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" Ownership, Incentives and Hospitals"

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Abstract

This article analyzes hospital privatization by comparing costs and quality between different ownership forms. We put the attention on the distinction between public hospitals and private hospitals with public funding. Using information about Spanish hospitals, we have found that private hospitals provide services at a lower cost at expenses of lower quality. We observe that property rights theory is fulfilled at least for the Spanish hospital market. The way that Heath Authorities finance publicly funded hospitals may be responsible for the differences in incentives between public and private centers. We argue that the trade-off between costs and quality could be minimized by designing financing contracts with fixed and variable components.

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I. INTRODUCTION

Public health expenditure has increased notably in recent decades. Technological change, the ageing of the population, the increase in public health coverage and the presence of more chronic diseases are the main factors explaining this phenomenon. Since *per capita* expenditure for healthcare grew at an annual rate of 6%[1] on average in OECD countries between 1990 and 2007, debates about healthcare systems arose in the nineties and have resulted in reforms in most OECD countries.

In Europe, where the majority of healthcare systems are publicly funded, reforms were designed to pursue two objectives: cost-containment and the introduction of internal market competition. In order to achieve these goals health authorities delegated some of their responsibilities to the private sector[2]. As a result of these reforms healthcare markets are characterized by the simultaneous existence of public and private providers. Here we focus on the comparison of public hospitals and private hospitals with public funding, using data from Spanish hospitals from 1997 and 2007.

Privatization may lead to cost savings if it introduces competition or if private firms can take better advantage of the economies of scale and scope than their public counterparts. However, in healthcare delivery, at least in publicly funded healthcare systems, such factors are not applicable. Indeed, it is difficult to introduce competition in the hospital market, as hospitals are isolated entities. Thus, the cost differences between ownership forms should be found in the managers' incentives.

Taking this into consideration, we claim that the mechanism used by Health Administrations to pay hospitals is a key element in hospital healthcare provision. If hospitals are paid a fixed amount per attributed patient or activity, which means that they are paid following a capitalization system, then managers would have an incentive to incur cost reductions to maximize their benefits. If health administrations reimburse all hospital expenses then managers would not have any motivation to reduce costs.

The fact that healthcare delivery is a complex product implies that health administrations enter into incomplete contracts when they choose a private firm to provide healthcare services. In particular, healthcare delivery is characterized by having high transaction costs. This means that the contractor may find it difficult to

[1] Source: Organization for Economic Cooperation and Development (OECD) Databases.
[2] Italy, United Kingdom, Switzerland, Germany and Spain are some examples of countries that applied such reforms during the nineties.

monitor hospital quality. According to Hart, Shleifer and Vishny (1997), private hospitals may reduce costs at the expense of quality because it is difficult for health administrations to notice this reduction in quality. Overall, it is possible that a tradeoff between cost and quality reduction could arise from hospital privatization.

In this paper, we undertake an empirical analysis to examine whether hospital privatization in Spain has led to cost savings at the expense of quality. This may provide an explicit test of the property rights theory in publicly funded healthcare systems. Note that another contribution of our paper is that we construct an index that takes into account several dimensions of hospital quality.

We chose the Spanish hospital sector to carry out our analysis for several reasons. First, the healthcare reforms in Spain have been ambitious. These reforms were aimed at increasing the efficiency and reducing the cost of healthcare services by introducing private firms into the market. Second, as a result of these reforms there is a large variety of forms of healthcare delivery in the Spanish hospital market. Finally, the Spanish healthcare system is a National Health System with a publicly funded universal coverage. This allowed us to analyze both private and public firms providing a public service with public funds.

The paper is organized as follows. Section 2 reviews both the theoretical and empirical literature about ownership and performance focusing on the hospital market. Section 3 deals with the data while giving an overview of the scope of privatization in the Spanish hospital market. Section 4 explains the empirical strategy. Section 5 gives the conclusions.

II. THEORETICAL AND EMPIRICAL REVIEW OF HOSPITAL OWNERSHIP AND PERFORMANCE

In this section we review economic theories related to privatization, ownership and performance in the hospital market. Then we give an overview of the empirical literature about ownership and performance in hospitals.

2.1. Theories about ownership and performance

With regard to market structure, two different economic theories agree on the idea that if privatization results in an increase in market competition then cost savings will be incurred. According to the Structure-Conduct-Performance (S-C-P) paradigm (Bain, 1951; Mason, 1939), *industrial organization* theories state that if privatization results in an improvement in market competition, then firms will modify their behavior, leading to more competitive results.

Theories explaining the positive relationship between competition and cost reduction can also be found in the Political Economy literature. *Public choice* believes that public agents are not benevolent, and thus they act in their own interests, as do private agents in private markets (Stigler, 1971). Thus for example, politicians want to be re-elected, so their conduct will be focused on vote maximization, which normally will lead to an overprovision of public services. Bureaucrats, meanwhile, are interested in maximizing their budgets, but once again this will result in overspending on public services (Brennan and Buchanan, 1980). Public choice theories claim that if competition in the provision of the service is introduced, then public agents will not have enough power to achieve their own objectives.

With regard to hospital sector it is worth noting that introducing competition is a difficult task, at least for publicly funded healthcare systems. This phenomenon can be explained by the fact that it is the governmental health authority that normally plans healthcare services. In publicly funded systems patients are distributed among centers according to their demo-geographical location. For this reason, there is almost no opportunity for publicly funded centers to compete for patients.

Privatization may also lead to costs savings if private firms can take better advantage of economies of scale and scope than their public counterparts. However, hospitals are isolated productive unities, and private firms do not have better opportunities than public entities to exploit economies of scale. In addition, private hospitals are normally smaller than public hospitals, at least in our context. It has to be noted that private hospitals normally offer a lower variety of healthcare services, so taking advantage of the economies of scope is also unlikely in the private healthcare sector.

When studying healthcare delivery it is important to keep in mind that we are dealing with a particular sector. Medical care is characterized as being a complex market that violates most of the requisites of perfect competition. Arrow (1963) claimed the predominance of *uncertainty* in both healthcare demand and treatment effectiveness, which means that hospitals find it difficult to predict their costs. Moreover, the presence of *asymmetric information* gives the practitioner a key role in the market, so their incentives would determine market results. In addition, healthcare can be defined as a *credence good*, which means that the consumer is often not well informed about the quality of the service provided and cannot experience the quality of the good. In summary, as healthcare is a *complex product*, contracting out public

healthcare services is associated with high transaction costs. Taking all market imperfections into account, the incentives for different healthcare organizations are a key determinant of healthcare market results.

In this context, the relationship between hospitals and Health Authorities is a key element determining market results. *Transaction costs* theories can help us to develop different hypotheses about the effect of privatization on the hospital sector.

