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Price effects of Dutch hospital mergers

An ex post assessment of hip surgery

Ron Kemp and Astrid Severijnen

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Abstract

This study analyses price effects of two mergers in the Dutch healthcare industry. We investigate whether the merging hospitals raised their prices for hip surgery after the merger and, if so, how patients react to this higher price.

For the Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord merger, we found a statistically significant price increase for hip surgery, whereas for the Erasmus MC ziekenhuis – Havenziekenhuis Rotterdam merger, we did not find a significant price increase due to the merger. For both mergers, travel behaviour of patients prior and after the merger increased only slightly.

As we studied only one treatment, hip surgery, we cannot draw conclusions on the overall price effect of the mergers.

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Summary

In this study, we perform an ex-post analysis of two mergers involving Dutch hospitals that were approved by the NMa: the Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord merger[1] (hereafter: Gooi-hospital merger) and Erasmus MC ziekenhuis – Havenziekenhuis Rotterdam[2] (hereafter: Rotterdam-hospital merger). The first merger in particular has led to much debate, whereas the latter merger has not led to any debate. In our analysis, we investigate whether or not the merging hospitals increased their prices for hip surgery, which can be an indication for parties using their increased market power. Moreover, we analyze the travelling behaviour of patients to see whether patients react to a price increase by switching to another hospital.

For the Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord merger, we found a statistically significant price increase for hip surgery, whereas for the Erasmus MC ziekenhuis – Havenziekenhuis Rotterdam merger, we did not find a significant price increase due to the merger. For both mergers, travel behaviour of patients prior and after the merger increased only slightly. This is contrary to our expectations for the first merger case, as we would expect patients to go to other hospitals in response to a price increase.

A few caveats have to be mentioned. First of all, it should be noted that the hospital mergers that have been investigated are not a random sample of all the mergers that took place. For a full assessment of the effects of mergers, it is key to have systematic and quantitative analyses of a significant amount of cases. In addition, as we studied only one treatment (i.e. hip surgery), we cannot draw conclusions on the overall price effect of the merger. Moreover, the mergers took place one year after the introduction of competition in the health care sector. At least a part of the price increase for hip surgery may be explained by the fact that the prices of the merging hospitals were below the national average before the merger, i.e. a learning effect. Furthermore, we could not control for possible changes in the quality level of the hip surgery, as we don't have a reliable indicator for quality.

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[1] See
http://www.nmanet.nl/engels/home/News_and_publications/News_and_press_releases/2005/05_17.asp
[2] See http://www.nmanet.nl/nederlands/home/Besluiten/Besluiten_2005/5047BCM.asp (in Dutch)

1 Introduction

1.1 Background

Mergers of hospitals and the assessment of these mergers by competition authorities often get a lot of attention by both public and politics. Discussions concentrate on the effect of mergers on quality, accessibility, scale inefficiencies and the emergence of market power. Ex-ante assessments of mergers are challenging due to specific features of hospital markets, such as the presence of third-party payers, differentiated products and asymmetric information. Despite these issues, most attention is given to the geographical market delineation.

In the United States, there were over 900 hospital mergers during the period 1995 – 2002. Competition authorities challenged only seven of these cases. In court, they lost all seven cases, and most of these losses were because of the geographical market delineation. The courts usually accepted the broad market definition that the parties put forward. Nevertheless, studies that performed ex-post assessments of hospital mergers showed that several hospital mergers did have anticompetitive price-effects. Moreover, in 2005, competition authorities challenged a hospital merger ex-post. In this case, the court accepted the limited geographical market put forward by the competition authorities. This was the first time since the 1980s that the courts ruled in favour of the competition authorities with regard to challenging a hospital merger (Varkevisser and Schut, 2008)[3].

Since the gradual introduction of managed competition in the Dutch hospital market in 2004, the NMa has assessed eight hospital mergers. Apart from an intended merger that was cancelled by the merging parties, the NMa approved all of the other mergers, mainly because there would be enough competition left on the market after each merger. Some of these decisions have led to a lively debate among policymakers, scholars, and politicians.[4]

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[3] This case is FTC – Evanston Northwestern Healthcare Corporation, No. 9315 (FTC May 17, 2005).
[4] See for example a special issue of the journal Markt & Mededinging, No. 2: April 2009, that was entirely devoted to competition in the health care sector. Other examples are Kalbfleisch (2009), Reerink (2009), Canoy (2008) and Van Sinderen (2008).

The geographical market definition in particular turned out to be one of the focal points of this debate (Janssen et al., 2009). Unlike in the U.S., hospital mergers in the Netherlands have yet to be empirically assessed ex-post.

1.2 Research questions and structure of the paper

In this study, we perform an ex-post analysis of two mergers involving Dutch hospitals that were approved by the NMa: the Ziekenhuis Hilversum – Ziekenhuis Gooi-Noord merger[5] (hereafter: Gooi-hospital merger) and Erasmus MC ziekenhuis – Havenziekenhuis Rotterdam[6] (hereafter: Rotterdam-hospital merger). The first merger in particular has led to much debate, whereas the latter merger has not led to any debate. In our analysis, we investigate whether or not the merging hospitals increased their prices for hip surgery, which can be an indication for parties using their increased market power. Moreover, we analyze the travelling behaviour of patients to see whether patients react to a price increase by switching to another hospital.

Chapter 2 provides an overview of the related literature. In chapter 3, we describe the process of (hospital) merger control in the Netherlands, and the background of the mergers studied. The methodology and data are described in chapter 4. The results are discussed in chapter 5, followed by the conclusions and discussion in chapter 6.

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[5] See
http://www.nmanet.nl/engels/home/News_and_publications/News_and_press_releases/2005/05_17.asp
[6] See http://www.nmanet.nl/nederlands/home/Besluiten/Besluiten_2005/5047BCM.asp (in Dutch)

2   Literature overview

2.1   Introduction

The economic literature covers a large number of empirical studies on the effects of mergers on prices. These studies compare the effect of the outcome of either an antitrust intervention or antitrust abstention with the estimated effect of a counterfactual (alternative decision). These kinds of studies are often carried out by the authorities themselves (Van Sinderen and Kemp, 2008) and can take different forms (Davies, 2010).

Qualitative ex-post investigations are often used to investigate the price effect of mergers. For example, in Great Britain, the Office of Fair Trading (OFT), the Department of Trade and Industry (DTI) and the Competition Commission (CC) commissioned PricewaterhouseCoopers (PwC) to perform an ex-post evaluation of mergers that had been approved by the CC between 1991 and 2002 (PwC, 2005). PwC concluded that there was effective competition in all of these cases at the moment of research, although in some cases there were some short-term competition concerns as a consequence of the merger. Recently, the OFT commissioned external researchers to conduct a review of eight merger decisions in the period of 2004-2006 (Deloitte, 2009). They concluded that, in most of the cases, post-merger market developments have not led to considerable reservations about the soundness of the decision.

