



## Effects of regulated competition on key outcomes of care: Cataract surgeries in the Netherlands



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### ABSTRACT

Similar to several other countries, the Netherlands implemented market-oriented health care reforms in recent years. Previous studies raised questions on the effects of these reforms on key outcomes such as quality, costs, and prices. The empirical evidence is up to now mixed. This study looked at the variation in prices, volume, and quality of cataract surgeries since the introduction of price competition in 2006. We found no price convergence over time and constant price differences between hospitals. Quality indicators generally showed positive results in cataract care, though the quality and scope of the indicators was suboptimal at this stage. Furthermore, we found limited between-hospital variation in quality and there was no clear-cut relation between prices and quality. Volume of cataract care strongly increased in the period studied. These findings indicate that health insurers may not have been able to drive prices down, make trade-offs between price and quality, and selectively contract health care without usable quality information. Positive results coming out from the 2006 reform should not be taken for granted. Looking forward, future research on similar topics and with newer data should clarify the extent to which these findings can be generalized.

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### 1. Introduction

Regulated competition is playing an important role in the current Dutch health care system since the major reform in 2006. Several market-based mechanisms were introduced to attain multiple goals of efficiency, cost containment, quality improvement, and innovation, while guaranteeing access to care through regulation. This shift toward market mechanisms in health care has taken place in several countries since the late 1980's [1,2]. To a large extent, these reforms are based on Enthoven's theoretical model of managed competition [2,3]. This model is

grounded in economic theory and aims to “reward with more subscribers and revenue those that do the best job of improving quality, cutting cost and satisfying patients” [3]. Competition is ‘managed’ or ‘regulated’ in order to guarantee accessibility and to address market failures. Consumers can choose, and their preferences and interests are bundled within organizations in order to increase purchasing power and reduce information asymmetry. In the original US-based model, these organizations (often employers) negotiate and conclude contracts with health care plans, i.e. organizations where insurers and providers are integrated, to stimulate provider competition. Nevertheless, this theory also relates to systems where purchasers and providers of health care are separated, as in most social health insurance (SHI) countries [2]. Several SHI countries shifted toward regulated competition, by giving

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consumers a yearly free choice of health insurer, which stimulates insurer competition [2]. The main idea is that insurers will respond to consumer preferences and stimulate efficiency in health care provision. Other countries, such as England, have relied on patient-driven provider competition, instead of payer-driven competition [4,5]. Market-based reforms thus come in different forms and diverse institutional contexts.

Van de Ven et al. study the preconditions that need to be fulfilled in order to achieve efficient and affordable competitive health care markets. Based on Enthoven's theoretical model, ten main preconditions are identified: free choice of insurer, risk-bearing buyers and sellers, guaranteed access to basic care, cross-subsidies without opportunities for free riding, effective quality supervision, consumer information and transparency, contestable markets, freedom to contract and integrate, effective competition regulation, and cross-subsidies without incentives for risk-selection (for a comprehensive explanation, see [2]). The fulfillment of these preconditions does not, however, guarantee an efficient and affordable health care system. Neither can it be ascertained that the theoretical model of regulated competition provides the best way to organize the health care system. This discussion, however, is beyond the scope of this paper. For five SHI countries (Belgium, Germany, Israel, the Netherlands and Switzerland), the authors evaluate the extent to which preconditions are fulfilled. By 2012, the first five preconditions have been fulfilled in all five countries. The remaining five preconditions have been met to varying degrees. Most importantly, there has been a perceived lack of transparency and quality information [6,7], both in the Netherlands and the other countries [2]. With respect to the other four preconditions not being sufficiently met (contestable markets, freedom to contract and integrate, effective competition regulation, and cross-subsidies without incentives for risk-selection), the Dutch system seems to perform better than the other countries [2]. Nevertheless, the risk-equalization scheme – though improved over time – is not perfect, and insurer choice seemed somewhat constrained by supplementary insurance [6].