Transaction costs theories focus on the effect of costs in service delivery including administrative costs and the costs of incomplete contracts. This theory states that factors such as asset specificity, uncertainty (Brown and Potosky, 2003) or monitoring and control (Sappinton and Stiglitz, 1987) determine the potential problems and risks of contracting public services, because these features increase the complexity of the contracts for public service delivery. Following Hart and Moore (2008) and Williamson (1975), complex contracts could lead to undesirable contractor behavior because it is difficult to monitor their acts.

In relation to healthcare, we have seen that it is a complex product in which uncertainty, asymmetric information and non-contractible quality have an important role. In addition, hospitals require assets that can only be used for healthcare. These are precisely the elements that are difficult to control during the fulfillment of the contract, and increase the complexity of the contracts for healthcare delivery, which could lead to unprofessional practitioner behavior that goes undetected by public agencies.

Based on the idea that different organizational forms have distinct objectives, the *property rights theory* analyzes the economic incentives of public and private firms by studying who has the residual control rights of non-human assets. Hart, Shleifer and Vishny (1997) claimed that private firms have strong incentives to invest in innovations because they have well defined control rights, but as they would gain more benefit from cost reduction, private providers may over-invest in cost-cutting at the expense of quality. The authors assumed the presence of asymmetric information, and the idea behind their findings is based on the fact that private deliverers ignore the adverse effects of non-contractible quality.

Hart, Shleifer and Vishny (1997) discussed the implications of their theory for healthcare delivery. They argued that in this sector both the gains for innovation and the harm of quality reduction are potentially enormous and that consumers do not

notice a reduction in quality. For these reasons, they predicted that public property would be superior to private in the healthcare sector.

To sum up, economic theories of ownership and behavior predict that public hospitals would be more costly than their public counterparts and private firms would provide lower quality services than public hospitals. As it is difficult to introduce competition in the hospital market, and the economies of scale and scope are more prone to arise in public hospitals, the reduction in hospital costs as a result of privatization may be explained by differences in incentive between ownership forms. Taking into account the fact that healthcare delivery is characterized as being a complex product, which means that it is difficult for Health Authorities to monitor the quality offered, private hospitals may be taking advantage of the transaction costs by reducing costs at the expense of quality.

2.2. Empirical literature about hospital privatization

The empirical literature analyzing the effects of privatization on market performance finds no clear evidence about the expected consequences of privatization. In their review of empirical studies on the effects of selling public firms, Megginson and Netter (2001) concluded that privatization leads to cost savings, while Bel, Fageda and Warner (2010) found no systematic relationship between ownership and costs in their meta-analysis study about contracting out local services.

Conflicting results are also found when studying the impact of hospital privatization on performance[3]. Table 1, which summarizes the empirical studies about hospital privatization, shows the variety of results found in the literature.

The vast majority of empirical literature analyzing the effect of hospital privatization does it by relating hospital ownership and costs. As can be seen in Table 1, there is no systematic relationship between hospital ownership and costs.

It is worth noting that the majority of studies analyzing the US hospital market found that private for-profit hospitals were more costly than non-profit and public entities (Granneman et al., 1986; Ozcan et al., 1992). However, most of the analyses carried out for European countries showed the opposite (Barbetta et al., 2007; López-Casasnovas and Wagstaff, 1997). Note that while in Europe the majority of private

[3] See Malani et al. (2003) and Sloan (2000) for a theoretical and empirical review of hospital ownership and performance.

hospitals receive public funds, in US private hospitals are basically financed by their consumers.

The empirical relationship between ownership behavior and hospital quality has been less well analyzed. It is worth noting that almost all studies concern the US hospital market. The relationship between hospital ownership and quality is not clear either. Although some studies found private hospitals to offer a lower quality of services (Mark, 1996), the opposite is also true (Keeler et al., 1992). As Table 1 shows, the results differ depending on the definition of quality used and the sample included in the analysis.

To our knowledge all studies analyzing hospital quality have used partial indicators for rating hospitals. We believe that it is convenient to construct an index that combines all quality dimensions that can be found in a hospital. In this way it would be possible to compare public and private for-profit and non-profit hospitals from a broader perspective.

Very few studies have examined hospital costs and quality at the same time and those that have did so by comparing the costs and quality of treating specific diseases. As far as we know, three studies have undertaken this kind of analysis. Herzlinger and Krasker (1987) found no differences in the costs and quality between US public, private for-profit and non-profit hospitals. Sloan et al. (2001) found US for-profit hospitals to be more expensive, but they found differences in quality offered. Finally, Lien et al. (2008), who studied the Taiwanese hospital market, claimed that there were no differences in medical expenditure between ownership forms, but they detected differences in quality. In particular, non-profit firms offered a higher quality than their for-profit counterparts.

III. DATA FROM THE SPANISH HOSPITAL SECTOR

The data used in this study were extracted from the *Estadística de Establecimientos Sanitarios con Régimen de Internado* (EESRI), a survey that is carried out annually by the Spanish Ministry of Health and Social Affairs, for the years 1997 and 2007. All Spanish hospitals and their dependent centers are obliged to provide the information requested in the survey.

The EESRI provides census information about hospital resources, healthcare and economic activity as well as who is paying each patient's costs. Note that this survey is protected by the Statistical Secrecy Law 12/1989, which protects all kinds of personal data. For this reason, we were unable to determine the precise location of each

hospital in our database. In particular we only had information about the region in which each hospital was found.

The EESRI provided information about 789 hospitals for 1997 and 764 for 2007, which represents 88.15% and 83.4% of the centers registered in the hospital census[4]. Of these hospitals we had to eliminate 18 observations because the data they provided was confusing. We worked with a sample of 1535 observations, 783 from 1997 and 752 from 2007.

As we were working with economic data from different years we deflated all monetary variables in order to convert all data to constant 2007 prices. We used the Consumer Price Inflation provided by the Spanish National Statistics.

To construct the quality index we used data from the *Barómetro Sanitario*, a statistical report produced annually by the Spanish Ministry of Health and Social Affairs.

Healthcare delivery in Spain is carried out by three types of center: public hospitals in which the Public Administration directly provides healthcare services, private centers that are publicly funded and private entities in which the users pay for the services received.

The mechanism of finance of each kind of managerial form remains a key element to understand the different incentives of the agents. Public hospitals are financed by a global budget, which theoretically is based on prospective payments. This means that hospitals agree on an *ex-ante* budget with the Health Authorities. When the agreed budget is not sufficient to cover public hospitals costs, an extra budgetary subsidy is transferred to finance the hospital costs (López-Casasnovas, 2001). For this reason, it can be said that the expenses of public Spanish hospitals are guaranteed to be covered.

On the other hand, the relationship between the Public Administration and private providers is defined by a contract. Resources are allocated to service providers in one single package, as in a capitation formula, and private managers decide how to use these resources. This means that private hospitals that deliver public healthcare services have a fixed budget with which to carry out their activities.

