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EVIDENCE FROM ELDERLY CARE IN
SWEDEN**

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ABSTRACT

Privatization and Quality: Evidence from Elderly Care in Sweden*

Non-contractible quality dimensions are at risk of degradation when the provision of public services is privatized. However, privatization may increase quality by fostering performance-improving innovation, particularly if combined with increased competition. We assemble a large data set on elderly care services in Sweden between 1990 and 2009 and estimate how opening to private provision affected mortality rates – an important and not easily contractible quality dimension – using a difference-in-difference-in-difference approach. The results indicate that privatization and the associated increase in competition significantly improved non-contractible quality as measured by mortality rates. It also reduced the cost per resident, although left total cost unaffected.

JEL Classification: H57, I18 and L33

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1. Introduction

Governments around the world increasingly rely on private contractors for the provision of goods and services.¹ One factor behind this trend is tighter budget constraints, and the hope of enjoying cost savings from the stronger incentives linked to private ownership and competition. However, precisely because of these stronger incentives, maintaining an appropriate quality level after privatization may be a concern. For standardized products, quality degradation can be avoided by properly written and managed contracts. The risk of quality degradation is higher, however, when the procured products or services are complex and important quality dimensions are hard to verify and hence not easily contractible.

This paper estimates the effects of shifting from public provision to private, competitive provision on non-contractible quality for a common service with many important quality dimensions that are rather hard to contract upon: nursing-home care for the elderly.² As an outcome measure of quality we consider mortality rates, a performance indicator commonly used in the health care literature that was not included in contracts – most likely because it is too noisy at the single-institution level and so as not to induce screening of residents. In addition to this, we study the effect of procurement on the cost of nursing-home care.

Privatization may cause quality degradation in non-contractible dimensions because of the stronger cost-cutting incentives of private contractors. However, their stronger

¹ Public procurement from private contractors makes up 15-20% of GDP of developed countries and is on the rise (see, for example, http://cordis.europa.eu/fp7/ict/pcp/key_en.html)

² In Sweden, public sector procurement – including publicly held corporations that must adhere to the Procurement Act – is estimated at about SEK500 billion (€50 billion) per year, corresponding to 16 to 18% of GDP (Bergman, 2008).

investment incentives may compensate and lead to the opposite outcome (Hart, Shleifer, and Vishny, 1997). From an ownership-investment perspective, therefore, privatization may influence non-contractible quality either positively or negatively.

There are other factors that make the relationship between privatization and quality a fundamentally empirical question. For example, the risk of quality degradation from outsourcing is particularly high in public procurement. In private transactions buyers have substantial discretion and can react to non-verifiable quality signals, reputation, brand names and long-term informal relations. This links future sales to current performance and strengthens sellers' incentives to maintain high quality (Klein and Leffler, 1981; Banerjee and Duflo, 2000). Public procurement legislation, instead, requires procedures to be objective and transparent for accountability reasons, limiting buyer discretion and with it the scope for such informal governance mechanisms (Kelman, 1990).³ On the other hand, privatization often introduces or strengthens competition, which we know can have strong positive effects on providers' management practices and hence on the quality of services, even if this is not contractible (Bloom et al., 2010).

Our empirical analysis is based on a panel of all Swedish municipalities over a period of up to 20 years. In this period about one third of all municipalities privatized – wholly or partially – the provision of elderly care services. We use data on mortality by age group (60 to 64, 65 to 69, 70 to 74 and so forth, with the oldest age group covering those aged 95 and over) and municipality characteristics (population density, educational level, share of immigrants in the population aged 65 and above)

³In many countries a contracting authority is, in principle, not allowed to discriminate in favour of strong brand names or providers that performed well in the past on non-verifiable performance dimensions (see Spagnolo, 2012).

covering the period 1990 to 2009. For the latter half of the period we have access to municipal-level data on the average cost per person in sheltered permanent accommodation (nursing homes), total expenditures for nursing homes and, by age group, the number of residents. We then surveyed the municipalities to establish whether elderly care services were exclusively produced in-house or if competitive provision from private providers had been used at all during the two most recent decades and if so, during what periods. The survey was undertaken in 2009 and we obtained answers from all but six of the 290 municipalities.

We measure mortality at the municipality level and this is the level at which we can identify effects. To this end, we make use of difference-in-differences-in-differences (DDD) strategies. We compare the changes in mortality for municipalities moving from in-house to procurement with corresponding changes for those that did not. To take into account possible differences in mortality trends among municipalities, we compare changes in mortality within the population aged 70 and above with changes in mortality among those aged 60-69 years in the same municipality.

The focus on the municipality level, rather than on the nursing-home level, restricts us to estimating intent-to-treat effects, including the effect of more intense competition, rather than effects of private ownership per se.⁴ Hence, our estimates capture the overall effect of the privatization process – the combined effect of opening to both competition and private provision – in much the same way as studies of educational markets that are opened up to entry by private schools. Focusing on

⁴Estimating the pure effect of private ownership would be more complex because of potential sorting and because the quality of the care provided by in-house units is most likely also affected when the market is opened to competition from private providers. But here we are interested in the effects of overall privatization which, as noted above, is almost inevitably linked to intensified competition.

individual nursing homes, on the other hand, would increase sorting problems, as private providers could potentially select (or be selected by) a non-representative group of residents.

We find that mortality falls (by 1.7%) in the age groups affected by the reform. The results correspond to an extension by about four weeks of the expected remaining two years of life upon admission to a nursing home. Privatization is also associated with a 1.7% reduction of the per-resident cost of service. There is no reduction of total cost though, suggesting that there is a balancing expansion in the number of beds.

The remainder of the paper unfolds as follows. Section 2 discusses the theoretical background and prior empirical research. Section 3 describes the characteristics of the elderly care industry in Sweden. Section 4 presents our data and reports some descriptive statistics. Section 5 describes our empirical approach. Section 6 presents our main results and Section 7 briefly concludes.

2. Theory and prior empirical studies

Theory

With pure in-house public production, there is often no element of competition and little scope for decentralized decisions. Governments could, in principle, have more direct control over the various quality dimensions of the services that are offered. However, where quality is hard to verify the provision of internal incentives is also more difficult, and in-house production may also suffer from poor quality.

