COMPETITION 🛡 COMMISSION

PRIVATE HEALTHCARE MARKET INVESTIGATION

Empirical analysis methodology of price outcomes in negotiations between hospital operators and insurers

Introduction and summary

1.   This working paper sets out the methodology we have used in our empirical analysis of hospital operators' market power in negotiations with insurers, with a focus on negotiated insured prices.[1]

2.   The working paper is structured as follows:

(a) Price outcomes—comparisons of insured price outcomes across hospital operators.

(b) Drivers of price outcomes—comparisons of insured price outcomes and likely drivers of these outcomes (eg reflecting the hospital portfolio's desirability to insurers) across hospital operators.

(c) Insurers' buyer power—comparisons of insured price outcomes across insurers and relative to self-pay patients.

3.   As regards *(a)*, we set out the methodology for our analysis of the prices charged by different hospital operators to each insurer. This analysis can provide a useful insight into the degree of any market power held by hospital operators in negotiations.

4.   As regards *(b)*, our analysis of insured price outcomes in *(a)* indicates that hospital operators secure different prices with insurers and a question arises as to what drives these price differences. We set out the methodology of this analysis which seeks to contrast hospital operators' insured prices (outcome of negotiation) with

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[1] In what follows we refer to 'insured prices' as the prices charged by hospital operators to insurers for treatments provided to insured patients. These prices are negotiated bilaterally between hospital operators and insurers.

metrics that characterize the hospital operators' portfolio (input of negotiation). A number of metrics are considered.

5.   As regards *(c)*, we set out the methodology for our analysis of the prices charged by each hospital operator to different insurers and how we have compared insured prices relative to self-pay prices across hospital operators. Both these analyses can provide a useful insight into the degree of any buyer power held by insurers in negotiations.

6.   In relation to all the analyses listed above, comparing insured price outcomes is not a straightforward task. Each insurer has a price list for each hospital operator which can run to thousands of different treatments. Furthermore, pricing patterns can vary across hospital operators and insurers. During negotiations, discussions typically focus on the price of the overall bundle of a hospital operator's services (or the associated revenue), with relatively little focus on the price of individual treatments.[2] While a particular hospital operator may have a lower price for one treatment, this may be offset by a higher price for a different treatment. This means that comparing the price of too small a number of treatments may lead to distorted results as the hospital operator may have higher or lower prices elsewhere.

7.   We have sought to address this issue by identifying two different measures of insured prices:
     (a) an average revenue per admission earned by hospital operators from each insurer: this price measure is the most inclusive, as the revenue corresponds to all the treatments provided by each hospital operator, but it does not control for

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[2] As shown by the internal documents we reviewed supplied by the parties to the Competition Commission. To the extent that discussions take place around adjusting individual treatment prices, this will normally be done on the basis that the changes made are 'revenue neutral'.

the different mix of treatments that hospital operators may perform (see para-

graphs 12 and 13); and

(b) a price index based on a common basket of treatments offered by the different

hospital operators to each insurer: this measure considers a subset of treatments

only, but controls for the mix effect of different treatments provided by hospital

operators (see paragraphs 14 to 16).

8.   The detailed results of our analysis are confidential. Overall, our view is that the

analyses of the insured price outcomes in *(a)* and *(b)* indicate that some hospital

operators have some market power in negotiations with insurers. We note that the

assessment in relation to one operator is more finely balanced. The analysis of the

insurers' buyer power in *(c)* suggests that the ability of these hospital operators to

exercise their market power varies depending on the individual insurers, with the

larger insurers paying lower prices relative to smaller insurers.

Insured price outcomes methodology

9.   We analyse the prices charged by different hospital operators to each insurer. In

particular, using disaggregated insured patient invoice data,[3] we examine:

(a) the average revenue per admission earned by hospital operators from each

insurer; and

(b) a price index based on a common basket of treatments offered by the different

hospital operators to each insurer.

10.   We also construct an average revenue per admission earned by hospital operators

on all insured patients they treat on the basis of aggregated data provided by hospital

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[3] Insurers include: Bupa, Axa, Aviva, PruHealth, SimplyHealth and WPA.

operators.[4] In what follows, we refer to the average revenue per admission for all insured patients as 'average insured revenue per admission'.

