

ANNEX 3**LOCAL AREA ANALYSIS****1. INTRODUCTION AND SUMMARY**

- 1.1 The CC's first theory of harm is that a private hospital operator may have market power with respect to patients in a particular local geographic area, and that this may, in some way, lead to higher prices and/or a lower quality of service.¹ The assessment of local market power is also relevant to CC's third theory of harm, which asserts that private hospital operators may, in some way, be able to use their market power at a local level to influence the national price negotiations with the PMIs.
- 1.2 In this regard, there are two key aspects to the CC's local market analysis:
- (a) first, the CC has undertaken a quantitative assessment to create "filters" for the purpose of identifying hospitals which appear to face relatively little competition in local areas (i.e. areas described by the CC as being "hospitals of potential concern"); and
 - (b) second, the CC has conducted a price concentration analysis in order to see if there is any causal relationship between the local prices charged by PH operators to self-pay patients and the level of local competition. (As the prices charged to PMIs are set nationally, they do not feature in this analysis).
- 1.3 Each of these two pieces of analysis are considered in turn below.
- 1.4 However, it should be noted at the outset that there are manifest errors in the CC's analysis, which has created preliminary findings in respect of the potential for market power that bear no relationship with Ramsay's local or national operations. These are expanded further below.

¹ AIS, paragraph 51.

PART 1 - LOCAL AREA ANALYSIS**1. INTRODUCTION**

- 1.1 The CC claims to have identified 147 hospitals of "potential concern" out of the 215 general private hospitals and PPUs providing inpatient care.² Such facilities are defined as a hospital with either a weighted average market share of 40 percent or higher, or a hospital that faces less than two other competing fascias in its catchment area.³ In relation to Ramsay, the CC claims to have identified [X] as having market power and being of potential concern.⁴
- 1.2 Ramsay considers that this analysis is implausible (it cannot associate any of its hospitals to the CC's findings). Indeed, to suggest that there are potential concerns in relation to [X] per cent of Ramsay's facilities is itself prima facie confirmation that the analysis is manifestly flawed. The CC's analysis is also wholly inconsistent with Ramsay's internal documents (already submitted as part of the investigation) and the way that it views the competitive constraints on its business.
- 1.3 This section comments on three important aspects of the local market analysis:
- (a) the missing data which is creating a systematic bias in the CC's local market analysis;
 - (b) the measures of concentration used by the CC for the purpose of assessing local market competition; and
 - (c) the threshold/decision rules applied to the filters for deciding which local hospitals are of potential concern.

2. MISSING DATA

- 2.1 The CC's local market analysis is based on incomplete patient invoice records and an incomplete assessment of the number and range of different competitors of PH services.
- 2.2 The CC acknowledges that invoices were missing/not provided for 50 hospitals, which accounts for 23 per cent of all private hospitals included in the analysis. This means that the total market size figure (whether by LOCI or the traditional approach to calculating market shares) will be understated and the market shares will be overstated.
- 2.3 The CC speculates that "*these missing invoices are likely to be smaller hospitals and so the magnitude of missing invoices may only be limited*".⁵ However, this appears to be nothing more than conjecture; the CC should openly set out which hospitals' patient invoice records are missing so that the parties have the opportunity to comment on whether they are likely to be material or not. In any event, and irrespective of the overall market share held by the missing facilities, it may well be the case that these facilities are important competitors at the *local* level, particularly in respect of the general acute care typically delivered by Ramsay's own hospitals.
- 2.4 In addition to the incomplete patient invoice records for over 50 hospitals, the CC's analysis also excludes additional important competitive constraints. In particular, the CC's analysis appears to exclude:

² AIS, paragraph 62.

³ AIS, paragraph 60.

⁴ These are [X].

⁵ AIS, Appendix B, Annex 1, slide 21.