[4] In Spain hospitals are registered in the *Catálogo Nacional de Hospitales* (CNH). In 1997, 895 hospitals were registered in the CNH while in 2007 there were 916.

The diversity of healthcare management in the different regions explains the heterogeneity of hospital ownership that can be found in Spain. In particular, 39.29% and 40.69% of Spanish hospitals were publicly managed in 2007 and 1997 respectively, 45.11% and 42.36% were run by private for-profit entities respectively, and 16.94% and 16.94% by private non-profit firms. As Figure 1 shows, the importance of being private for profit and non-profit hospitals varies between regions.

The proportion of private for-profit installed beds increased from 18.21% in 1997 to 21.61% ten years later. On the other hand, public and private non-for-profit beds decreased from 67.83% to 65.93% and from 13.29% to 12.46% respectively. The proportion of private beds also varies between regions.

From Figure 1 it is worth noting that the proportion of private hospitals is higher than the proportion of private beds. This reflects the fact that at least for the Spanish hospital sector, private hospitals are smaller than their public counterparts.

It is interesting to examine the scope of public funds in private hospitals in order to gain an overview of the importance of the private sector in the Spanish National Health System, and as a consequence in terms of public expenditure. In particular, almost 50% of private hospitals finance more than half of their patients with public funds. The scope for public funds in private hospitals is higher in non-profit centers.

Public hospitals are on average more costly than their private counterparts. At first glance this could be explained in several ways. First, public hospitals are, on average, bigger than private centers. Second, public entities receive, on average, more complex patients than private for-profit hospitals. And finally, the quality offered by public centers is, on average, higher than that offered by their private counterparts[5].

IV. EMPIRICAL STRATEGY

Our empirical strategy relies on estimating cost and quality equations including ownership as an explanatory variable in order to test whether the property rights theory is fulfilled in the Spanish hospital market. In this section we describe the variables used in our empirical model and we present the main results.

4.1. Description of the variables

While it is easy to define and control for hospital inputs, outputs are not easy to characterize. Hospitals produce a wide range of heterogeneous services, so defining

[5] Using a Student's t-test for mean differences we found them to be statistically significant.

hospital production is a complex task (Pinto et al., 2008). For that reason hospital cost studies have used intermediate outputs as a measure of hospital activity. Table 2 describes and summarizes the variables used in the analysis.

Dependent variables: total deflated hospital costs and quality index

For the cost equation we used the total deflated unitary expenditure as a dependent variable. This reflects the total disbursement made by the hospital in assets or services required for developing its activity, the most outstanding being labor expenditure, pharmaceutical and material goods. With the objective of having a comparable measure of hospital costs we deflated 1997 total expenditure into 2007 prices and obtained unitary costs by dividing the total deflated expenditure by the number of discharged patients.

Health outcomes depend on the quality of care received, which means that the higher the quality of a hospital, the better its outcomes will be. Some forms of hospital quality may easily be observed by patients, such as food or the size of the room, but other forms are more difficult for patients to gauge, for example, the quality of the personnel (Sloan et al., 2001). One of the main difficulties for the analysis arises in establishing a satisfactory operational definition of quality. Following Vuori (1988) we constructed a quality index that takes into account different dimensions of quality and provides an acceptable overview of each hospital standard.

Many studies have analyzed the effect of ownership on hospital quality[6] but as mentioned above all of them have used partial quality variables such as mortality rates or other adverse rates such as complications or medical errors. This limits hospital quality analysis to just one variable, which may not reflect real hospital quality.

On the basis that hospital quality is not a one-dimensional attribute, Vuori (1988) defined quality in healthcare services as a combination of three different outcomes: adaptability, scientific/technical quality and degree of consumer and professional satisfaction. *Adaptability* means in terms of balancing the needs and expectations of the public, *scientific/technical* quality means that the services and techniques provided should be in accordance with the level of current scientific/technical knowledge, and *consumer and professional satisfaction* refers on one hand, to satisfying the needs and expectations of clients, and on the other hand the conditions and expectations of health personnel (Solà and Prior, 2001).

[6] See Eggleston et al. (2008) for a systematic review.

In order to obtain a more accurate relation between ownership and hospital quality we constructed a quality index that takes into account these three dimensions of hospital quality. As it was not obvious how to find variables that exactly measure each of the quality definitions listed above, we used proxies to represent them. Table 3 gives a summary of all variables included, their source and summary statistics.

As proxies for *adaptability* we included the number of nurses per installed bed and the number of pieces of hospital equipment, such as incubators or surgical rooms, per installed bed. Although using physical labor or capital intensity as quality variables has its limitations, they have been used in recent empirical literature. Farsi and Filippini (2008), for example, used a hospital's nurse per bed ratio to represent the quality of nursing care.

In order to approximate *scientific/technical* quality we included the hospital mortality rate, the technological equipment such as X-ray or hemodynamic rooms per installed bed and a variable defining whether a hospital served as a medical school for graduates. In Spain not all hospitals are authorized to train graduates. To open training vacancies hospitals must fulfil certain requirements. For this reason, we assumed that the fact that a hospital has postgraduate positions may be a sign of hospital quality. Previous studies such as those of Aletras (1999) and Farsi and Filippini (2008) also used a variable representing hospital training as a proxy for hospital quality.

To capture *consumer satisfaction*[7] we included a variable representing a consumer satisfaction survey carried out by the Spanish Ministry of Health and Social Affairs. In particular, we rated the second question of the survey in which citizens were asked about their overall opinion of the healthcare system.

To construct our quality index we gave a point for each category that a hospital *i* was above average during time *t*, except for the mortality rate which we consigned a point if the hospital mortality rate was below average, and for the medical school variable which took a value of one if the hospital had postgraduate students. Ultimately we obtained an ordinal variable that ranked hospital quality from 0 to 6, where 0 was the lowest possible hospital quality and 6 the highest.

Ownership variables

[7] We were unable to include the degree of professional satisfaction because the sources available from the Spanish Ministry for Labor and Immigration do not provide concrete information for the healthcare sector.

In order to evaluate the effect of privatization on hospital costs and quality we included in our estimations two dummy variables, one representing private for-profit hospitals and the other representing private non-profit centers. In this way we took public hospitals as the reference type.

We used the definition in the EESRI to classify hospitals into different ownership types. In particular, we considered as a public hospital all entities that are legally dependent on the Spanish National Public Health System. With regard to private non-profit hospitals we included all organizations that do not distribute their surplus to owners or stakeholders, such as Church Hospitals or Foundations. Finally, we considered those centers that are managed by private firms to be private for-profit hospitals.