Average revenue per admission by insurer

11.   The average revenue per admission from each insurer (ie *(a)* in paragraph 9) is calculated on the basis of disaggregated insured patient invoice data provided by Healthcode, with information on patient visit date, discharge date, episode setting (inpatient, day-case and outpatient), surgical procedure (CCSD code), invoiced charge, and itemized charges for each treatment and service provided on the same patient visit.[5] The price measure is an average price per episode (ie patient visit), excluding consultant fees.[6] It covers inpatient and day-patient episodes for patients insured by the different insurers in 2011.

12.   As mentioned above, during negotiations, discussions typically focus on the price of the overall bundle of a hospital operator's services (or the associated revenue), with relatively little focus on the price of individual treatments. The average revenue per admission is a comprehensive price measure in that it compares prices for the set of all inpatient and day-patient treatments provided by each hospital operator. However, it does not control for the different mix of treatments that different hospital operators may perform. For example, a hospital operator that treats a smaller number of high acuity patients, where the average price per patient is likely to be higher, will appear comparatively more expensive when compared with a hospital operator that treats a large volume of low acuity patients at a lower average price. However, in practice the

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[4] Insured revenue refers to the six major insurers (Bupa, Axa, Aviva, PruHealth, SimplyHealth and WPA) as well as some smaller insurers.
[5] In the invoice data, 21 per cent of episodes included more than one CCSD code (ie the patient has had more than one surgical treatment performed). As it is not possible to disaggregate which part of the charge is associated with each CCSD code, we excluded these episodes from our analysis.
[6] To ensure that our price comparison between hospital operators is consistent, we tried to capture all charges associated with an episode of treatment—ie all charges from when the patient is admitted in a hospital for a treatment until when the patient is discharged. However, we are aware of the following issues: *(a)* some hospitals bundle pre- or post-operative treatments/tests in the same invoice while others may invoice separately at a later date; *(b)* we have no information on the condition of the patient (severity, co-morbidities, illness) which may affect the level of the charge; and *(c)* we are aware that there may be some errors in the data where hospital operators have billed an insurer more than once for the same procedure.

two hospital operators could have identical prices for the same treatments. For this reason, we have also analysed a price index.

Price index of common basket of treatments by insurer

13.   The price index of a common basket of treatments offered by the different hospital operators to each insurer (ie *(b)* in paragraph 9) is also based on disaggregated insured patient invoice data provided by Healthcode. The invoice data allows us to compare the prices charged by each hospital operator to each insurer for different treatments (inpatient and day patient). Through the construction of a price index, we compare the average price that would be charged by different hospital operators were they to treat exactly the same number of patients for the same treatments.[7] As we want to compare the price index for a given insurer across all hospital operators, this reduces the number of common treatments in the basket that could be compared. We note that this approach is similar to the approach that several insurers have taken in comparing the price charged by different hospital operators.[8]

14.   The steps to calculate our price index across hospital operators for a given insurer are as follows:

   (a) Identify the basket of treatments that are 'purchased' by a given insurer from all hospital operators under analysis. The price of these treatments for that insurer could therefore be compared across hospital operators.[9] Eligible treatments are those where each hospital operator has treated at least five of the insurer's patients in 2011.[10]

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[7] We note that this is one way to compare baskets of prices.
[8] Examples of insurers using a price index to compare prices across hospital operators include: [✂].
[9] In order to investigate better the price differences across hospital operators, we have expanded the common basket of treatments by considering pair-wise comparisons across hospital operators for given insurers. In other words, we have identified baskets of common treatments between two hospital operators for given insurers (rather than across all hospital operators) and we have constructed the corresponding price indices.
[10] In order to limit the effects of possible outliers, we have run a sensitivity check where eligible treatments are those where each hospital operator has treated at least 30 of the insurer's patients in 2011.

(b) For each treatment in the basket, calculate the average price per episode (ie patient visit) charged by each hospital operator to the insurer.

(c) For each treatment in the basket, calculate the hypothetical expenditure the insurer would face if it were to purchase all its requirements for this treatment (given by the total volume of patients insured by that insurer who received the treatment) from one hospital operator at the average price charged by that hospital operator to the insurer.