In the Netherlands, ECORYS, commissioned by the Dutch Ministry of Economic Affairs, performed a qualitative ex-post analysis of ten case studies which included five merger cases (ECORYS, 2002). It concluded that in none of the four approved mergers (three with remedies) the level of competition had been negatively influenced. For the blocked merger, ECORYS concluded the level of competition would have been lower had the merger been approved. The disadvantage of qualitative ex-post investigations is that they are often based on perceptions of stakeholders and lack 'hard' data.

According to Weinberg (2008), a quantitative analysis of prices pre-merger and post-merger is the most credible way of assessing the price effects of mergers. He surveyed 22

mergers in various sectors of the U.S. and showed that most of the mergers led to higher prices for the merging parties, at least in the short run. He concluded that a stricter merger policy is needed to protect consumer welfare.

Most of the quantitative ex-post studies were conducted in formerly regulated sectors where pricing data were publicly available: airlines, banking and hospitals (Pautler (2003), Ashenfelter and Hosken (2008)). This may have implications for the generality of the findings.

2.2 Ex-post evaluation of hospital mergers

Several quantitative ex-post studies of mergers in the health care sector have been conducted over the past years. Most of these ex-post evaluations of hospital mergers originate from the U.S., as competition in the health care sector has been introduced there quite some time ago. In Europe on the other hand, for instance in Germany and the Netherlands, the health care sector is currently in a transition towards more competition.[7]

Until the beginning of the 2000s, most of the studies that investigated the effects of hospital mergers used the structure-conduct-performance paradigm. In these studies, the correlation between market concentration and price is employed to assess a merger. Since the mid-1980s, the studies typically found a positive relationship between concentration and price (see e.g. Dranove et al., 1993, Pautler and Vita, 1994), suggesting that hospital mergers would lead to higher prices after the mergers have gone through. Although quite informative, these studies, however, did not reveal any direct evidence of the effects of mergers. Furthermore, the results of these studies depend heavily on the market definition, which in itself is very challenging (Varkevisser et al., 2008). Consequently, in these studies, inaccurate market definitions may have led to incorrect conclusions about the effects of mergers.

Since 2000, comparing pre-merger prices with post-merger prices has been the most common methodology, particularly using the difference-in-differences (DID) approach. One of the major advantages of this methodology is that it does not require any market

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[7] Comparatively speaking, Germany is a bit further with respect to the introduction of competition in the health care sector than the Netherlands.

definition. Accordingly, erroneous conclusions about the effect of a merger, as a consequence of an incorrect market definition, are avoided. One of the first studies that employed this methodology in the hospital sector is Vita and Sacher (2001). Their analysis showed that the merger analyzed led to significant price increases (around 30 and 15 per cent). They also demonstrated that the change in cost did not provide an explanation for the price increases, and that the market share of the merging hospitals in the Santa Cruz County had declined, indicating that a relative quality improvement could not explain the price.

Connor et al. (1998) and Krishnan (2001) also used DID approaches to assess multiple hospital mergers ex-post. Connor et al. analyzed the change in total patient revenue for all of the 122 hospitals in the U.S. that merged during the period 1986-1994. They found a decrease in costs of 5 per cent and a price decrease of 5 per cent for the merging hospitals relative to the control group of non-merging hospitals. The decrease in costs is converted into lower prices and the mergers have thus been pro-competitive. Krishnan (2001) examined 22 hospital mergers in Ohio and 15 hospital mergers in California. His analysis took place at the level of case (treatment) types and he showed that, for all case types studied, the price increase for the merging hospitals was higher than for the control group. Moreover, he demonstrated that the price increase was larger for the case types for which the merging hospital obtained a larger market share.

Recently, the Federal Trade Commission (FTC) produced three working papers that provide case studies of hospital mergers that took place in the beginning of the 2000s, using a DID approach. Tenn (2008) compared pre-merger to post-merger prices for one hospital merger to be paid by three large insurers. He used control variables for observable hospital characteristics, like the type of hospital, the number of beds and the for-profit status of the hospital. One of the merging hospitals had relatively low pre-merger prices, while the other hospital had relatively high pre-merger prices. Post merger, the prices converged to the higher price level. Regression analysis confirmed that the price change of the hospital with lower prices was significantly larger than the average price change, while the price change of the hospital with higher prices was not statistically different from that in the control group. This conclusion held for all insurers.

Haas-Wilson and Garmon (2009) investigated two hospital mergers. For one merger, regression analysis showed that for four of the five managed-care organizations (MCOs), the price increase was large and significant.[8] In the other merger, regression analysis showed a significant relative price decrease due to the merger for three MCOs, a non-significant price increase for one MCO and a significant price increase for another MCO. On average, there was a price increase of 4 per cent in the period 1999-2002.

To end this brief overview, the results of the evaluation of a hospital merger by Thompson (2009) were mixed. Regression analysis demonstrated that two insurers experienced a significant price increase (> 50 per cent), one insurer had a significant price decrease (-29 per cent), whereas another insurer had a small price increase compared to the control group.

The results of the studies discussed are mixed: some mergers resulted in price increases, others had a price-decreasing effect while also some mergers occurred which did not affect prices at all. These differences most likely result from differences in the specific circumstances of the mergers. Hospital characteristics and other specific circumstances have to be taken into account when assessing price effects of mergers.

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[8] A MCO is a health organization that finances and delivers health care using a specific provider network and specific services and products.

3 Ex-ante assessment of hospital mergers in the Netherlands

3.1 Introduction

The NMa, established in 1998, enforces fair competition in all sectors of the Dutch economy. A part of its responsibility is ex-ante assessment of mergers. During the period of 1998-2003, before the major reforms in the health care sector had been introduced, the NMa was already asked to assess several hospital mergers. The conclusion of the subsequent reviews by the NMa was that actual competition between hospitals was not yet possible due to price and supply regulation (Varkevisser et al., 2008) and therefore, mergers could not restrict competition. The NMa decided to approve these hospital mergers without carrying out substantive assessments.

However, in 2004, the NMa concluded that, given the legislation at that time, hospitals could compete with respect to quality, service and supply.[9] From then onwards, the NMa has assessed hospital mergers for their effect on competition. The NMa has assessed eight hospital mergers since 2004.[10] In most cases, the merging hospitals were close competitors in a geographical sense. Except for an intended merger that was cancelled by the merging parties after all, the NMa approved all of these mergers, primarily because of the fact that there would be enough competition left on the market after the merger.[11] In the assessment of hospital mergers, the definition of the relevant product and geographical market are central issues.

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[9] After the introduction of the competitive segment in 2005, competition also became possible with respect to price.

[10] For more extensive descriptions of the cases, see for example Janssen et al. (2009).

[11] Recently, the parties of the withdrawn merger applied again for a license to merge and this time, the merger was approved with remedies (Besluit 6424/ Ziekenhuis Walcheren – Oosterscheldeziekenhuizen, 25th March 2009).