It comes as no surprise that both academics and policymakers seek evidence on the effects of market-based reforms in health care. The Dutch 2006 health reform received widespread international interest [8–12]. The first qualitative evaluations of the reform showed favorable results, such as strong consensus among stakeholders in favor of regulated competition and fierce price negotiations among health insurers in the first years. At the same time several problems were identified, most importantly the lack of transparency. However, quantitative evidence regarding the effect of competition-based reforms on key outcomes such as quality, volume, and prices of care is still scarce. The literature provides evidence mostly from the UK and the US. The English NHS showed that the 1990s internal market, in which the roles of purchaser and provider were separated (and selective contracting was possible), created lower prices, lower clinical quality, and shorter waiting times particularly in more competitive areas [13]. In the 2000s the New Labor Market, comprising patient choice for elective hospital care and selective contracting

by purchasers on quality (fixed tariffs), did not reduce quality [13]. Over time, one of the major issues of the English model has been the absence of competition between purchasers [1]. Evidence from the US showed a 'medical arms race' before the 1990s [13,14]. In a system of patient-driven competition and fee-for-service payment, hospitals engaged in massive investments in expensive medical technology and modern buildings to attract more patients. This resulted in escalating health care costs. In the later era of managed competition, substantial price reductions were realized mainly in areas with lower provider concentration [15,16]. However, this effect disappeared in the end of the 1990s, partly because the insured required greater choice of providers [17]. The impact of negotiations on quality has been ambiguous in the US. Results varied between quality measures and conditions [18,19]. In addition much depends on the institutional settings [13,15]. Overseeing the empirical evidence, Bevan and Skellern concluded that the impact of competition, particularly in elective surgery, "remains an open question". Not the least because outcome measures used in previous studies, mostly mortality rates, may not be a valid instrument of health care quality for elective surgery [12].

In this study, we aimed to contribute to the empirical literature. We studied price, volume, and quality of elective hospital care in the Netherlands. We concentrated on elective hospital care, in particular cataract surgeries, because price competition was introduced in 2006 in this segment. Our main goal was to understand changes in price, volume, and quality after the introduction of price competition using data from 2006 to 2009. Did prices reduce or converge? Did the system move toward a better price-quality ratio as expected with regulated competition? In contrast to most previous studies, we used negotiated prices instead of public list prices or other proxies. We examined price variation over time and between hospitals. RIVM [20] reports some descriptive figures for Dutch hospital care on trends in average prices and variation in prices for several conditions, among which cataract care. The statistics cover the period 2006–2008 and show moderate variation in cataract prices. In this study, we go a step further: first, we analyzed the relationship between negotiated price and several quality indicators. Second, we explored the relationship between price and provider concentration. We focused specifically on cataract surgery but also provided information on general trends in elective hospital care. This study is an intermediate evaluation, since market-based reforms are work-in-progress and develop over time. This article is organized as follows. Section 2 describes the funding and organization of Dutch hospital care. In section 3 we present the data and methodology. Sections 4 and 5 summarize and discuss the results. Section 6 describes the implications for policymakers. Section 7 concludes.

## 2. Funding and organization of hospital care in the Netherlands

Since the early 1990s the Dutch health care system has been in transition from strong supply-side government regulation toward regulated competition [6]. In the 1980s Dutch hospitals received budgets that were based on

several factors such as the expected number of admissions, the expected number of in-patient days, day-treatment days, and outpatient visits, and the size of the population in the hospital's region. The budget for each hospital was fixed and based on the expenses of the preceding year. Tariffs were regulated. In 2006, the health care reform partly abolished hospital budgets. These are still used as reference. The reform enacted the introduction of a new reimbursement method and product classification system for hospital care. This so-called Diagnosis Treatment Combination (DTC) resembles DRG-type of payments. From 2006 onwards, insurers were allowed to selectively contract hospitals and to negotiate with hospitals about volume, quality, and (partly) price. At first, price competition was expanded to approximately 10 percent of all hospital services – the so-called 'B segment' – including elective treatments such as cataract surgery. Price competition was increased to roughly 20 percent in 2008, and 30 percent in 2009 and 2010. As from 2012 the B segment represents 70 percent of hospital care. In the remaining part of hospital care, i.e. the 'A segment', prices are still regulated.

