursing care costs. However, the price for accommodation and services has a statistically significant impact on the number of registered nurses that amounts to nearly 90% of the effect of care prices. Contrary, subsidies have a very small effect on the number of registered nurses, but it is still statistically significant. Further, the OLS results show that private nursing homes employ fewer registered nurses than non-private homes and bigger nursing homes employ fewer registered nurses per 1,000 care days, which can be explained by economies of scale in care arrangements.

Since the OLS estimates are likely to be biased when nursing homes cross-subsidize between cost components, we now show our IV results in columns two to four for different exclusion radii used to construct the instrument. Our main model (15 minute radius) shows an effect of 0.343. Across all estimated models, the effects vary slightly between 0.339 and 0.351 and are always significantly different from zero. Revisiting the example of a 10% increase in nursing care prices and a nursing home with 50 beds, this corresponds to 0.6 additional nurses $(0,343 * \ln(1.1) (365 \text{ days} * 50 \text{ beds} / 1,000 \text{ days}))$. The average sized nursing home in our sample employs 17.5 registered nurses (FTE) $((0,96 * 365 \text{ days} * 50 \text{ beds} / 1,000 \text{ days}))$. Thus, a 10% increase in care prices increases the number of registered nurses per resident by 3.4%, which lies below the linear effect.

In a next step, we consider the effect of the price for accommodation and services on care quality. Our main model shows a statistically and economically significant effect of 1.124. The effect increases slightly from 1.041 to 1.159 across the estimated models, though the coefficients are not significantly different

from each other. Revisiting the example of a 10% price increase, the main effect corresponds to 1.96 additional nurses $(1.124 * \ln(1.1) (365 \text{ days} * 50 \text{ beds} / 1,000 \text{ days}))$ in an averaged sized nursing home. Hence, a 10% increase in the price for accommodation and services, increases the number of registered nurses per resident by 11%. If the price of accommodation and services increases by a comparable absolute amount to the 10% increase in the nursing care prices (10.65 CHF), the number of registered nurses per resident would increase by 7.5%. This effect is smaller but still twice as large as the effect of an increase in nursing care prices. On average, the price for accommodation and services within a nursing home increases by 2.6% (4.07 CHF) per year, which would increase the number of registered nurses in an averaged sized nursing home by 0.52 (or 3%).

First stage estimation

The last part of Table 3 shows the results of the first stage. Our main specification excludes all surrounding nursing homes within a 15 minutes driving radius when constructing the instrument, but we do also show the results for exclusion radii of 5 and 25 minutes. Across all models, the effect of the average price for accommodation and services of surrounding nursing homes on the price for accommodation and services of the respective nursing home varies between 0.218 and 0.283 and is always significantly different from zero. The corresponding F-statistic is larger than 20 across all estimated models, which shows the relevance of our instrument.

Robustness

We test the sensitivity of our results in Table 4. In several robustness checks, we vary the assumptions made for the choice of surrounding nursing homes that are used to construct the instrument for the price for accommodation and services. In columns one and two, we vary the level of similarity in terms of the number of beds. In column three, we do not control for ownership type when constructing the instrument. Lastly, we exclude the two cantons with maximum cost to ensure that the results are not driven by these

cantons. Although the coefficients vary slightly in magnitude, they remain positive and statistically significant across all these models.

We conclude that both price components lead to higher registered staffing levels. Moreover, higher prices for accommodation and services within a canton may indeed be used for higher quality of care, since prices for nursing care do not vary within the same canton.

[Table 4 about here]

Discussion

The financing and the provision of sufficient, high quality long-term care poses a major challenge in ageing societies. This is also the case for rich countries like Switzerland, whose health care systems provide high quality.²⁸ In this paper, we focus on the quality of care in nursing homes and how it is influenced by pricing. We study i) the influence of nursing care prices on quality of care and ii) whether prices for accommodation and services are used to subsidize higher quality of care using rich administrative data on 779 Swiss nursing homes for the years 2012 to 2016.