3.2   Product market definition

In all merger cases[12], the NMa has considered inpatient care and outpatient care as two separate product markets.[13]   One reason for this distinction is that both supply substitution and demand substitution can be different for inpatient and outpatient care. Blank and Van Hulst (2005) confirm this observation for the supply substitution. Moreover, competition conditions differ, since independent treatment centres are only allowed to supply outpatient hospital care. Also, in the United States and in New Zealand, inpatient care and outpatient care are considered to be two separate product markets in hospital merger control. There is no public debate about this product market delineation. In contrast, the geographical market definition in hospital merger cases is more challenging.

3.3   Geographical market definition

For hospital mergers, geographical market definitions are exceptionally challenging, since the normal tests that are applied to define relevant markets cannot be applied directly. This is due to the specific characteristics of hospital markets, namely the presence of third-party payers, differentiated products, asymmetric information, uncertainty, and entry and exit barriers (Varkevisser and Schut, 2008).

Normally, competition authorities use the standard 'Small but Significant Non-transitory Increase in Price' (SSNIP) test in order to define the relevant product and geographical market. In the SSNIP criterion, a relevant market is defined as a group of products and a geographical area in which a hypothetical profit-maximizing firm would impose a small but significant non-transitory increase in price above all prevailing or likely future levels holding constant the terms of sale for all products produced elsewhere. In general, the assumed price increase is 5-10 per cent lasting for one year. (Gaynor and Vogt, 2007). There are two main problems with the application of the SSNIP test in hospital markets. The first problem is that, in the non-competitive segment, price is no competition parameter, since prices are regulated. Second, the prices in the competitive segment are not paid by the

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[12] Besluit 3524/Juliana Kinderziekenhuis/Rode Kruis Ziekenhuis – Ziekenhuis Leyenburg, 28th January 2004, points 46-48

[13] Inpatient care concerns treatments whereby patients are admitted to a hospital for more than 24 hours; outpatient care concerns treatments whereby patients are admitted to a hospital for 24 hours or less.

patients themselves, since all patients have mandatory insurance. Therefore, patients are not price-sensitive. Due to these problems, the price elasticity of demand of the hospital cannot be calculated. There are various alternatives for the SSNIP test that can be used to define the geographical markets in hospital merger cases. One alternative is the Elzinga Hogarty (EH) test, which is commonly used by competition authorities worldwide, including those in the U.S., Germany and the Netherlands.[14]

The EH test is a shipment-based approach to geographical market definition and is based on historical patient-flow data. The rationale behind the method is that if a certain geographic area is the relevant market, then there is little export of hospital services (consumers within the relevant market do not make use of many hospital services from outside the relevant market, LOFI, little out from inside) and there is little import of hospital services (consumers outside the relevant market do not make use of many hospital services from within the relevant market, LIFO, little in from outside). The test starts with a narrowly defined market, and that market is enlarged until the thresholds are met. If both LOFI and LIFO are at least 75 per cent, Elzinga and Hogarty consider such a market to be a 'weak' market and if both LOFI and LIFO are at least 90 per cent, they define such a market as a 'strong' market.

Although the EH test is transparent and easy to understand, it also has some important shortcomings (Frech III et al., 2004). First of all, it is a static test: it uses patient-flow data pre-merger to deduce what will happen post-merger. But current behaviour is not necessarily a correct measure of future behaviour – particularly not for sectors that are in a transition, like the health care sector in the Netherlands. Furthermore, the threshold values of 75 and 90 per cent are chosen arbitrarily. Next to that, heterogeneity of the patients in the geographic area could lead to markets that are too broadly defined: this problem is called the 'silent majority fallacy'. If a certain subgroup of patients is willing to travel to a more distant hospital, this does not automatically hold true for the whole population. Hence, the existence of such a subgroup is no reason to define the geographical market broader. In other words, the presence of a group of patients that travels to more distant

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[14] There are other alternatives for the SSNIP test, under which the critical loss analysis, the time-elasticity approach, the competitor share approach, the LOCI and the option-demand approach. See Varkevisser et al. (2008) and Halbersma et al. (2009) for extensive descriptions of these methods. Competition authorities also make use of analyses of travel time for market definition.

hospitals does not discipline merging hospitals from abusing their increased market power, since there is a non-travelling silent majority (Varkevisser et al., 2008). The results are also sensitive to alternative implementations of the EH test (Frech III et al., 2004). Finally, the EH test can lead to either too large a geographical market, in case of horizontally differentiated products, or too small a geographical market, in case of very close substitutes.[15] As a consequence, the EH-test is considered to be unreliable in defining the relevant geographical hospital markets. Therefore, most of the time, the EH test is used in combination with other techniques for market definitions.

3.4 Merger Background

In this section, we first describe the institutional framework of the Dutch health care sector, since it is important to take this into account when performing ex-ante and ex-post assessments of hospital mergers. Then, the two mergers under investigation are described.

3.4.1 Reforms in the Dutch health care system

Over the last five years, a number of major reforms took place in the Dutch health care sector. The policy objectives of the Dutch government are to keep health care affordable, accessible and of high quality. This is done by a gradual introduction of a system of managed competition.

With regard to hospitals, the first steps were the introduction of a system of so-called diagnosis-treatment combinations (DBCs), as well as the introduction of a competitive segment of hospital care. A DBC describes the care for a patient in four codes: care question, care type, diagnosis and treatment. In this way, a DBC covers the entire treatment process a patient goes through, from the first appointment to the last check. The DBC diagnosis codes are connected to the international ICD10-codes. The DBC system was introduced in 2005, and it forms a unequivocal negotiation and declaration language: DBCs are the same in all Dutch hospitals and can be seen as relatively homogeneous treatments. For a carefully selected small group of DBCs, namely DBCs that deal with uncomplicated, elective (non-acute) outpatient hospital care, prices, quantities and quality

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[15] For a more extensive description of the EH test, see for example Gaynor and Vogt (2007).

were made subject to bargaining between insurers and hospitals. This competitive segment of hospital care is called the B-segment. All other treatments are part of the non-competitive segment (A-segment). For each treatment in the B-segment, insurers negotiate on the price with hospitals. In 2005, 8 per cent of the hospital care is part of the competitive segment. The competitive segment was expanded by including more treatments to 20 per cent of the hospital care in 2008 and to 34 per cent in 2009.[16]

In 2006, the Netherlands Healthcare Authority (NZa) was established, which is the sector-specific regulator for all health care markets in the Netherlands. The NZa promotes quality, accessibility and affordability in the health care sector and provides the NMa with opinions in hospital merger cases with respect to these three aspects of health care.[17] Since January 1st, 2006, the new Health Insurance Act has been in effect. There under, all residents of the Netherlands are legally required to take out health care insurance and to get at least a basic health insurance package. This package consists of basic medical and hospital care. The coverage of this package is the same for each resident, although the fee may differ per insurer. Health care insurers are obliged to accept all applicants for the basic package, and they have to charge the same price to each insured person. As a result, price discrimination and risk selection are not allowed regarding the basic package. To compensate insurance companies for actuarially predictable health expenditure differentials induced by socio-demographic factors, such as age, sex, income, location and prior health care consumption (chronic pharmaceutical dependencies and prior hospitalization), a sophisticated risk adjustment system has been introduced. This risk adjustment system was meant to level the playing field for health insurers and, as a consequence, to enable price competition (see Schut and Van de Ven, 2005).

