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Does managed competition constrain hospitals' contract prices?

Evidence from the Netherlands

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Abstract

In the Dutch health care system health insurers negotiate with hospitals about the pricing of hospital products in a managed competition framework. In this paper, we study these contract prices that became for the first time publicly available in 2016. The data show substantive price variation between hospitals for the same products, and within a hospital for the same product across insurers. About 27% of the contract prices for a hospital product is 20% higher or lower than the average contract price in the market. For about half of the products the highest and lowest contract price across hospitals differ by a factor three or more. Moreover, hospital product prices do not follow a consistent ranking across hospitals, suggesting substantial cross subsidization between hospital products. Potential explanations for the large and seemingly random price variation are: (i) different cost pricing methods used by hospitals, (ii) uncertainty due to frequent changes in the hospital payment system; (iii) price adjustments related to negotiated lumpsum payments, and (iv) differences in hospital and insurer market power. Several policy options are discussed to reduce variation and increase transparency of hospital prices.

Keywords: contract prices hospitals; price variation; hospital-insurer negotiations; managed competition.

JEL codes: I00; I11; L11; L51.

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1. Introduction

Worldwide, policy makers are searching for new ways to organize hospital care efficiently. In most hospital markets a nationwide product classification system exists that allows third-party payers to identify the product a patient receives and to compare productivity across hospitals. However, countries make different choices in how to price these hospital products (Siciliani et al., 2017).

One extreme option of pricing hospital products is fixed prices. For example, Germany, the UK and traditional Medicare in the US have a system with administered prices where prices are determined by the regulating authority. Competition among hospitals will take place in non-price means, like volume and quality (Gaynor et al., 2015). More efficient hospitals have financial leeway for quality improvements and increase productivity by attracting more patients. On the contrary, fixed prices can lead to a low overall quality level of health care if the regulator sets prices below hospital marginal or average cost prices.

The other extreme is that prices of individual hospital products are fully market-determined. In this situation prices are determined through a bargaining process between health insurers (or other third party payers) and hospitals. Some examples approaching this extreme are the employer based insurance market and Medicare Advantage in the US, and systems of managed competition in Switzerland and the Netherlands. Competition among hospitals and insurers will then be based on prices, volume and quality (Gaynor et al., 2015).

It is still an open question whether a situation of fixed hospital prices is preferable over a situation with largely market-determined prices, or vice versa. Outcomes of different hospital pricing systems are difficult to compare or evaluate and depend on many different factors that are often hard to observe and difficult to isolate. In a market where prices are negotiated by health insurers and hospitals, important preconditions are that health insurers can act as a prudent buyer of care for their consumers and can steer their patients to hospitals with a good price-quality ratio (Enthoven, 1993).

In the Netherlands, there is a system of managed competition where insurers negotiate with hospitals about individual prices for a large share of the hospital products. Since 2005 price negotiations have been phased in gradually for an increasing number of hospital products. For a long time, the contract prices of these hospital products were considered as private information and were not publicly available, making it difficult to evaluate pricing of hospital products. However, in 2016, in response to growing pressure from consumer associations, one large insurer and one hospital group made their contract prices publicly available. This allows us to study negotiated prices of hospital products for the first time.

We hypothesize that in a good functioning managed competition framework, hospital-insurer negotiations will lead to low price variation for similar products. The reason is that health insurers –all else equal– will use comparative information on hospital prices to negotiate the lowest possible prices and will motivate their enrollees to visit the lowest priced hospitals, which will drive down price variation across similar hospital products. Furthermore, we expect that hospitals would charge similar prices for the same products to different health insurers if there is effective competition among insurers. The aim of this paper is to examine the extent of price variation between hospitals for the same hospital products, and within a hospital for the same products across insurers by analyzing publicly available price information.

We find a substantive price variation. About 27% of the contract prices for a hospital product is 20% higher or lower than the average contract price in the market. For about half of the products the highest and lowest contract price across hospitals differ by a factor three or more. Such large price variations for similar products cannot be explained by underlying differences in price-cost margins, and therefore indicate the presence of substantial cross-subsidization between hospital products within hospitals. In addition we find evidence of considerable price discrimination across insurers as the prices of the same product charged by a single hospital on average varies by a factor 1.4. Since these differences are not consistent across different hospital products, this price variation cannot solely be explained by difference in (regional) buying power by insurers. Moreover, since the prices charged to different insurers vary for most of the products, the way prices are set seems to differ per insurer. Below we discuss several potential explanations for these findings.

Empirical studies based on actual contract prices that are negotiated between hospital and insurers in a market with managed competition are scarce. An important reason is that data on contract prices are often proprietary and confidential. Therefore researchers have to rely on hospital list prices (i.e. the prices that have to be paid by uninsured patients and by patients visiting non-contracted hospitals) or other proxies of contract prices, which can substantially differ from the true contract prices (Halbersma et al., 2011). Based on insurance claims data for individuals with private employer-sponsored health insurance in the US, Cooper et al. (2015) found a large variation in overall inpatient hospital prices and in prices for seven relatively homogenous procedures. In the Netherlands there are some earlier studies using proprietary data. Halbersma et al. (2011) studied the initial year, 2005, of free hospital-insurer price negotiations. They found a significant impact of idiosyncratic effects on hospital prices, which, as argued by the authors, is consistent with the fact that the Dutch hospital sector is not yet in a long-run equilibrium. Heijink et al. (2013) studied a single hospital procedure (i.e. cataract surgery) and found evidence of substantial price variation that was persistent over time (from

2006-2009). Our study is the first for the Netherlands covering a comprehensive set of hospital contract prices using the recently published data on hospital prices.