- (a) all those facilities that do not provide in-patient treatment, but nevertheless compete for daycase patients and outpatients. In Ramsay's last financial year, inpatient revenue accounted for [x] per cent of Ramsay's total revenue ([x] per cent in 2006). This reflects the large increase in day-patient and outpatient revenue over this period (with day-patient revenue [x] between 2006 and the 2011/12 financial year, and outpatient revenue [x] per cent over the same period). This reflects the advances in medical technology which has resulted in many more different types of treatment being carried out on a daycase basis.⁶ Accordingly, focusing only on inpatient services means that the CC is ignoring direct potential constraints on [x] per cent of Ramsay's business (by revenue) and indirect constraints on those treatments that Ramsay may deliver on an inpatient basis but which can or could be delivered in the daypatient setting. The materiality of this omission is set out in further detail in respect of Ramsay's comments on product market definition;
- (b) all those facilities that provide a limited range of different treatment types so as not to qualify for inclusion based on the cluster of 16 treatment types considered in the CC's product market definition, but which nevertheless compete in relation to the treatment types that they do provide;
- (c) paid-for beds in NHS hospitals (which are different to PPU's, but nevertheless compete with private hospital operators). According to Laing and Buisson's Healthcare Market Review 2011-12, as at mid-2011 "*there [were] believed to be around 1,500 non-dedicated beds used to treat private patients*".⁷ This is in addition to the estimated 1,123 beds in PPU's. To put these non-dedicated beds into context, the numbers exceed the total number of beds across Ramsay's entire portfolio and may be easily expanded due to the ease with which non-dedicated facilities may be extend. These issues are explained in further detail by Ramsay in its comments on NHS competition⁸; and
- (d) the constraints provided by the NHS in general, both in terms of constraining local demand for PMI and providing free care to PMI patients.

2.5 Accordingly, the competitor set is obviously and materially incomplete, with the result that relevant competitors are excluded and market shares exaggerated. By way of comparison, according to Laing and Buisson, there are 588 sites throughout the UK specialising in the treatment of private patients or outsourced NHS patients (515 are in the independent sector). The CC has included only 223 hospitals in its competitor set and even then, as mentioned above, has disregarded 50 of these (23 per cent) due to incomplete invoice records. Ramsay estimates that at least some 25 per cent by volume of the relevant market has been ignored by the CC and in all likelihood it is much higher.

2.6 This means that various competitive constraints (e.g. for certain treatment types, day-case centres etc.) are all excluded from the market share calculations and fascia count analysis. Unless the CC takes such factors into account, its analysis will significantly overstate the levels of concentration in the market, and grossly understate the competitive constraints on Ramsay's business.

⁶ A similar trend is evident in the market as whole: in 2011, there were 304 facilities that provided day surgery only in the independent sector, representing an increase from just 43 in 2004 and reflecting the transition of treatment from an inpatient to a day case setting. Laing & Buisson, *Laing's Healthcare Market Review 2011-2012*, Table 2.8.

⁷ Laing & Buisson, *Laing's Healthcare Market Review 2011-2012*, page 84.

⁸ It should also be noted that the Laing & Buisson figures are likely to underestimate the extent to which the NHS competes with PH operators, as the trend towards outpatient and daycase treatment centres means that less emphasis is put on the availability of beds. It is also easy for NHS hospitals to increase the number of non-dedicated beds available for private treatment, particularly in light of the recent NHS reforms and the removal of the private patient income cap.

- 2.7 The CC would reject market share analysis if it were prepared on such a flawed basis by a third party, as manifestly incomplete and potentially misleading, in that it will materially overstate market shares and market concentration held by the largest five PH providers.

3. MEASURES OF CONCENTRATION

- 3.1 In order to carry out the local market analysis, the CC has adopted two approaches to measure concentration of private hospitals at the local level:

- (a) the first approach seeks to calculate "weighted average" market shares for each hospital (described by the CC as a measure which is similar to "LOCI"); and
- (b) the second approach seeks to identify for each hospital the catchment area over which it draws its patients and the number of competitor hospitals within this catchment area (described by the CC as "fascia counts").