3.4.2   The cases

In this study, we assess the price effect of two Dutch hospital mergers: the Gooi hospital merger and the Rotterdam hospital merger. Both mergers were finalized at around the same time in 2005.

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[16] Monitor Ziekenhuiszorg 2008, by NZa.

[17] Before the establishment of the NZa, its predecessor, the College Tarieven Gezondheidszorg, advised the NMa on these aspects.

In the Gooi hospital merger, both hospitals were of comparable size. In the first-phase investigation, the NMa used the EH test to define the relevant geographical market. The EH test suggested at a small geographical market in which the combined market share of the two hospitals was high. More extensive studies in the second-phase investigation of the relevant geographical market, with a more dynamic character and a stronger focus on the patients' willingness to travel, did not lead to an unequivocal picture. Due to these ambiguous results and given that the hospital market was in transition, whereby the availability of transparent information on quality was expected to increase in the near future, the NMa decided that there were 'insufficient grounds' for defining a small geographical market. As in the broader geographical market, the combined market shares of the merging parties would be low, the NMa approved the merger. This decision led to a lot of debate and criticism from policymakers, scholars and politicians (see e.g. Janssen et al., 2009). The subject of the debate was the geographical market definition. According to these critics, the NMa should, in case of doubt, have chosen for the smaller geographical market instead of for the larger geographical market.

In the Rotterdam hospital merger, two hospitals of different size merged. The EH test showed that the LOFI and LIFO scores were below 80 per cent for the zip code areas in which the hospitals are located. This is an indication that the geographical market would probably be larger than this area. In the end, the NMa has not defined the relevant market in detail. Even for the smallest possible geographical market, it was not likely that the merger would lead to the creation or a strengthening of a dominant position (combined market share less than 40%), since there would be sufficient competition left on the market. There was no debate on this decision.

4 Methodology

4.1 Model

We use the commonly used difference-in-differences (DID) approach, which is based on a 'before-after' comparison (Hunter et al., 2008) to estimate the effect of the two mergers on prices. This method is also used in previous studies on the price effect of hospital mergers (Tenn, 2008, Thompson, 2009). In order to distinguish the effect of the mergers, it is necessary to control for factors that can cause a price change, such as hospital size and the competition conditions. Other factors which are more difficult to quantify, like technological developments and changes in the regulatory framework are also controlled for in the DID approach. We include other hospitals in other geographic areas in the regression, in which the price is affected by the same factors, but not by the merger. We assume that the merging hospitals are influenced by general technological developments and regulatory reforms to the same degree as the other hospitals in the Netherlands are.

Typically, ex-post merger studies use a model of the form (Tenn, 2008):

$$\ln p_j = X_j \beta + \gamma_{h_j} + \alpha PostMerger_j + \theta (PostMerger_j * m_j) + \omega_j \tag{1}$$

The dependent variable p_j is the price for patient j, X_j represents the set of patient characteristics and γ_{hj} is the fixed effect for hospital h. The variable $PostMerger_j$ is a dummy variable that has value one if a patient enters a hospital in the post merger period. Dummy variable m_j is equal to one if the hospital is one of the merging hospitals. The coefficient θ is the DID parameter and reflects the difference between the price change of the merging hospitals and the price change of the control group, after controlling for the observable characteristics (X).

Tenn (2008) and Thompson (2009) use a two-step approach to avoid downward-biased standard errors (Bertrand et al., 2004). In the first stage, the average price change for each hospital is estimated, while controlling for patient characteristics. In the second stage, the difference between the price change of the merging hospitals and the price change of the

control group of hospitals is estimated, controlling for hospital characteristics that explain variation in each hospital's post merger price change. In our analysis, we can aggregate the patients' level data to insurer-hospital level data without a loss of information as the prices are the same for all patients that have the same insurer and that enter the same hospital. Therefore, it is not necessary to control for patient characteristics, as our level of analysis is the hospital-insurer level and patient characteristics do not affect DBC-prices.[18] Furthermore, we directly look at the relative price change between 2005 and 2007.

We determine the price effect of the merger after controlling for hospital characteristics. In other words, an OLS regression will be performed to control for both the observable hospital characteristics, such as the number of beds, type of hospital, changes in the number of orthopaedists, by means of including these variables in the regression model and the unobservable hospital characteristics by means of including a control group[19].

So we estimate a model of the form:

$$\Delta p_{hi} = \alpha + Z_h \beta + \lambda_{ih} + \phi m_{hi} + \varepsilon_{hi} \tag{2}$$

where, Δp_{hi} is the price change between 2005 and 2007, as a percentage of the price in 2005, per hospital-insurer combination, α is the constant, Z_h reflects the observable hospital characteristics (see table 1) and λ_{ih} is an insurer fixed effect for insurer i. The coefficient ϕ is the DID parameter and m_{hi} is a dummy variable that is equal to one if hospital h_i is one of the merging hospitals.

The analysis is done for hip surgery in the competitive segment, and for one specific disorder in particular, i.e. the abrasion of the hip, arthrosis. This is a disorder that is very

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[18] In contrast, Tenn (2008) and Thompson (2009) do need to control for patient characteristics, like age, sex and type of insurance. This is due to the differences between the American health insurance system and the Dutch system. We have also employed an analysis in which we corrected the actual prices for patient characteristics (age and sex), but the results were not different from the results reported in this paper. Moreover, the variable PostMerger[j] is only useful in the first stage, in which the price change is estimated. Since we can calculate the price change directly from our dataset, we can exclude PostMerger[j].

[19] Moreover, our control group is relatively large (387 hospital-insurer combinations), so we do not have the problem that the obtained estimates are imprecise as a consequence of a small control group (see e.g. Tenn, 2008, p. 13).

common among seniors and is a fairly homogeneous treatment. The treatment includes more than 95 per cent of total hip treatments in the competitive segment in the period of investigation. We concentrate on this treatment because hip treatments have a large share of the total revenue in the competitive segment of hospital care in the Netherlands (20 per cent in 2005).[20] Furthermore, hip surgery is performed in almost all hospitals in the Netherlands, so a large control group can be constructed. Finally, hip surgery is typically performed in hospitals and not in independent treatment centres.[21]

4.2   Data

The analysis is based on a NZa data set of treatment, prices, quantities and patient characteristics for all hospitals in the Netherlands. The level of analysis is the hospital-insurer combination level. We focus on two years: the year before the merger took place (2005) and the year after the merger was finalized (2007).[22] The dependent variable in our analysis is the price change between 2005 and 2007, as a percentage of the price in 2005.

