IN-HOUSE PROVISION, PROCUREMENT AND QUALITY: EVIDENCE FROM ELDERLY CARE SERVICES

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Abstract:

Many quality dimensions of complex public services are hard to contract upon, and may be reduced when the service is procured from an outside provider rather than produced in house. We put together a large data set on elderly care services in Sweden for the 1993-2008 period, including several measures of hard-to-contract-upon quality (including changes in mortality rates and injuries) as well as measures of subjectively perceived quality (customer satisfaction indicators). We then estimate the effects of municipalities' decision to procure rather than produce elderly care in-house on quality of provision, using a difference-in-difference approach and controlling for a number of other potential quality determinants. The results suggest that procurement increases the quality of provided services (reduces mortality and injures) and does not reduce subjectively perceived quality relative to in-house production.

Keywords: public procurement, non-verifiable quality, elderly care, mortality, outsourcing, nursing home

1. Introduction

Procurement is used extensively, by the public sector as well as by private firms, and accounts for a large part of the world economy. Government procurement alone is estimated to account for about 15% of the world GDP (Bajari, 2009). In Sweden, the country on which this study focuses, the public sector (including publicly held corporations that must adhere to the Procurement Act)is estimated , to procure each year for about SEK 500 billion (or approximately 50 billion euros), corresponding to 16-18 percent of GDP (Bergman, 2008).

The underlying economic rationale for procurement from outside providers is to leave production to specialized firms which, due to

economies of scale, superior technology, lower factor costs, stronger incentives or other advantages, can produce at lower cost. For highly specialized products, where markets are thin and contracts are costly to write, it may instead be more efficient to rely on in-house production. This is particularly true for products where the would-be buyer has its core competence and, therefore, is reasonably efficient.

Quality dimensions that can easily be verified by a court are, in principle, easy to govern through explicit contractual remedies. However, there are many quality dimensions that are difficult or impossible to contract upon, because their levels cannot be measured in a way that could be verified by courts. Some quality dimensions are simply impossible to verify for a third party (often used examples are the quality of TV programs or of consultancy services). In other cases quality may in principle be measured and verified by courts, but only at high costs or with long delays (for example the 'reliability' of goods with a long life-cycle).

In private transactions, quality may still be upheld in dimensions where observation is difficult and verification is impossible. Reputational concerns linked to brands provide an implicit guarantee that unobservable quality is high; for this guarantee the manufacturer can charge a premium price (Klein and Lefler, 1981). Although short-run gains would accrue if the seller deviated from the implicit guarantee, this would reduce or eliminate the value of the brand name. The seller and the buyer can also develop a long-term relation that provides a similar (or additional) implicit quality guarantee. If the seller skimps on quality, the buyer will eventually notice and can then punish the seller by terminating the relation (Macaulay, 1963).

Public procurement rules, however, significantly limit the latitude of the buyer to rely on such implicit mechanisms in the attempt to ensure accountability (Kelman, 1990; Banfield, 1975). In many countries a public procurer is in principle not allowed to discriminate in favour of strong brand names, nor of providers that performed well in the past on non-verifiable performance dimensions. Similarly, while a public procurement contract can give the buyer an option to extend the duration of the supply contract, the exact length of the extension must typically be specified in the original contract, while under many public procurement legislations the criteria driving the decision to award the extension must be 'objective', that is, verifiable. It follows that non-contractible quality degradation is a serious concern for publicly procured products and services where quality is important in dimensions where contractability is limited.

This study sets out to address the effect of public procurement on actually provided quality for a service where we believe important

quality dimensions are difficult both to observe and to contract upon: elderly care.

We build a large a large data set on elderly care services in Sweden covering the period 1993-2008. The data set includes several measures of contractible input quality (staff number and education, number of beds per rooms, etc.) as well as measures of hard-to-contract-upon quality of output, including in particular (changes in) mortality rates and fall injuries. We also consider measures of subjectively perceived quality as measured by customer satisfaction indicators from surveys on final users.

We then estimate the effects of municipalities' decision to procure – rather than produce in house – elderly care services on effectively provided quality levels, using a difference-in-difference approach and controlling for a number of other potential quality determinants.

Our results suggest that procurement from outside providers ceteris paribus increases the quality of the provided services, reducing mortality and (to a somewhat lesser extent) injuries relative to in-house production; and that it does not reduce subjectively perceived quality.

The reminder of the paper unfolds as follows. Section 2 discusses the theoretical background leading to hypotheses; Section 3 describes the characteristics of the elderly-care industry in Sweden, Section 4 describes most closely related previous studies; in Section 5 our database is explained and some descriptive statistics are reported. Section 6 describes our empirical approach; Section 7 presents our results while Section 8 briefly concludes.

2. Theoretical background

If the desired level of quality is known in advance, the procuring entity can specify a minimum quality level and allow firms to compete in price. If the buyer does not know the cost of achieving different levels of quality, but it knows its preferences over price and quality aspects, it can design scoring rules that allow the firms to compete in both quality and price (Che, 1993). This will work as long as quality is easy to verify, but will be more difficult when quality is non-verifiable or even unobservable. Hard-to-verify quality aspects, crucial in services like schooling, health care or research, are at risk of being underprovided. More intense competition can make the problem even larger (Manelli and Vincent, 1995).

If quality is non-verifiable but observable in advance, i.e., in a search-good adverse-selection setting, the procurement design could

give the procurer sufficient discretion to chose high-quality providers. The disadvantage is of course that the procurer will then be less accountable. The outcome will not be completely predictable and it will be impossible to verify ex-post that the contract was awarded to the supplier with the best bid.

If quality is non-verifiable and observable only ex post, the situation is even more difficult. This is an *experience-good* moral-hazard setting, where the buyer must provide incentives for the seller to provide quality. Bonuses (monetary or in terms of contract renewal) or penalties that depend directly on ex-post observed quality cannot help unless the buyer can a) discretionally decide bonuses and penalties and b) make it credible that it will fairly reward high quality and punish low quality (MacLeod, 2007; Calzolari and Spagnolo, 2009). Although a public entity may conceivably be able to commit to such a scheme, it may not be possible or desirable to give the procurer such discretion due to the risk of corruption.

In general, the main mechanism to maintain a quality level above the minimum experience goods with non-verifiable quality is to have future sales increasing in current quality level (see e.g. Bar-Isaak and Tadelis 2008). For example, consumers may return to sellers that provided high quality in the past, they may influence other consumers to patronize the same seller and an industrial buyer may continue a long-term supply relation. A seller that consistently provides high quality will obtain a good reputation (a valuable brand name) and this will increase future sales.

There are some ways to create a similar link between current quality and future sales in a public procurement setting. For example, an element of consumer choice may be present or introduced. This can be done without post-award competition, as is typical of the procurement of public transport services. The contract may be structured so that the seller retains the ticket revenues – and these revenues will tend to increase in the quality level. In a traditional consumer-choice model, however, there will generally be competition ex post between two or more selected providers. This ex-post competition for customers gives incentives for providing high quality also after the selection stage, and also on non-contractible quality, as providers can 'steal' customers from each other by offering better services.[1]

[1] This benefit comes, as usual, at a cost: with consumer-choice models the quantity sold by each of the provider is uncertain and, with more than one supplier, smaller than in single-provider procurements; and the higher risk

A related method to reward high quality borrowed from private procurement is to formalize and quantify evaluations of past performance – and to let these be an input in the bid evaluation process. The high degree of transparency and predictability required in public procurement, however, makes it difficult to let future sales depend on current quality.[2] More generally, the methods to foster non-contractible quality just discussed tend to be much weaker in public than in private procurement settings, because of the limits to discretion imposed by accountability concerns.

Competition on price is sometimes regarded as a cause for low quality in procurement when non-contractible qualitative aspects are crucial (e.g. Spulber, 1990; Manelli and Vincent, 1995; Bajari and Tadelis, 2001), also because it may weaken the reputational forces that often sustain the provision of hard-to-contract quality dimensions (Calzolari and Spagnolo, 2009). Clearly, if the procurer only looks at the price when awarding contracts, the third of the methods described above becomes ineffective. Also, to the extent that intense price competition makes future sales less profitable, the prospect of future sales will be a weaker incentive to provide quality today. On the other hand, competition in other dimensions than price may also dissipate profit and, hence, may make future sales a less attractive carrot for current quality.