Although the aim of our study was to analyze the provision of publicly financed healthcare services, we included a dummy variable to control for those private hospitals that are financed with private funds. We believe that such centers would not behave like private hospitals that depend on public funds.

Hospital output variables

O'Neill et al. (2008) found that the empirical literature on hospital efficiency used a wide variety of hospital intermediate inputs. In our analysis we used the number of *discharged patients*[8] as a measure of hospital activity, as suggested in several studies (Barbetta, 2007; Ozcan, 1992; O'Neill, 2008).

One of the main features of the healthcare market is the uncertainty of both the demand for and the effectiveness of the treatments. For this reason a hospital may encounter a wide variety of cases that may be more or less complex depending on multiple unpredictable factors. To control for both the complexity and severity of illness we constructed a *case-mix index*, as defined by Roemer (1968) and used by Aletras (1999).

The index adjusts a hospital's average length of stay by its occupancy rate in order to exclude the influences of exogenous supply and demand, which also affect the length of stay (Aletras, 1999). The formula applied in our database is expressed in equation (1).

$$CM_{it} = ALOS_{it} * \frac{OCC_{it}}{OCC_{t}} \quad (1)$$

[8] A discharged patient is normally defined as a case who has previously been admitted into the hospital (Redrado, 2007).

where $ALOS_{it} = \frac{Inpatient\ days_{it}}{Discharged\ Patients_{it}}$ and $OCC_{it} = \frac{Inpatient\ days_{it}}{Installed\ beds_{it} * 360}$

and $ALOS_{it}$ is the average length of stay in hospital i during the period t, OCC_{it} is the occupancy rate of hospital i during t, and OCC_{t}, is the mean occupancy of all sample hospitals in t. This formula weights the average length of stay by the proportion with which a hospital's occupancy rate differs from the mean occupancy of the sample in each period.

We also included a *rotation index* that captures the marginal effect that an increase in hospital activity could have on hospital performance. We defined our index following Redrado (2007). See expression (2).

$$RI_{it} = \frac{discharged\ patients_{it}}{installed\ beds_{it}} \quad (2)$$

Hospital input variables

We included different variables in order to represent hospital inputs. As in the previously published hospital cost literature (Aletras, 1999; Sloan et al., 2001), we used the *number of installed beds* to represent hospital size as a proxy for capital assets. Hospital size is a particularly important control variable given the notable differences in input and output mixes that exist between large and small hospitals (Ozcan, 1992).

It is important to note that about two-thirds of hospital costs are due to payroll expenses, so including labor inputs in a hospital cost equation is indispensable. We introduced the *average wage*, calculated from the total personal expenditure divided by the number of employees in the hospital.

In line with Farsi and Filippinni (2008) we also included a dummy variable for the *emergency room* in order to capture those hospitals that are usually involved in severe cases.

Finally, a variable reflecting *hospital investment* was also incorporated. We used the total deflated investment in fixed assets per discharged patient.

Control variables

In order to control for unobserved differences between hospitals we included dummies for hospital type and time[9].

With regard to hospital type, we used the hospital classification used by the EESRI. This statistic classifies hospitals into five types: general, surgical, other acute, psychiatric and long term. We considered general hospitals as the reference case so we included four dummies to represent the other hospital types.

As we were working with data from two different years, 1997 and 2007, we introduced a dummy variable for all 2007 observations. In this way we were able to capture the overall technological progress and the variation in unobserved variables such as potential differences in data collection from one year to another.

4.2. The empirical model

Determinants of hospital costs

To estimate the effect of ownership on hospital costs we used a cost equation in its reduced form. The continuous variables are expressed in logarithms. The equation used is as follows:

$$\begin{aligned}\ln\_unitary\_cost_{it} = \\ \beta_0 + \beta_1 prtvate\_profit_{it} + \beta_2 prtvats\_non\_profit_{it} + \beta_3 privatelly\_funded_{it} + \\ \beta_4 ln\_discharged_{it} + \beta_5 ln\_case\_mix_{it} + \beta_6 ln\_rotation\_index_{it} + \beta_7 ln\_average\_wa \\ \beta_8 emergency\_room_{it} + \beta_9 ln\_investment_{it} + \beta_{10} Surgical_{it} + \beta_{11} Other\_acute_{it} + \\ \beta_{12} Psychatric_{it} + \beta_{13} Long\_stay_{it} + \beta_{14} Y07 + \varepsilon_{it}\end{aligned} \quad (3)$$

where i represents each hospital and t the period of time analyzed. The explanatory variables are defined in the previous section and summarized in Table 2.

As we saw in Section 2 economic theories about ownership and performance provide different explanations for the potential cost savings of privatization. Following the property rights theory, private hospitals may incur lower costs than their public counterparts, but this could be associated with the provision of lower quality healthcare services.

On the contrary, we expect privately funded hospitals to behave differently from publicly supported centers. In particular, we believe that completely private entities should incur higher costs than public centers and may offer a higher quality of services.

[9] We estimated our cost and quality equations including regional dummies but this incurred multicollinearity problems without improving our results. For this reason, we decided not to include them in the analysis.

Note that in privately funded hospitals patients pay for the treatments received, so in order to capture clients, private hospitals might offer a higher quality of services that would lead to higher costs.

The effect of discharged patients on hospital costs will depend on how the economies of scale affect the hospital cost structure. If, on average, Spanish hospitals benefit from economies of scale we could expect discharged patients to have a negative effect. This would mean that an increase in hospital activity reduces unitary costs, and thus having more patients would improve hospital efficiency. If, on the contrary, Spanish hospitals suffer diseconomies of scale, then additional fixed costs would have a greater impact than lower variable costs per patient, and thus an increase in activity would lead to a rise in unitary costs. For this reason we were unable to determine a priori the relation between discharged patients and unitary costs.

In relation to the case-mix index we could expect to find a positive relationship with hospital unitary costs. The more complex the patients that the hospital receives, the more costly it would be to treat them. Furthermore, a previous report found a positive relationship between costs and the case-mix index (Aletras, 1999).

As explained earlier, we also included a rotation index to capture the marginal effect of hospital activity on hospital costs. The relationship between the rotation index and our dependent variable is not certain and would depend on how discharged patients and the number of installed beds influence hospital costs.

The empirical literature on hospital costs is clear about the effect of hospital capacity on costs. Among others, Aletras (1999) and Sloan et al. (2001) found that hospital capacity has a positive relationship with costs. The idea behind this result is that an increment in installed beds represents a rise in hospital fixed capital, which is related to an increase in hospital costs. For this reason we could expect a positive relationship between the number of installed beds and hospital unitary costs.

Another variable that we would expect to have a positive relationship with unitary costs is the average salary. It is clear that an increase in personnel costs will lead to a rise in unitary costs.