(d) Sum together the hypothetical expenditures associated with each treatment in the basket to obtain the total hypothetical expenditure the insurer would incur if it were to purchase all the treatments in the basket from one hospital operator. The higher the prices charged by the hospital operator, the higher the hypothetical expenditure the insurer has to incur in order to purchase the basket of treatments from that particular hospital operator.

(e) Index the total hypothetical expenditure at one hospital operator's prices relative to the insurer's actual expenditure on the basket of treatments at the different prices charged by different hospital operators.

15. An index of 0.8 means that had the insurer in 2011 purchased the treatments in the basket only from that hospital operator, it would have spent 20 per cent less on these treatments than it did in fact spend. An index of 1.2 means that had the insurer in 2011 purchased the treatments in the basket only from that hospital operator, it would have spent 20 per cent more on these treatments than it did in fact spend.

16. One of the hospital operators we looked at is based in London only. We wish to consider whether and to what extent insured price differences between this major London operator and the other large hospital operators are driven by cost differences. In particular, the cost profile of a hospital operator, which has almost all hospitals located in central London, could be different from the cost profile of hospital

operators that do not have a significant central London presence.[11] In order to control for these possible cost differences better, we conducted two pieces of analysis. First, we constructed a separate price index considering the major London operator and its closest competitor that is based in central London only.[12] Second, we looked at the major London operator's premium relative to the next most expensive operator.[13] We constructed a separate price index considering both hospital operators for insured patients and for self-pay patients[14] for a common basket of treatments.[15] Assuming that the cost of providing treatment to the two types of patients is broadly the same for a given treatment, if the price premium varies significantly for self-pay and insured patients, this would suggest that the price differences between the major London operator and other operators are not fully explained by differences in costs.

Average insured revenue per admission

17.   The average insured revenue per admission (see paragraph 10) is calculated on the basis of aggregated data provided by hospital operators covering the total number of admissions of insured patients (including inpatient and day patient) and the total revenue they earned from insured patients (including inpatient, day patient and outpatient). This data covers all insurers in aggregate in 2011.

18.   The average insured revenue per admission offers a simple 'implied price' measure that can be compared across hospital operators. In particular, an advantage of this measure is that it is not limited to surgical procedures, as CCSD codes are, and it

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[11] These cost differences may arise because of (some) costs in London being higher than in other parts of the UK and/or because of the different mix of treatments/specialties provided in central London compared with the rest of the UK (eg high acuity and complex treatments/specialties).
[12] The closest competitor in central London in terms of range of treatments/specialties provided is selected based on our review of the evidence and our analysis.
[13] The next most expensive operator chosen is based on the results of the price index analysis outlined in paragraph 14.
[14] Instead of calculating the price index across hospital operators for a given insurer, we have calculated the price index across the major London hospital operator and the next most expensive hospital operator once for self-pay patients and once for all insured patients. We have used weighted average prices for insured patients, where the weights are the shares of patient visits in the selected basket of treatment accounted for by each insurer.
[15] We identified the basket of treatments that are 'purchased' by insured and self-pay patients from both hospital operators. Eligible treatments are those where each of the two hospital operators has treated at least five insured and self-pay patients in 2011. In order to limit the effects of possible outliers, we have run a sensitivity check where eligible treatments are those where each hospital operator has treated at least 30 of the insurer's patients and 30 of the self-pay patients in 2011.

covers all services provided by hospital operators to insured patients or, equivalently, all areas of expenditure of insurers with hospital operators. This is particularly relevant as negotiations between hospital operators and insurers typically focus on the price of the overall bundle of a hospital operator's services. However, the average insured revenue per admission does not control for the different mix of treatments that different hospital operators may perform.

Drivers of insured price outcomes methodology

19.   The previous section sets out our results for the insured price differences across the five largest hospital operators. Insured prices are the outcomes of the negotiations. This section considers the likely inputs to the price negotiations from the hospital side—in other words, what the hospitals have to offer the insurers.