The paper is organized as follows. In section 2 we discuss the main features of the Dutch hospital market and the price setting of hospital products. Data and methods are described in the third section. The results are described in the fourth section and potential explanations are discussed in the fifth section. The final section discusses the policy implications of our findings that may not only be relevant for the Netherlands but also for other countries that have implemented, or are intending to implement, market-determined hospital prices.

2. Price setting in the Dutch hospital market

The Dutch hospital market is gradually changing from a supply-side regulated to a more demand-side driven system. In 2006 the Health Insurance Act (HIA) came into force introducing market mechanisms as instruments for cost control. For hospitals, contractual negotiations with insurers about price and quality of their services are central in this reform. The intention of the government is to gradually step back in regulating the capacity and prices of health care supply

Table 1. Overview of important changes in the hospital payment system since 2005

Year	Change
2005	Introduction of DTC product classification system (>40,000 DTCs)
	Introduction of prices per DTC instead of hospital per diem rates
	Introduction freely negotiable prices for on average 10% of hospital revenue
2008	Expansion of free pricing segment to on average 20% of hospital revenue
2008-2017	Phasing out retrospective capital cost compensations
2009	Expansion of free pricing segment to on average 34% of hospital revenue
2012	Profound revision (DOT) of DTC product classification system (4,400 DTCs)
	Expansion of free pricing segment to on average 70% of hospital revenue
2012-2014	Phasing out global hospital budgeting system (transition model)
2012-2018	General agreements about macro budget total hospital expenses Insurers and hospitals negotiate about lumpsum payments and DTC prices
2015	Integration of medical specialist remuneration in DTC prices
	Reduction of maximum duration of DTCs from 365 to 120 days

and leave it more to the market. However the introduction of such a system takes times and since 2005 the hospital payment system has been frequently and profoundly changed (see Table 1).

To facilitate contractual negotiations at a product level in 2005 all hospital services were classified into a diagnosis treatment combination (DTC) (Oostenbrink and Rutten 2006; Westerdijk et al. 2011). Each DTC included all hospital activities and services (both inpatient and outpatient) associated with the patient's demand for care, from the initial consultation to the final check-up. At the same time, the system of hospital pricing based on per diem rates was replaced by a system of prices per DTC.

Initially, most of these DTC prices were regulated and only for a minority of routine elective hospital treatments (e.g. cataract surgery and hip replacements), accounting for on average about 10% of total hospital revenue, DTC-prices were made freely negotiable between hospitals and insurers. In due course, the average share of freely negotiable DTCs was stepwise expanded, to about 20% of total hospital revenue in 2008, 34% in 2009, and 70% percent in 2012. For the remaining 30% (consisting of the most complex hospital products) prices are still regulated. The introduction of DTCs was accompanied with a gradually phasing out of retrospective capital cost compensations for hospitals, making hospitals increasingly at risk for investments in hospital infrastructure.

The initial set-up of the new product classification system was highly complex with over 40.000 DTCs (Krabbe-Van Alkemade 2014). In 2012 the DTC system was simplified to reduce the complexity, administrative costs, and incentives for upcoding, by reducing the number of DTCs by a factor seven to about 4.400 products. The new classification system required a new pricing system. The introduction of the new system caused considerable uncertainty among both hospitals and insurers about what would be appropriate hospital prices for the new DTCs, because the underlying cost prices of these products were largely unknown.

At the same time, the excessive growth of hospital expenditure urged the government to conclude "General agreements" with the hospital and insurer associations to limit total spending growth of the hospital sector. Initially, for the period 2012-2013, the annual growth limit was set at 2.5% in real terms (i.e. excluding wage and price adjustments), but in subsequent years the maximum growth rate was reduced to 1.5% (for 2014), 1.0% (for 2015-2017), and 1.4% (for 2018). To be able to enforce the agreed upon growth limits, the government created a new legal "macro budget control instrument". This instrument empowers the government to compensate any total budget overrun by imposing a levy on each hospital in proportion to its revenue. To date, however, this instrument only functioned as a credible threat but has not been used in practice, since total hospital spending growth – except for a small exceedance in 2013 – remained within the stated limits.

The General agreements also affected the contractual agreements between hospital and insurers as they started to negotiate fixed or maximum lumpsum payments based on previous years expenditures (Ruwaard et al. 2014). Prices of DTCs were used as a payment mechanism to collect the lumpsum amount (implying zero DTC prices after the agreed upon lumpsum payment level being reached). These lumpsum payments did not only provide both parties with more certainty about revenues (hospitals) and expenses (insurers), but also made it possible to provide the government with sufficient certainty that total hospital expenditure would remain within the agreed upon macro budget.

In 2015, the DTC system was again substantially changed by two measures. First, the remuneration of medical specialists was integrated in the DTC prices, implying that specialists were no longer paid by the insurers of their patients but by the hospital in which they are working. Hitherto, medical specialists were paid a regulated fee per DTC (based on a regulated payment per hour and a normative amount of time per DTC). Second, the maximum duration of a DTC was lowered from 365 to 120 days.

Since 2012, payment negotiations between hospitals and insurers typically consist of two consecutive stages (Van Rooy 2014). First, both parties negotiate an annual maximum or fixed lumpsum payment (which may be adjusted during the year due to unforeseen circumstances). Next, DTC-prices are negotiated for hospital products included in the free pricing segment, given the DTC-prices for hospital products in the regulated segment set by Dutch Healthcare Authority.