Based on the same idea as that for the case-mix variable, we could expect to find a positive relationship between unitary hospital costs and the emergency room variable. The availability of an emergency room attracts more severely ill patients into

the hospital, thus leading to higher costs. Previous studies, such as that by Farsi and Filippini (2008), have corroborated this idea.

Regarding the investment in fixed assets we would expect it to have a positive relationship with unitary costs. Investment in fixed assets represents an increase in hospital fixed capital, thus we should find the same relationship as with the number of installed beds. In addition, any expenditure would yield a rise in unitary costs.

Determinants of hospital quality

To estimate the empirical effect of privatization on hospital quality we used a quality equation in its reduced form. The continuous variables are expressed in logarithms. The empirical expression used in the analysis can be seen in equation (4).

$$\begin{aligned} Quality_{it} = {} & \beta_0 + \beta_1 private\_profit_{it} + \beta_2 private\_non\_profit_{it} + \beta_3 privately\_funded_{it} \\ & + \beta_4 ln\_discharged_{it} + \beta_5 ln\_case\_mix_{it} + \beta_6 ln\_rotation\_index_{it} \\ & + \beta_7 ln\_average\_wage_{it} + \beta_8 emergency\_room_{it} + \beta_9 ln\_investment_{it} \\ & + \beta_{10} Surgical_{it} + \beta_{11} Other\_acute_{it} + \beta_{12} Psychatric_{it} + \beta_{13} Long\_stay_{it} \\ & + \beta_{14} Y07 + \varepsilon_{it} \quad (4) \end{aligned}$$

where i represents each hospital and t the period of time analyzed. Note that all variables used in the cost equation were also used for regressing hospital quality.

As mentioned above, the property rights theory predicts that private hospitals with public funding may have lower costs at the expense of lower quality. On the contrary, privately funded hospitals should provide healthcare services of a higher quality in order to capture more clients.

The effect of discharged patients on quality is not clear. In fact all variables accounting for hospital activity could affect hospital quality in two different ways: the learning effect and congestion effect. The former would improve hospital quality while the latter would have the opposite effect.

The fact that a hospital has a large number of discharged patients per year may improve hospital quality because of the learning effect. Hospital personnel would have more experience and thus could offer better services. In contrast, receiving many patients may reflect a situation of hospital congestion. If a hospital is congested quality may be eroded because patients would have to register on waiting lists and practitioners would have to treat more patients and the time per patient would thus decrease. Taking all this into consideration, it is not clear what effect the number of discharged patients would have on hospital quality.

The effect of the case-mix index on hospital quality is also ambiguous because receiving complex cases could be related to quality in different ways. Higher quality might result because complex cases require more sophisticated techniques and thus the hospital would display higher levels of scientific/technical quality, but lower quality might result because complex cases present more uncertainty and thus patients might have a lower probability of recovery.

The effect of the rotation index would depend on the variables constructing the quality index. At the same time the controversy between learning and congestion is also applicable.

The relationship between hospital size and quality is not simple either. On the one hand, a larger hospital could capture variations in healthcare demand to a better extent, and so it would present higher levels of adaptability. But holding other inputs constant, this could also mean offering a lower quality of attention to patients because it would mean attending more patients with the same personnel.

The variable capturing personnel salaries is the only one in the quality analysis for which we could define a clear relationship with the dependent variable. In particular, we would expect to find a positive relation between salaries and quality because it is accepted worldwide that increasing salaries is an effective mechanism for improving service quality.

Regarding the emergency room variable we were unable to predict a priori the results that we would find. On the one hand, having an emergency room could positively affect quality because such hospitals would show higher levels of adaptability and because they are normally equipped with high levels of technology, and thus would present high levels of scientific/technical quality. On the other hand, it could mean that resources are channeled through the emergency room such that the rest of the services have tighter budgets, which could be reflected in the provision of lower quality healthcare.

In relation to investment in fixed assets we expected it to have a positive relationship with quality. The idea of introducing this variable was to capture the intention of a hospital to improve the quality of healthcare, such that the more a hospital invests, the higher quality it will provide.

4.3. Estimation and results

We performed the regressions for the complete sample and just for general hospitals. In both cases we analyzed on one hand all centers and on the other hand only publicly funded hospitals. We considered publicly funded entities those hospitals that finance more than 90% of their patients with public funds.

First, we performed the regressions for the complete sample; second, we analyzed only those entities that were financing more than 90% of their patients with public funds; then we studied general hospitals; and finally, we included only publicly funded general hospitals.

Recall that we estimated hospital costs and quality equations in their reduced form so that each equation had the same explanatory variables. As our quality index is a censured variable we could not apply a Seemingly Unrelated Regression Equations (SURE) estimation. For these reasons, we estimated the cost and quality equations separately.

Determinants of hospital costs

We estimated equation (3) using the Ordinary Least Square (OLS) methodology for all cost estimations. Table 4 shows the results for each regression. The estimated coefficients are mostly significant and generally have the expected sign.

Private for-profit and non-profit hospitals presented lower costs per discharged patient than their public counterparts. As Table 4 shows, the ownership variables are significant at 1% and have negative signs. Moreover, these results hold for all our regressions.

We found that private for-profit hospitals with public funds expended, on average, 3,111.5 € less per patient than public centers. In the same way, the unitary expenditure in private non-profit hospitals was, on average, 3,791.5 € less than in their public counterparts. We should be careful when analyzing these results because the estimate coefficients are never totally precise. In our case, we may have captured differences between case severity within ownership types. The differences were smaller when the estimation focused on general hospitals. In particular, private for-profit (non-profit) general hospitals spent 1,327.7 € (1,459.1 €) less per patient than public entities. So, when comparing hospitals of the same type the cost differences between public and private hospitals were not as large.

The opposite was found for *privately funded* hospitals. From our estimates we can state that privately funded hospitals are more costly than their public counterparts.

In particular, privately funded hospitals spent, on average, 824.2 € more per patient than publicly funded centers. These differences were also reduced when focusing on general hospitals. Specifically, privately funded general hospitals cost 452.2 € more per patient than public centers. These results are consistent with studies from the US.

The effect of *Ln_discharged* on hospital costs was negative and significant at 1%. We found that this relationship was maintained for all estimates. Based on our results we can say that, on average, Spanish hospitals enjoy economies of scale. Publicly funded hospitals enjoy the largest benefits with a 7.5% reduction for each 10% rise in the number of discharged patients.

The *Ln_Rotation Index* had a negative effect on per patient costs. This variable was just significant at 1% for general hospitals. These results may be explained by the fact that different hospital types were being considered in the other estimates. As different hospitals might be experiencing different cost responses to hospital activity, the average effect is unclear.

As expected, hospital inputs affected unitary expenditure positively. *Ln_installed_beds, Ln_average_wage* and *Ln_investment* were statistically significant at 1% in all estimates. The same results were found for the variable accounting for whether the hospital has an emergency room, but were just significant at 5% when we used the whole sample and not significant when including just general hospitals.