Our results show that a higher price for nursing care leads to better quality of care. While this result may seem intuitive, it comes with an unintended side effect: Since the majority of Swiss cantons limit their reimbursement for long-term care, our finding implies that these cantons also limit the quality of care. Nursing homes that wish to provide higher quality are unable to do so since the case-mix weighted price for care is capped at a cantonal level. Policy makers need to consider this when setting reimbursement levels and should not focus on cost containment only. This is especially important since quality of care is valued extremely highly by nursing home residents.²⁹ Hackmann¹ emphasizes that current nurse staffing ratios in the US are inefficiently low since the residents' marginal benefits would exceed the costs for an additional nurse.

Moreover, we find significant differences in the quality of care based on the ownership type of the nursing home. In line with the literature (e.g. Comondore et al.²²), we find lower quality levels in for-profit nursing homes.

Lastly, we find a strong positive association between quality of care and prices for accommodation and services, although it is illegal for Swiss nursing homes to cross-subsidize nursing care with higher prices for accommodation and service. Hence, it is likely that nursing homes use higher prices for accommodation and services to signal higher quality of care. While a positive effect of care prices on quality might not be surprising, the positive relationship between the price for accommodation and services and quality raises equity concerns. According to the Swiss constitution, the Swiss confederation and the cantons are required to ensure that every person receives the necessary long-term care (Art. 41³⁰). However, the differing quality levels across cantons raise doubts whether this requirement is met. Reimbursement levels may vary across cantons due to differences in wages. Yet, any differences in reimbursements beyond such cost differences will lead to differences in the quality of care. While richer cantons may choose to provide more than the minimum quality required, clear minimum quality standards are necessary to ensure that adequate care is provided and that costs are not transferred to the nursing home residents through higher prices for accommodation and services.

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Tables and Figures

Table 1

Example composition of the daily nursing care price

Level of care	Norm costs	Health insurance	Resident	Canton/municipality
1	14.80	9.00	5.80	0.00
2	38.10	18.00	20.10	0.00
3	48.60	27.00	21.60	0.00
4	70.30	36.00	21.60	12.70
5	97.90	45.00	21.60	31.30
6	115.60	54.00	21.60	40.00
7	137.00	63.00	21.60	52.40
8	150.00	72.00	21.60	56.40
9	175.70	81.00	21.60	73.10
10	183.10	90.00	21.60	71.50
11	206.40	99.00	21.60	85.80
12	277.40	108.00	21.60	147.80

Note: Prices are given in Swiss franc per care day. The norm costs vary by canton and year. The part paid by the health insurance is fixed for all cantons and the amount paid by the resident is capped at 21.60. The norm costs shown here serve as an example (canton Thurgau in 2013). To generate an overall price, the cost for accommodation and services needs to be added. The residents cover the latter components privately.

Table 2

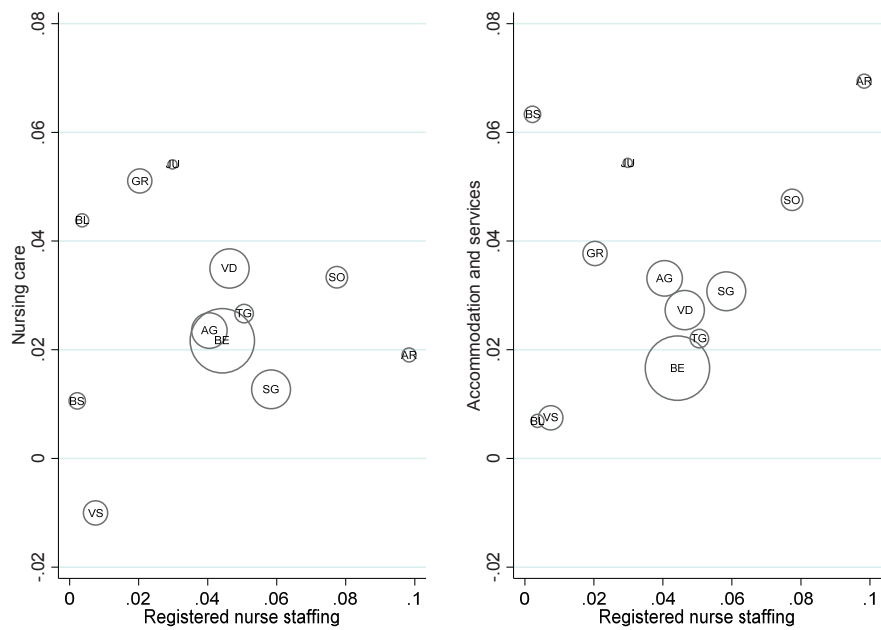
Descriptive statistics by canton (Mean values, SD given in parentheses)