20.   The principal inputs to the negotiations are of course the individual hospitals and, collectively, the portfolio of hospitals that each hospital operator has to offer. Insurers may prefer some hospitals and portfolios of hospitals over others, and this may translate into different willingness to pay for access to those hospitals and portfolios. Put differently, a hospital operator's portfolio, or a particular hospital, may be worth more to an insurer because it has some characteristics that, in some way, make it more attractive. Because we only observe national prices for insured patients (ie insured prices are generally negotiated between each insurer and each hospital operator for its entire portfolio), we have focused on the portfolio of hospitals owned by each operator, rather than specific hospitals.

21.   As demonstrated by this strategic document, a hospital operator has an incentive to gain a portfolio of hospitals with the characteristics noted above—in particular, hospitals which are 'flagship', 'solus' or located in a region with other hospitals under

common ownership—as these characteristics are seen to be linked with the hospital operator's ability to negotiate higher insured prices.

22. In light of the above considerations, we have undertaken two tasks:

   (a) characterize the different hospital operators' portfolios through a number of simple metrics; and

   (b) compare the insured price outcomes of the previous section (in particular, the average insured revenue per admission and the weighted average price index), with the metrics that characterize each operator's portfolio of hospitals.

23. We note that there are only four hospital operators that own an extensive portfolio of hospitals across the UK (ie BMI, Spire, Ramsey and Nuffield) and this analysis is limited to them.

24. The metrics we have considered can be grouped into four categories. These are listed below, with an explanation of why each category may be relevant in negotiations:

   (a) Size. Larger portfolios of hospitals provide an insurer with access to more PMI customers. The metrics used are: total admissions from insured patients in 2011 and total revenue from insured patients in 2011.

   (b) Footprint. Hospital portfolios with a larger footprint may not only give access to more PMI customers (as in *(a)*), but offer more geographic coverage which may be relevant for certain PMI customers (eg corporate customers). The metrics used are: number of hospital sites, number of NUTS2 regions that contain a hospital and number of hospitals in high PMI penetration regions.

   (c) Flagship hospitals. Hospitals that are well known because of a strong reputation may be those that downstream PMI customers pay particular attention to when selecting their PMI policy. The metrics used are: number of high admissions

hospitals (top quartile) and number of hospitals providing critical care level 3 (CCL3).

(d) *Local concentration.* Hospitals that are located in more concentrated markets are those for which an insurer has fewer outside options to consider when negotiating, and at the extreme, certain hospitals may be 'must have' to certain insurers. The metrics used are: '1 minus average LOCI', average network effect per site, number of hospitals with low LOCI (bottom quartile) and number of hospitals with fascia count lower than two.

25.   The following table summarizes the metrics used under each category.

TABLE 1 **Metrics used to characterize hospital operators' portfolios**

Category	*Metric*
Price	Average insured revenue per admission
	Price index—weighted by insurer market share
Size	Total admissions from insured patients, 2011
	Total revenue from insured patients, 2011
Footprint	Number of hospital sites
	Number of NUTS2 regions that contain a hospital
	Number of hospitals in high PMI penetration regions
Flagship sites	Number of high admissions hospitals (top quartile)
	Number of hospitals providing CCL3
Local concentration	1 – average LOCI
	Average network effect per site
	Number of hospitals with low LOCI (bottom quartile)
	Number of hospitals with fascia count <=1

Source: CC analysis.

26.   After constructing the metrics in each category, we have compared the ranking of hospital operators' portfolios by these metrics with the ranking by the prices that the hospital operators secure with insurers. We have focused on the ranking between hospital operators rather than the precise differences in metrics and prices for two reasons. First, the particular functional relationship between these metrics and the price outcomes is unclear, and thus the size of the differences may on its own not be particularly reliable or informative. Second, as the analysis is limited to four data points, it is difficult to discern any detailed pattern between the differences in prices

and metrics. The ranking, however, is considered to give us a broad picture across these various metrics.

Insurers' buyer power methodology

27. We analyse the prices charged by each hospital operator to different insurers. In particular, using disaggregated insured patient and self-pay patient invoice data,[16] we compare:

    (a) insured price outcomes across insurers; and

    (b) insured price outcomes relative to self-pay patients' prices.