The insurance market changed significantly in 2006. The dual system of public and private coverage was abolished and private health insurers regulated under private law offered statutory coverage. At present, the insurance market includes four concerns covering 80–85 percent of the population. These four concerns comprise around twenty insurance companies. The remaining part of the population is covered by one of the seven smaller insurance companies. These seven plans usually negotiate all together with hospitals. Up to 2009, the period we analyze, health insurers contracted all hospitals. In other words, health insurers did not exclude hospitals from the network [21]. The number of hospitals providing B segment hospital care slightly declined from 99 in 2005 to 95 in 2009, 90 percent of which are general hospitals [21]. At the same time, according to the Dutch Healthcare Authority (NZA), the number of small-size specialized clinics providing B segment care grew extensively. Health insurers contracted 37 clinics in 2005 and 129 in 2009 [21]. It is unknown whether health insurers contracted all specialized clinics. The share of specialized clinics in total hospital expenditures has risen but is still limited: in 2009 around 5 percent of total spending on the primary B segment treatments [21]. Each insurer may apply different prices across providers. And each provider may vary its price by insurer.

### 3. Data and methods

#### 3.1. Study setting

A cataract is "clouding of the lens of the eye which prevents clear vision" and is mainly caused by aging [22]. The common treatment is an operation that removes the opaque lens and replaces it by an artificial intraocular lens [23]. In this study the choice for cataract surgery is appealing because it has been part of the B segment since the introduction of price competition. In 2006, cataract surgery represented 15 percent of total expenses in the B segment, which equalled approximately €150 million [24]. The choice for cataract minimizes heterogeneity across

hospitals in our analysis because cataract surgery is a high-volume standardized procedure mostly performed in day-treatment. Patients' case-mix is thus less relevant for cataract than for other types of surgery. Moreover, contrary to other treatments, a number of quality indicators – both clinical measures and patient-reported satisfaction – for cataract surgery were publicly available.

#### 3.2. Data

We used data from the NZa on the number of treatments and contract prices for cataract care by hospital/specialty clinic and by health insurer for the years 2006–2009. The NZa collected contract prices from health insurers and information on the supply of elective treatments from hospitals. Hospitals are required by law to deliver the latter information.

We further used clinical indicators from 'Zichtbare Zorg' – a national program set up by the Ministry of Health, Welfare and Sports and guided by the Health Care Inspectorate (IGZ), to develop quality information for health care purchasers. The data were provided by the IGZ, whereas hospitals performed the measurements. Hospital level scores were publicly available for 2008 and 2009. IGZ qualified the information according to four criteria: (1) validity, as determined by expert opinion; (2) registration quality, as determined by hospitals' answers to verification questions<sup>1</sup>; (3) reliability, based on power analysis; and (4) comparability (do population characteristics affect the indicator?), as determined by expert opinion. The IGZ assessed each quality indicator using these four criteria. We used three cataract care quality indicators with mostly "good" ratings for these criteria, as shown in Table 1. The first measure was the percentage of surgeries with complications, i.e. the number of cataract surgeries with perioperative vitrectomy during surgery as a percentage of all cataract surgeries in each hospital. The second indicator was the percentage of patients waiting for a period of 28 days or more between operations, if the patient needed an operation on both eyes. The third indicator was the percentage of patients waiting for a period of at least 21 days after the first surgery and before a post-operative check was performed, if the patient needed an operation on both eyes.

We also used patient-reported satisfaction in this analysis. For this purpose we collected data from the Consumer Quality Index (CQI) for cataract surgery [25]. The CQI was partly derived from the US CAHPS instrument [26]. Data was available for 2007 and 2008. In 2007, 17,000 patients in 74 hospitals completed the survey, compared to 20,000 patients in 85 hospitals in 2008. Three case-mix standardized (for age, education, and general health) average hospital ratings were available: (1) communication with the eye surgeon; (2) communication with the nurse; and (3) the information provided on the medication prescribed.

<sup>1</sup> Questions: Was the definition of the nominator and denominator clear? Are the numbers based on full counts? Authorization by medical specialist? All self-reported.

**Table 1**  
Assessment of the quality of the indicators (good–average–bad).

Indicator	Validity	Registration quality	Reliability	Population comparability
Complications				
2008	Good	Average	Good	Good
2009	Good	Good	Average <sup>a</sup>	Good
Time between 1st and 2nd eye operation				
2008	Good	Average	Good	Good
2009	Good	Good	Average	Good
Time between 1st operation and control in case of operation both eyes				
2008	Good	Average	Good	Good
2009	Good	Good	Good	Good

<sup>a</sup> The reliability of the indicator on complications decreased. In 2009 the measurements of 74% of the institutions had enough power, in 2008 this was 78%.