The control group consists of all other hospitals in the Netherlands that perform hip surgery in both 2005 and 2007. In total, we have 387 observations, of which 27 are related to one of the two mergers. We control for observable differences between the hospitals by including several control variables (see Table 4.1).[23] Several control variables are measured in changes. For the other variables changes were not relevant: either there was no information available for 2005 and 2007 (HHI hospital market) or the variables were (almost) constant in time (Type of hospital, Number of beds, Urbanization, Region and Independent treatment centre). The variables for which no source is mentioned have been obtained from the NZa.

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[20] See Monitor Ziekenhuiszorg 2004, Monitor Ziekenhuiszorg 2005, Monitor Ziekenhuiszorg 2006, Monitor Ziekenhuiszorg 2007, by NZa.

[21] Independent treatment centers are small outpatient treatment centers that are allowed to enter the market since 1998. These independent treatment centers are only allowed to provide elective (no acute) hospital care (Halbersma et al., 2007).

[22] We exclude the year in which the merger took place, since we consider this to be a transition year in which the effect of the merger is not yet correctly measurable (see e.g. Thompson, 2009).

[23] We wanted to include the length of the waiting lists as a control variable as well, but this was not possible due to a lack of reliable information.

Table 4.1 Control variables for observable hospital characteristics

Control variable	Description
Type of hospital	A dummy variable for a general hospital, medical teaching hospital or academic hospital
Number of beds	The number of beds (absolute value)
Δ Medical specialists	Change in the number of medical specialists working in the hospital
Δ Outpatient cases	Change in the number of outpatient cases in the hospital
Δ Orthopedists	Change in the number of orthopedists working in the hospital
Urbanization	The extent to which the area in which the hospital is located is urbanized (scale of 1 to 5; 1 is most urbanized)
Region[24]	A dummy variable for the region in which the hospital is located (north, east, south, west)
Δ HHI insurers[25]	Change in the HHI of insurers, per province
HHI hospital market	The HHI of the relevant market of the hospital
Independent treatment centre	The extent to which a independent treatment centre is located nearby (scale of 1 to 3; 1 is most nearby located)
Δ Quality AD[26]	Change in the yearly Algemeen Dagblad (AD, a Dutch newspaper) survey on hospital quality

Type of hospital, Number of beds and Δ Medicals specialists control for the influence that the type and size of hospitals may have on prices. For example, academic hospitals and medical teaching hospitals may have a higher expertise and quality, which can lead to higher price increases. The Number of beds indicates the size of the hospital. A change in the number of medical specialists indicates to what extent the hospitals have grown during this period.[27]

Δ Outpatient cases and Δ Orthopedists control for the focus and expertise of the hospital with respect to the competitive segment in general and to hip surgery in particular. Δ Outpatient cases shows to what extent hospitals focus on the competitive segment,

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[24] This information is obtained from Statistics Netherlands (www.cbs.nl)

[25] This information is obtained from *Monitor Zorgverzekeringsmarkt 2008*, by NZa.

[26] This information is obtained from Algemeen Dagblad, AD Ziekenhuis Top 100 (www.ad.nl/ziekenhuistop100)

[27] The change in the number of beds may also indicate to what extent the size of hospitals changed, but this measure only takes into account inpatient cases. Conversely, the change of the number of medical specialists takes into account both inpatient and outpatient cases. Moreover, the number of beds of the hospitals has virtually been constant during the period of our investigation.

relative to the non-competitive segment during this period.[28] Orthopedics is the medical specialism that deals with hip surgery. An increase of the number of orthopedists may imply, for example, lower price increases (economies of scale), or higher price increases (more expertise and higher quality).

The variables Regions and Urbanization control for the area in which the hospital is active, as prices may differ per region in the Netherlands. HHI hospital market[29], ΔHHI insurers and the Independent treatment centre variables control for the competition and negotiation circumstances. A higher HHI of the hospital market can lead to higher price increases, since hospitals have options to use their market power. An increase in the HHI of the insurers can lead to lower price increases, due to stronger bargaining power of insurers. A growth in the fierceness of competition in the market, e.g. as the result of the nearness of an independent treatment centre, can lead to lower price increases as well.

Finally, we control for overall quality developments at hospital level (Δ Quality AD), as there is no specific and reliable quality measure for hip surgery available. Increased quality may lead to higher price increases, while decreased quality may lead to lower price increases. Quality is measured by the change of the score in the annual survey of Dutch newspaper Algemeen Dagblad (AD) on quality, which consists of twenty-six quality indicators that are formulated by, amongst others, the Netherlands Health Care Inspectorate (IGZ).[30] Examples of these quality indicators are undernourishment, pain after surgery, cancelled operations and patient satisfaction.[31]

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[28] The major part of the treatments in the competitive segment is outpatient cases.

[29] To calculate the HHI's we need to determine the relevant geographical markets. We used the EH-test on patients flows to define the relevant market. For these markets we calculated the market shares of the hospitals. These resulting market shares are used to calculate the HHI's for each geographical market (see also Halbersma, et al. 2007). Unfortunately, we only have information on 2005, therefore we cannot calculate the change in the HHI hospital market.

[30] Inspectie voor de Volksgezondheid (www.igz.nl).

[31] This quality measure is at the hospital level. There is no measure of quality of hip surgery available for the whole period under investigation.

5 Results

5.1 Price development

Figure 5.1 shows the average price increase for hip surgery in the whole industry as well as for the merging hospitals, per insurer, between 2005 and 2007.[32]

Countrywide, there is an average price increase that varies between 0.2 and 3.9 per cent. For Ziekenhuis Gooi-Noord, there is a price increase for all insurers (approximately 10 per cent) except for insurer E, for which there is a price decrease of 1.4 per cent. For Ziekenhuis Hilversum, there is a price increase for all insurers between 5 and 10.5 per cent.

Figure 5.1 Average price increase in the Netherlands and the merging hospitals, per insurer, 2005-2007