In relation to the case-mix variable we had expected to find a positive relationship with hospital unitary expenditure, but we only found a significant relationship when including the whole sample. In our opinion, it is possible that the case-mix index that we constructed does not properly reflect the patients' complexity and severity of illness. We believe that information about the exact diagnoses treated in each hospital would provide better information with which to construct a case-mix index than a weighted average length of stay.

Determinants of hospital quality

As explained above, we constructed a quality index in order to capture different dimensions of hospital quality. Our quality index used ranks from 0 to 6, and thus we estimated our equation (4) using an Ordered Logistic regression. Table 5 shows the results for each regression.

Our estimates indicate that private for-profit and non-profit hospitals provide a lower quality of services than their public counterparts. Table 5 shows that both

ownership variables were negative and significant at 1%. These results are robust because they hold for the four estimates. In the light of our results it can be stated that the property rights theory holds for the Spanish hospital sector. Accordingly, we can say that private hospitals are less costly than public centers because private managers tend to reduce the quality of the services provided.

We also found that the variable for privately funded hospitals was positive but not statistically significant. Although privately funded hospitals try to attract patients by offering more expensive services, it is not clear that the quality offered is higher than in public centers.

Our estimates suggest that learning effects predominate in the Spanish hospital market. We found *Ln_discharged* to be positive and significant at 1% for all our estimates. In contrast, the congestion effect appeared when analyzing hospital capacity and rotation. In particular, *Ln_installed_beds* was negative and statistically significant at 1% in all estimates and *Ln_Rotation-Index* was negative and significant for all estimates except for publicly funded hospitals.

Hospital quality increases when the investment in fixed assets increases (*Ln_Investment*) and when there is an emergency room (*Emergency_room*). *Ln_Case-mix* and the average salary did not have any impact on hospital quality. It should be noted that in the majority of hospitals all personnel have regulated salaries, so hospital managers cannot use salaries as an incentive. It is preferable to think that they use non-monetary elements, like flexibility or fewer medical guards, as an incentive mechanism.

V. CONCLUDING REMARKS

Healthcare is a complex market with high transaction costs. Furthermore, the effect of privatization on cost reduction cannot be explained by the introduction of competition and/or by the fact that private firms take better advantage of economies of scale and scope. According to property rights theories the explanation of cost differences between ownership forms should be found in managers' incentives. In particular, private firms are more prone to engage in cost reductions at the expense of quality.

Our empirical analysis showed that private for-profit and non-profit hospitals incur lower per patient expenditure than their public counterparts. Moreover, we can confirm that those differences are partially explained by the fact that private hospitals provide a

lower quality of service. The way that Heath Authorities finance publicly funded hospitals may be responsible for the differences in incentives between public and private centers. Private hospitals are normally paid by a capitation system, so their managers would have incentives to engage in cost reduction at the expense of quality in order to maximize hospital profits. Public centers, on the other hand, do not have such economic restrictions, so the incentive for reducing costs would be less strong. Overall, we can say that property rights theory is fulfilled at least in the Spanish hospital market.

When analyzing private hospitals offering private healthcare services the results are different. We found that privately funded centers do not offer services at lower costs although the quality offered is no higher than in public centers. The idea behind this is that privately funded hospitals need to appear to provide better services in order to attract new clients.

Finally, we were lacking information about the institutional differences between hospitals. It is worth noting that each entity has a special relationship with the Health Administration, so knowing the individual type of contractual relationship would be very useful for determining which features provide incentives to private firms to cut costs at the expense of quality.

Considering the results found, it is worth noting that Health Authorities face a trade-off between costs and quality when choosing private hospitals as providers of public healthcare services. Under a context of fiscal restrictions privatization could be a reasonable solution because it could represent a notable reduction in public expenditure by guaranteeing a minimum of quality. However, if the current Government gives priority to Health Policies and to quality of health services, then privatization could not be an appropriate solution, because private hospitals with public funding may provide health services at lower quality that public entities.

This trade-off could be minimized by designing contracts and finance mechanisms that redirect private incentives. As far as we are concerned, if Health Authorities finance private entities through a prospective basis, it would lead to hospital managers to over expend in the provision of their services. This would end into an increasing of public expenditure. On the other hand, if private centers are financed by a capitation mechanism, which means that hospitals receive a fix amount per patient attended, managers would be tended to reduce unitary costs in order to increase their

benefits. Following our results this cost reduction would be accompanied by a decrease of the quality offered.

We believe that a financing contract that includes fixed and variable payments could minimize the trade off. Keeping a fixed part the Health Authority can ensure that the hospital receive a minimum of income and that have incentives to save costs. In addition, the introduction of a variable payment based on the severity of illnesses treated and a quality indicator could reinforce the maintenance of a minimum of quality. Hence, private hospitals could take into account the adverse effect that cost reduction has on hospital quality. The optimal combination of the fixed and variable parts in the financing contract of hospitals could be the subject of future research.

Once again the need of a proper definition of hospital quality arises as a potential limitation in order to maximize the benefits of a mixed reimbursement method. We have presented a first draw of what we believe that a complete quality indicator would be, but further research should be done to find a better approach for constructing a quality index.

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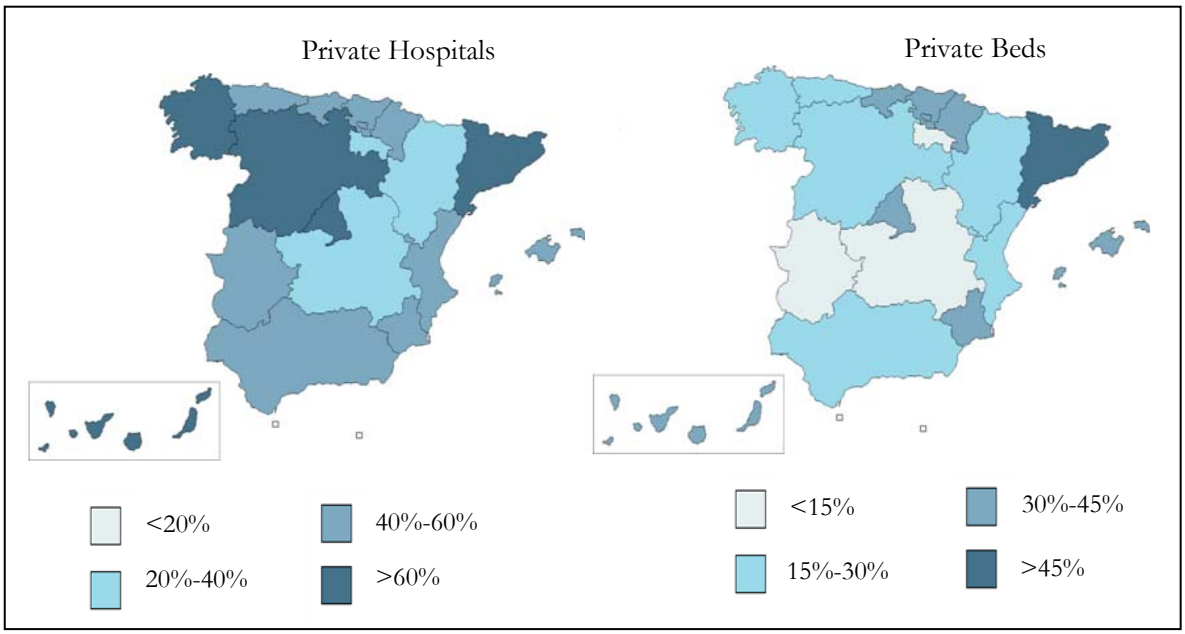
FIGURES AND TABLES