Hospitals received a rating on a scale from 1 (minimum) to 4 (maximum).

### 3.3. Method

Our main goal was to evaluate changes in outcomes of elective hospital care after the introduction of price competition in 2006. We studied whether the market was able to realize a reduction and convergence of contract prices. We used variation coefficients and Intraclass Correlation Coefficients (ICC) to explore this. The ICC describes the correlation of observations per hospital, i.e. the ratio of between hospital variance and total hospital variance. We also tested if prices differed by hospital type (general hospital, academic hospital, or specialized clinic).

Furthermore, we investigated the variation in quality across hospitals. Although previous studies showed a general lack of good quality information in Dutch health care, some quality information was available for cataract surgery. We linked the quality of care indicators with price information and analyzed the price–quality relationship at the hospital level. On a general note, price variation is not undesirable. If higher prices correspond to higher quality and people are willing to pay for higher quality there is no issue at stake [27]. Regulated competition in the Netherlands' health care system stimulates health insurers to become prudent purchasers of care for their consumers and are expected to trade-off price and quality.

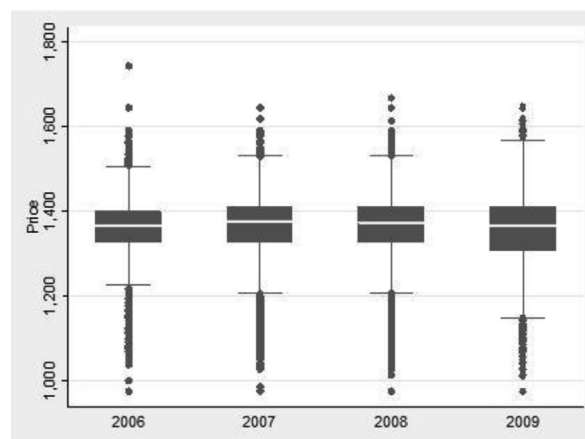
We lastly examined the relationship between price and provider concentration, which has been used as measure of the degree of provider competition in previous studies [15,28]. The international literature showed that the Herfindhal-Hirschman Index (HHI) suffers from endogeneity problems [28]. Unobserved characteristics of hospitals and patients may determine patient choice and thus the relationship between competition and quality or price. Similar to previous studies we used a predicted HHI to control for reverse causality. Firstly, we estimated a logit model to determine the probability of an individual seeking care at a particular hospital using distance (between the patient's home and the hospital) as main predictor. Secondly, the relevant geographical markets were defined using the “combine-then-rank” method of the Elzinga-Hogarth test [29]. The boundaries of the geographical market were based on a ranking of zip codes that make-up 75 percent of the services (based on predicted probabilities

of use) in the area and in which 75 percent of the residents obtain care from the hospitals in the area. Overlapping areas were combined. Finally, the HHI was calculated using the sum of squared predicted patient shares.

## 4. Results

### 4.1. The volume of cataract surgery

The number of cataract surgeries increased from 116,000 in 2005 to almost 156,000 in 2008 (the figures for 2009 were not complete yet); an increase of 34 percent. General hospitals supplied the greatest share: 84 percent in 2005 and 80 percent in 2008. The share of specialized clinics (20 clinics provided cataract care in 2008) rose to 15 percent. This increase in activity in the early years post reform was not caused by demographic changes. The population aging was slower, e.g. the number of people over 65 rose with 9 percent only in the same period. Since we had no objective data on the prevalence of cataract and eye disorder symptoms (besides information on the number of people treated), it was unclear whether this rise was a result of demand or supply factors.