The analysis of Hart, Shleifer, and Vishny (1997) focuses precisely on how the mode of public goods production – in-house or by private suppliers – affects non-contractible quality provision, as well as innovation and cost efficiency (see also Schleifer, 1998). They propose an incomplete contracts model where a provider can make non-verifiable investments to increase (non-verifiable) quality or to reduce cost; the latter investment will, however, be associated with a fall in quality. The main presumed differences between public and private production are that, first, the government can veto any investment in-house but not for private production; and, second, that a government employee managing production will receive a smaller share of the rents created by these investments than a private owner. The implication is that an external supplier will be more prone to making both types of investments, but will tend to invest too much in cost savings. If non-contractible cost reductions have large deleterious effects on non-contractible quality and there is little scope for efficiency-enhancing innovation, then in-house government production may be preferred. Otherwise, procurement and provision by private suppliers should be preferred as it may lead to increased quality as well as lower costs. In this model, competition strengthens the case for private provision: the set of parameter configurations under which it dominates public provision becomes larger.

Abandoning the stark assumption that quality is completely non-contractible, Levin and Tadelis (2010) assume that the cost of specifying and enforcing quality for external provision varies across goods and services, and that it is convex in the required quality level. Again, the government can opt for in-house provision. With in-house production, contracting costs will be zero but cost-reducing incentives will be weaker, so production costs will be higher. The conclusion mirrors that of Hart, Shleifer, and Vishny (1997): when quality is important enough, in-house production

dominates private provision. In Levin and Tadelis' model, the reason is that saving on transaction costs more than compensates for the decrease in productive efficiency.

The two models mentioned above focus on contracting and do not explicitly consider non-contractual governance forces. In standard market interactions, suppliers' incentives to degrade quality are also checked by the risk of losing future business. With repeat purchases, buyers may establish long-term supply relations, supported by threats to break those relations if the suppliers degrade quality (MacLeod, 2007). Absent repeat purchases, concerns over reputation and brand name value can still sustain quality provision, as they are important determinants of future sales to other buyers (Klein and Leffler, 1982; Bar-Isaac and Tadelis, 2008).

In the context of public procurement, if quality is non-verifiable but observable in advance, the contracting authority could be given sufficient discretion to choose high-quality providers. The disadvantage is of course that the authority will then be less accountable (Banfield, 1975). The outcome may not be fully predictable and it may be impossible to verify ex post that the contract was awarded fairly or efficiently to the supplier with the best bid, making the process susceptible to corruption.

If quality is non-verifiable and observable only ex post, the situation is even more difficult. A buyer must now give the private supplier incentives to provide quality after a supply contract is signed. Bonuses (monetary or in terms of contract renewal) or penalties conditional on ex-post non-contractible quality cannot help discipline opportunism unless the buyer can i) discretionally award them (non-contractible quality cannot be verified by third parties, hence the need for discretion); and ii) make it credible that it will reward high quality and punish low quality fairly

(Calzolari and Spagnolo, 2009; Iossa and Rey, forthcoming). Although a public contracting authority may commit to such a scheme, it may not be possible or desirable to give it the necessary discretion due to the risk of corruption (Dellarocas, Dini, and Spagnolo 2006).

Alternatively, an element of consumer choice may link current quality and future sales in a public procurement setting, since with consumer choice there will be ex-post competition between two or more selected providers. This gives incentives for providing high quality also after the selection stage, as providers can ‘steal’ customers from each other by offering better services. Even without ex-post competition, contracts may be structured so that revenues increase with the ex-post quality level, if sales respond to quality.

In the absence of consumer choice and with reputational forces constrained by accountability regulation, competition on price may induce even lower non-contractible quality (e.g. Spulber, 1990; Manelli and Vincent, 1995). Competition may then contribute to further weakening reputational forces. Clearly, if the procurer only looks at the price when awarding contracts, then good past performance 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 (Stiglitz, 1989; Calzolari and Spagnolo, 2009). This problem is particularly important for public procurement because of the widespread use of auctions for selecting contractors that does not allow firms to use high prices to signal high non-contractible quality (see Hoerner, 2002). Competition on dimensions other than price may also dissipate profit and make future sales a less attractive carrot for current quality. Spence (1975) showed that price regulation could revert this negative effect of competition on quality. In line with this argument, Gaynor and

Town (2011) present a model of a health care market where quality increases with competition if prices are fixed, but where the effect is indeterminate if prices are set by the market. In the market we study, prices are set by the market in competitive procurement auctions, so according to these models the effects of intensified competition on quality is indeterminate.

On the other hand, competition may improve managerial incentives and management practices, and through them the quality offered by the provider. Adam Smith wrote that “monopoly ... is a great enemy to good management” (1776) and John Hicks that “[t]he best of all monopoly profits is a quiet life” (1935, p. 8). Formal analyses, however, do not deliver unambiguous predictions of the relationship between competition and managerial incentives either (Hart, 1983; Schmidt, 1997; Raith, 2003).

Finally, Besley and Gathak (2005) show that in sectors where agents are intrinsically motivated, or “mission oriented”, an increase in decentralization and competition may improve effort and quality and reduce costs through an increase in the heterogeneity of services provided and hence improved matching of employers’ and employees’ missions. These motives are likely to be important for at least some of the providers and employees in our sample, and could therefore counteract the negative effect of competition on reputational forces mentioned earlier.

To summarize, theoretical arguments suggest that non-contractible quality may be lower under private provision, although investment incentives may push in the opposite direction. Similarly, theoretical arguments suggest that competition may increase quality, particularly when it increases that diversity of approaches that improves matching with motivated agents, but also that it may reduce reputational

concerns and hence quality, particularly when the buyer's ability to use non-verifiable information to screen and provide incentives is limited by accountability rules. Hence, the relation between privatization and non-contractible quality is likely to be highly sensitive to the specifics of the market, for which reason we now turn to the empirical evidence.

Prior empirical research

While there is an extensive empirical literature on the effects of privatization on prices, access and contractible quality, relatively few studies have touched instead on the effects of privatization on not easily contractible quality dimensions. A likely explanation is the difficulty of subjecting a quality dimension that is hard to verify, and hence to measure by third parties, to quantitative analysis.⁵

Based on data from US cities, Levin and Tadelis (2010) report that outsourcing is indeed less common when guaranteeing quality contractually is more difficult, but do not investigate the effect of outsourcing on quality. Bajari and Lewis (2011) report that appropriate contractual incentives on a verifiable quality dimension (delivery time) can greatly increase procurement performance in highway construction contracts, but do not deal with non-contractible quality dimensions.