Figure 1. Proportion of private hospitals and beds in the Spanish hospital market. 2007.



Estadística de Establecimientos Sanitarios con Régimen de Internado (EESRI) 1997 and 2007. Ministry of Health and Social Affairs.

Table 1. Empirical Literature about Hospital Privatization, Costs and Quality

	Ownership forms included	Sample	Methodology Quality variable	Results
Hospital ownership and costs				
Becker & Sloan (1985)	PUB, PFP, PNP	USA. 1900 hospitals. 1979.	Cost Regression	Inconsistent Results
Granneman et al. (1986)	PUB, PFP, PNP	USA. 867 hospitals.	Cost Regression	PFP more costly than PNP and PUB
Ozcan et al. (1992)	PUB, PFP, PNP	USA. 3000 hospitals. 1987	DEA	PUB more efficient
Herr (2008)	PUB, PFP, PNP	Germany 1556-1635 hospitals. 2000-2003	SF	PUB more efficient
Barbetta et al. (2007)	PUB, PNP	Italy. 531 hospitals. 1995-2000	DEA	PNP more efficient
Daidone and Amico (2009)	PUB, PFP, PNP	Italy. 625 hospitals. 2000-2005	SF	PUB and PNP more efficient
Farsi and Filippini (2008)	PUB, PFP, PNP	Switzerland. 150 hospitals. 1998-2003	SF	No differences
Piror & Solà (1993)	PUB, PFP	Spain. Catalonia. 169 hospitals. 1989	DEA	No differences
López-Casasnovas & Wagstaff (1997)	PUB, PFP	Spain. Catalonia. 43 hospitals. 1988-1991	DEA	PFP more efficient
Dalmau-Matarrodona & Puig-Junoy (1998)	PUB, PFP	Spain. Catalonia. 94 hospitals. 1990	DEA	No differences
Hospital ownership and quality				
Keeler et al. (1992)	PUB, PFP, PNP	USA. 14.008 elderly patients. 297 hospitals. 1981-1982 & 1985-1986	Diagnosis and treatments. Doctor's opinion.	PUB offer lower quality. No differences between private types.
Brennan, et al. (1991)	PUB, PFP, PNP	USA. New York. 31.000 patients. 51 hospitals. 1984	Adverse Rates	No differences
Shortell & Hughes (1988)	PFP, PNP	USA. 214.839 patients. 981 hospitals. 1983-1984	Mortality Rates	No differences
Mark (1996)	PFP, PNP	USA. 286 hospitals. 1984-1989	Third-party Assessment	PFP lower quality
Hospital ownership, costs and quality				
Herzlinger & Krasker (1987)	PUB, PFP, PNP	USA. 563 hospitals. 1982	Cost: Pair Comparison Quality: Third-party Assessment	No differences
Sloan et al. (2001)	PUB, PFP, PNP	USA. 8.404 medical cases. 1982-1995	Quality: Mortality Rates Logit Estimation	PFP more costly. No quality differences.
Lien et al. (2008)	PFP, PNP	Taiwan. 127.623-149.160 cases. 480-515 hospitals. 1997-2000	OLS and IV Estimation	No costs differences PNP higher quality

Note: Public (PUB) Private for-profit (PFP) and non-profit (PNP). Data Envelopment Analysis (DEA) Stochastic Frontier (SF)

Table 2. Definition of the variables, descriptive statistics and data sources

Variable	Description	Mean (S.D.)	Max (Min)	Hypothesis*	
				Cost	Quality
Ownership variables					
Private-profit$_{it}$	Dummy variable which takes value 1 if the hospital is managed privately.	0.43 (0.49)	1 (0)	-	-
Private-non-profit$_{it}$	Dummy variable which takes value 1 if the hospital is managed by a non-profit firm.	0.16 (0.36)	1 (0)	-	-
Privately-funded$_{it}$	Dummy variable which takes value 1 if the hospital finances more than a 10% of their patients with private funds.	0.18 (0.39)	1 (0)	+	+
Dependent variables					
Ln total unitary expenditure$_{it}$	Natural logarithm of total unitary expenditure deflated into 2007 prices per discharged patients.	7.86 (1.47)	13.43 (4.12)	--	--
Quality$_{it}$	Quality Index which accounts for: hospital adaptability, scientific-technical quality and consumer satisfaction.	2.57 (1.52)	6 (0)	--	--
Intermediate outputs					
Ln discharged$_{it}$	Natural logarithm of the number of discharged patients in hospital i during the year t.	7.55 (1.93)	11.12 (0)	-	Not clear
Ln Case-mix$_{it}$	Natural logarithm of the Case-mix index following Roemer (1968)	2.46 (2.02)	9.08 (-4.97)	+	Not clear
Ln Rotation Index$_{it}$	Natural logarithm of the number of discharged patients per installed beds	5.36 (0.62)	5.92 (-0.20)	Not clear	Not clear
Input variables					
Ln Installed beds$_{it}$	Natural logarithm of the number of installed beds in each hospital i and time t.	4.78 (1.08)	7.56 (1.38)	+	Not clear
Ln Average Wage$_{it}$	Natural logarithm of total personal expenditure per number of employees deflated in 2007 prices.	9.00 (1.09)	11.13 (5.21)	+	+
Emergency room$_{it}$	Dummy variable which takes value 1 if the hospital offers emergency room services.	0.73 (0.44)	1 (0)	+	Not clear
Ln investment$_{it}$	Natural logarithm of total investment in fixed assets per installed bed deflated in 2007 prices.	7.13 (1.94)	12.78 (-1.17)	--	+
Control Variables					
Surgical$_{it}$	Dummy variable which takes value 1 if the observation is a surgical hospital	0.07 (0.25)	1 (0)	--	--
Other acute$_{it}$	Dummy variable which takes value 1 if the observation is an other acute hospital	0.07 (0.26)	1 (0)	--	--
Psychiatric$_{it}$	Dummy variable which takes value 1 if the observation is a psychiatric hospital	0.10 (0.31)	1 (0)	--	--
Long stay$_{it}$	Dummy variable which takes value 1 if the observation is a long stay hospital	0.14 (0.35)	1 (0)	--	--
Y07	Dummy variable which takes value 1 if the observation is from 2007			--	--