In sum, since the introduction of the health care reform the hospital payment system has been frequently and profoundly changed.

3. Data and method

The variation in individual contract prices may be due to a combination of hospital pricing factors and bargaining efforts by insurers. However, little research has been done to study this price variation of hospital products across hospitals and insurers in the Netherlands. One problem here is that contract prices are private information and, therefore, difficult to obtain. Recently, however, this information has been made partially available by a large health insurer (*CZ)*, with a market share of 21% in 2016 (NZa 2016b), and a medium-sized hospital (*IJsselmeerziekenhuizen)*, a general hospital with 360 beds. This allows us for the first time getting insight in the extent of price variation across hospitals and of within hospital price variation across insurers in the free pricing segment.

From an insurer perspective, we studied price variation between hospitals within insurer *CZ*. The prices published by insurer *CZ* include all hospital products that were priced by at least one hospital below the maximum amount people (>18 years) had to pay out of pocket. In 2016 this amount was 885 euros, which is the sum of the mandatory deductible (385 euros) and the maximum voluntary deductible (500 euros). Because of the fact that variation in hospital prices below 885 euros may matter for consumers, consumer organizations put pressure on insurers and hospitals to release information about these prices. All prices are contract prices of individual hospital products from 2016. We compare contract prices of about 1.400 individual hospital products negotiated by *CZ* with 3 university hospitals, 56 general hospitals and 178 independent treatment centres (ITCs) (CZ, 2016). In the Netherlands, ITCs may offer only routine type elective care for which no hospital admission is required, comprising the relatively inexpensive DTCs that are included in this dataset. The dataset includes about 70,000 prices of individual products up till a price of 2847 euros.

We analyze price variation across insurers within a hospital, using contract prices published by hospital *IJsselmeer* (MC Groep 2016) as negotiated with all health insurers, including five health insurance companies (*CZ, DSW, Menzis, VGZ, ZK),* and a purchasing cooperative of several small health insurers (*Multizorg*). After excluding all DTC-prices that were not freely negotiable (i.e. regulated by the NZa), the dataset includes about 20,000 contract prices for 3,941 hospital products (DTCs) with a maximum price of 55,080 euros.

We provide insight into the variation of hospital contract prices in the following ways. We first construct several graphs to visualize the price variation across hospitals for all hospital products and for various subsets of products (i.e. different specialties). To this end we rank all individual hospital products by the average price per product (averaged over all hospitals), from low to high contract prices, and show for each product both the average price and all contract prices. In addition, we show for each product by which factor the lowest and highest price per product differs. Next, we measure the degree to which hospitals have the same relative ranking in prices for two consecutively ranked products (by average price), by calculating the Pearson's correlation coefficients between these two products:

$$Pearsons\ r = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2 \sum_i (y_i - \bar{y})^2}}$$

In the formula, the $\bar{x}$ and $\bar{y}$ are the means of prices of two consecutive products, and x_i and y_i are prices of these products for hospital *i*. If hospitals follow the same ranking in price for consecutive products, then r will be close to 1. By contrast, if hospital prices are set randomly, r will be around 0. Negative correlation coefficients occur when many hospitals have relatively

low prices for one product but relatively high prices for the other product (in case of an exactly opposite ranking of both product prices *r* will be close to –1). Finally, we take a closer look at the variation of contract prices for different types of hospitals and different insurers.

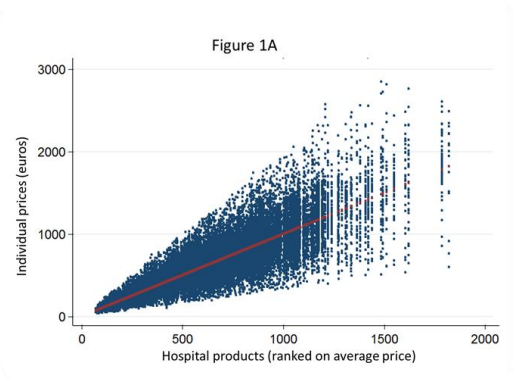
4. Results

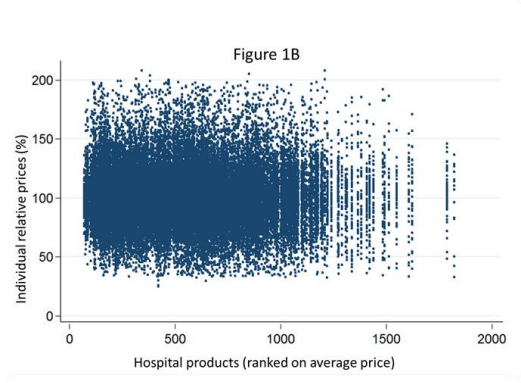
4.1 Price variation across hospitals within an insurer