Precisely because the importance of non-contractible quality and the scope for quality degradation vary across services, the effect of privatization should also be expected to vary across services. The quality effect of outsourcing cannot be determined definitively, so effective policy-making seems to require that the impact of privatization be explored in different contexts.

⁵An important exception is education – the determinants of educational outcomes, including the impact of voucher systems, have been studied extensively as will be discussed shortly.

One topic that has generated a relatively large empirical literature is the effect of school voucher programs on pupil performance (e.g. Hsieh and Urquiola, 2006, and Angrist, Bettinger, and Cremer, 2006) and choice of school (Angrist et al., 2002). Here, outsourcing goes hand-in-hand with intensified competition through consumer choice based on voucher systems; a typical finding seems to be that there is no significant effect on average pupil performance (MacLeod and Urquiola, 2013).⁶

A small number of studies have focused on prison services.⁷ Bédard and Frech (2009) use a three-year panel (1979, 1984 and 1990) of state prisons with different shares of medical staff employed under contract. They use self-reported mortality at the prison level and within-prison variation in the share of contracted staff over the 12 years in the estimation. They find that a 13% increase in contracted medical staff implies an increase in mortality of 1.3%. Similarly, Bayer and Pozen (2005), who uses detailed cross-sectional data on juvenile offenders, find that recidivism is higher among those juvenile offenders that are released from privately operated correction facilities, relative to publicly operated facilities.

Cabral et al. (2010), on the other hand, find that privately operated prisons in Brazil improved their performance over a range of quality indicators during the period 2001 to 2006. Since there is no within-prison variation in provision, the private-versus-public dimension is controlled for in regression models, using characteristics of the prison and its inmate population together with random prison effects.

⁶ While educational outcomes are partially observable through test results and grades, contracts are rarely conditioned on outcomes, except possibly the fraction passing a minimum standard. One reason is that explicit contracting based on outcomes is likely to distort efforts, e.g., 'teaching-to-the-test'.

⁷ Possibly inspired by the lively UK debate and following the influential paper by Hart, Shleifer, and Vishny (1997) cited above, which used prisons as an archetypical example.

While the empirical strategy of Bédard and Frech (2009) was similar to ours, they do not seem to have information on costs. They cannot, therefore, evaluate whether the reduction in quality as measured by the increased mortality was accompanied by strong cost savings, or even was determined by a deliberate switch towards cost-saving policies. Similarly, the data in Bayer and Posen's (2005) study of juvenile offenders does not allow for robust causal inference of the kind that a DDD analysis permits.

Quantitative studies of quality in the US nursing-home industry have mainly focused on the difference between non-profit and for-profit facilities. Anderson, Weeks, and Hoobs (2003), for example, report lower quality in for-profit care. Similarly, Amir Khanryan, Kim, and Lambright (2008) find that for-profit providers violate quality standards more often than non-profit providers. The latter study is based on a large nursing-home-level sample, with numerous controls for resident 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 resident's position is weak (i.e., when the client has no living close relatives or is suffering from dementia), but not otherwise. In common with the current study, Chou uses mortality as the main indicator of quality.

A concern with all of these studies is that the estimated effect of the owners' objectives on quality may be affected by sample-selection bias. To address this concern, Grabowski and Stevenson (2008) focus on changes in quality following changes in owner objectives among US nursing homes. They find that transition from one category to another does not affect quality, and also that homes that change from for-profit to non-profit status tend to provide 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, rather than a causal effect of ownership status.

The effect of competition on quality in hospital care has attracted a substantial amount of research during the last decade, as surveyed by Gaynor and Town (2011). Many of these studies focus on markets with regulated prices and find that the quality of care – often measured by mortality – increases significantly with hospital competition and/or decreases with hospital concentration (e.g. Kessler and McClellan, 2000; Gowrisankaran and Town, 2003; and Kessler and Geppert, 2005 for the US; Cooper et al., 2011; and Gaynor, Moreno-Serra, and Propper, 2013 for the UK). It is worth noting that an earlier study by Propper, Burgess, and Gossage (2008) studied a UK policy reform that introduced competition between 1991 and 1997, but with negotiated rather than fixed prices. During this period, efforts to measure quality were limited and such data was not publicly available. This study confirmed our concerns about non-contractible quality, as it found that without regulated prices, competition reduced the quality dimensions that were not measured and published, although it did reduce waiting times, which were measured.

Broadening the perspective to other markets, there exists a small, but growing empirical literature comparing the performance of in-house and outsourced water utilities. Ménard and Saussier (2000) find no significant differences between in-house and outsourced water utilities, possibly because water quality is relatively easy to measure and to base contracts upon. Galiani, Gertler, and Schargrodsky (2005) find that child mortality related to water quality fell significantly in Argentina in areas where water services were privatized, particular in poorer municipalities. Borraz, Pampillon, and Olarreaga (2011) find instead that in Uruguay, it was the

nationalization of water services that led to an improvement in sanitation rates, water quality and child mortality.

Finally, Jensen and Stonecash's (2005) survey of the literature on public-sector outsourcing suggests 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).

3. The Swedish market for provision of nursing home for the elderly

Elderly care in Sweden is the responsibility of local governments at the municipal level. Close to 100,000 persons live permanently in nursing homes for the elderly, while more than 150,000 receive assisted living services at home. The provision of elderly care is an important part of the welfare system and it consumes a relatively large part of the Swedish public sector's resources. The cost of elderly care services – assisted living as well as care in nursing homes – was approximately SEK90 billion in 2008, or close to 3% of GDP. Of this, SEK56 billion was for elderly care units.⁸

There are roughly 2,600 nursing homes in Sweden, of which about 10% were privately operated in 2008.⁹ Almost all of the supplying firms are owned by for-profit corporations; many of the owners are private equity firms. However, admittance decisions are made by the municipality. A private supplier cannot decide who to accept, and nor does it have the right to decline if it has capacity (open spots).

⁸NBHW (2009).

⁹NBHW (2008). In addition, there are about 150 transitory (short-stay) nursing homes, with another 11,000 residents. The fraction of private provision has risen rapidly since, to more than 20% in 2012.

Income-dependent fees cover on average 4% of the cost, with the municipalities paying the rest. Even when a nursing home is privately operated, the facility itself is usually owned by the municipality.