Cost-sharing can possibly tilt the balance in the direction of higher quality. If the procurer reimburses a fraction of the supplier's cost, it will be less costly to produce higher quality. For a given return in terms of future sales, the producer will have stronger incentives to raise current quality. Hence, cost-sharing schemes can boost the effectiveness of the other mechanisms for encouraging high quality.[3]

The use of dynamic mechanisms for the control of quality, like feedback/reputational mechanisms, vendor rating and contract renewal schemes that link future awards to evaluations of past performance, has been studied by Dellarocas et al. (2006) and Calzolari and Spagnolo (2009), among many others. (See also Iossa and Rey, 2009; Case and Besley, 1995; and Laffont and Tirole, 1993.). But while a rich literature developed on procurement design when verifiable quality matters – see e.g. Asker & Cantillon (2005)

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and smaller quantities is typically reflected in higher prices, together with the higher quality.

[2] The procurer is typically not allowed to exclude bidders with weak brand names or to give preferential treatment to firms that he believes delivered better on non-verifiable quality in the past – he must provide substantive verifiable reasons for preferring a particular firm.

[3] Laffont and Tirole, 1993

and references therein – little besides the works cited above has been written on procurement design when crucial quality aspects are not verifiable.

With pure in-house production, there is no element of competition. Then, the state may have a more direct control over the various quality dimensions of the services that are offered. Provision by external entities involves different allocation methods that can induce different levels of competition ex-ante (when the provider is selected) and ex post (during the provision of the service) and different incentives for the provision of quality. Understanding which services should be provided in which way and when it is possible to increase efficiency (lower price/quality ratio) through intensified competition (ex ante and/or ex post), is crucial for the organization of a State and for its social and economic performance. It may also be difficult to maintain quality in in-house production (Hart, Shleifer, Vishny, 1997; Levin and Tadelis, 2008).

3. The elderly-care industry

Elderly care in Sweden is the responsibility of the municipalities. Close to 100 000 persons live permanently in elderly care units (or nursing homes), while more than 150 000 receive assistance in their homes. Elderly living in elderly care units constitute 6 percent of the population aged 65 or more. People aged 80 or more make up 80 percent of the residents; in this age group 16 percent of the population lives permanently in care units. For those above 95 years of age, the fraction rises to more than 50 percent. More than two thirds of the residents are women.[4]

There are about 2600 nursing homes in Sweden, of which about 10 percent are privately operated.[5] A small fraction of the private provision is organized as a consumer-choice system, where consumers implicitly come with vouchers to their providers of choice.

The cost for elderly care, home care as well as care in nursery homes, was approximately SEK 90 billion in 2008, or close to 3 percent of GDP, of which SEK 56 billion was for elderly care units.[6]

The average age when admitted to a care unit is about 84 years. After three years in a care unit, half of the individuals will have deceased.

[4] Äldre – vård och omsorg andra halvåret 2008, NBHW, 2009

[5] NBHW, 2008. In addition, there are about 150 transitory (short-stay) nursing homes, with another 11 000 residents.

[6] Jämförelsetal för socialtjänsten år 2008, NBHW, 2009

No study appears to exist of expected remaining life time when admitted, but it is likely to be somewhat higher than three years.

Of the population aged 65-74, only 0.6 per cent live in elderly care units; of the population aged 75-84 the share is less than 4 per cent, while for the population aged 85 or more the share rises to 17 per cent. For the whole population aged 65 or more, the fraction is 7.5 per cent, which is less than in Norway and the Netherlands, more than in Germany and about the same as in France. (Larsson et al, 2008.) Variation within Sweden is also large. The ratio between the municipality with the highest and the lowest fraction of its population in nursing homes is about four. Northern and rural municipalities tend to have a high fraction of their population in nursing homes. Larsson et al report that among people aged 80 or more, the fraction in permanent care has fallen from 23 percent in 1995 to 17 percent in 2004. Depending on income, people living in care units pay fees, but the cost coverage averages only 4 per cent. Around three quarters of the residents are dement.[7]

From the age of 40 at least until the age of 90, the logarithm of mortality in general rises more or less linearly with age. For example, the annual mortality rate is 1 percent approximately at the age of 63 (68) and 10 percent approximately at the age 84 (87) for men (women).[8] Admittance to a nursery home is a strong indicator of increased mortality rates (Larsson et al, 2008). Also, they report that while about 10 % of the population aged 75 or more live in elderly care units five years prior to their death, the fraction rises to about 50 percent in the months prior to death.

There are about 70 firms that bid at least once in our sample. Of these, Attendo, Carema and Förenade Care are the largest ones, accounting for almost half of all bids.

When procuring, municipalities were relatively free to choose supplier up until the beginning of 2008. If I understand the situation correctly, the procurer was until then free to choose *either* the bidder with the lowest price, *or* the bidder with the economically most advantageous bid, and the latter did not have to be well specified.

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[7] Aktuellt på äldreområdet 2007, Sveriges Kommuner och Landsting. **Check also SALAR, 2007, p 17, where different numbers are reported!**

[8] SCB,
see ://www.scb.se/statistik/_publikationer/BE0701_1986I03_BR_BE51ST0404.pdf

4. Earlier studies

Quality in elderly care

A number of studies have analysed the Swedish market for care-of-elderly services, but few have been able to directly address quality provision quantitatively. Johansson (2005) finds that per-capita costs for elderly care fall as more services are outsourced to private providers, but has no measure of quality. Svensson and Edebalk (2006) compare voucher programs for care of elderly in two municipalities and argue that more and better information to users will increase quality competition. Their conclusions are based on qualitative assessments. NBHW (2003) and the Ministry of Health and Social Affairs (2002) discuss possible quality indicators and the latter reports that a large majority of the recipients of care-for-elderly services are satisfied with the service they get. The NBHW (2007a) reports, contrary to Johansson, that private provision has no impact on the cost of elderly care. Further references to Swedish and Nordic studies can be found in these texts.

Forder (1997) provides a theoretical analysis of incentives for care providers under different contractual structures, as well as survey data that support the hypothesis that under some contracts, the service provider has incentives to misrepresent the level of physical dependence of those in its care. Forder and Netten (2000) compare the cost for residential and nursing-home care of elderly, as a function of contract form.

Quantitative studies of quality in the US elderly care (nursing home) industry have mainly focused on the effect of ownership type: non-profit or for profit. Anderson_et al (2003), for example, reports lower quality in for-profit providers. Similarly, Amirkhanyan et al (2008) finds that for-profit provides violate quality standards more often than non-profit providers. Their study is based on a large institution-level sample, with numerous controls for client composition and similar measures. In a study based on more than 1000 individuals, Chou (2002) addresses the effect of asymmetric information and finds that for-profit homes provide lower quality than non-profit rivals when the client's position is weak, i.e., when the client has no living close relatives or is dement, but not otherwise. Chou uses mortality as the main indicator of quality; a measure that we argue is more robust than most other measures of quality.

A concern is that the estimated effect of ownership status on quality is affected by sample selection. To address this concern, Grabowski et al (2008) focus on quality changes following changes in ownership status among US nursery homes. Since they find no such effect, while finding that homes that change from for-profit to non-profit

status tend to have higher quality than homes that make the opposite transition, they conclude that the negative impact of for-profit status found in earlier studies is due to selection effects, not a causal effect of ownership status.

Grabowki (2004) finds that higher payment seems to result in higher quality, again contrary to earlier studies. Again, the new result appears to be driven by better controls for selection effect.

The studies on the US nursing home industry all seem to focus on the difference in quality provided by for-profit and non-profit suppliers; there seems to be few systematic quantitative studies of how the quality of care-of-elderly services is affected by the choice between in-house and outsourced production or by the type of contract.

Quality in procurement

A number of studies of quality in elderly care focus on the difference between for-profit and non-profit providers, but few address the link between the make-or-buy decision and quality. In contrast, there is a large literature on the effect of school voucher programs on pupil performance. (E.g. Hsieh and Urquiola, 2006, and Angrist et al, 2006.) Another related empirical application is residential youth care (Lindqvist; 2007). Broadening the perspective to the choice of contractual form in other markets, there exists a small but growing empirical literature, including, e.g., Bajari et al; 2003 (complex construction projects) and Ménard and Saussier; 2000 (comparison of the performance of in-house and outsourced water utilities).