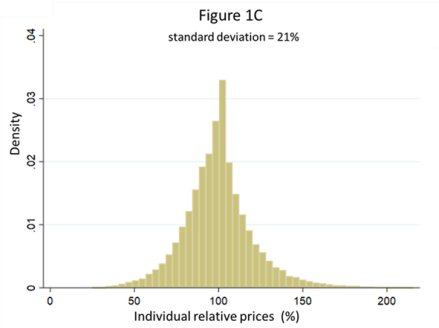
Figure 1 visualizes the data of all contract prices concluded by insurer *CZ* with all 260 providers (i.e. general hospitals, university hospitals and independent treatment centres; hereafter simply referred to as hospitals). Figure 1A shows all prices ranked by the average price per product across all hospitals. The data show large price variations between hospitals for the same hospital product. Furthermore, the absolute price variation increases with the contract price level (Figure 1A). By contrast, the relative price variation is about constant, as prices vary from about 30 to 200% of the average price (Figure 1B). Figure 1C shows the distribution of all relative prices (the standard deviation being 21%). About 27% of the contract prices for a hospital product are 20% higher or lower than the average contract price in the market. Figure 1D shows that price differences can be very large. For about half of the products contract prices between the most expensive and cheapest hospital can differ by a factor three to six. Thus, patient hospital choice can have a huge impact on the price paid by insurer *CZ*, and potentially also for the price to be paid by the patient insofar prices do not exceed the patient's deductible. To provide an example of such an extreme price difference, *CZ* pays a contract price of €747.55 to the hospital *Catharina* for DTC "one or two outpatient clinic visits for a condition of the arteries", which is about five times as much as *CZ* pays for the same DTC to hospital *Reinier de Graaf Gasthuis* (€156.98).

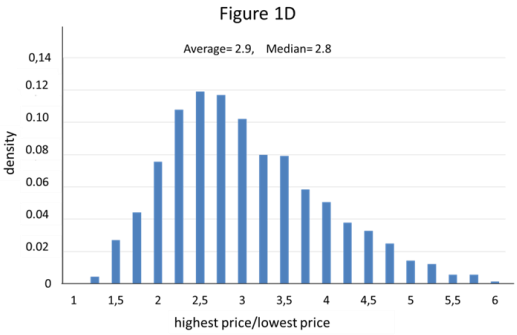
An interesting question is whether contract prices of individual products are across-the-board more expensive in some hospitals compared to other hospitals. In Figure 1E we show correlation coefficients of consecutive products on the horizontal axis to answer this question. The correlation coefficients are symmetrically distributed around a mean of 0.14, suggesting little structure in hospital price rankings. We performed the above calculations also for two large specialisms, such as surgery and internal medicine with quite similar results (see Appendix A). In Figure 1F we computed the average relative prices of three different categories of hospitals: university and general hospitals and ITCs. The three university hospitals have on average about 10% higher prices for the same hospital products. For each of the three types of hospitals the variation of contract prices hospitals is about 20%.

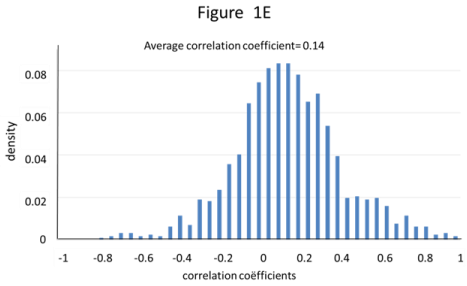
Figure 1. Price variation of all products contracted between insurer CZ and all hospitals

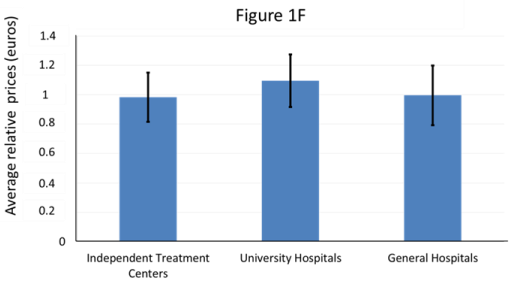












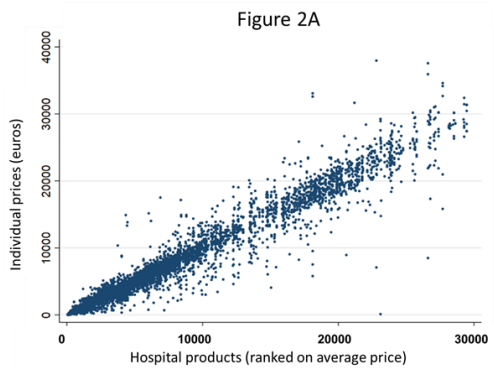
NOTE: Figure 1A shows on the horizontal axis the individual hospital products ranked by the average price per product (averaged over all hospitals), from low to high contract prices. The individual contract prices are ranked on the vertical axis. The red line is the 45 degree line and represents the average price. Figure 1B shows the relative price on the vertical axis where we scaled the average relative price at 1 (or 100%). Figure 1C shows the distribution of all relative prices. Figure 1D shows the distribution of all factors, where a factor indicates for each product the price of the highest priced hospital divided by the price of the lowest priced hospital. The first bar provides the weight of all factors that fall between 1 and 1.25, the second bar between 1.25 and 1.5 etc. Figure 1E shows the distribution of the correlation coefficients for all hospital prices of two consecutive products on the horizontal axis in Figure 1A. Figure 1F shows the average relative price for three groups of hospitals. First, we computed for each product of all three groups of hospitals average relative prices (compared to the average price for all hospitals). Next we computed the average over all these average relative prices. The black vertical lines within the bars with average price relative prices per hospital type represent plus and minus one the standard deviation (which is the average of the standard deviations of the relative prices for all).