The elderly living at nursing homes constitute 7% of Sweden's senior citizens (i.e. the population aged 65 or more). This is less than in Norway and the Netherlands, more than in Germany and about the same as in France (Larsson, Kåreholt, and Thorslund, 2008). Senior citizens aged 80 or above make up 80% of the residents; in this age group, 16% of the population lives permanently in nursing homes. For seniors above 95 years of age, this rises to about 50%. More than two thirds of the residents are women and around three quarters of the residents suffer from dementia.¹⁰

Variation within Sweden is high; the ratio between the municipality with the highest and the lowest proportion of its senior citizens in nursing homes is about 4:1. Northern and rural municipalities tend to have a higher proportion of their population in nursing homes, mainly due to an older overall population. Larsson, Kåreholt, and Thorslund (2008) report that among those aged 80 or more, the proportion living in nursing homes fell by about a quarter between 1995 and 2004, due to better health and also to a policy shift towards providing more assistance at home in order to delay entry into nursing homes.

Admittance to a nursing home is a strong indicator of increased mortality risk. Based on a survey conducted in 1995, Larsson, Kåreholt, and Thorslund (2008) report that while about 10% of the population aged 75 or more are living in elderly care units

¹⁰SALAR (2007); NBHW (2009).

five years before their death, this rises to about 50% in the months prior to death.¹¹ Based on the same survey, they find that the average age when admitted to a nursing home is about 84 years. After about one year in a home, half of the individuals will have deceased.¹²

Procurement has become an important mechanism for organizing the provision of elderly care services in Sweden since the 1990s. Nursing-home service-provision contracts are awarded after a tendering procedure where the winner is nominated on the basis of lowest price, highest score for price and quality or, more unusually, highest quality for a given price. Once a winner has been nominated, the contract is essentially a per-resident fixed-fee contract with an average duration of close to four years. The procurer normally has an option to extend the contract once or twice, with an average total extension period of more than two years.¹³

According to EU procurement regulation, any qualitative criteria that will be considered when public contracts are allocated must be verifiable and listed in the so-called contract notice (a document published by the contracting authority that contains the information on which potential suppliers base their bids). Contract performance clauses are also to be specified in the same document, while past performance information cannot be used for the selection of contractors. These rules limit considerably the possibility that quality is sustained by “the shadow of the future” (Spagnolo, 2012). However, prior to the Swedish 2008 Procurement Act the Swedish legislation allowed a rather liberal interpretation, in the sense that the buyer

¹¹The survey was conducted in 1995 on 567 elderly persons living in Stockholm. The individuals were followed until 2005.

¹²Personal communication with experts at SALAR.

¹³Bergman and Lundberg (2011).

had a relatively high degree of freedom to select the winner (Hyytinen, Lundberg, and Toivanen, 2008). The new act considerably reduced this freedom.

The legislation allows the municipality's own production unit to participate in the tendering process on an equal footing with private providers, although the municipality may of course choose not to do so. Legislation that formally allows the organization of a voucher system was introduced only in 2009, although a handful of municipalities had such systems in place much earlier, possibly in violation of the rules.¹⁴

4. The data

Our key measure of (inverse) quality is the mortality rate. Mortality data across five-year age groups as well as municipality characteristics – i.e., population, population density, educational level (more than three years of university-level education), political preferences (distribution of seats on the local council) and share of population of immigrants aged 65 and over – were obtained from Statistics Sweden (SCB) for the period 1990 to 2009. Municipal-level data on the average cost per resident in nursing homes for the elderly and total expenditures for nursing homes for the period 2000 to 2009, and the number of residents for the period 1990 to 2009, were obtained from the National Board of Health and Welfare (NBHW).

We surveyed all municipalities on what method they use to organize elderly care services: in-house production, traditional competitive procurement, voucher scheme,

¹⁴ Four municipalities introduced user choice in the early 2000s, one more followed in 2006 and another two in 2008-2009.

or a combination thereof. We asked what fraction of the beds was under in-house operation in 2008 and when procurement was first introduced for this service in the municipality. We also asked if there had been any changes to the mode of provision of nursing-home care for the elderly, other than the initial decision to procure from private providers. The survey was undertaken during 2009. Due to the small number of voucher systems during the period we study, we do not distinguish between the two modes of private provision.

In total, 276 out of 290 municipalities are included in the data. Eight municipalities are excluded from the panel due to their being involved in a municipality split or merger, and six municipalities did not respond to our survey. At the time of our survey, 190 municipalities report neither having shifted, nor having an intention to shift to procurement, i.e., they are initially in-house producers and remain so for the entire time period studied. One municipality had already introduced competition in 1990. Consequently, 85 municipalities reported that, at some point between 1990 and 2009, they shifted from in-house production to procurement and potentially an external provider. As noted, a tendering process does not guarantee that a private provider actually enters, although this is by far the most frequent outcome.

Descriptive statistics

Table I provides summary statistics of socio-economic factors that will be controlled for in the empirical analysis. For simplicity, means are provided for three years: 1990, 2000 and 2009. Additional summary statistics are presented for 2009. All figures are reported for the full sample but also by type of provision: external (shift = 1) or in-house (shift = 0).

Table II reports summary statistics for the total cost for nursing-home care, the cost per resident living in a nursing home, the share of the population aged 65 or more that live in nursing homes, and the share of beds procured (if shifting is equal to 1).

From Table I we can clearly see that external provision is more prevalent in the more urban areas of Sweden. Municipalities that procure the provision of nursing-home care for the elderly tend to have a larger population and be more densely populated than those that have never procured. Those with external provision have a more highly educated population and political preferences associated with fewer left-of-centre seats in the local government (*t*-values for mean differences are provided in the table).

According to the values presented in Table II, there are no statistically significant differences when it comes to the share of immigrants aged 65 and more in the population, average cost per resident, or the share of senior citizens living in nursing homes. The data on the share of senior citizens living in nursing homes is available for five-year age groups. The average annual cost per person is close to SEK370,000 (at the 1990 price level) or approximately €60,000 (at the 2011 price level).

As seen in Table II, there is a notable dispersion in the extent of privately provided care within the group that does procure at some point between 1990 and 2009, and the share of procurement clearly increased between 2000 and 2009. Furthermore, although not reported in the table, while in 2000 the highest share of procurement was 66%, we observe two municipalities with 100% external provision in 2009.