From Jensen and Stonecash' (2005) survey of the literature on public-sector outsourcing, it is apparent that while a relatively large number of studies have addressed the size of the cost savings from outsourcing, few have tried to evaluate the effect of outsourcing on quality. The only cited article finds, based on a case study, that quality falls (Cope, 1995).

5. The data

All of our data is by municipality, rather than by elderly-care home. We see this as an advantage, because it reduces the problem of sample selection. Focusing on individual homes, we would be concerned that private providers could select (or were selected by) a non-representative group of clients.

Data sources

The data is drawn from five main sources. First, we have panel data on 290 Swedish municipalities with an average population of just over 30 000 inhabitants. This data is mainly taken from Statistics Sweden, covers the 1990-2007 period and includes the number of elderly citizens by five-year age groups (65 to 69, 70 to 74 etc, with the oldest age group covering all persons that have reached 100 years of age), mortality by age group, as well as a number of municipality characteristics, such as population density and total population, tax rate, average income, political situation, educational level, employment, immigrants' share of population etcetera. Since 2000 we also know the average cost per person in sheltered permanent accommodation (elderly care units, or nursing homes) and the number of residents. Also as municipal-level panel data, from 1998 to 2007, we have obtained data on fall fractures from the Swedish National Patient Register.

Second, we have cross-sectional data at the nursing-home level that is related to quality and that is collected by the National Board of Health and Welfare (NBHW, or Socialstyrelsen), including whether there is a choice of meals, whether there are more than one person to each room and the educational level of the staff; all in all 20 (19?) variables. These data have been collected by the NBHW since 2007.[9] All quality parameters are reported on a one-to-five scale, where a five reflects the highest quality level. Out of the 290 municipalities, 287 responded and 2584 or Sweden's 2596 nursing homes are included. We use 2007 data.

Third, the NBWH has asked clients and their relatives about how satisfied they are overall with the quality of the service provided in elderly care homes, as well as their views on more focused issues. The survey can be seen as a customer satisfaction index(CSI). Of the close to 60 000 surveyed, more than 35 000 (61 percent) responded. The survey was undertaken between August and October 2008 and will be repeated annually.[10] Recipients of elderly care were asked to grade, on a ten-graded scale, the quality of the services provided concerning information, staff's attitude, user influence, safety, extent of care, food quality, cleaning and hygiene, health care, social interaction and activities and the standard of the room and the facility. Finally, the respondents were asked to give an overall evaluation of the care they received. In 62 percent of the cases a relative, associated person or legal representative answered the questionnaire on behalf of the recipient of care. The data are available on the municipality level, not for individual nursing homes.

[9] NBHW, 2008. The number of quality indicators has increased in the 2009 report.

[10] NBHW, 2009

We can also note that since 2007 the Swedish Association of Local and Regional Authorities (SALAR, or SKL with the Swedish abbreviation) compiles a slightly different set of variables that measure quality.[11] This work is done in collaboration with NBHW and some of the variables used in both studies are similar or identical, measuring things like the staff's educational level and the standard of the room. However, there are some differences. SALAR includes a set of outcome variables, like fall fractures and use of multiple psychotropic drugs, while NBHW includes more variables that measure how the work is done.

Fourth, we have surveyed all municipalities about what method they use to organize elderly care: in-house production, traditional procurement, a voucher scheme – or a combination thereof. We asked what fraction of the beds was under in-house operation and when procurement was first introduced for this service in the municipality. Also, we asked if there had been a shift in the method organizing elderly care, other than the initial decision to procure. The survey was undertaken during 2009 and we obtained answers from all but 7 municipalities.

Finally, we have collected data at the level of individual procurements. We studied 123 contracts that had been tendered via one of the commercial electronic procurement databases in Sweden – Opic, Allego and E-avrop – and that we could find when searching for "elderly care" ("äldrevård" + "särskilt boende" or "permanent boende"). We found no tender earlier than 2001. For the contracts, we were able to identify the number of bidders, the identity of the winner, the bids, what method was used to evaluate the bids, if there was an option to renew the contract and so on.

Descriptive statistics

[More text will come here, more variables will be reported]

The below table reports political control variables by type of provision.

As can be seen from Table 1, municipalities that procure elderly care are larger, richer and more densely populated. The population is better educated and is more prone to vote for the right.

[11] SALAR, 2007

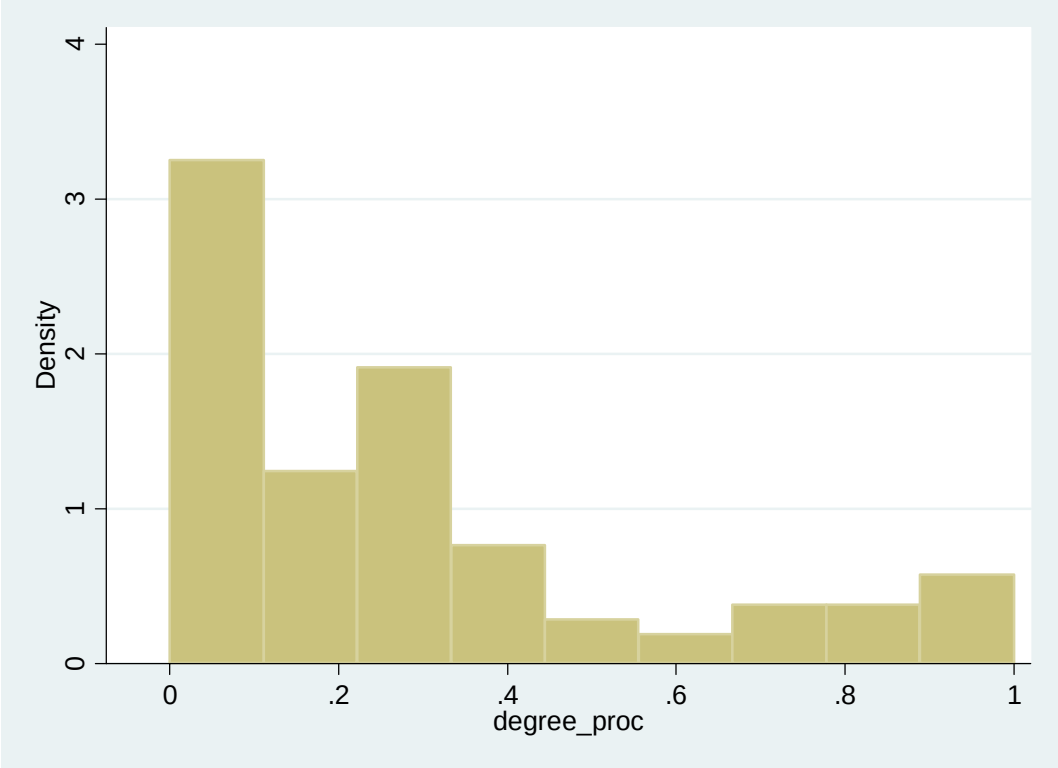
Table 1. Descriptive statistics controls and costs, also by type of provision, 1993 and 2008 for illustration

Year	Variable		Min	Max	Mean	Std.dev	N
1993	Average	All	104.23	224.30	135.96	17.99	287
	income	In-house	104.23	224.30	135.57	18.2	264
		External	129.60	175.70	142.22	11.84	16
	Higher	All	0.02	0.20	0.04	0.02	286
	education	In-house	0.02	0.20	0.04	0.02	264
		External	0.02	0.14	0.06	0.03	16
	Population	All	2865	692954	30577.3	54286.3	286
		In-house	2865	695954	28550.9	53609.9	264
		External	10473	237438	68071.69	62058.26	16
	Population	All	0.30	3700.1	119.18	386.83	286
	Density	In-house	0.30	3700.1	110.76	384.78	264
		External	08.8	1544.8	293.11	458.31	16
	Employment	All	0.31	0.51	0.42	0.04	286
		In-house	0.31	0.51	0.42	0.04	264
		External	0.38	0.51	0.43	0.03	16
	Left wing	All	0.16	0.78	0.45	0.11	286
		In-house	0.16	0.72	0.46	0.11	264
		External	0.21	0.49	0.39	0.08	16
2008	Average	All	114.29	301.44	141.86	21.23	290
	income	In-house	114.29	301.44	137.88	18.61	196
		External	118.85	245.09	151.60	24.14	87
	Higher	All	0.05	0.35	0.11	0.04	290
	education	In-house	0.05	0.35	0.09	0.04	196
		External	0.07	0.31	0.14	0.05	87