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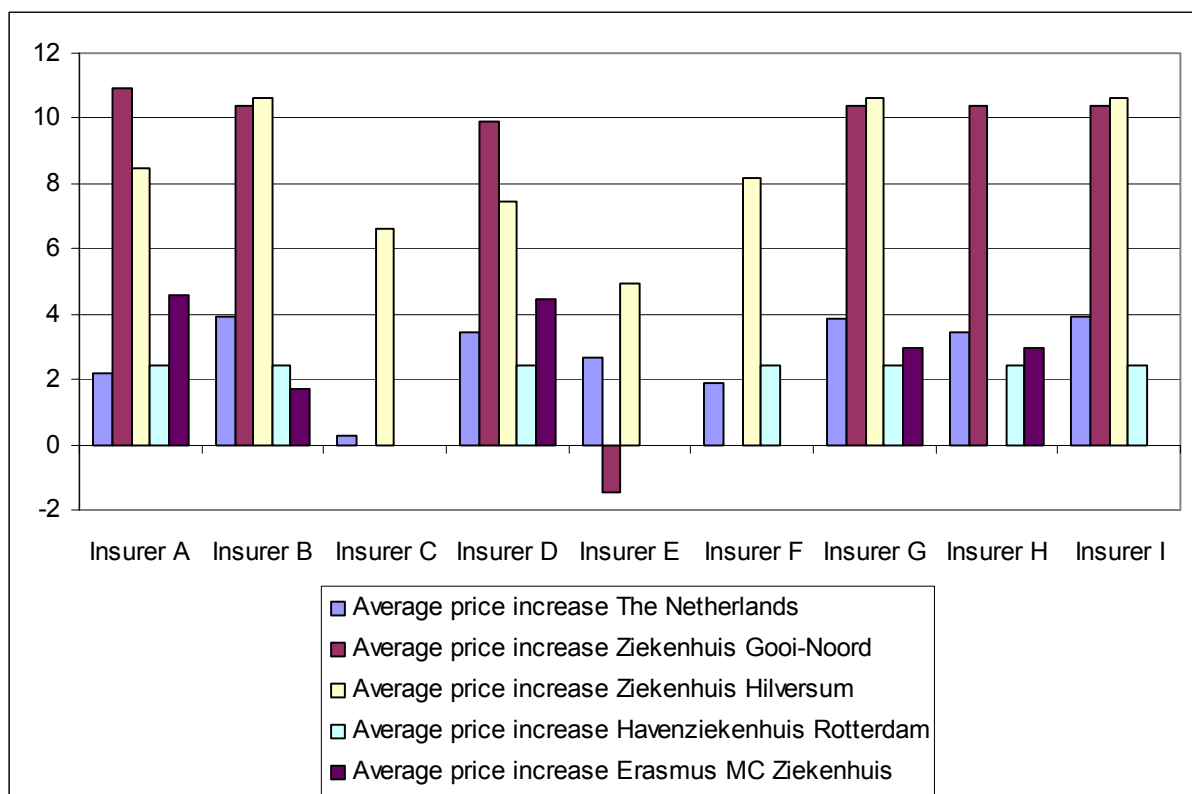
[32] Only the insurers that have actually insured patients that have undergone hip surgery in one of the merging hospitals in the relevant period are included.

Havenziekenhuis Rotterdam has a fixed price increase for all insurers of 2.4 per cent, for Erasmus MC Ziekenhuis, the price increase is between 1.7 and 4.6 per cent. The weighted average price increase in the Netherlands is 2.5 per cent, the weighted average price increase for Ziekenhuis Gooi-Noord is 3.6 per cent, for Ziekenhuis Hilversum 7.1 per cent, for Erasmus MC 2.4 per cent and for Havenziekenhuis Rotterdam 3.0 per cent.

5.2 Pre-merger and post-merger prices in comparison to the national average

For the Gooi hospital merger, there are substantial price increases for this specific treatment, compared to the average price increase in the Netherlands. In order to put this price increase in a wider perspective, we compare the absolute price of each merging hospital in 2005 to the national average price, per insurer (see Table 5.1). The national average price is set at 100.

Table 5.1 Price index of merging hospitals, pre and post merger, per insurer

Insurer	National average		Gooi Merger			Rotterdam Merger			
	2005	2007	Ziekenhuis Gooi-Noord	Ziekenhuis Hilversum	Gooi hospital merger	Haven-ziekenhuis Rotterdam	Erasmus MC Ziekenhuis	Haven-ziekenhuis Rotterdam	Erasmus MC Ziekenhuis
			Pre merger	Pre merger	Post merger	Pre merger	Pre merger	Post merger	Post merger
A	100	102.2	96.4	98.6	106.9	103.4	99.6	105.9	104.1
B	100	103.9	98.7	98.5	109.0	104.9	100.0	107.4	101.7
C	100	100.1		95.1	101.4				
D	100	103.4	96.0	98.2	105.6	103.1	99.2	105.5	103.6
E	100	102.6	102.9	96.7	101.4				
F	100	101.7		97.1	105.1	101.1		103.5	
G	100	103.9	97.7	97.5	107.8	103.8	104.3	106.3	107.4
H	100	103.4	97.4		107.5	103.5	104.0	106.0	107.1
I	100	103.9	98.0	97.8	108.1	104.1		106.6	

In 2005, for Ziekenhuis Gooi-Noord and Ziekenhuis Hilversum, prices for most insurers were below the national average. In 2007, these merging hospitals use one uniform price, which, in most cases, is above the national average in 2007. So between 2005 and 2007, the prices of the merging hospital have, on average, changed from below the national average to above the national average level, except for insurer E, which is the largest

insurer in the region (market share > 50 per cent). This may be a sign that negotiation power of the insurer was becoming more effective here[33].

For the Rotterdam merger, both hospitals use their own price after the merger. For Havenziekenhuis Rotterdam, the prices were above the national average in 2005. In 2007, its prices were again above the national average with approximately the same percentages as in 2005. For Erasmus MC ziekenhuis in 2005, the prices were around the national average for insurer A, B and D. For insurer G and H, the prices were above the national average. After the merger, this pattern does not change much. So for this merger, the price development is in line with the average price development in the Netherlands.

5.3   Results of the regression analysis for the two mergers simultaneously

We have estimated equation (2) for both mergers simultaneously (see Table 5.2)[34]. Several control variables have statistically significant effects. The effect of the number of beds is statistically significant and positive, indicating that the larger the number of beds, the higher the price increase. All variables that control for the location of the hospitals (urbanization and dummies for the regions) are statistically significant. The price increases are higher in rural areas. Price increases also vary between regions in the Netherlands.

Moreover, the effect of changes in the relative number of outpatient cases appears to be statistically significant and positive. Apparently, an increased focus on the competitive segment (relatively more outpatients) leads to higher price increases for hip surgery. A possible explanation is that, as a result of a more specific competition strategy in the period under investigation, these hospitals may have a higher production for treatments in the competitive segment (possible at the expense of production in the non-competitive segment). As a result, these hospitals have shorter waiting lists for the competitive segments and can achieve higher price increases.

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[33] One of the reviewers also mentioned that the price effect may be the result of the introduction of the managed competition. The merging parties perhaps did not fully anticipate on the new situation resulting in relatively low prices just after the introduction. After two or three years they learn to negotiate better, with higher prices as a result.

[34] We also performed the regression for both mergers separately. The results are the same, therefore we feel confident to pool the results.

The Δ HHI insurers and the nearness of an independent treatment centre both have a statistically significant negative effect on the price increase. This matches our expectations, since this leads respectively to a worse negotiation position and fiercer competition for hospitals. The own HHI of hospitals is also significant and has a negative sign. Although the coefficient is small, this is an unexpected result. The price increase also differs per insurer, as several insurer dummies are statistically significant.