**Fig. 1.** Box-plot of the price for cataract surgery between 2006 and 2009.

#### 4.2. The price of cataract surgery

Fig. 1 shows contract prices (contract between one hospital and one health insurer). Between 2006 and 2009 the mean nominal price of cataract surgery remained stable, around €1350 each year. This is equal to a decrease of around 5 percent in the inflation-adjusted price of cataract care. Fig. 1 shows almost no change in the price distribution. The wider distribution in 2009 was caused by a few missing hospitals in the dataset for that specific year. Fig. 1 depicts a difference of approximately €600 between the lowest and the highest price. The variation coefficient, which is the ratio of the standard deviation and the average, was 0.07 for cataract surgery in all years, showing that the relative variation remained similar over time. The ICC statistics for prices showed that most of the variation, almost 70 percent, was caused by variation between hospitals. The other 30 percent comprised variation within hospitals over time and across health insurers. In other words, hospitals with high prices in the first year also applied high prices in later years. And hospitals with a high price for one health insurer generally showed a high price for other health insurers too. We observed significantly lower prices for specialized clinics compared to general and university hospitals (two-group mean-comparison *t*-test:  $p = 0.00$ ).

#### 4.3. The quality of cataract surgery

Fig. 2 shows the distribution across hospitals of the percentage of surgeries with complications in 2008 and 2009. The figure shows a similar distribution in both years with outcomes ranging between 0 percent and 2 percent per hospital. The mean percentage across hospitals decreased from 0.45 percent to 0.32 percent. It is unclear whether this change was statistically significant. A report of the IGZ showed that differences between hospitals were not statistically significant, except for a few outliers [30].

Table 2 depicts that hospitals applied on average the criterion 'waiting for a period of 28 days or more between operations' in 93 percent of the cases in 2008 and in 95 percent of the cases in 2009. Additionally, hospitals applied on average the criterion 'waiting a period of 21 days or more between the operation on the first eye and the post-operative check' for 80 percent of the cases in 2008 and for 84 percent of the cases in 2009. Both process indicators showed a smaller distribution as more hospitals reached a high percentage. Again, as reported by the IGZ, significant differences between hospitals were hardly observed [30].

Table 2 also shows the case-mix adjusted patient-reported satisfaction per hospital in three domains. The correlation coefficients of 0.60 (communication with doctor), 0.60 (information on medication) and 0.42 (communication with nurse) confirmed that hospitals with high CQI scores in 2007 generally received a high rate in 2008 too. The hospital ratings for communication with doctors and communication with nurses varied in a relatively small range, between 3.6 and 3.9 across hospitals. In other words, most hospitals received a rating that was close to the maximum score of 4. The variability was somewhat larger in the dimension information on medication, between 2.3 and 3

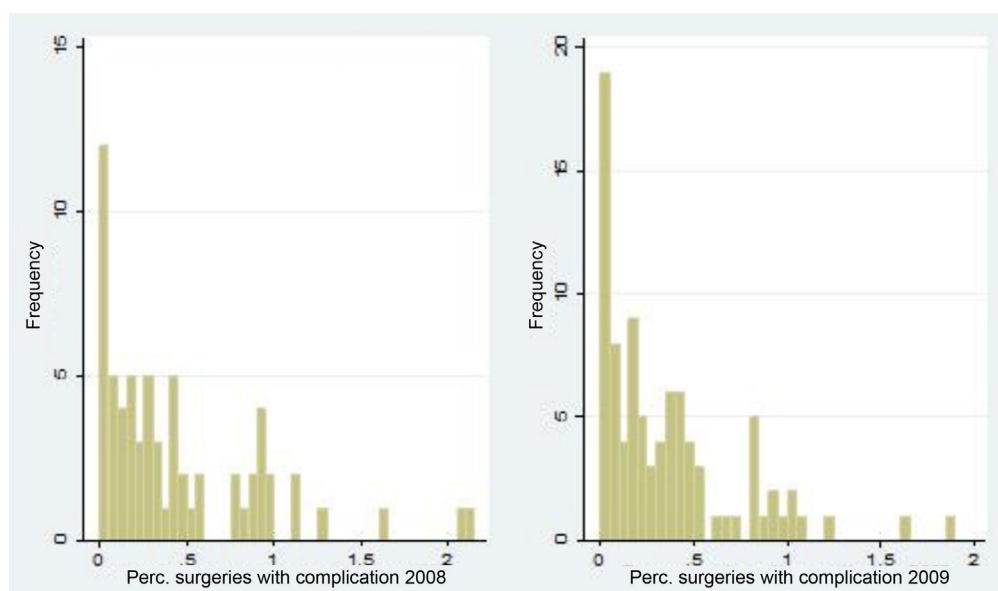
for most hospitals. A previous study also reported limited between-hospital variation in the CQI for cataract care (ICC of around 0.02 for the three CQI dimensions) [25]. It seems that the variation in patient-reported satisfaction almost entirely resulted from within-hospital variation.