	Population	All	2516	810120	31918.44	62477.66	290
		In-house	2516	500197	20103.90	37945.94	196
		External	7220	810120	59624.59	93340.94	87
	Population	All	0.20	4307.80	132.65	451.37	290
	Density	In-house	0.20	1163.70	60.77	159.57	196
		External	0.90	4307.80	303.39	764.62	87
	Employment	All	0.37	0.53	0.47	0.03	290
		In-house	0.53	0.39	0.46	0.03	196
		External	0.37	0.56	0.47	0.03	87
	Left wing	All	0.11	0.83	0.46	0.12	290
		In-house	0.11	0.83	0.48	0.111	196
		External	0.12	0.57	0.42	0.09	87
2000	Cost per resident		169107.20	452752.70	315107.40	50881.73	289
	Total cost MSEK		13.30	3692.71	133.43	269.57	263
	Cost per capita		0.0014	0.0102	0.0048	0.0015	263
2008	Cost per resident		201308.70	950560.30	415689.50	79400.24	289
	Total cost MSEK		10.91	2415.13	125.16	196.71	289
	Cost per capita		0.0012	0.0127	0.0048	0.0018	289

Among the 283 responding municipalities the vast majority still operates nursing homes in-house. Approximately 66 percent of the municipalities report that they have never procured this service. In the group that does procure elderly care, there is a notable dispersion in the extent of in-house production. Figure 1 shows the fraction of beds not managed by the municipality itself. A value of zero implies that all units are managed in-house, although previously the municipality has been procuring, or at least that it has put up contracts for tender. It is quite common that in-house production units participate in the procurement auction and submit bids as any other firm. A value of one corresponds to a situation where all units are procured and the care is provided by private firms. The average share of homes that are managed by private firms is 28.6 percent (see Table A1 in the Appendix for descriptive statistics).

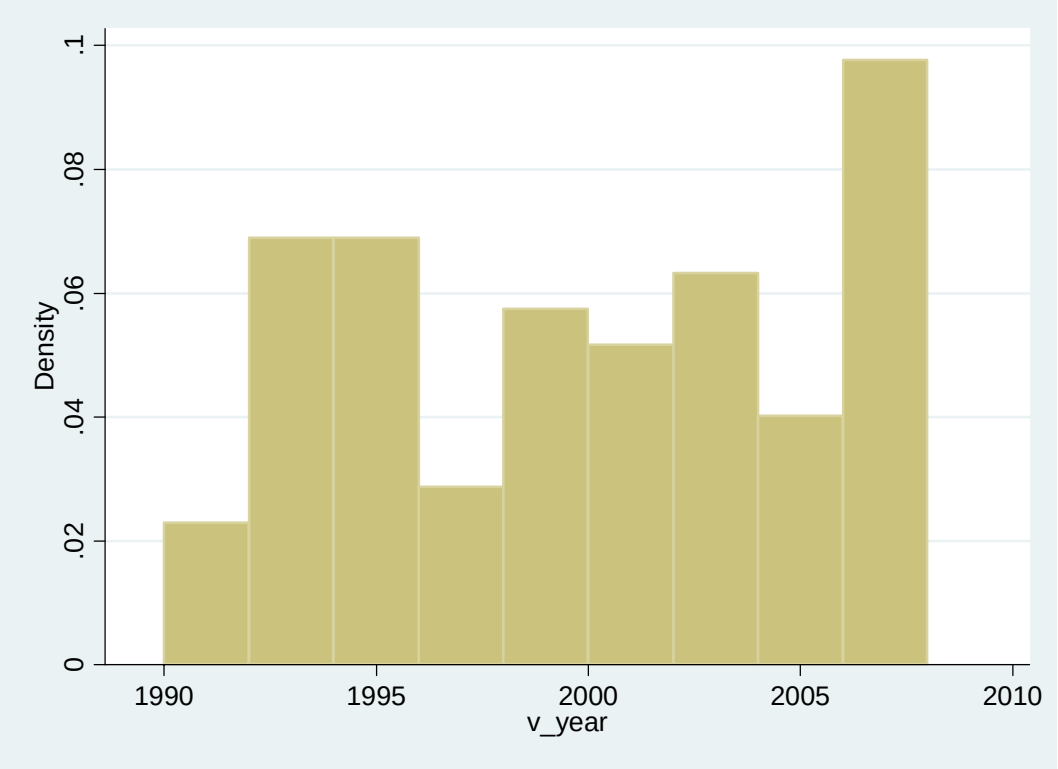
Figure 1. The share of beds under private management in municipalities that have implemented procurement auctions in the care for elderly, 2008 (?)



Hence, close to 10 percent of all beds are managed by private providers. This value corresponds well with institution-level data from the NBHW, according to which about 10 percent of all units are privately managed.

About half of the municipalities that have procured elderly care began doing so during the 1990s; the other half introduced competition after the year of 2000, as shown in Figure 2.

Figure 2. Starting year for procurement of elderly care.



The NBHW has transformed the results of its CSI into a scale 0 to 100. The average value for all municipalities is 70, with a slightly higher value for municipalities that have in-house production only than for procuring municipalities. The difference is, however, not statistically significant (*t*-value 1.2).[12] Notable, though, is that among the procuring municipalities, there is a relatively strong negative correlation between the CSI and the degree of competition (correlation coefficient is -0.28). The lowest score, 56, is found in a procuring municipality while the highest score, 88, is found in a municipality with only in-house production. Descriptive statistics for the *CSI* by type of provision is found in Table A1 in the Appendix. The distribution of the *CSI* for all municipalities and by type of provision is shown in Figure 3.

[12] We treat each municipality as an observation, independently drawn from an infinitely large population.

Figure 3. Distribution of *CSI*, all municipalities, municipalities with in-house production only and municipalities with procurement.

Figure 3a. *CSI*, all municipalities

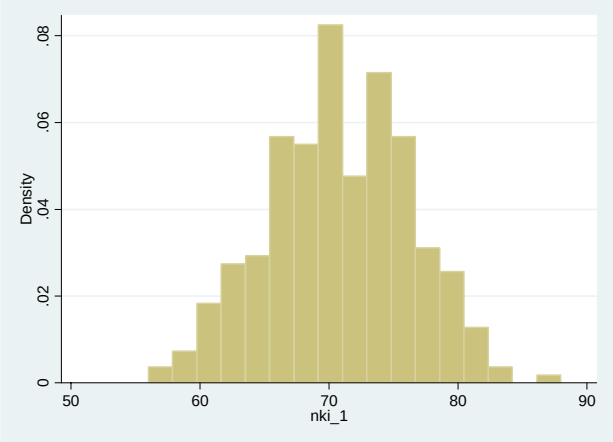


Figure 3b. *CSI*, in-house only.