- 3.2 Both of these two approaches adopted by the CC raise a number of issues, which are considered in turn below. However, as Ramsay has not seen the CC's workings underpinning this analysis, it reserves the right to supplement this submission with further comments once it's economic advisors have had access the data room.

LOCI

- 3.3 The CC states that concentration measures based on market shares ("LOCI") have been constructed as an alternative to the fascia count. In doing so, the CC has used patient invoice records from each of the individual hospitals in order to calculate "weighted" average market shares. However, Ramsay has a number of very serious concerns with this approach:

LOCI is over-concentrative

- 3.4 The first point to note is that the LOCI measure of concentration is over-concentrative. This appears to be due to the weighting that is applied to the LOCI calculations which systematically understates those areas where patients have a choice between different hospitals (as discussed further below).

- 3.5 For example, the CC presents an example of how to calculate LOCI in Table 1 of Annex B. Based on the numbers in this example, the LOCI value of the hypothetical hospital in question is 0.63 (which gives rise to a market share of 37 per cent). However, in comparison, the traditional market share of the hypothetical hospital in question is just 17 per cent.⁹ A gap of 20 percentage points between the two different measures of concentration is far too large to provide reliable and meaningful results.¹⁰ However, despite these large divergences, the CC claims that "*LOCI is closely related to these traditional concentration measures*", which does not seem to be correct.¹¹

- 3.6 Given the discrepancies between LOCI and standard market share calculations, Ramsay would urge the CC to be extremely cautious of relying on the results. The CC should also explain why it considers the weighting underpinning the LOCI calculations to be relevant in this case.

⁹ The CC provides a further example on slide 19 of Annex 1 to Appendix B. The weighted market share using LOCI results in hospital A having a market share of 52 per cent (LOCI of. 0.48). However, based on the traditional approach to calculating market shares, hospital A would have a share of just 45 per cent.

¹⁰ A reduction in Ramsay's market share by 20 percentage points would result in many of its hospitals that are currently identified as being potential problem hospitals passing the filters.

¹¹ AIS, Appendix B, paragraph 6.

LOCI is an unsupported measure of market power

- 3.7 The LOCI measure of concentration is taken from obtuse academic literature, relevant papers in respect of which remain in draft form. Even then, the CC has effectively sought to adapt a model whose original purpose was to assess the pricing effect of changes in concentration (using a logit model to represent patient demand and choices). However, the model underpinning the LOCI assessment has itself been proven to have poor predictive power in terms of the pricing effects that it estimates and is largely discredited in the jurisdictions where it was experimented with (US and Netherlands).
- 3.8 Standard market shares and certain other measures of concentration (e.g. HHIs) are frequently used as a proxy for market power and have been used as a preliminary screen in healthcare markets.¹² In contrast, there is no evidential or established theoretical basis upon which to use the LOCI measure of concentration as a proxy for market power. Indeed, the CC itself acknowledges that the LOCI measure of concentration is not widely used and that it has not previously been used by the CC in any of its previous cases.¹³ It is plainly inappropriate for the CC to experiment with such a measure in the context of this market investigation and we trust that no material weight will be placed upon the results derived from it, which are themselves implausible and indicative of its unsuitability even in the context of an initial filter.