Comparing insured price outcomes across insurers

28. In order to compare the price charged by different hospital operators to a given insurer, we use the price index analysis described in paragraphs 13 to 15 to identify a basket of treatments that are provided by all hospital operators (or a subset of them) to that insurer. As the components and size of each basket are insurer specific, the meaningful comparison is across hospital operators for each insurer (eg BMI's price with Aviva compared with Spire's price with Aviva). This analysis does not allow a comparison of the price charged by a specific hospital operator to different insurers. Therefore, in order to make a comparison across insurers, we repeat the analysis identifying for each hospital operator a basket of treatments provided to all six insurers.

Comparing insured price outcomes relative to self-pay prices

29. We construct a price index based on a common basket of treatments offered by each hospital operator to all insurers as well as to self-pay patients. Similar to the price indices described above, the data on insured prices is based on disaggregated

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[16] The source for insured patients' data is Healthcode. Insurers include Bupa, Axa, Aviva, PruHealth, SimplyHealth and WPA. The sources for self-pay patient data are BMI, HCA, Nuffield Health, Ramsay and Spire respectively.

insured patient invoice data provided by Healthcode. The data on self-pay prices is based on disaggregated patient invoice data provided by hospitals.[17] The two data sets contain information on patient visit date, discharge date, episode setting (inpatient, day case and outpatient), surgical procedure (CCSD code), invoiced charge, and itemized charges for each treatment and service provided on the same patient visit.[18] The price measure is an average price per episode, excluding consultant fees (ie patient visit).[19]

30.   The steps to calculate our price index are as follows:

(a) Identify the basket of treatments that have been provided by a given hospital operator to all insurers and to self-pay patients in 2011. A treatment is included in the basket if the hospital operator has treated at least five patients for each insurer as well as five self-pay patients.[20]

(b) For each treatment in the basket, we calculate the average price per patient visit charged by a given hospital operator to each insurer and to self-pay patients.

(c) We calculate the weighted average price of the basket of treatments for each insurer and for self-pay patients. The prices per treatment are weighted by the total volumes of the treatment provided by each hospital operator to insured and self-pay patients.

(d) We index the weighted price of the basket for each insurer relative to the self-pay weighted price of the basket.

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[17] BMI, HCA, Nuffield Health, Ramsay and Spire.
[18] In the invoice data we excluded episodes with more than one CCSD code (ie the patient has had more than one surgical treatment performed) from our analysis as it is not possible to disaggregate which part of the charge is associated with each CCSD code.
[19] To ensure that our price comparison between insurers is consistent, we tried to capture all charges associated with an episode of treatment—ie all charges from when the patient is admitted in a hospital for a treatment until when the patient is discharged. However, we are aware of the following issues: *(a)* some hospitals bundle pre- or post-operative treatments/tests in the same invoice while others may invoice separately at a later date; *(b)* we have no information on the condition of the patient (severity, co-morbidities, illness) which may affect the level of the charge; and *(c)* we are aware that there may be some errors in the data where hospital operators have billed an insurer more than once for the same procedure.
[20] We undertook sensitivity checks by imposing more conservative restrictions on the number of patient visits required to include a treatment in the basket. We used thresholds of 10, 20 and 30 observations in our sensitivity checks.

31.   An index of 100 means that the hospital operator charges the insurer for the selected basket of treatments the same prices as self-pay patients. An index of 80 means that the insurer is charged 20 per cent less than self-pay patients. Similarly, an index of 120 means that the insurer is charged 20 per cent more than self-pay patients.

32.   As mentioned above, all the price indices computed in this section are for baskets of inpatient and day-patient treatments. A sensitivity check is conducted using inpatient treatments only. We focus our analysis on inpatient and day-patient treatments for the three following reasons:

   (a) Hospital operators and insurers do not distinguish between inpatient and day-patient treatments in their price negotiations. In addition, when parties conduct their own price analysis, they look at inpatient and day-patient treatments together.

   (b) The basket size is larger when the price index is based on both inpatient and day-patient treatments, and hence the basket provides a fuller coverage.

   (c) The medical conditions of inpatients are more likely to vary than those of day patients, and this makes the prices of inpatients more sensitive to patient condition mix effects.