Figure I shows the development of annual mortality rates for two age intervals: 60-69, and 70 and above.¹⁵ Generally, there was a significant fall in mortality rates between 1990 and 2009 due to improved health in the population. Also, for all age groups, mortality rates tend to be markedly higher in municipalities that only have in-house production than in procuring municipalities (external). However, the graphs do not reveal whether this is because procurement results in lower mortality (a causal effect) or whether municipalities with low mortality tend to procure (a selection effect). In the graphs, a municipality that begins procurement sometime between 1990 and 2009 is categorized as “external” in all years.

Figure I about here

Table I and Table II about here

Figure II displays the average mortality rate for only those municipalities that by 2009 had shifted from in-house to at least partially private provision. The solid (dashed) line represents the municipalities before (after) they shift to procurement. One municipality had already shifted to private provision in 1990. All municipalities in our sample that eventually introduced procurement during the period of study had done so by 2008; hence the line representing as yet pre-reform municipalities disappears after 2007. Visual inspection of the graphs suggests that procurement is associated with lower mortality rates, but only for the more senior age group, not for the group of 60-69 year olds.

Figure II about here

¹⁵ Corresponding diagrams for 5-year age groups are shown in Bergman, Lundberg, and Spagnolo. (2012).

5. Empirical approach

We identify the effect of opening of elderly care services to external and private provision by comparing the municipality-wide changes in mortality following a shift to procurement, relative to contemporaneous changes in mortality among municipalities that have not shifted from in-house to external provision.¹⁶ As noted, using municipality-wide mortality rates largely avoids problems of selection bias in the estimation, since fewer than two out of 1,000 nursing-home residents receive elderly care outside of their home municipalities.

We argue that mortality can be seen as an objective measure of non-contractible quality. It is widely used as a quality indicator for medical and related services and it has the interesting property that it is observable to us, in the sense that it is amenable to econometric analysis, but it is not contractible in our context for at least two reasons. First, the relationship between mortality and elderly care quality is noisy; the number of nursing-home residents would be too small within an individual provider-municipality relation to allow for significant inference and, hence, for effective incentive mechanisms to be linked to mortality. Second, explicit rewards or sanctions linked to survival or mortality, respectively, would give providers incentives to screen potential residents. Even if mortality were in principle contractible, we know from the direct inspection of contracts that it was not used in our data, so it would still be a relatively good proxy for effects on other non-contractible quality dimensions.

The identification strategy uses shifts from in-house to external provision. Given the long-run positive trends in health and resultant falling mortality rates (see Figures I

¹⁶Sommers, Baicker, and Epstein (2012) use similar methods to assess the impact of expanded Medicaid eligibility.

and II), a simple before-and-after comparison will not yield an unbiased estimate of the effect of external provision. By using the mortality rate in municipalities with in-house provision as a counterfactual for the mortality rate in the absence of the external provision, we could potentially take these positive health trends into account in a difference-in-difference (DD) framework.

However, the regime is a choice variable for the municipality. The change from in-house to external provision could be due to a shock to the municipality that also had an impact on our measure of quality, i.e., the mortality rate. For example, a negative budget shock could trigger a transition to procurement *and* spending cuts that could also affect the health of the population in the municipality. This would invalidate the strict exogeneity assumption needed in a standard DD framework. A further complication is that trends in mortality rates may differ between reforming and non-reforming municipalities. Some authors (e.g. Shkolnikov et. al., 2012) have argued that the health status, and hence longevity, of the population living in more privileged area has increased more than that of the population living in less privileged areas. Since the population in the municipalities shifting from in-house to external provision has a higher average socio-economic status, there is a relevant concern over diverging trends for the two groups.

In order to take these potential complications into account, we use a difference-in-difference-in-difference (DDD) framework. We assume that the population below 70 years of age is unaffected by the change in nursing-home provision. Under this assumption, we can use those aged 60 to 69 to control for shocks and differences in trends that are correlated with the decision to procure.

We define the mortality rate M_{imt} as:

$$M_{imt} = \frac{\text{No. of deceased}_{imt}}{\text{Average Population}_{imt}} \quad (1)$$

where $i=1, \dots, 9$ represents age group, with each group comprising five years; $m=1, \dots, 276$ represents municipality; $t=1, \dots, 20$ corresponds to the period 1990-2009; and where *Average Population* is measured as the mean of the population at the start and end of year t .

The identifying assumption of our DDD framework is that in the absence of an effect from the shift to private provision, the time pattern of the differences in mortality rates of those older than 69 against those younger than 70 for the procuring municipalities should match that of municipalities that do not yet procure; in other words, the differences in differences should be zero in the absence of an effect from privatization. While we cannot test this assumption directly, we can get an idea of whether the assumption is valid by comparing i) the difference in mortality rates between the group younger than 70 and those older than 69 in the years prior to a change to external provision with ii) a similar difference in mortality rates for those that have not (yet) outsourced elderly care services. The result from this exercise is seen in the scatter plot displayed in Figure III.

From the scatter-plot smoother we can see that there are very small differences between the two groups. The mortality rates of the over 69 year olds are around 5.7 (5.4) percentage points higher at the beginning of the period and 5.4 (5.2) percentage points higher at the end of the period than they are for the younger age group for those procuring (not yet procuring). Given the small differences in levels, any functional-form assumption in a regression model used in the estimation should not be influential for the inferences. We also cannot see any sharp difference in the year just before the shift to external provision, which supports the strict exogeneity

assumption. Figure IV provides a scatter-plot smoother for the difference between the two curves in Figure III, with the 95% confidence interval indicated. Importantly, we can see that by taking the difference, the decreasing trend in mortality is removed; the difference in mortality rates is basically flat. Overall, we conclude that the difference in levels is small and not statistically significant.