Table 3. Variables included in the quality index

	Definition	Average (observations above)	
Adaptability		**1997**	**2007**
-Nurses per installed bed	Hospital's nurse per bed ratio	0.45 (327)	0.71 (347)
-Physical equipment per installed bed	Number of physical equipment which includes incubators, surgical rooms and birthing rooms per installed bed	0.05 (294)	0.06 (316)
Scientific-Technical			
-Mortality rate	Number of hospital deaths per admitted patients.	0.09 (637)	0.08 (627)
-Technological equipment per installed bed	Sum of technological equipment available in the hospital which includes X-ray rooms, X-ray computed tomography, Magnetic Resonance, renal litroticia equipment, Hemodynamic Rooms, Digital Angiography, Gamma Camera, Megavoltage x-Rays and Hemodialysis technology per installed beds.	0.04 (279)	0.05 (274)
-Medical School for graduates	Dummy variable which take value one if the hospital accepts Medical School graduate students.	0.26 (205)	0.29 (224)
Consumer satisfaction degree			
-Health Care System evaluation	Average opinion of the Spanish Health Care Sysrem per CA.	6.78 (269)	6.99 (177)

*EESRI. Estadística de Establecimientos Sanitarios con Régimen de Internado. Ministry of Health and Social Affairs.
**Barómetro Sanitario. Ministry of Health and Social Affairs.
***INE. Instituto Nacional de estadística. Spanish Nacional Statistics.

Table 4. Cost equation estimates

Ln total unitary expenditure	All hospitals		General hospitals	
	Ownership	**Publicly founded**	**Ownership**	**Publicly founded**
Private-profit$_{it}$	-0.302***	-0.278***	-0.364***	-0.278***
	(0.035)	(0.045)	(0.044)	(0.055)
Private-non-profit$_{it}$	-0.368***	-0.297***	-0.400***	-0.236***
	(0.039)	(0.053)	(0.052)	(0.074)
Privately-funded$_{it}$	0.080**	--	0.124***	--
	(0.037)		(0.047)	
Ln discharged$_{it}$	-0.722***	-0.784***	-0.474***	-0.510***
	(0.018)	(0.029)	(0.037)	(0.066)
Ln Case-mix$_{it}$	0.017**	-0.002	0.015	0.008
	(0.008)	(0.014)	(0.013)	(0.015)
Ln Rotation Index$_{it}$	-0.018	-0.012	-0.190***	-0.311***
	(0.034)	(0.082)	(0.057)	(0.116)
Ln Installed beds$_{it}$	0.647***	0.746***	0.481***	0.577***
	(0.022)	(0.031)	(0.037)	(0.062)
Ln Average Wage$_{it}$	0.584***	0.676***	0.525***	0.641***
	(0.034)	(0.057)	(0.042)	(0.069)
Emergency room$_{it}$	0.093**	0.136**	0.074	0.356
	(0.043)	(0.062)	(0.081)	(0.095)
Ln Investment	0.087***	0.057***	0.063***	0.034***
	(0.010)	(0.011)	(0.012)	(0.010)
Surgical$_{it}$	-0.066	0.027	--	--
	(0.058)	(0.132)		
Other acute$_{it}$	-0.013	-0.042	--	--
	(0.055)	(0.071)		
Psychiatric$_{it}$	-0.382***	-0.454***	--	--
	(0.066)	(0.090)		
Long stay$_{it}$	-0.285***	-0.352***	--	--
	(0.057)	(0.074)		
y07	0.857***	0.787***	0.989***	0.874
	(0.067)	(0.100)	(0.082)	(0.123)
constant	4.178***	3.513***	4.482***	3.830***
	(0.279)	(0.536)	(0.327)	(0.690)
Number of observations	1275	690	789	454
Prob>F	0.000	0.000	0.000	0.000
R^2	0.93	0.94	0.92	0.95

Robust Standard Errors in parenthesis. ***p<0.01; **p<0.05; *p<0.1. Baseline: Public and publicly funded hospitals.

Table 5. Quality equation estimates

	All hospitals		General hospitals	
Quality	**Ownership**	**Publicly funded**	**Ownership**	**Publicly funded**
Private-profit$_{it}$	-1.729***	-1.789***	-2.369***	-2.506***
	(0.178)	(0.276)	(0.241)	(0.410)
Private-non-profit$_{it}$	-1.801***	-1.440***	-2.919***	-2.512***
	(0.213)	(0.280)	(0.303)	(0.377)
Privately-funded$_{it}$	0.095	--	0.042	--
	(0.147)		(0.220)	
Ln discharged$_{it}$	0.875***	0.971***	1.928***	2.629***
	(0.100)	(0.162)	(0.251)	(0.482)
Ln Case-mix$_{it}$	-0.034	-0.046	0.004	-0.0002
	(0.036)	(0.058)	(0.046)	(0.082)
Ln Rotation Index$_{it}$	-0.356**	-0.293	-0.942***	-1.400***
	(0.138)	(0.291)	(0.259)	(0.485)
Ln Installed beds$_{it}$	-0.881***	-0.708***	-1.704***	-2.023***
	(0.106)	(0.164)	(0.215)	(0.158)
Ln Average Wage$_{it}$	0.089	0.589	-0.062	0.729
	(0.140)	(0.377)	(0.178)	(0.516)
Emergency room$_{it}$	0.398**	0.643**	0.496	1.140
	(0.183)	(0.329)	(0.345)	(0.722)
Ln Investment	0.133***	0.141***	0.126**	0.153**
	(0.037)	(0.067)	(0.049)	(0.077)
Surgical$_{it}$	-0.261	-0.173	--	--
	(0.188)	(0.464)		
Other acute$_{it}$	-0.538**	-0.663**	--	--
	(0.231)	(0.331)		
Psychiatric$_{it}$	0.309	0.709	--	--
	(0.364)	(0.565)		
Long stay$_{it}$	-2.756***	-2.705***	--	--
	(0.352)	(0.489)		
y07	-0.665**	-1.528**	-0.496	-1.979
	(0.284)	(0.691)	(0.362)	(0.948)
Number of observations	1275	1275	789	454
Prob>χ^2	0.000	0.000	0.000	0.000
Pseudo R^2	0.24	0.29	0.14	0.15

Robust Standard Errors in parenthesis. ***p<0.01; **p<0.05; *p<0.1. Baseline: Public and publicly funded hospitals.

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