LOCI does not reflect patient choices

- 3.9 A major concern with the LOCI measure of market concentration is that it does not reflect patient choices. In particular, the weighting underpinning the LOCI measure of market concentration understates the importance of the areas where patients face choices (i.e. the infra-marginal patients). As mentioned above, the costs of operating a private hospital are largely fixed, which means that it is competition for these infra-marginal patients that is ultimately extremely important to the overall profitability and financial viability of a hospital. The implication of under-weighting the marginal areas of competition is to understate the degree of competition in the very area where pan-hospital competition is likely to be at its most intense. Conversely, over-weighting those areas from which a hospital draws most of its patients presents an exaggerated picture of concentration closest to the facility which, in turn, produces false results of concentration in the areas surrounding each local hospital.
- 3.10 By way of illustration, assume that hospital X serves two catchment areas, Area 1 and Area 2. In Area 1, hospital X receives 100 of the 100 patients that received treatment in that area (i.e. 100 per cent of all available patients). However, in Area 2, strong competition with two other hospitals means that hospital X only receives 100 out of the 1000 patients that required treatment. Based on this example, both Area 1 and Area 2 are equally important to hospital X as it receives 100 patients from each area (each accounting for 50 per cent of its business), although there are notable differences between the two areas in terms of choices.
- 3.11 If hospital X is not competitive in Area 2, then it could lose up to half of its business, which would have a major impact on the commercial viability of the business due to the high fixed costs of operating a private hospital (and most likely result in the hospital no longer being commercially viable). Similarly, if it wants to increase utilisation rates and grow its business it needs to gain share in Area 2 (it already gets 100 per cent of patients in Area 1). In other words, it is the competition in Area 2 that is ultimately driving and impacting on its business, and the patients from Area 1 are largely irrelevant to this assessment.

¹² The CC itself acknowledges that the use of standard market shares as a measure of local concentration is a well-established and widely employed technique. AIS, Appendix B, Annex 2, paragraph 6.

¹³ AIS, Appendix B, Annex 2, paragraph 41.

- 3.12 However, the weighting behind the LOCI measure of concentration instead puts much more weight on Area 1. The LOCI calculation would result in hospital X having a market share of 55 per cent (LOCI of 0.45), which would fail the filters used by the CC and be identified as a potential problem hospital. In comparison, the standard market share calculation would result in hospital X having a share of just 18 per cent (200/1100), as it puts more emphasis on the importance of the larger Area 2 where hospital X ultimately faces intense competition. This example clearly illustrates that the LOCI analysis is giving rise to some perverse and implausible results as it does not adequately reflect patient choices or take account of the importance of the infra-marginal patients.

LOCI is a self-fulfilling and biased metric

- 3.13 As mentioned above, the LOCI measure of market share calculations suffers from a systematic bias which generally results in the market share calculations being overstated. This is because it attaches less weight to those areas within the hospital's catchment area where it actually faces competition (as it will expect to get relatively fewer patients from those areas than if it was the only provider).
- 3.14 Moreover, the LOCI measure of concentration only focuses on the pre-existing catchment area locations of a hospital's insured patients, and not the actual choices facing patients (e.g. in the event of a decrease in quality or innovation, for example). Clearly, if insurers and GPs are automatically referring patients to their closest hospital (e.g. because it is already in the network and the price of treatment is the same across all facilities due to the national price negotiations), then this will systematically understate the actual distances that insured patients are willing to travel.
- 3.15 This means that focussing specifically on the locations of insured patients is resulting in an overly-narrow approach to the geographic market which is creating a self-fulfilling and distorted picture of the actual choices facing patients.

The LOCI analysis excludes various important competitive constraints

- 3.16 As mentioned above, the CC's analysis is based on incomplete patient invoice records. There are 588 sites throughout the UK specialising in the treatment of private patients or outsourced NHS patients (515 are in the independent sector). The CC has included only 223 hospitals in its competitor set and even then acknowledges that invoices were missing/not provided for 50 hospitals, which accounts for 23 per cent of all private hospitals included in the analysis. This means that the total market size figure (whether by LOCI or the traditional approach to calculating market shares) will be understated and the market shares will be overstated.
- 3.17 This means that various competitive constraints (e.g. from significant local hospitals, for certain treatment types, from day-case centres etc.) are all excluded from the market share calculations. Unless the CC takes such factors into account, its analysis will grossly understate the competitive constraints on Ramsay's business.

The catchment area fallacy

- 3.18 The CC claims that the key difference of LOCI compared with the traditional concentration measures is that "*LOCI does not rely on a fixed geographic market definition, calculated, for example, with a catchment area or isochrone methodology*".¹⁴ The CC goes on to say that LOCI "*avoids the two-step process by exploiting more granular geographic data on purchases*",¹⁵ and that this is "*seen as being particularly beneficial in this instance*".¹⁶

¹⁴ AIS, Appendix B, Annex 2, paragraph 7.