Figure III and Figure IV about here

Analysis

Let P_{mt} be a step function that takes value 0 until the time municipality m shifts to external provision, and 1 afterwards. Furthermore let $I_{imt} = 1$ if the age group is above 69 years of age. The following model forms the basis for our analysis:

$$\ln(M_{imt}) = \alpha_0 + \alpha_t + \alpha_i + \alpha_m + \beta_0 P_{mt} + \beta_2 X_{mt} + \beta_1 P_{mt} I_{imt} + u_{imt}, \quad (2)$$

Here α_m , α_t and α_i , are municipal, calendar time and age group fixed effects, respectively, while u_{imt} is the error term. The parameter of interest is β_1 . The ordinary least-squares (OLS) estimator of β_1 will, under the assumption of strict exogeneity, be an unbiased estimate of the effect of external provision. Any potential difference in trends in the differences across the two age groups for procuring and non-procuring municipalities is here allowed to differ by the factor $\beta_0 + \beta_2 X_{mt}$. Based on Figure IV we expect β_0 to be very close to 0. Note also that the shift, P_{mt} , takes place at different time periods and not, as in traditional DD and DDD models, at the same time period for all of the treated groups. The primary advantage is that the inference from our model is less susceptible to common shocks, which may plague the traditional DD and DDD models (Bertrand, Duflo, and Mullainathan, 2004).

This specification implies equal proportional effects on the mortality rate for all age groups affected by the reform. There are two reasons for why this is a reasonable specification. 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 approximately 1% percent at the age of 63 (68) and approximately 10% at the age 84 (87) for Swedish men (women).¹⁷ For this reason we prefer a logarithmic model in the estimation of the effect of external provision.¹⁸ The second reason is that the share of each age group that lives in nursing homes is highly correlated ($\rho > 0.99$) with the per-age-group average mortality rate.

We include in X_{mt} the population density, the share of the population with more than three years of university studies, the share of immigrants aged over 64 and, finally, the share of the seats on the local council held by left-of-centre parties. The inclusion of socio-economic factors is motivated by, for example, Gallo et al. (2000) and Shkolnikov et al. (2012). The former find that the job market situation has a negative and significant effect on physical and mental health, after controlling for other socio-economic factors, while Shkolnikov et al. (2012) find evidence of increased differences in mortality rates between population groups with different levels of education. The job market situation is not included in our model, however, because it is only available from 1993 onwards. Also, education and employment are highly correlated (0.45) and education and average income are also highly correlated (0.89). The correlation between average employment and average income is 0.61.

¹⁷ SCB, see [://www.scb.se/statistik/_publikationer/BE0701_1986I03_BR_BE51ST0404.pdf](http://www.scb.se/statistik/_publikationer/BE0701_1986I03_BR_BE51ST0404.pdf)

¹⁸ As sensitivity analysis we also estimated models with mortality rates in levels; as expected given the graphs displayed in figure II, the results are robust to this change in specification.

Model (2) is to some extent restrictive. The main advantage with the specification is that, given the graphs displayed in Figures II and III, it is transparent with respect to the identification strategy. However, in order to test the model specification we also estimate a model in which – in addition to the three main fixed effects – we also control for all three second-order interactions. This specification allows for more flexible control of potential difference-in-difference in trends across procuring and non-procuring municipalities. To this end, we specify and estimate the following model:

$$\text{Ln}(M_{imt}) = \alpha_0 + a_t + a_i + a_p + a_{pt} + \alpha_{it} + \alpha_{ip} + \beta_1 P_{mt} I_{imt} + u_{imt} \quad (3)$$

Here $p = 1$ if a municipality ever procured and $p = 0$ otherwise, where α_p , α_{pt} , α_{it} and α_{ip} are procurement, procurement-by-time, age-by-time and age-by-procurement fixed effects, respectively.

6. Results

Expressions (2) and (3) specify the models used in the estimation of the effects of external provision on mortality over the period 1990 to 2009.¹⁹ Estimation of models (2) and (3) is performed with weighted least squares (WLS). The (square root of the) population size is the natural weight, as the unit of analysis is the individual and not the municipality.²⁰ Inference is performed with standard errors that are estimated

¹⁹ Due to lack of data on the employment rate for the first three years, a shorter panel is used when municipal control variables are included.

²⁰ The implication is that our analysis is at the individual level. Thus, each individual gets the same weight. An analysis without weights gives more weight to individuals living in smaller municipalities.

under the assumption of within-municipality level correlations (i.e. within-municipality clustered standard errors).

The results from the estimation of model (2) with a different setup of controls are displayed in Table III. In column (1) we only control for age. Column (2) gives the result when we add municipal fixed effects and in column (3) we additionally control for calendar time. Column (4) provides the results from the full model given in equation (2).

Table III about here

From column (1) of this table we can see that when we do not control for the municipality, the estimate is small and statistically insignificant. The results from the specifications in columns (2)-(4), however, are all statistically significant and of the same magnitude. The point estimates with and without control variables are virtually the same and suggest that shifting to external provision would reduce the mortality rate by 1.7%. That the effect is similar with and without control variables suggests that selection based on unobservables should not be a problem in our analysis (cf. Altonji, Elder, and Taber, 2005).

As a sensitivity analysis we have also estimated model (3), which provides us with more flexible control for potential difference-in-difference in trends across procuring and not-yet-procuring municipalities. The results are displayed in Table IV. In addition to the fixed effect we have successively added second-order interaction terms. In column (1) we have added age-by-year effects, column (2) includes age-by-procurement fixed effects and, finally, column (3) presents the results from the fully specified model (3).

The results are once again very stable and also very close to the results displayed in Table III. The results from the preferred model (column 3) suggest that shifting to external provision would reduce the mortality rate by 1.9%.

Table IV about here

We have found that the opening of elderly care services to external competitive private provision results in a reduction of the mortality rate by about 1.7% in the affected population. The question, then, is how this effect should be interpreted. In the relevant age groups, only around one person out of nine lives in a nursing home, and the average spell in a nursing home is around two years. Under the simplifying assumption of no time dependence, this means a yearly death hazard of 50%. Then, under the assumption that all of the effect stems from increased health among those living in nursing homes, we get a reduction in hazard rates from 50% to 48.3%. This means that a reform that introduces private provision and competition increases longevity from 2 to around $(1/0.483)$, corresponding to an average increase in longevity of around 4 weeks.

6.1 Costs

We have also estimated the effect of the reform on the costs for municipalities. As explained in the data section, this variable is only available from 2000. We study the costs per person living in an elderly home as the dependent variable. The primary reason for using this variable instead of the total cost is that the observed change in quality from the shift to external provision affects the demand for elderly care services, which in itself has a direct effect on total cost (more weeks in elderly care). As a sensitivity analysis, however, we also estimated the effect on total cost. In this

analysis the unit of interest is the municipality and we therefore estimate the effects on the (log) cost using the fixed effect ordinary least squares (OLS) estimator.