#### 4.4. Price versus quality

The down left panel of Fig. 3 depicts how price related to the outcome indicator 'percentage of surgeries with complications'. We observed no direct relationship between these two variables. The correlations between price and other quality indicators such as process indicators and CQI ratings showed a similar result. We further tested the association between prices and the degree of provider competition to explain price differentials. The upper left panel shows that providers in relatively concentrated markets set prices at about €1400, which is in line with the average price. Competitive areas showed a wider variation in prices ranging between €1200 and €1500. The upper right panel shows that insurers mostly exhibited a share between 0 and 20 percent in a hospital's production. Within this range we observed much variation in prices, i.e. between €1000 and €1500. Insurers with a share above 30 percent did not seem at first sight to use their negotiation power to set lower prices, as these remained on average around €1400.

### 5. Discussion

In this study, we looked at the impact of price negotiations for cataract care on volume, prices, and quality. Previous studies described a lack of consumer information and transparency, and of provider competition in the Dutch health care market in the past years [10], though several quality programs were launched to increase patients' and insurers' awareness of quality variation across providers. Our results showed that negotiated prices for cataract surgery have not converged since the introduction of price competition. Interestingly, a previous report confirmed that other treatments experienced similar or even greater price variation across hospitals, and no or very little decreases in variation over time [20]. For example, the mean nominal price of tonsillectomies (also largely performed in day treatment) slightly increased between 2006 and 2008. We further depicted that price differences between hospitals remained stable over time. There has been an increase in the number of specialized clinics entering the Dutch market. These clinics offered lower prices compared to general and academic hospitals, not just for cataract care but also for other conditions that were subject to price competition. [21]. Lower prices could be the result of aggressive pricing strategy to gain market share or better production's efficiency. Another explanation could be patient selection: these clinics might have referred patients with co-morbidities to hospitals [24]. Studies from the UK showed that specialized treatment centers in the NHS, introduced in the late 1990's, treated less severe patients than hospitals [31]. If this holds true for the Netherlands, it would mean that higher prices for hospitals were justified by case-mix variation.



**Fig. 2.** Percentage of surgeries with complications per hospital, 2008 and 2009\*. \*In this figure we only include 65 hospitals that provided information for both years.

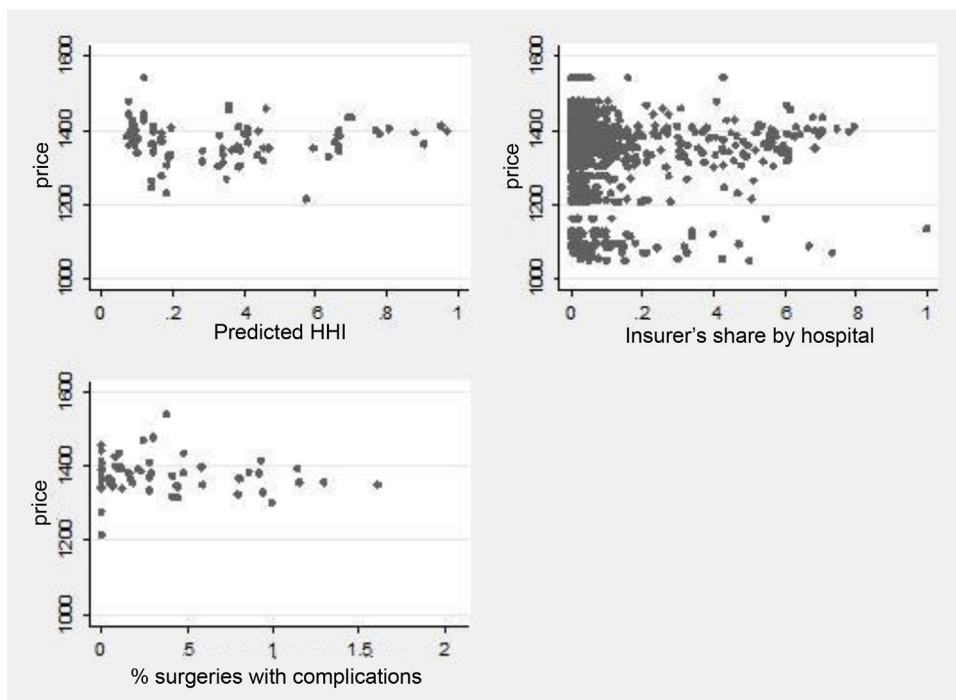
The specialized clinics also played a role in the volume increase between 2005 and 2008, which indicates limited barriers to enter the market (i.e. precondition of contestable markets). Although the market share of specialized clinics increased, general and academic hospitals showed a substantial increase in terms of volume as well. In other words, volume increases occurred throughout the market. Research from other countries confirmed that the introduction of activity-based financing in elective care, without control mechanisms, led to increased production [27]. Since the DTC system can be considered activity-based financing, similar mechanisms may have played a role in Dutch health care [32]. It is unclear though whether volume increases led to the provision of unnecessary care. Did doctors provide treatments without much benefit to the patients, for example by adjusting, i.e. lowering, the inclusion criteria for treatment (practice variation)? Or did the volume increase reflect unmet (excess) demand? If certain hospitals induced demand for care by lowering the threshold for treatment over time (and other hospitals did not), this may have decreased the comparability or homogeneity