Table 5.2 Regression analysis for the two mergers simultaneously

Relative price increase	Coefficient	Standard Error	Significance
General hospital	0.754	0.791	
Medical teaching hospital	0.076	0.724	
Number of beds	0.001	0.001	*
Urbanization	0.755	0.268	***
Dummy region 2	-1.928	1.145	*
Dummy region 3	2.588	0.585	***
Dummy region 4	-2.011	0.858	**
Δ Medical specialists	-0.002	0.054	
Δ Orthopedists	0.149	0.369	
Δ Outpatient cases	0.157	0.041	***
Δ HHI insurers	-0.002	0.001	***
Δ Quality AD	0.021	0.018	
Independent treatment centre	-1.779	0.595	***
HHI hospital market	-0.000	0.000	***
Insurer A	-1.641	0.507	***
Insurer C	-3.231	0.780	***
Insurer D	-0.297	0.503	
Insurer E	-1.102	0.560	**
Insurer F	-1.748	0.567	***
Insurer G	-0.624	0.747	
Insurer H	-0.308	0.533	
Insurer I	-0.174	0.638	
Dummy Ziekenhuis Gooi-Noord	3.500	1.243	***
Dummy Ziekenhuis Hilversum	5.130	1.055	***
Dummy Havenziekenhuis Rotterdam	-0.278	1.139	
Dummy Erasmus MC Ziekenhuis	-0.629	1.424	
Constant	4.673	2.396	*
R^2	0.3486		
N	387		

Note: Significance levels are defined as * = 10%, ** = 5% and *** = 1%.

The dummy variables for Ziekenhuis Gooi-Noord and Ziekenhuis Hilversum are significant. This means that the effect of the Gooi hospital merger is statistically significant and positive. The regression analysis shows that, even if we control for other factors that may cause a price increase, price increases of 3.5 per cent for Ziekenhuis Gooi-Noord and 5.1 per cent for Ziekenhuis Hilversum is related to the merger[35].

The dummy variables for the Havenziekenhuis Rotterdam and the Erasmus MC ziekenhuis are both statistically insignificant[36]. This matches our expectations, since there is no price increase that deviates considerably from the national average for this Rotterdam merger.

5.4   Analysis of travel behaviour of patients

In this section, the aim is to link the price effect of the mergers with the travel behaviour of patients. We expect that especially patients in the edges of the catchment area of the merging hospitals will go to other hospitals in order to avoid the price increase. The average travel time of patients of the merged hospitals is therefore expected to diminish.

For the Gooi hospital merger, the NMa defined a broad geographical market in its decision.[37] This was especially based on the stated preferences of patients and the expectation that the transparency on quality and prices would increase over time. More transparency was assumed to increase the patients' willingness to travel. Although patients may not be that price sensitive because they do not have to pay the price directly, we would expect to find an effect of the price increase on travel behaviour as a consequence of channelling of patients by insurers. The insurers have to pay the price and have therefore an incentive to channel patients to cheaper hospitals. If this assumption is correct, one would expect to see a change in travel behaviour as a consequence of the increase in prices. In other words, for the Gooi hospital merger with a significant price increase, one would expect that some patients who went to the merging hospitals pre-merger, will go to

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[35] The effect of the merger differs per insurer (see Table A.1 in the Appendix. We only include the four insurers for which the equation is statistically significant. Because the ratio of the observations to the number of variables is relatively small, we have to be careful with drawing strong conclusions based on these results.
[36] We also performed the analysis per insurer and this provided us with the same picture: the dummy variables are insignificant for all insurers. In other words, for none of the insurers, there is a price increase that can be attributed to the merger.
[37] Although the NMa did not define the market exactly.

other hospitals in the broader geographical market post-merger, in order to avoid the price increase. For the Rotterdam hospital merger, we do not expect to find a change in travel behaviour in the post merger period as there is no significant price increase.

For the purpose of testing this proposition, an additional analysis is performed. We have calculated the average travel time of patients that have undergone hip surgery in one of the merging hospitals (see Table 5.3).

Table 5.3 Average travel time to hospitals, 2005 and 2007

Hospital	2005	2007
Ziekenhuis Gooi-Noord	16.32	
Ziekenhuis Hilversum	17.33	
Hospital Gooi hospital merger		18.57
Havenziekenhuis Rotterdam	14.29	16.63
Erasmus MC Ziekenhuis	23.04	24.98

The results indicate that the average travelling time of the Gooi-hospital mergers' patients increased by 7 to 14%. However, in absolute terms the increase is relatively small, approximately 2 minutes. This result is contrary to our proposition, i.e. we see that a price increase goes together with an increase in travelling time. Also for the Rotterdam hospital merger we see that the average travel time increases between 9 and 16%. Also in this case, in absolute terms the increase is relatively small, approximately 2 minutes.

It is clear that the patients did not change their behaviour as result of the price increase in the Gooi hospital merger. Apparently the mechanism suggested above does not work. We know that selective contracting by the insurers companies and channelling of their patients is not used between 2005 and 2007. At the moment some channelling is introduced but it remains to be seen what the effect will be. Also transparency on prices and especially quality is limited.

There may also be another explanation for the observed travelling behaviour. As Vita and Sacher (2001) suggested, a price increase may also be caused by an increase in quality. They argued that:

> " ... If the transaction improved the quality of hospital care provided in Santa Cruz County,
>
> relative to that provided in hospitals outside the county, we would expect to observe (*ceteris*

paribus) an increase in the proportion of Santa Cruz County residents who seek hospital care within Santa Cruz County. ... " (p. 81).

If we look at the (combined) market share of the merged hospital in the small relevant market it increased by 3 per cent.[38] This may indicate that the patients perceive a higher quality of the merged hospital. Especially patients at the edges of the small relevant market may decide to go to the merged hospital resulting in an increased average travelling time. For the patients, the higher perceived quality does not have an effect on the price they pay for their insurance and the insurers do not try to influence their travelling behaviour. As a consequence the LOFI score increases, i.e. less patients from inside the small relevant market go to hospitals outside the small relevant market.

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[38] In order to calculate the market shares, we have made use of the definition of the small market that the NMa has made in the original decision.

6　Final remarks

6.1　Conclusions

In this paper, we have analyzed the effect of two hospital mergers in the Netherlands on the prices for hip surgery. For the Gooi hospital merger, we observed a substantial price increase after the consummated merger. Part of this price increase may be explained by the fact that the prices were below the national average before the merger. The merging hospitals have to learn how to operate and negotiate in the new managed competition situation. But this does not explain why the prices are well above the national average post merger. For the Rotterdam hospital merger, we did not find a statistically significant price increase as a result of the merger while the prices remain above the national average. In addition, for both mergers we found that the travel time slightly increased after the merger. In the Gooi hospital merger, the patients did not react to the price increase by choosing another hospital. They seem not to be (effectively) channelled by their insurers either.