The results from the estimation are displayed in Table V. From this table we can clearly see that when we control for calendar time fixed effects, the effect of competition decreases the cost per resident. This result is stable when we add control variables to the regressions.

Table V and Table VI about here

In Table VI the corresponding results in which we regress the shift on log total cost are displayed. From this table we can see an initial increase in total cost, but this effect disappears when controls are added.

Taking the effect on mortality also into account, our results indicate that opening of nursing-home care for the elderly to competitive private provision - at least to some extent – increases quality while at the same time decreasing the cost per resident. The shift has no effect on the total cost of elderly care services. The effect on the total cost is most likely outweighed by the effect of an aging population.

7. Discussion and conclusions

Somewhat contrary to our expectations, we find evidence suggesting that non-contractible quality – as measured by mortality rates – *increases* with a shift to private, competitive provision, even though prices are competitively determined. Municipalities that begin to outsource elderly care services experience a reduction in mortality rates and these improvements are concentrated to the age groups where nursing-home residency is common. We arrive at our results after controlling for

municipality characteristics, year effects and socio-economic factors using a difference-in-difference-in-difference approach.

Per-capita costs did not go up, so we can conclude that in Sweden the privatization of elderly care services has increased a form of non-contractible quality (mortality rates) while simultaneously reducing costs per resident. A simple explanation for these results, consistent with Hart, Shleifer, and Vishny (1997), is that even in this industry efficiency gains dominated on cost-cutting incentives production was transferred to complementary private suppliers. A non-exclusive explanation is that it was the increase in competition associated with privatization that improved quality of service, for example by forcing an improvement in management practices ousting under-performing managers.

As mentioned earlier, during most of the study period the public procurement rules were rather liberal in Sweden, in the sense that the buyer had a relatively high degree of discretion in the selection of contractors. This may also have allowed buyers to maintain quality through informal reputational threats (“the shadow of the future”).²¹ The fact that procured elderly care expanded rapidly during this period may have further boosted the importance of future sales relative to current profitability. It will be interesting to see if our result holds up in a few years, under the EU’s revised and stricter rules aimed at limiting discretion and encouraging cross-border entry, and when the market has left the first expansionary phase.

²¹ This explanation would match well Bandiera, Pratt and Valletti’s (2009) finding that in Italy, the more autonomous is the purchasing body (the more discretion it enjoys), the better is its procurement performance, both in terms of higher value for money and of lower corruption.

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Table I

Descriptive statistics, municipality characteristics, 1990-2009. Source: Statistics Sweden.

Variable	Mean 1990	Mean 2000	Mean 2009	Std. dev. 2009	Min. 2009	Max. 2009	# Obs 2009	t-test
Population (inhabitants)	29211.82	29898.24	31389.26	63963.99	2500	829417	276	
Shifting	54175.22	57836.85	62552.85	106212.20	7156	829417	86	3.93
In-house	17792.40	17252.34	17283.64	15416.58	2500	95798	190	
Population density (pop./km2)	124.98	127.54	139.10	475.52	0.20	4410.40	276	
Shifting	288.30	313.34	345.71	803.64	0.90	4410.40	86	3.45
In-house	50.27	43.44	45.57	101.70	0.20	876.30	190	
Share immigrants 65+	0.01	0.02	0.03	0.03	0	0.28	276	
Shifting	0.02	0.03	0.03	0.02	0.01	0.14	86	0.53
In-house	0.01	0.02	0.03	0.03	0	0.28	190	
Higher education, share of adult pop.	0.04	0.06	0.10	0.04	0.05	0.29	276	
Shifting	0.06	0.09	0.13	0.05	0.06	0.29	86	7.94
In-house	0.03	0.05	0.08	0.02	0.05	0.18	190	
Left-of-centre share in local council	0.51	0.52	0.48	0.13	0.09	0.83	276	
Shifting	0.47	0.46	0.42	0.11	0.09	0.78	86	5.84
In-house	0.53	0.54	0.51	0.13	0.22	0.83	190	

Note: Population density is defined as the total population per square kilometer (km²). Education is defined as the share of the total population with more than three years of university studies. Immigrant shares are the share of immigrants aged 65 and above, relative to the whole population in that age group. Total cost (in millions) and annual cost per resident (in 1000s) are measured at 1990 prices in Swedish kronor (SEK). The t-test is applied to the 2009 data.

Table II

Descriptive statistics, nursing-home care, 2000-2009 (except share of residents, for which the period is 1990-2009). Source: the National Board for Health and Welfare (NBHW).

Variable	Mean 1990	Mean 2000	Mean 2009	Std. dev. 2009	Min. 2009	Max. 2009	# Obs 2009	t-test
Total cost for elderly care services (million SEK/year)		132.20	125.09	230.56	10.82	3147.88	276	
Shifting		235.68	228.45	384.16	30.20	3147.88	86	3.60
In-house		83.79	78.31	62.57	10.82	399.22	190	
Cost per nursing-home resident (SEK1000/year)		315.23	368.06	58.66	188.96	571.77	276	
Shifting		314.67	360.07	48.02	240.26	455.86	86	1.67
In-house		315.48	371.68	62.67	188.96	571.77	190	
Nursing-home residents, share of elderly population	0.07	0.07	0.06	0.02	0.01	0.10	273	
Shifting	0.08	0.07	0.06	0.01	0.03	0.09	86	1.35
In-house	0.07	0.07	0.06	0.02	0.01	0.10	190	
Share of procurement		0.13	0.26	0.25	0	1	86	

Table III

Estimation results of effects on mortality of introducing competitive procurement.

	Effect (1)	Effect (2)	Effect (3)	Effect (4)
Estimate	-0.006 (0.007)	-0.013** (0.006)	-0.017*** (0.006)	-0.017*** (0.006)
Age-group fixed effect	Yes	Yes	Yes	Yes
Municipal fixed effect	-	Yes	Yes	Yes
Calendar-time fixed effect	-	-	Yes	Yes
Control variables	-	-	-	Yes

Note: Estimation of the model displayed in equation (2) is performed with weighted least squares (WLS) using the size of the population as weights. Standard errors, displayed within parenthesis, are estimated by clustering at the municipality level. Control variables are the population density, education, the employment rate, the share of immigrants aged 55 to 64 and 65 and above. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$

Table IV

Estimation results of the effects on mortality.