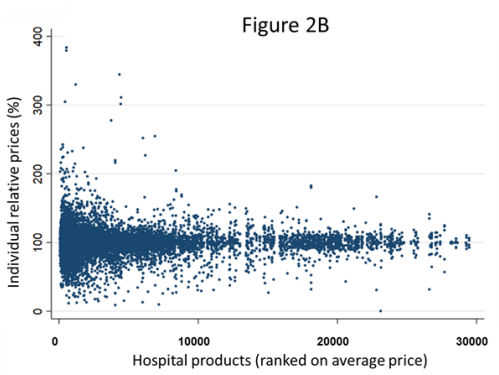
4.2 Price variation across insurers within a hospital

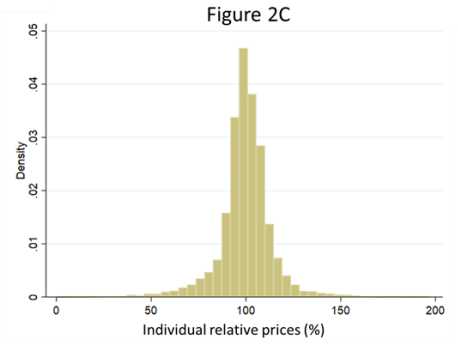
Figure 2 shows, in the same way as in Figure 1, the variation in contract prices of hospital *IJsselmeer* for insurers *CZ, DSW, Menzis, VGZ, ZK,* and *Multizorg*. Notice, however, that the price range in the hospital dataset is much larger (ranging from about zero to 30,000 euro) than in the insurer dataset in Figure 1 (ranging from about zero to less than 2,000 euro) because insurer CZ only published price data in the relevant range for consumers (i.e. if prices for at least one hospital were below the maximum deductible). Moreover, for each product there are only a maximum of six contract prices (instead of a maximum of 260 prices in the hospital dataset). Figure 2A provides evidence of price discrimination – insurers pay a different price for the same hospital product. Figure 2B shows that the relative price variation decreases with the average price per product. Figure 2C indicates that the price variation is smaller with much less outliers as in insurer dataset (the standard deviation being 12%). From Figure 2D follows that more than 50% of the prices the difference between highest and lowest insurer prices is lower than 1.25 and for 10% of the products this difference exceeds a factor 1.4. Price differences across insurers can be quite substantial. For example, insurer VGZ pays €1697 for patients receiving an "operation for low hernia" while CZ pays €712. Interestingly, for only 1.7% of the hospital products prices do not differ across insurers, which suggest that active negotiations or budget recalculations between insurers and hospitals almost always results in some price variation. Further investigation of the data, not shown here, shows that the degree of price variation is quite similar for different groups of DTCs (i.e. different medical specialisms).

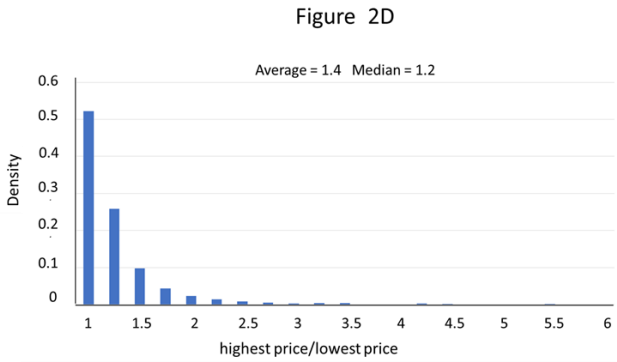
Interestingly, the correlation coefficients in Figure 2E show a different pattern as in Figure 1 and seem to follow a more uniform distribution around a mean of 0.21. This low positive correlation indicates that there is no clear ranking across insurers but that some insurers might obtain cheaper products than other insurers. This is confirmed in Figure 2F. The dominant insurer in the region of hospital *IJsselmeer* is insurer *Zilveren Kruis (ZK)*. This insurer negotiated on average about 5% lower prices than the average contract prices in the market, although the large standard deviation indicates that especially for this insurer the variation in relative prices is large.

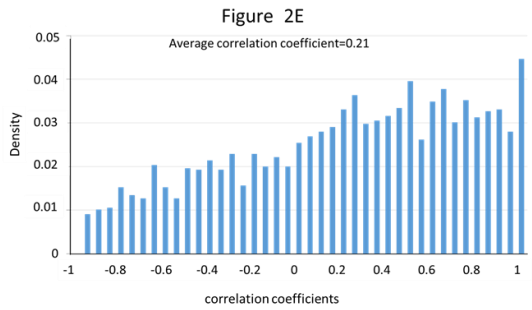
Figure 2. Price variation of all products between IJsselmeer hospital and six insurers

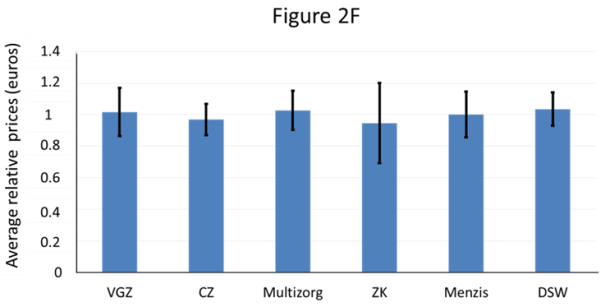












NOTE: Figure 2A shows on the hoirzontal axis the individual hospital products ranked by the average price per product (averaged over all insurers), from low to high prices (until 30000 euros). The individual contract prices are ranked on the vertical axis. Figure 2B shows the relative price on the vertical axis where we scaled the average relative price at 1 (or 100%). Figure 2C shows the distribution of all relative prices. Figure 2D shows the distribution of all factors, where a factor indicates for each product how much more expensive the highest priced insurer is compared to the lowest priced insurer. The first bar shows all factors that fall between 1 and 1.25, the second bar between 1.25 and 1.5 etc. Figure 2E shows the distribution of the correlation coefficients for all hospital prices of two consecutive products on the horizontal axis in Figure 2A. We only calculated correlation coefficients if a contract price existed for 3 or more insurers. Figure 2F shows the average relative prices for six health insurers in the market. First, we computed for each product average relative prices per insurer. Next, we computed for each insurer the average of all the relative prices. The black vertical lines within the bars with relative average prices represent plus and minus one the standard deviation of all the relative prices per insurer.