	All	AG	AR	BE	BL	BS	GR	JU	SG	SO	TG	VD	VS
Registered nurses per 1000 care days	0.96 (0.3)	1.03 (0.3)	0.66 (0.2)	1.08 (0.3)	1.13 (0.2)	1.20 (0.3)	1.00 (0.3)	1.49 (0.3)	0.73 (0.2)	1.10 (0.3)	0.94 (0.2)	0.73 (0.3)	0.90 (0.2)
Daily prices													
Nursing care	106.54 (18.0)	94.37 (10.4)	81.07 (10.7)	111.78 (17.3)	96.40 (8.4)	107.68 (12.6)	104.69 (10.7)	111.65 (10.5)	88.58 (7.6)	103.79 (16.7)	95.12 (9.5)	120.62 (14.3)	125.68 (4.2)
Accommodation	157.07 (31.1)	161.63 (28.5)	118.46 (33.4)	163.51 (28.8)	205.79 (23.7)	182.30 (23.6)	145.52 (28.9)	153.65 (13.6)	142.59 (24.8)	166.76 (31.2)	145.31 (24.8)	160.27 (33.4)	129.75 (13.7)
Subsidies	4.62 (12.0)	1.97 (6.7)	11.01 (18.2)	3.35 (11.8)	0.82 (3.0)	8.25 (18.3)	8.25 (18.3)	13.46 (12.8)	4.29 (10.4)	6.02 (18.0)	3.39 (7.5)	7.16 (11.9)	5.69 (4.6)
Number of beds	50.02 (30.4)	52.74 (30.3)	28.64 (7.7)	44.19 (29.5)	98.10 (50.5)	80.82 (27.0)	47.70 (21.9)	44.23 (12.2)	54.29 (27.9)	59.61 (21.3)	39.74 (24.4)	48.16 (30.3)	61.16 (31.2)
Share of private nursing homes	0.32 (0.5)	0.30 (0.5)	0.39 (0.5)	0.43 (0.5)	0.00 (0.0)	0.00 (0.0)	0.05 (0.2)	0.00 (0.0)	0.15 (0.4)	0.20 (0.4)	0.68 (0.5)	0.42 (0.5)	0.06 (0.2)
Number of nursing homes per year	676.10	76.96	12.39	252.84	10.08	16.06	36.48	5.23	91.29	27.73	21.37	92.63	35.42
Observations	3377	383	59	1263	50	79	180	26	456	137	104	463	177

Note: Registered nurses and prices for nursing care are weighted by case-mix. Means and SD are generated from the pooled cross-section. Cantons: AG=Aargau, AR: Appenzell Ausserrhoden, BE: Bern, BL: Basel-Landschaft, BS: Basel-Stadt, GR: Grisons, JU: Jura, SG: St. Gallen, SO: Solothurn, TG: Thurgau, VD: Vaud, VS: Valais.

Source: FOPH, own calculations.

Figure 1
Cantonal averages of the yearly variation in price components and registered staffing levels



Note: Figure 1 shows the cantonal averages of the yearly variation (%) in the price for nursing care (left) and in the price for accommodation and services (right) and the variation in registered nurse staffing within nursing homes by canton. Registered nurses and prices for nursing care are weighted by case-mix. Cantons: AG=Aargau, AR: Appenzell Ausserrhoden, BE: Bern, BL: Basel-Landschaft, BS: Basel-Stadt, GR: Grisons, JU: Jura, SG: St. Gallen, SO: Solothurn, TG: Thurgau, VD: Vaud, VS: Valais. Source: FOPH, own calculations.