of patient populations across hospitals. As a result, the comparability of prices may be hampered in recent years because treating less-severely ill patients may require fewer resources. Douven et al. [32] found strong indications that supplier induced demand played a role in Dutch hospital care between 2006 and 2009. The study found a higher number of treatments in regions with greater physician density after controlling for a large set of control variables (such as case-mix variables). Moreover, this effect was stronger for physicians paid on output-basis compared to salaried physicians. Nevertheless, the study did not provide evidence for 'unnecessary care' since condition-specific need variables [33] and health outcomes were not included in the analysis. Therefore, it is unclear to which extent unwarranted practice variation exists in practice. If unwarranted practice variation exists this should be taken into account in the analysis, in particular when it is related to the price of care, i.e. when there is a relation between the intensity to provide unnecessary care and pricing behavior. Practice variation may have determined price differences at the introduction of price competition, albeit to an unknown

**Table 2**

Quality indicators for cataract surgery; mean outcome across hospitals and standard deviation (between brackets), 2007–2009.

	2007	2008	2009
<i>Clinical measures</i>			
Complications per hospital (% of all surgeries)	–	0.45 (0.49)	0.32 (0.37)
Compliance to criterion "time between operation 1 and operation 2 >28 days?" per hospital (% of all patients)	–	92.27 (15.07)	95.07 (6.91)
Compliance to criterion "time between operation and follow-up check >21 days?" per hospital (% of all patients)	–	80.27 (31.07)	84.82 (24.38)
<i>Patient-reported satisfaction</i>			
Communication with doctor (rating between 1 and 4 per hospital)	3.72 (0.07)	3.70 (0.09)	–
Communication with nurse (rating between 1 and 4 per hospital)	3.78 (0.06)	3.78 (0.06)	–
Information on medication (rating between 1 and 4 per hospital)	2.61 (0.21)	2.74 (0.21)	–



**Fig. 3.** Relation between price and percentage complications (down left), price and predicted HHI (upper left), price and insurer's share in the hospital (upper right), in 2008.

extent. However, the fact that price hardly changed over time and that the mean nominal price remained stable does not support the latter proposition.

The (small) number of available indicators limited the quality of our analysis. These indicators were not optimal in some cases (Table 1). The quality indicators depicted low complication rates, scores of 80–90 percent for two process indicators (maximum equals 100) and patient-reported satisfaction close to the maximum (at least in two dimensions). Most quality indicators showed additionally limited between-hospital variation. Therefore, it comes as no surprise that we did not find any association between price and quality at the hospital level. To put it differently, we did not find expensive hospitals to provide above-average quality of care, at least for the indicators included in this study. In the last years, many efforts have been undertaken to realize greater transparency of information in the Dutch health care market. Health care providers were involved in the development of clinical indicators and health insurers sponsored the development of patient-reported satisfaction measurements. These indicators were used in this article. Although several quality indicators were developed and published for cataract care, they may not have provided sufficient information for insurers' purchasing activities [7]. Furthermore, a general discussion on the validity and reliability of quality indicators may have created reluctance among health insurers to selectively contract providers, benchmark across hospitals, or negotiate lower prices of care. The lack of health insurers' expertise on negotiations in the first years post reform may have strengthened this effect. Health insurers had to build

up knowledge on medical practice and organization of care, which may take some years before becoming effective.