5. Discussion

The publication of (part of) hospital contract prices by a large insurer and a medium-sized hospital in 2016 made it possible to obtain a first insight in the effect of price negotiations on prices of Dutch hospital products.

We hypothesized that effective hospital-insurer negotiations would result in limited price variation across hospitals for the same product. Contrary to our hypothesis, however, we find evidence of high and seemingly random price variation. This result is consistent for different types of hospitals and subsets of hospital products. The large price variation and low correlation of contract prices for similar products across hospitals suggest that hospitals cross subsidize a lot of their products. The presence of substantial cross subsidies casts doubt about the effectiveness of price competition in the Dutch hospital market, since in competitive market the room for cross subsidization is likely to be small because profit maximizing hospitals would have incentives to increase prices of unprofitable products or cut back production.

There are several potential explanations for these notable findings. First, hospitals are using different cost pricing methods to assign indirect costs to the various hospital products. In 2005, after the introduction of the new system product classification, hospitals were required to use a uniform cost pricing model to calculate the unit costs of DTCs (Oostenbrink and Rutten 2006). Nevertheless, the calculation of unit costs of DTCs may differ across hospitals because hospitals may differ in how they use the uniform cost pricing model. For example, the model leaves room for discretion in how to allocate fixed costs, such as depreciation cost of buildings, inventories and technological equipment among different products.

Second, hospitals prices may also differ because of different technology, wage levels, quality and efficiency of a hospital (including economies of scale and scope), and case-mix differences within DTCs.

Third, price variation can also stem from different price-cost margins per DTC as a result of differences in hospital strategy and hospital market power. Hospital pricing strategies may differ, for example, because hospitals may follow aggressive pricing strategies for specific DTCs if they want to compete with specialized hospitals or independent outpatient clinics that are located in their local market (Heijink, Mosca, and Westert 2013). Differences in hospital market power may also influence the outcome of price negotiations (Oostenbrink and Rutten 2006). Cooper et al. (2015) find that hospital market power is the most important observable factor in explaining hospital price variation in the US. For the Netherlands, Halbersma et al. (2011) found evidence of a significant positive effect of hospital market share on price-cost margins. Due to horizontal consolidation, the hospital market have become highly concentrated over the years

(Schut and Varkevisser 2017). A recent investigation by the Dutch competition authority found evidence of increasing hospital prices due to hospital mergers over the period 2007-2014 and of a positive association between hospital prices and market concentration (ACM 2017).

A fourth explanation for the large price variation may be the considerable uncertainty about underlying costs per DTC product due to frequent changes in the product classification system and other changes in the hospital payment system (see Table 1). These frequent regulatory changes make it difficult to create a stable data infrastructure to calculate product related cost prices. Since the introduction of negotiable prices in 2005, almost every year the payment system was substantially adjusted, frustrating adequate cost calculations.

The above explanations can explain why we find substantive price variation across hospitals but do not explain why we find price discrimination between insurers. We offer two potential explanations for this. First, since 2012, hospitals and insurers seem to have primarily focused on negotiating fixed or maximum annual lumpsum payments for all hospital products, as both parties wanted to create certainty about revenues (hospitals) and expenses (insurers) and to prevent government intervention. Hence, the contract prices may have primarily functioned as a vehicle to generate the agreed lumpsum payments. That is, given the considerable uncertainty about underlying cost prices, hospital contract prices may have been 'mechanically' adjusted annually to generate the lumpsum payments as negotiated by the insurer and the hospital.

A second explanation for the observed price discrimination is a combination of different purchasing strategies combined with differences in market power between health insurers. Moriya et al. (2010) find that increases in insurance market concentration in the US are significantly associated with decreases in hospital prices. A hypothetical merger between two of five equally sized insurers is estimated to decrease hospital prices by 6.7%. For the Netherlands, Halbersma et al. (2011) also find a significantly negative impact of insurer market share on hospital price-cost margins. If hospitals also have market power, they may be able to price discriminate between insurers, particularly if insurers vary in buying power. Given that almost all hospital markets in the Netherlands are highly concentrated and regional market shares of health insurers vary widely, this is likely to be the case. Indeed, insurer market power may explain our finding that contract prices of hospital *IJsselmeer* are on average somewhat lower for insurer *Zilveren Kruis* since this is by far the largest insurer in its catchment area with a regional market share of about 60% in 2016 (SFK 2016). However, more research is needed here because the lower contract prices could also be explained by other, more random factors, such as a mechanical update of contract prices.