A central point in the NMa decision is the expectation that patients would travel if prices would increase. This point was based on research on stated preferences. In this study, we see that the average travelling time in absolute terms only slightly increases in both mergers, despite changes in price. This result is consistent with earlier observations: patients in the Netherlands do not travel to distant hospitals.[39]

It is, however, possible that patients are going to travel more in the future, when quality becomes more transparent and/or selective contracting and channelling by insurers becomes common practice. At the moment, quality per treatment is not yet transparent in the Netherlands, since it is very difficult to measure. Currently, there are a number of attempts to foster the diffusion of information on quality, and especially on the quality of

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[39] See e.g. Roland Berger (2008) and
http://www.volkskrant.nl/archief_gratis/article865116.ece/Patient_wisselt_niet_van_ziekenhuis_door_wachtlijst

specific treatments.[40] Moreover, the Netherlands Health Care Inspectorate has recently started a project, called *Zichtbare Zorg*, which, within a couple of years, should lead to a uniform set of quality information that is useful for patients. This is essential for patients to really balance decisions on quality versus travelling time. For hospitals, quality can become an additional competition parameter

Nowadays, most insurers have contracts with almost all hospitals in the Netherlands. Moreover, most patients can choose any hospital they want, as insurers virtually do not channel patients to hospitals that they prefer out of price or quality motives. If channelling would have taken place, patients could have been channelled to other (cheaper) hospitals (under the assumption that quality remained the same) making the price increase less profitable. At the moment there are signs that selective contracting and channelling will take place in the future. According to a survey of the NZa, 52 per cent of health care insurers indicated that they pay 'much more' or 'more' attention to channelling in 2009, relative to the year before.[41] For channelling to work, also transparency on quality is important. Furthermore, the possibility alone to channel patients will give insurers more bargaining power in their negotiations with the hospitals. On the other hand, channelling could be at the expense of consumer freedom of choice. Therefore, consumers who are channelled should be compensated in terms of for instance shorter waiting lists, or a lower insurance premium.

6.2   Discussion and future research

Just like the results of some recent studies of the FTC, this study shows that in some cases there is a substantial post-merger price increase. However, it is important to be careful when drawing conclusions. First of all, the mergers took place one year after a major market reform, i.e. the introduction of competition in the health care sector. At least a part of the price increase for hip surgery may be explained by the fact that the prices of the merging hospitals were below the national average before the merger, i.e. a learning effect. For some hospitals, it took a few years after the opening of the market before the

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[40] Examples are www.kiesbeter.nl, www.independer.nl and
http://rivm.openrepository.com/rivm/bitstream/10029/16490/1/260101003.pdf (for hip surgery).
[41] Monitor Ziekenhuiszorg 2009.

negotiators were used to the bargaining process for the competitive segment. Large price increases can accordingly indicate improved negotiation skills. The price increase could also be explained by an increase in quality, although our overall quality indicator is not significant in the regression. The increased average travelling time may be explained by a perceived increase of quality for this specific treatment.

In addition, it is important to be aware of the limitations of this study. First of all, it should be noted that the hospital mergers that have been investigated are not a random sample of all the mergers that took place. As Carlton (2007) argues a mistake in one case could be a random error and would not necessarily have to point at a systematic error in the policy. Therefore, it is important to have systematic and quantitative analyses of all mergers, or of a sample thereof. In our study, we have focused on only one type of surgery: we did not take into account all other treatments in the competitive segment. Investigating the price change of all treatments in the competitive segment may provide a different picture. It is, for example, quite common that insurers and hospitals agree on a total budget that hospitals receive annually. Within this budget, the funds that are allocated to specific treatments can be somewhat arbitrary: for some treatment, a relatively high price can be agreed on, while for other treatments, a relatively low price can be agreed on.

Secondly, as long as quality is not transparent, it is hard to draw any conclusions from a price increase. A price increase may (partially) be caused by a quality increase (Argue, 2009). In the analysis, we controlled for the overall quality level of hospitals (not significant), however, we have no specific quality measure for the hip surgery. Thirdly, it is important to see how the prices develop over a longer period of time, for instance do the prices remain above the national average.

Moreover, in order to interpret the results of a study that only uses quantitative information, like this study, it is worthwhile to perform complementary qualitative research on for instance changes in the negotiation skills of the hospitals and insurers, changes in quality, etc. This qualitative research can, for example, consist of interviews with the involved hospitals, insurers, patients and other stakeholders. A combination of quantitative and qualitative information will provide more insight into what really happened after the finalization of a merger. For future research, we suggest that such a combined research

could be done for this merger and preferably systematically for all Dutch hospital mergers, like Carlton (2007) recommended.

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Appendix

Table A.1 Result of the regression analysis Gooi hospital merger, per insurer

Relative price increase	Insurer A			Insurer B			Insurer D			Insurer H		
	Coefficient	Std. Err.	Sign.*	Coefficient	Std. Err.	Sign.*	Coefficient	Std. Err.		Coefficient	Std. Err.	Sign.*
General hospital	-0.171	1.795		1.034	1.494		-0.320	1.584		3.090	1.281	**
Medical teaching hospital	-0.628	1.508		1.879	1.372		-0.328	1.374		2.780	1.045	**
Number of beds	0.001	0.001		0.000	0.001		0.002	0.002		0.001	0.001	
Urbanization	-0.214	0.692		0.835	0.444	*	1.770	0.628	***	0.440	0.416	
Dummy region 2	0.369	3.616		-6.648	2.149	***	-2.106	2.846		-4.059	2.128	*
Dummy region 3	0.309	1.426		-0.141	1.135		3.386	1.366	**	-1.519	1.397	
Dummy region 4	-6.308	2.394	**	-4.553	1.662	***	-3.662	2.020	*	-3.438	1.885	*
Medical specialists	-0.128	0.131		-0.006	0.110		-0.104	0.117		0.154	0.109	
Orthopedists	0.823	0.911		0.454	0.784		-0.176	0.938		-0.761	0.596	
Outpatient cases	0.155	0.098		0.102	0.075		0.120	0.095		0.224	0.067	***
HHI insurers	-0.001	0.001		0.001	0.001		-0.004	0.001	***	-0.003	0.001	**
Quality AD	0.055	0.046		0.025	0.036		0.018	0.042		0.006	0.030	
Indep. treatment centre	-1.295	1.837		-3.358	1.152	***	-2.238	1.423		-3.811	1.085	***
HHI relevant market	-0.000	.000		-0.000	0.000	**	-0.000	0.000		-0.000	0.000	**
Dummy Ziekenhuis Gooi-Noord	8.802	3.174	***	4.329	2.413	*	2.652	2.946		6.340	1.908	***
Dummy Ziekenhuis Hilversum	6.004	2.813	**	6.233	2.253	***	3.628	2.633		(dropped)		
Constant	5.997	6.403		11.375	4.627	**	4.072	5.327		9.766	4.342	**
R^2	0.583			0.519			0.505			0.655		
N	60			61			62			50		

* Significance levels are defined as * = 10%, ** = 5% and *** = 1%.