Table 3

Regression results for the number of registered nurses per 1,000 care days

	OLS	IV with different exclusion radius		
		5 minutes	15 minutes	25 minutes
Log daily price				
Nursing care	0.416*** (0.073)	0.351*** (0.078)	0.343*** (0.079)	0.339*** (0.080)
Accommodation	0.369*** (0.051)	1.041*** (0.320)	1.124*** (0.321)	1.159*** (0.334)
Subsidies	0.029*** (0.006)	0.047*** (0.010)	0.049*** (0.011)	0.050*** (0.011)
Private	-0.109*** (0.023)	-0.146*** (0.031)	-0.151*** (0.031)	-0.153*** (0.033)
Number of beds	-0.094*** (0.017)	-0.099*** (0.019)	-0.100*** (0.019)	-0.100*** (0.019)
2013	0.020** (0.009)	0.003 (0.013)	0.001 (0.013)	-0.000 (0.013)
2014	0.042*** (0.011)	0.017 (0.017)	0.014 (0.017)	0.013 (0.018)
2015	0.046*** (0.012)	0.018 (0.018)	0.015 (0.018)	0.013 (0.019)
2016	0.043*** (0.013)	0.014 (0.019)	0.010 (0.019)	0.008 (0.020)
Observations	3377	3377	3377	3377
<u>First stage estimates:</u>				
Accommodation in		0.283***	0.275***	0.218***
surr. nursing homes		(0.055)	(0.051)	(0.046)
F-statistic exclusion restr.		26.22	28.72	22.82

Note: Canton fixed effects are included in all specifications. Reference groups: Non-private nursing homes, 2012. The price for accommodation and services is instrumented using nursing homes within the same canton that are most similar in terms of beds (+/- 10 beds). Registered nurses and prices for nursing care are weighted by case-mix.. Standard errors are clustered at the nursing home level. Source: BAG, own calculation.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4**Robustness checks**

	Similarity of surrounding nursing homes			Cantons with maximum costs excluded
	+/- 5 beds	+/- 15 beds	No conditioning on ownership	
Log daily price				
Nursing care	0.319*** (0.087)	0.373*** (0.077)	0.312*** (0.092)	0.390*** (0.083)
Accommodation	1.369*** (0.387)	0.811** (0.348)	1.434*** (0.506)	1.255*** (0.428)
Subsidies	0.055*** (0.013)	0.041*** (0.010)	0.057*** (0.015)	0.054*** (0.012)
Private	-0.164*** (0.036)	-0.133*** (0.032)	-0.168*** (0.038)	-0.157*** (0.034)
Number of beds	-0.101*** (0.020)	-0.097*** (0.018)	-0.102*** (0.021)	-0.110*** (0.020)
2013	-0.006 (0.015)	0.009 (0.013)	-0.008 (0.017)	-0.007 (0.017)
2014	0.005 (0.020)	0.026 (0.017)	0.003 (0.023)	0.013 (0.021)
2015	0.004 (0.021)	0.028 (0.019)	0.002 (0.025)	0.011 (0.021)
2016	-0.001 (0.022)	0.024 (0.020)	-0.004 (0.027)	0.004 (0.023)
Observations	3377	3377	3377	2862
F-statistic	21.24	23.59	15.22	19.98

Note: Canton fixed effects are included in all specifications. Reference groups: Non-private nursing homes, 2012. In the first and second column the price for accommodation and services is instrumented using nursing homes within the same canton that are most similar in terms of beds (+/- 5 beds and +/- 15 beds, respectively). In the third and fourth column we use the standard approach with +/- 10 beds, but (i) do not control for ownership type when constructing the instrument and (ii) do exclude the cantons with maximum instead of norm costs in the fourth column. Registered nurses and prices for nursing care are weighted by case-mix.. Standard errors are clustered on the nursing home level. Source: BAG, own calculation.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$