Our study has several limitations. Due to the fact that only one insurer and one hospital published data on hospital contract prices, we observe only a small subset of the market. Since

these data were only recently published, prices could also not be evaluated over time. In the future, however, more information may become available to extend our analysis. For example, two other large health insurers recently published data on hospital contract prices, albeit these price data are not easily comparable because of the use of web-tools. Another limitation of our study is that data on important factors that may explain price variation, such as differences in quality, output, treatment intensity and market shares of individual hospitals and health insurers were not available. Given these data limitations, this study can only provide a first and largely descriptive overview of contract price variation in Dutch hospitals. Our observations may be valuable, however. as a first step towards a better understanding of price setting in hospital markets where prices are freely negotiable between insurers and hospitals. The role of individual pricing factors in these markets is an interesting area for further research, as well as variation of prices over time.

6. Policy implications

An important policy question is whether the observed large price variation is a problem. One could argue that if hospitals and insurers effectively negotiate on maximum lumpsum payments, the underlying price variation involving cross subsidies may not be an important problem. In the short run, competition primarily based on global budget negotiations may be effective given the prevailing uncertainty in the market. In the long run, however, as hospitals acquire better information on the underlying cost structure, systematic cross subsidies are likely to distort incentives. Hospitals may be tempted to reduce investments in unprofitable products (the 'bleeders') while increasing investments in profitable ones (the 'feeders'). As long as insurers do not have similar information on the various price-cost margins, this may result in inefficient market outcomes. The government may reduce (regulatory) uncertainty by keeping the changes in payment and product classification system as small as possible for a considerable period of time. This may enable hospitals and insurers to generate adequate information to set prices based on "true" cost prices. Another potential problem of cross subsidies is that it may complicate market regulation. If price-cost margins vary in unpredictable ways then it becomes more difficult for a regulator to judge, for example, whether hospital prices are high or low.

The large variation in hospital contract prices due to cross subsidies may also pose a problem for consumers, insofar as these prices are below their deductible. Until 2016, consumers were not able to base their hospital choice on the prices they had to pay because hospital price information was not publicly available. For this reason, several consumer organization urged insurers and hospitals to publish these data. A similar problem occurred in the US, where hospital prices also substantially vary and are largely opaque to the consumers

(Reinhardt 2006). Understandable hospital price information is even more relevant for US than for Dutch consumers, since US consumers typically face much higher deductibles and copayments. In order to improve consumer information on hospital prices, more than half of US states have passed legislation establishing price transparency websites or mandating health plans and hospitals to make price information available to consumers (Desai et al. 2016). In response to these requirements health plans and employers have provided their enrollees or employees with online price transparency tools. As expected, people having a high deductible are more likely to use these tools. Despite the proliferation of these tools, however, most consumers do not use them and are not even aware of their existence (Gourevitch et al., 2017). Hence, Desai et al. (2016) find that offering a price transparency tool to employees was not associated with lower health spending.

In case of the Netherlands, it is also very unlikely that the public release of contract prices will help consumers to make price conscious hospital choices because of the multitude and complexity of the hospital products. Since DTCs represent a bundle of services, it is very hard for consumer to figure out upfront which DTC product they will receive. However, the public discontent about nontransparent hospital prices may urge hospitals and insurers to simplify the hospital pricing system for consumers. Recently, the hospital *Elkerliek* introduced a system of only three uniform contract prices for 900 DTCs that were priced below 885 euros (Elkerliek Ziekenhuis 2017). In Appendix B, we graphically show how these three prices relate to the contract prices for the same hospital products negotiated by insurer *CZ* in 2016. Another recent initiative to simplify consumer choice was taken by insurer Menzis who negotiated with 17 hospitals only 10 different prices for 250 DTCs below 885 euros (FD, 2017). These initiatives are examples from the market to make prices more uniform and comparable for consumers. However, if more insurers and hospitals come up with these kinds of initiatives, the market may still end up in a very complicated choice setting. Therefore, the government could play an important role in coordinating this process by requiring hospitals and insurers to use similar subsets of DTC products for which consumers would have to pay the same maximum price (or copayment).

A more far reaching policy option to reduce price variation is by using reference pricing. In this case, the regulator may set a reference price for each DTC, for example the average price in the market. Hospitals and insurers could then negotiate about a monetary conversion factor for individual or a bundle of products, for example all products within a specialism. The larger the bundle the fewer conversion factors that are necessary. Reinhardt (2006) proposes an even more extreme option, in which insurers and hospitals negotiate about only one conversion factor for all hospital products. The reference price plus the conversion factor determines the contract price for each product. A higher conversion factor might reflect, for example, higher

quality, higher treatment intensity or more inefficiency. In this case insurers negotiate with hospitals not about each single product but about composite goods. This would increase transparency and reduce price variation. However, more uniform pricing may also reduce the scope for optimal price negotiation and may result in less efficient outcomes (Laffont and Tirole, 1993). Hence, the most appropriate way of hospital price setting still is an open question.