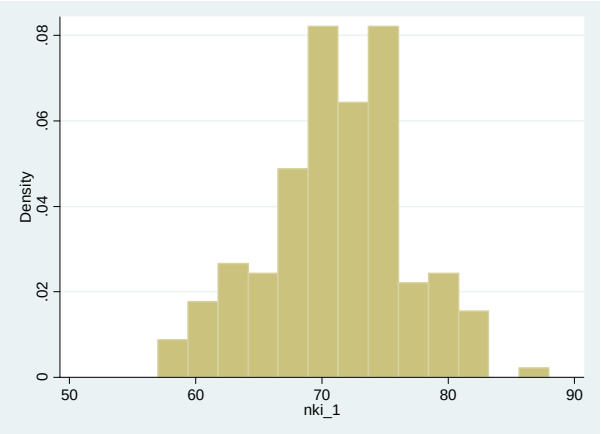
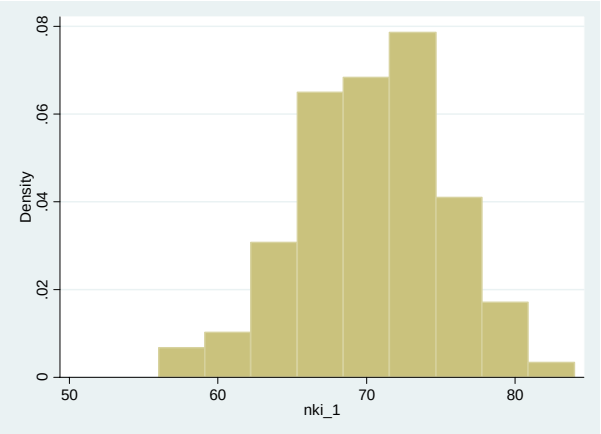


Figure 3c. *CSI*, procuring municipalities

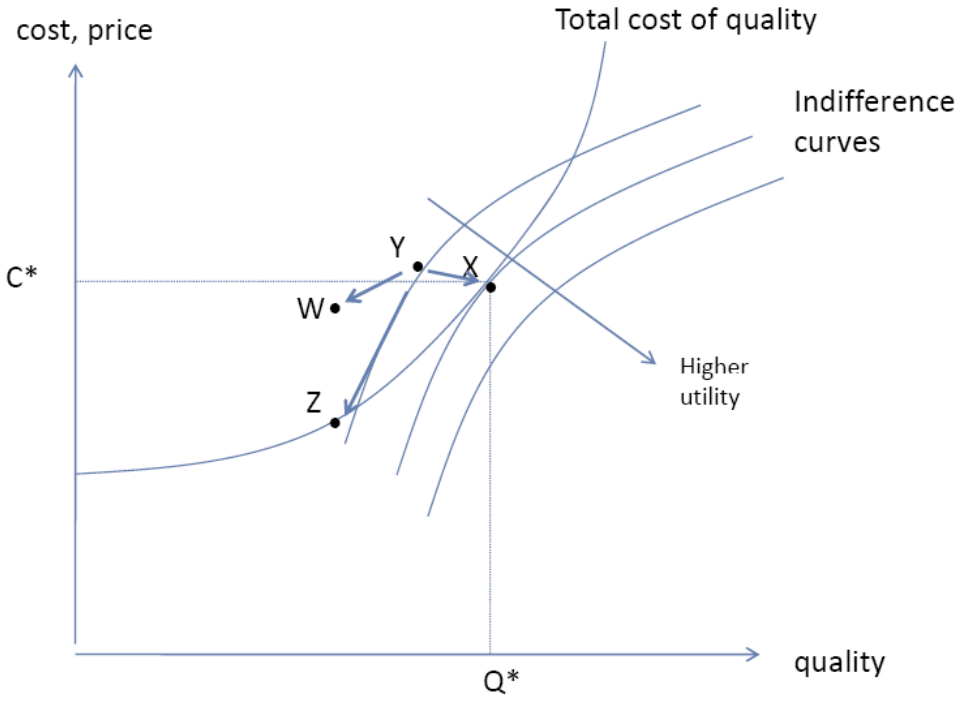


6. Empirical approach

When a municipality decides to procure, this can have several effects. With reference to Figure 4, we assume that the cost of producing a service such as elderly care rises with the quality of provision. This is illustrated by the total-cost-of-quality function. If the municipality has preferences over cost and quality as shown in the figure, the best feasible point along the cost curve is X. However, we may with some justification assume that a municipality that produces in-house does so with some degree of productive inefficiency. Specifically, we assume that it only achieves the cost and quality combination illustrated by Y.

If well designed and executed, procurement is likely to raise productive efficiency. With verifiable quality, a well-designed tender and strong competition we may in fact be able to reach a point close to X, the optimal point. However, if quality is non-verifiable, the outcome may instead be a point like Z. Now we have productive efficiency, but we have allocative inefficiency. If quality is non-verifiable and competition is weak we may, from the point of view of the buyer, end up in a point like W. Perhaps the cost of production still corresponds to point Z, but due to weak competition the municipality has to pay a price that corresponds to point W.

Figure 4. Procurement, quality, cost and efficiency



It may also be that the decision to procure is triggered by a change in the municipality's preferences. Perhaps preferences change so that Z is now the optimal point, for example because of a negative budget shock or because of a change in the political situation in the municipality.

To sum up, we are interested in testing the following hypotheses:

- Is the shift to a procurement regime associated with a change in quality?
- Is the shift to a procurement regime associated with a change in costs?
- Is the shift to a procurement regime associated with a change in quality, controlling for possible changes in costs?
- Is the shift to a procurement regime associated with changes in factors that could be expected to change preferences, such as budget shocks and political situation?

We argue that mortality and fall fractures can be seen as relatively objective measures of quality. The municipality's CSI, in contrast, is a subjective measure of perceived quality. For the two first, we have panel date, while for the latter we have only cross-sectional data.

Mortality and fall fractures – panel data analysis

As our first test of the quality effect of procurement, we model current (inverse) quality, measured as mortality or fall fractures, as a function of the regime and control variables related to the municipality. That is

$$MORT_{ikt} = \alpha_i + \beta_1 PROC_{it} + \beta_2 COST_{it} + \beta_3 RES_{it} + \beta_4 CONTM_{it} + \beta_5 CONTC_{ikt} + \beta_6 PROC_{it} D_{70} + \beta_7 PROC_{it} D_{75} + \ldots + \beta_{12} PROC_{it} D_{100} + \gamma_t + \delta_k + \varepsilon_{ikt} \quad (1)$$

where $MORT_{ikt}$ is the mortality in municipality i for cohort k at time t, measured as annual deaths per 1000 inhabitants. As an alternative measure of quality, we use fall fractures, $FALL_{ikt}$, with the same explanatory variables.

Our explanatory variables are as follows. First, α_i is a municipality-fixed effect, γ_t is a time-fixed effect and δ_k is a cohort-fixed effect. $PROC_{it}$ is a dummy variable that takes the value one if elderly care in

municipality i has been procured at time t, D_k is a dummy variable that takes the value one for cohort k and ε is the error term. [13]

CONTM and *CONTC* are two (vectors of) control variables for municipal-specific and municipal-and-cohort-specific variables, respectively. (E.g., average educational level in the municipality and the share of immigrants in a specific cohort in the municipality.) (If these are the two most interesting control variables; maybe we want to add more, maybe we change those for others.) (Other important explanatory variables?)

We use the 65-69 cohort as the control group, since only about half a percent of the population in this age group live in nursing homes. The parameter β_1 captures the effect of introducing procurement on the mortality of the control group. Our prior is that there should be no effect; if an effect is found this may be due to some underlying variable that impacts on both mortality and the decision to procure. The *differential* effects on the older cohorts are captured by the parameters β_6 through β_{12}. People in these age groups, which tend to live in nursing homes to a greater extent, may be affected by changes in the quality of the care provided. Our assumption is that people in the control cohort are not affected.

COST is a measure of costs per bed and year and *RES* is a measure of the number of residents at elderly-care homes per 100 inhabitants aged 65 or more. The construction of these variables will be discussed in the following paragraphs, but we can think of both variables as measuring the municipality's generosity towards its elderly citizens. The variable *COST* measures generosity in terms of expenditures per nursing-home resident, while *RES* measures generosity in terms of accepting elderly into nursing homes. According to the hypotheses listed above, we will estimate the effect of procurements both with and without controlling for costs.

The idea is that higher spending per client increases quality (as shown by Grabowski, 2004, in his study of US nursery homes). However, costs per bed may be high because the municipality has an elderly population with poor health or because the municipality has a restrictive policy and only accepts clients in very poor health into nursing homes. Similarly, the number of residents per capita may be high because the municipality has a population that is older than in

[13] In the standard notation of the diff-in-diff literature, *PROC* is the interaction of a treatment-group dummy and a post-treatment time dummy. The municipality fixed effects capture any time-constant difference between the treatment group and the control group; the time fixed effects capture any common trend or other time-dependent changes.

most other municipalities or because it has a generous admittance policy. For this reason, *COST* and *RES* are index variables, designed to measure how generous the municipality is in terms of spending per resident and in terms of accepting residents, relative to an average municipality with the same population profile.