	(1)	(2)	(3)
Effect	-0.023*** (.004)	-0.015*** (.004)	-0.019*** (.005)
Age, municipal, time fixed effects	Yes	Yes	Yes
Age -by-year	Yes	Yes	Yes
Age-by-procurement		Yes	Yes
Procurement-by-year			Yes

Note: Estimation is performed with weighted least squares (WLS) using the size of the population as weights. Standard errors are displayed within parenthesis. They are estimated by clustering at the municipality level. *p < 0.1, **p < 0.05, ***p < 0.001

Table V

Results from the regression of shift on (log) cost per resident living in nursing homes.

	Effect	Effect	Effect
Estimate	0.105 (0.011)	-0.019** (0.007)	-0.017** (0.007)
Municipal fixed effect	Yes	Yes	Yes
Calendar time fixed effect	-	Yes	Yes
Control variables	-	-	Yes

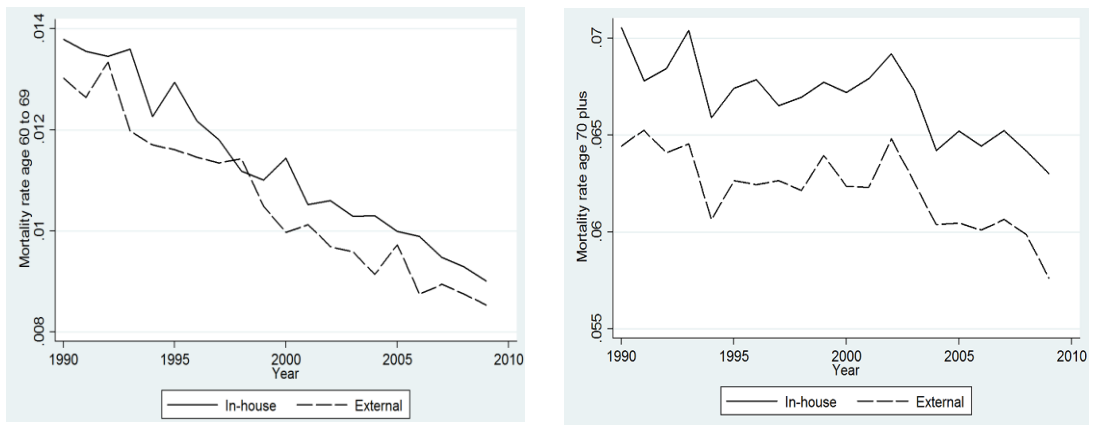
Note: Estimation is performed with OLS. Standard errors are displayed within parenthesis. Control variables are share of seats held by left-wing parties in the local council, share of population with more than three years of university education and share of immigrants among the population aged 65 or more. ** p<math><0.05</math>, ***p<math><0.001</math>.

Table VI

Results from the regression of shift on (log) total cost.

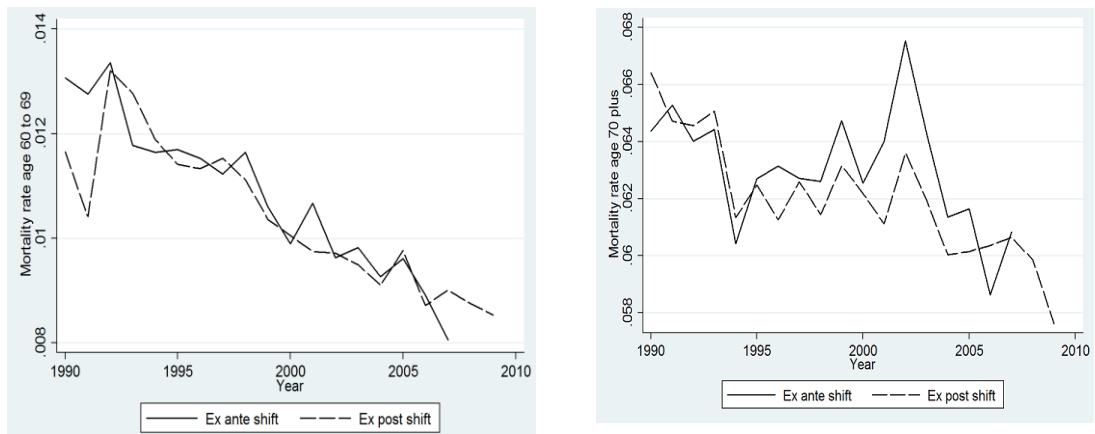
	Effect	Effect	Effect
Estimate	0.018 (0.007)	0.014 (0.007)	-0.003 (0.006)
Municipal fixed effect	Yes	Yes	Yes
Calendar time fixed effect	-	Yes	Yes
Control variables	-	-	Yes

Figure I



Mortality rate for municipalities that have shifted to external provision or will shift (“External”) and for other municipalities (“In-house”), by age group

Figure II



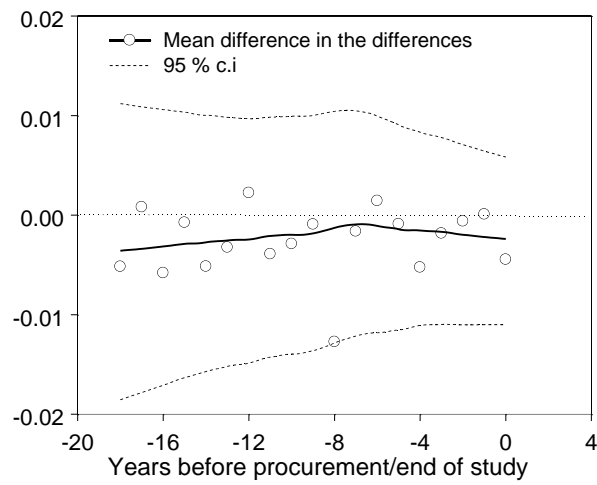
Mortality rate for municipalities that shifted from full in-house provision to external provision, ex ante (solid line) and ex post the shift (dashed line), by age group.

Figure III



The mean difference in mortality rates between those older than 69 and those younger than 70, for the municipalities shifting to external provision at time 0 and for those that did not (yet) shift. The lines are estimated using LOESS with one degree of freedom.

Figure IV



The mean difference in mortality rates between those older than 69 and those younger than 70 for the municipalities shifting to external provision at time 0 against the corresponding mean difference of those that did not (yet) shift. The lines are estimated using LOESS with one degree of freedom.