The degree of provider concentration as measured by the predicted HHI (hospital market structure) and the insurer's share in hospital production (insurer competition) did not explain price differences either. The cross-sectional variation in prices may be affected by other factors such as case-mix. Lower prices for specialized treatment centers may result from case-mix variation. Nevertheless, great price variation exists between hospitals as well. We expected, however, limited patient heterogeneity between hospitals in this case because we studied: (i) a treatment that is undergone by a specific patient group – mainly consisting of elderly people; and (ii) a high-volume standardized procedure. Cataract is among the most common and successful surgeries usually performed in daily treatment. This minimizes the heterogeneity of input needed across hospitals.

## 6. Implications for policymakers

One of the goals of the 2006 reforms was to improve the efficiency of the Dutch health care system through the introduction of market-based mechanisms and further emphasis on consumers' and health insurers' role. The main question is whether health insurers fulfilled, or were able to fulfill, their role of prudent purchasers of health care. Our empirical results point to the contrary. Since the start of the reforms, consumer information and transparency has been one of the major issues that hindered the achievement of these goals. Our recommendation to policymakers is to

put more effort into the availability and use of good-quality information. In particular, since free negotiations in hospital care were expanded to 70 percent in 2012. Moreover, health insurers increasingly bear financial responsibility for health care expenses (through the removal of ex-post compensation fund). Both changes support the ultimate goal of a competitive health care system. However, in combination with a lack of transparency they may create an incentive to skimp on quality as competition will be primarily focused on prices.

Because the role of health insurers is to prudently purchase health services, the quality of information should reflect consumers' and patients' preferences. In comparison to some of the current health quality indicators, generic and disease-specific patient-reported outcomes (PROMs), such as "self-reported vision improvement", may provide useful information in this respect. A look into the UK health care system could provide interesting lessons: the NHS for example systematically implemented PROM measurement. Other indicators such as the occurrence of reoperations provide valuable information to health insurers. The set-up of the Dutch Quality Institute in 2013 can be an important first step in this direction. The Institute's goals are to support further development of quality indicators and to help gathering comprehensive quality information for a broader set of health conditions.

As mentioned in the introduction, several countries implemented market-based health system reforms in the past decades. Even though all health systems have their particular (institutional and historical) characteristics, policymakers may learn from experiences abroad. The Dutch experience shows that long-term commitment may be needed when step-by-step changes are made. The Dutch system appears to have met several preconditions for effective regulated competition, more than a few similar social health insurance countries [2]. Nevertheless, much work is still to be done. In particular, the lack of transparency appears a critical issue among the many preconditions for effective competition. This may be no surprise, given the large role that information asymmetry plays in economic theory of competition. Furthermore, the empirical evidence regarding the impact of the reforms has been limited and may not have received much attention in the further development of reforms. New hospital classification systems were established and quality information was not properly developed from the start of the reform. This creates major difficulties for effective evaluation at early stages. A mapping of quality variation and stringent purchasing policies of insurers is strongly advised, because this may improve the understanding of variation in efficiency across providers. Furthermore, comprehensive and disease-specific information on case mix and health benefits could improve the evidence, also regarding the role of practice variation.

## 7. Conclusions

The Dutch 2006 health care system reform of regulated competition aimed to improve efficiency and quality of health care. The results of our study add evidence to the literature on market-based reforms, mostly from the

US and UK, that policymakers should not take positive effects for granted. Much will depend on the institutional arrangements and fulfillment of preconditions for effective regulated competition [2,13,15]. Looking forward, our study suggests a rich set of further research questions. The relationship between price and quality needs to be studied for other conditions to investigate the performance of hospitals across conditions. Additional studies that make use of more recent data are desired if we want to understand the evolution of health insurers' prudent buyers role. Such newer and probably richer datasets also enable the use of advanced econometric techniques to further analyze and explain the variation in price and quality across hospitals. Some important lessons can then be extrapolated for other countries, which follow the path of regulated competition in health care.

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