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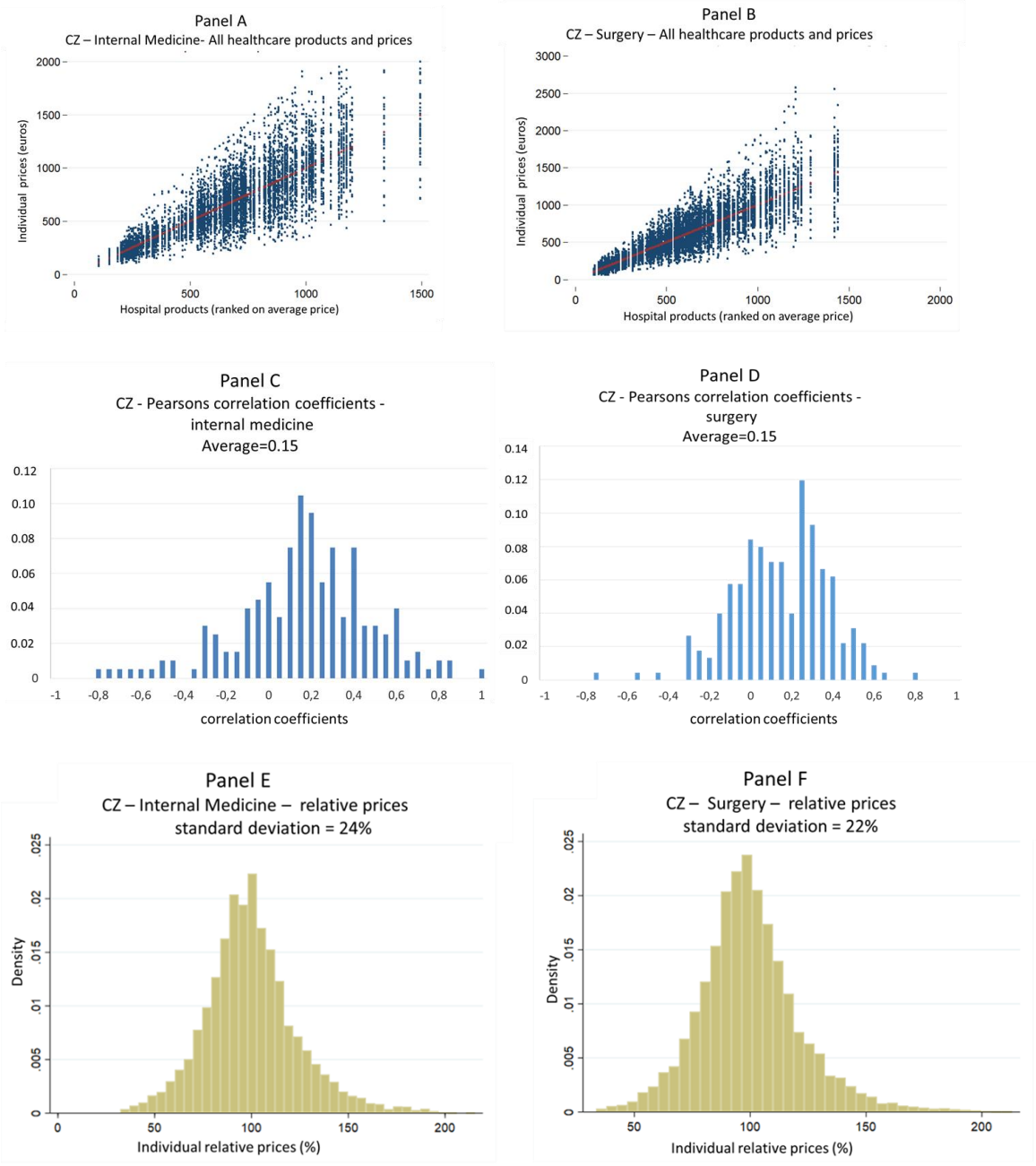
Appendix A

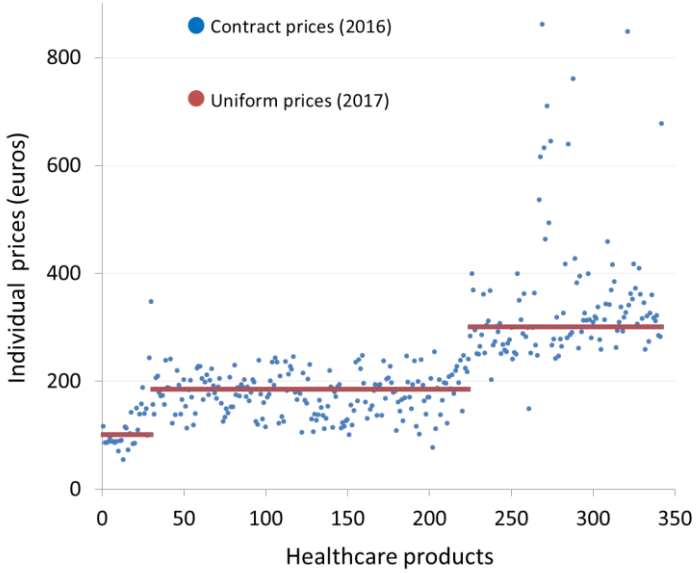
Figure A1. Price variation from the insurer perspective, internal medicine and surgery.



NOTE: Panel A and B show on the horizontal axis the individual hospital products ranked by the average price per product (averaged over all hospitals), from low to high contract prices. The individual contract prices for each hospital are ranked on the vertical axis. The red line is the 45 degree line and represents the average price. Panel C and D show the distribution of all relative prices. The standard deviation is 0.21. Panel C and D show the distribution of the correlation coefficients for all hospital prices of two consecutive products on the horizontal axis in Panel A and B. Panel B shows the distribution of all individual relative prices where we scaled the average relative price at 1 (or 100%).

Appendix B

Figure B1. Contract prices in 2016 and 2017 between insurer CZ and hospital *Elkerliek*.



Note: this graph presents the contract prices of CZ with Elkerliek hospital in 2016 and how these prices were changed to uniform contract prices in 2017. On the horizontal axis we ranked contract prices (2016) arbitrarily within each of the three groups of uniform contract prices (100, 185 and 300 euro).

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