First, we model the expected number of residents per (1000) capita as follows:

$$ACTRES^*_{it} = b^*_1 RES65\text{-}74_{it} + b^*_2 RES75\text{-}79_{it} + b^*_3 RES80\text{-}84_{it} + \ldots + b^*_6 RES95_{it} \quad (2)$$

where $ACTRES^*_{it}$ is the expected number of residents per 1000 inhabitants in municipality i at time t, $RES65\text{-}74_{it}$ is the actual number of inhabitants aged 65 to 74 years per 1000 inhabitants, and correspondingly for the other age intervals. The parameters b^*_i are taken from the fraction of people in different age groups living in elderly care at the national level. The values are as shown in Table 1.

Table 1. The fraction of the population by age intervals living in nursery homes, 200(8?) (NBHW)

Age (years)	Women	Men	All
65-74	0,912559	0,971143	0,941043
75-79	3,793745	3,149455	3,50845
80-84	9,186855	6,703249	8,183698
85-89	19,22256	12,48988	16,82569
90-94	34,3794	24,10474	31,41487
95-	50,22578	39,5069	47,9476
90-	37,9077	26,5708	34,8137

The values in the table allow us to construct an index of the relative number of residents as

$$RES_{it} = ACTRES_{it} / ACTRES^*_{it} \quad (3)$$

The cost per client will increase if the average health status is reduced. We do not know the health status of individuals, but we

assume health deteriorates with age. Hence, we can use average age of the clients as a proxy for their health. However, since we do not know average age either, we have to make assumptions about that as well. We assume that average age can be approximated as[14]

$$AGE^*_{it} = [70b^*_1 RES65\text{-}74_{it} + 77b^*_2 RES75\text{-}79_{it} + 82b^*_3 RES80\text{-}84_{it} + \ldots + 97b^*_6 RES95_{it}]/[\, b^*_1 RES65\text{-}74_{it} + b^*_2 RES75\text{-}79_{it} + b^*_3 RES80\text{-}84_{it} + \ldots + b^*_6 RES95_{it}]$$

(4)

That is, we assume that all municipalities admit fraction b^*_1 of its population aged 65 to 74, and so on, and then we calculate average age in this hypothetical population.

We also assume that a more generous admittance policy, i.e., a high value of *RES*, implies that the average health status of the clients is good. Hence, we assume that the cost per client can be modeled as

$$Ln(cost_{it}) = c_0 + c_1 RES_{it} + c_2 AGE^*_{it} + \xi_{it} \quad (5)$$

where $cost_{it}$ is the per client cost in municipality i at time t. Using the parameter estimates of the model, we can predict the logarithm of the expected cost per resident in the municipality as

$$Ln(cost^*_{it}) = c^*_0 + c^*_1 RES_{it} + c^*_2 AGE^*_{it} \quad (6)$$

where stars (*) again indicate model estimates. Finally, after taking the antilogarithm, we can construct our measure of cost per health-adjusted client as

$$COST_{it} = cost_{it}/cost^*_{it} \quad (7)$$

In the mortality equation above, we expect both *COST* and *RES* to have a negative impact on mortality. The first variable measures how generously the municipality spends on the clients it accepts into elderly care, with adjustments for age composition. The second

[14] The average age of Swedes aged 95 or more is 97 years, as calculated from Statistics Sweden's population statistics.

variable measures how generously the municipality accepts clients into elderly care, again accounting for the age composition.[15]

Note that we estimate mortality at the municipality level. Hence, we need not worry about the risk that there is positive or adverse selection to care units that are run by a non-government entity.

There is, however, a possible problem in that some municipalities may have a population that requires more care than that of others. As long as this extra requirement is constant over time, this should cause no problem in a fixed-effect regression. Also, since we estimate the differential impact on the elderly cohort relative to the concurrent changes in mortality of our control group (the 65 to 69 cohort), sudden shocks to particular municipalities that affect all age group similarly should not be a problem either. Our difference-in-difference approach allows us to identify the effect on quality that comes from *changes* in regime; typically from in-house to procurement.

Possibly, however, there could be shocks that impact on both the quality on the regime. For example, assume that procurement is efficient, in the sense that a given quality can be maintained at a lower cost, but politically unpopular, for example because staff will be reduced. Then it could be the case that negative budget shocks trigger a transition to procurement *and* budget cuts in excess of the efficiency gains.[16] A statistical analysis could lead us to the false conclusion that procurement results in lower quality. To resolve these concerns as far as possible, we control for expenditures per client in elderly care and we also try to control for the clients' age composition.

Customer satisfaction – cross-section analysis

Unfortunately, we do not have access to panel data for the CSI. Hence, we estimate the following equation

[15] Alternatively, we could use expenditure per capita aged 65 or more, instead of number of residents and costs per resident. That would be a little bit easier.

[16] Or, alternatively, that the politicians "bribe" their constituency into accepting procurement by simultaneously increasing spending on elderly care.

$$CSI_i = \alpha + \beta_1 PROC_i + \beta_2 COST_i + \beta_3 RES_i + \beta_4 EDUC_i + \beta_5 INPUT_i + \beta_6 POP + \beta_7 DESIGN_i + \varepsilon_I \quad (8)$$

Except for some additions, variables and notation are as above, with *t* and *k* suppressed. The variable vector *INPUT* represents quality indicators measured by the NBHW that mainly relate to inputs. The NBHW measures around 20 variables; we have used the competence of the nursing staff (paramedic or assistant nurse training), routines regarding relatives, access to own hygiene and cooking facilities, single room and if selection of food from a menu is an option. Descriptive statistics for these variables are provided in Table A1 in the Appendix. None of the verifiable quality parameters are too highly correlated to be included in the regression equation. The highest correlation is 0.21, between access to own hygiene and cooking facilities and single room. Also, we include the size of the municipality, *POP*.

7. Results

First, we generate the index for the number of residents per capita in each municipality *i*, RES_i, according to equations (2) and (3), and the predicted average age, AGE_i, according to equation (4). The resident index ranges from 0.24 to 1.69, with an average of 0.98 and a standard deviation of 0.24. The average age of residents ranges from almost 83 to just over 86 years, with an average of 84.75 and a standard deviation of 0.59. The average value seems consistent with that reported in the literature.[17]

We then estimate actual costs per persons by municipality as a function of *RES* and *AGE*, according to a linear version of equation (5). The results are reported in Table X. Both of the explanatory variables are negative and highly significant. That a more generous admittance policy should have a negative effect on the per-resident cost was expected. A priori, one could have thought that average age should have a positive effect. However, it may be that relatively young residents tend to have medical statuses associated with high costs, while relatively old residents tend to be less costly to treat.

[17] We base this statement on a few studies of medical use by residents of elderly care units in Sweden, with sample sizes of a few thousands.

Table 2. Estimation results. Cost per resident as explained by admittance policy (*RES*) and average age (all municipalities)

	OLS	
	Coefficient	t-value
RES	-239479	-9.55
AGE	-27139	-2.70
Constant	3137537	3.67
Adj R2		0.24
N		289

We compare actual costs per resident with predicted costs per resident, to construct a cost index according to equation (7). We find that the cost index ranges from 0.55 to 1.88, with an average of 1.00 and a standard deviation of 0.16.

Consumer satisfaction index as explained by type of provision

Consumer satisfaction is in principle a ranking variable, suggesting that a method such as ordered logit should be used. On the other hand, the large number of possible values and the fact that individual values are aggregated to the municipal level suggest that OLS can be used. Table 3 reports ordered logit and ordinary least square estimates.

As reported above, the average CSI was slightly lower among the procuring municipalities, but the difference was not statistically significant. After adding controls, there is still no significant effect of the type of provision on the consumer satisfaction index. Nursing home residents are equally satisfied if they live in a municipality where all homes are managed by the in-house production unit as if they live in a municipality with at least one home managed by a private firm. Residents in municipalities with a more generous admission policy are more pleased with the care given. A more generous admission policy indicates a lower hurdle to get admission. All things equal, this should imply healthier residents in the nursing homes and, as a result, it should be easier for the staff to provide high

quality service. The coefficient for cost per resident is not significant. A more competent staff has a positive impact on the score (8 or 9 percent level of significance for the two estimation methods). In the logit estimates, the presence of relatives has a positive effect, significant at the 10 percent level, while having a room of one's own has a positive effect that is almost significant at the 10 percent level. These results are much less significant in the OLS estimates. Overall, however, the results are similar for the ordered logit and the ordinary least square estimates, as well as for the ordered probit (not reported).

Table 3. Estimation results, Customer Satisfaction Index as explained by type of provision (all municipalities)

	Ordered logit		OLS	
	Coefficient	t-value	Coefficient	t-value
Type of provision (in-house=1)	0.095	0.37	0.247	0.31
COST	0.056	0.09	0.303	0.15
RES	1.47	3.15	4.34	2.34
Population	-0.0060	-1.36	-0.0198	-1.42
Education level	-0.0596	-0.39	-0.266	-0.55
Competence	0.201	1.76	0.579	1.68
Food menu options	0.189	1.30	0.504	1.14
Relatives	-0.142	-1.66	-0.321	-1.21
Single room	0.113	1.57	0.307	1.44
Own hygiene and cooking facilities	0.111	1.39	0.355	1.48
Constant			62.24	18.25
Log likelihood		-828.31		
Prob>Chi2 (Prob>F)		0.0129		0.0176

Pseudo R2/Adj R2	0.0134	0.04
N	276	276

Consumer satisfaction index as explained by extent of external provision

One possible explanation for the non-significant effect of type of provision on the CSI is the fact that a part of the municipalities that have organized procurement auctions have done so for only one or a few of their nursing homes. Therefore, the effect of the *share* of homes managed by private firms on the CSI is estimated for the sub-sample of municipalities that have organized procurement auctions. Above, we reported a negative correlation between the share of procured beds and the CSI. In the regressions, we also introduce the number of years since procurements were first introduced (*Experience*) as an explanatory variable. Results are reported in Table 4. Again, ordered logit and OLS estimates are presented.

The findings suggest that the higher the fraction of nursing homes under private management, the lower is the CSI. The Experience variable is not significant and nor is COST or RES significant. We find that CSI falls with the educational level in the city but increases with the fraction of single rooms.

Table 4. Estimation results, Customer Satisfaction Index as explained by fraction of procured provision (municipalities with procurement)

	Ordered logit		OLS	
	Coefficient	t-value	Coefficient	t-value
Share of homes private	-1.80	-2.11	-4.64	-2.19
Experience	.028	0.78	0.076	0.73
COST	0.166	0.14	-0.152	-0.04
RES	1.08	1.06	3.16	1.15
Population	-0.0076	-1.36	-0.019	-1.20
Education level	-1.01	-1.95	-2.47	-1.74
Competence	-0.321	-1.39	-0.925	-1.40
Food menu options	0.152	0.55	0.099	0.13
Relatives	-0.043	-0.24	0.090	0.18
Single room	0.427	2.74	1.01	2.46
Own hygiene and cooking facilities	-0.133	-0.78	-0.341	-0.73
Constant			69.12	10.33
Log likelihood		-235.48		
Prob>Chi2 (Prob>F)		0.055		0.062
Pseudo R2/Adj R2		0.039		0.996
N		85		85

Mortality and external provision

We now turn to the effect of external provision on mortality. We control for municipal, time and cohort fixed effects. Also, we use the 65-69 age group as the control group, since very few in this age group live in elderly care.

As can be seen in Table 5, the introduction of procurement is associated with a fall in mortality in the control group. The estimated effect is relatively large, on par with the average mortality in the age group (1.5 to 2 percent per year). We have no good explanation for this effect.

However, there is an additional fall in mortality for the treatment groups (the older age groups). The additional effect is statistically significant for all age groups and increases roughly in proportion with the increased mortality that comes with age. Mortality is reduced by close to 10 percent in most age groups. This is on top of the overall fall in mortality associated with the introduction of procurement.

There is one exception to the above results and that is the oldest age groups, the 100-plus group. In this group mortality increases with more than a third. The effect is statistically significant but difficult to explain. However, the absolute effect is not overwhelming, given the small size of the population in this age group. For example, for every person aged 100-plus there are around 50 persons in the 90-94 age group.[18]

The key results are stable when the model is estimated on the 2000-2008 period.

We also find that the control variables, other than the fixed effects, are not statistically significant. This may not come as a surprise, given that we control for municipal and time fixed effects. Hence, the effect of these variables can only be captured from idiosyncratic within-municipality variations.

[18] Hence, for overall mortality, a 10 percent reduction of the mortality in the 90-94 group is more important than a 35 percent increase in the 100-plus group.

Table 5. Estimation results, fixed effects model, the effect of procurement on mortality in municipality *i*, age cohort *j*, and year *t*.

Dependent	Mortality$_{ijt}$		Mortality$_{ijt}$	
Time period	*1993-2008*		*2000-2008*	
Controls	*β*	*t*-value	*β*	*t*-value
Procurement	-0.014	-2.47	-0.014	-1.50
Average income (tkr)	-0.200	-1.16	-0.110	-0.09
Employment (percent of population 16+)	0.003	0.03	-0.188	-0.95
Higher education (percent of population 16+)	-0.229	-1.42	-0.196	-0.36
Population/1000	-0.106	-0.55	0.200	1.09
Density	0.000	0.81	-0.000	-1.35
Left wing share of seats in local council	-0.019	-0.56	-0.009	-0.15
Share of individuals aged 65+ in elderly care	-	-	-0.000	-0.14
Social costs as share of total costs	-	-	-0.001	-2.37
Age dummies				
Age1 = 65 to 69	Reference		Reference	
Age2 = 70 to 74	0.010	66.34	0.009	44.30
Age3 = 75 to 79	0.028	124.74	0.026	97.59
Age4 = 80 to 84	0.062	149.65	0.059	117.88
Age5 = 85 to 89	0.120	186.01	0.118	159.57
Age6 = 90 to 94	0.215	168.37	0.214	141.14
Age7 = 95 to 99	0.369	85.26	0.361	71.15
Age8 = 100 +	0.392	27.89	0.439	26.07
Interactions				

Shift*Age1	Reference		Reference	
Shift*Age2	-0.001	-3.23	-0.000	-1.31
Shift*Age3	0.003	-8.03	-0.002	-4.72
Shift*Age4	-0.006	-9.95	-0.005	-6.28
Shift*Age5	-0.009	-7.45	-0.009	-6.86
Shift*Age6	-0.015	-6.71	-0.013	-5.09
Shift*Age7	-0.034	-5.22	-0.030	-4.22
Shift*Age8	0.143	5.79	0.099	3.52
Year dummies		Yes		Yes
σ_u		0.028		0.036
σ_ε		0.234		0.230
ρ		0.014		0.024
R2 within	0.31		0.34	
R2 between	0.05		0.01	
R2 overall	0.30		0.33	
N	35 936		20 056	
Number of groups	284		284	
Obs per group min	8		8	
Obs per group average	126.5		70.6	
Obs per group max	136		80	
F(36,284)/(29,284)	2068.46		1812.87	
Prob>F	0.0000		0.0000	

Fall fractures and external provision

We use the same empirical approach to assess the effect of procurement on fall fractures. I.e., we use a difference-in-difference approach with fixed effects for municipalities, time and age groups, with 65-69-year-olds as the control group.

Again, we find strong fixed age effects but no stable and significant effect of control variables (other than fixed effects). The signs and relative magnitudes are as expected, with fall fractures increasing with age, except for the 85-89 group

The effect of external provision on the control group, the 65-69-year-olds, is positive and significant at the 10-percent level, implying that fall fractures increase when procurement is introduced for the control group.

For the treatment groups, the effect of the procurement is negative and statistically significant at the 10-percent level (true?) for all age groups, except for the 85-89 group, where the effect is instead positive.

When it comes to the average length of the stay in hospital, procurement reforms seem to have no effect, except for the two oldest age groups, where the length of the stay increases by about one day.

Table 6. Estimation results. Fixed effects model. The effect of procurement on fall injuries per capita and average length of stay in hospital in municipality *i,* age cohort *j*, and year *t*,

Dependent	Fall injuries per capita$_{ijt}$		Average length of stay in hospital$_{ijt}$	
Time period	*1998-2008*		*1998-2008*	
Controls	*β*	*t*-value	*B*	*t*-value
Procurement	0.022	1.69[19]	-0.367	-0.85
Average income (tkr)	0.001	1.51	0.007	0.64

[19] Significant at 9.2 percent.

Employment (percent of population 16+)	-0.171	-1.33	-14.774	-3.62
Higher education (percent of population 16+)	-0.166	-0.76	-4.384	-0.54
Population/1000	-0.463	-0.40	4.228	0.91
Density	-0.000	1.04	-0.000	-0.41
Left wing share of seats in local council	0.027	0.60	1.014	0.68
Age dummies				
Age1 = 65 to 69	Reference		Reference	
Age2 = 70 to 74	0.018	8.73	3.414	38.55
Age3 = 75 to 79	0.033	8.30	4.216	39.41
Age4 = 80 to 84	0.137	8.51	4.812	40.70
Age5 = 85 to 89	-0.009	-9.81	4.987	38.20
Age6 = 90 to 94	0.151	7.40	4.406	30.74
Age7 = 95 to 99	0.157	5.56	0.946	5.51
Interactions				
Shift*Age1	Reference		Reference	
Shift*Age2	-0.006	-2.30	-0.159	-0.37
Shift*Age3	-0.011	-1.81	0.201	0.49
Shift*Age4	-0.043	-1.73	0.240	0.56
Shift*Age5	0.004	2.58	0.305	0.680
Shift*Age6	-0.046	-1.62	0.702	1.41
Shift*Age7	-0.056	-1.71	1.378	2.42
Year dummies		Yes		Yes
σ_u		0.131		1.645

σ_ε		0.225	4.890
ρ		0.253	0.103
R2 within	0.08		0.153
R2 between	0.00		0.001
R2 overall	0.06		0.131
N	24840		24840
Number of groups	284		284
Obs per group min	8		8
Obs per group average	87.5		87.5
Obs per group max	96		96
F(36,284)/(29,284)	32.93		116.35
Prob>F	0.0000		0.0000

Table 7 reports our findings on the cost of provision. There are no significant effects of procurement on costs, irrespective of how we measure costs: per resident, total costs or cost per capita. (We have not yet been able to construct the cost index and the acceptance index discussed above for the whole panel.)

Naturally, total costs increase significantly with population size. Also, a higher fraction of elderly in the population increases per capita costs but reduces costs per resident. Furthermore, costs fall with population density, income and employment, but these effects may be due to a lower fraction of the population being elderly. There is no statistically significant effect of the political situation in the municipality.

Table 7. Estimation results. Fixed effects model, log linear. The effect of procurement on costs per resident, total cost and cost per capita.

Dependent	Cost per resident$_{it}$		Total cost$_{it}$		Cost per capita$_{it}$	
Time period	*2001-2008*		*2001-2008*		*2001-2008*	
Controls	*β*	*t*-value	*β*	*t*-value	*β*	*t*-value
Procurement	-0.004	-0.19	-0.007	-0.46	-0.007	-0.46
Average income (tkr)	0.225	0.48	-0.739	-1.84	-0.738	-1.84
Employment (percent of population 16+)	-0.126	-0.44	0.656	2.45	0.656	2.45
High education (percent of population16+)	-0.062	-0.39	0.026	0.21	0.026	0.21
Population/1000	0.039	0.50	0.952	12.72	-0.048	-0.65
Density	-0.157	-5.21	0.200	0.70	0.020	0.70
Left wing share of seats in local council	0.032	0.62	-0.010	-0.22	-0.010	-0.22
Share of individuals aged 65+ in elderly care	-0.016	-4.50	0.013	4.34	0.013	4.34
Share of population in cohorts						
Age 65 to 69	-0.086	-0.75	0.080	0.82	0.080	0.82
Age 70 to 74	-0.182	-0.18	0.184	2.20	0.184	2.20
Age 75 to 79	0.090	0.86	0.066	0.86	0.066	0.86
Age 80 to 84	0.008	0.09	0.151	2.01	0.151	2.01
Age 85 to 89	-	-0.65	0.096	1.40	0.096	1.40

	0.044					
Age 90 to 94	0.008	0.18	0.071	2.03	0.071	2.03
Age 95 to 99	-0.008	-0.46	0.017	1.22	0.017	1.22
Age 100 +	0.002	0.35	0.004	0.62	0.004	0.62
Unhealthiness						
Age 16 to 19	-0.002	-0.21	-0.012	-1.66	-0.012	-1.66
Age 20 to 29	0.000	0.00	-0.040	-1.91	-0.040	-1.91
Age 30 to 39	0.019	0.53	-0.006	-0.19	-0.006	-0.19
Age 40 to 49	0.005	0.11	0.001	0.03	0.001	0.03
Age 50 to 59	0.075	1.05	0.011	0.19	0.011	0.19
Age 60 to 64	-0.096	-1.46	0.044	0.80	0.044	0.80
Year dummies		Yes		Yes		Yes
σ_u		0.252		0.185		0.185
σ_ε		0.109		0.088		0.088
ρ		0.842		0.815		0.815
R2 within	0.45			0.39		0.09
R2 between	0.02			0.95		0.72

R2 overall	0.06	0.94	0.66
N	1880	1884	1884
Number of groups	280	280	280
Obs per group min	1	1	1
Obs per group average	6.7	6.7	6.7
Obs per group max	9	9	9
F(29,279)/(36,284)/(29,279)	38.84	245.13	12.34
Prob>F	0.0000	0.0000	0.0000

8. Discussion and conclusions

Contrary to our expectations, we find that private provision of services on most counts seems to have improved quality in a market where quality is difficult to verify. Private provision is associated with a relatively large fall in mortality; mortality rates fall by almost 10 percent in the age groups where living in elderly care units is relatively common. We arrive at this result after controlling for municipal, year and age group fixed effects, using a difference-in-difference approach where 65-69-year-olds is the control group for the older treatment groups.

The above result is based on a panel of 290 municipalities over a 19 year period. Similarly, we find that the incidence of fall fractures is reduced when procurement is introduced. We find no evidence that costs change when procurement is introduced. This suggests that procurement is not triggered by adverse budget shocks or changes in preferences for service for the elderly. Neither does it seem that the politicians seek to use part of the potential efficiency gains to cut costs.

Using cross-sectional data, we find no statistically significant difference in customer satisfaction between municipalities that procure and those that do not. We do, however, find that among procuring municipalities, those that procure a larger fraction of the beds have less satisfied clients in their elderly homes.

We conclude that procurement appears to have been a success in the market for elderly care. Perhaps the success is due to an increased focus on quality that was triggered by the reform. As the procurer of services in a market where the ultimate customer is vulnerable to exploitation, the municipalities may have realized that they had to pay attention to quality. Also, during most of the period we have studied, the procurement rules were liberal, in the sense that the buyer had relatively large freedom to select the winner. I.e., the Procurement Act did not significantly constrain the way the buyer could rank the bids. This may have been good for maintaining quality; it will be interesting to see if our result holds up in a few years, when EU's new and stricter rules impose on the buyer to make the ranking predictable.

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Appendix

Table A1. Descriptive statistics, cross-sectional data.

	Minimum	Maximum	Mean	Standard deviation	*N*
Degree of competition	0	1	0.286	0.28	94
CSI	56	88	70.881	5.42	283
CSI, in-house only	57	88	71.153	5.60	189
CSI, procuring municipalities	56	84	70.334	5.02	94
Cost per person	291 500	1 376 435	601 928.70	114 973.50	290
Population	2 516	810 120	31 559.61	62 470.81	290
Education level	0.001	6.755	0.281	0.757	290
Competence	1	5	2.954	0.942	289
Hours of night fast	1	5	3.100	1.562	282
Food menu options	3	5	3.581	0.778	287
Relatives	1	5	3.066	1.219	288
Continuity	1	5	2.878	0.798	283
Single room	1	5	3.352	1.589	284
Own hygiene and cooking facilities	1	5	2.911	1.389	287
Non enforced decisions	1	5	3.179	1.540	290