¹⁵ Ibid.

¹⁶ AIS, Appendix B, Annex 2, paragraph 9.

- 3.19 However, the apparent benefit of LOCI appears to be significantly overstated. It is incorrect to say that LOCI does not rely on catchment areas. The analysis is based entirely on the number and location of patients that are treated at a specific hospital, which is exactly the same data that is used for catchment area analysis. Moreover, within each of the submarkets within the patient catchment areas, the CC also needs an estimate of the total market size (i.e. the total number of patients that are treated in that area). Whether this is done at the submarket level or aggregated across the overall catchment area of patients, the net effect should be the same.
- 3.20 The key difference with the traditional concentration measures, therefore, is that LOCI applies a different (biased) weighting to the individual submarkets within the overall catchment area, which, when aggregated together, results in an over-concentrative and self-fulfilling effect. The example set out in paragraph 3.10 above clearly shows the large discrepancy between the LOCI and standard market share calculations.
- 3.21 Accordingly, Ramsay is concerned that the CC seems to be significantly overstating the benefits of LOCI (most notably in terms of the false notion of catchment areas not being required) but at the same time failing to acknowledge some of the very serious limitations of the analysis (e.g. in terms of the biased weighting), which is what is ultimately driving the implausible local market results.

The CC's LOCI analysis is inconsistent and sensitive to the submarkets used

- 3.22 The CC explains in paragraph 10 of Appendix B that "*the LOCI method involves computing market shares for all geographic submarkets (ie areas that are typically much smaller than the catchment areas), and then combining these shares into a single measure by averaging*". However, the LOCI analysis appears to be sensitive to the precise submarkets that are used in the calculations. More specifically, if the submarkets are considered at a different level of granularity, then the LOCI shares will be different, even though the analysis is the same in all other respects. This reflects the underlying weighting which is creating both biased as well as inconsistent results.
- 3.23 For example, in the CC's example set out in Table 1 of Appendix B, the hospital's patients are derived from four submarkets: SM1, SM2, SM3 and SM4. On the basis of these four submarkets, the CC calculates the LOCI to be 0.63. However, if some of these submarkets are combined, then the overall LOCI result will be different even though the analysis is the same in all other respects e.g.:
- (a) combining submarket SM1 with SM2 results in a LOCI of 0.65;
 - (b) combining submarket SM2 with SM3 results in a LOCI of 0.68;
 - (c) combining SM1 with SM4 results in a LOCI of 0.77, and so on.
- 3.24 Moreover, if more granular data is used which splits the submarkets into smaller areas, then the LOCI shares will be different again.
- 3.25 Not only does the LOCI measure of concentration suffer from a systematic bias which is over-concentrative, but the results are unreliable and inconsistent as they vary depending on the granularity of the submarkets used. This further shows that LOCI is a wholly unreliable predictor of market power.

Hospital focal points presents a misleading picture of patient choices

- 3.26 The CC's LOCI analysis calculates market shares based on the location of patients that are centred on the hospital in question. However, given the location of patients and the importance of GP referrals and consultants in determining the patient referral pathway, this does not provide an accurate indication of the choices facing patients.

- 3.27 For example, patient choice is ultimately determined by the location as to where they live, and not around the hospital itself. Moreover, given that hospitals are heavily reliant on consultants, it may also be relevant to centre the analysis on the consultants' NHS practice to highlight the options faced by consultants and the directions in which they can send patients between different hospitals. As GPs also have influential role in the patient referral pathway, it is also relevant to look at patient choices centred on the main GP surgeries. These different approaches to the focal point of the analysis are likely to give rise to very different results, which will have a significant bearing on the CC's measures of concentration.

Market shares by patient numbers is an unreliable metric

- 3.28 The CC has calculated the LOCI measure of concentration on the basis of both revenue and patient numbers, and both of these metrics are used as filters in the CC's local market analysis. However, it is noteworthy that the charts presented on slide 25 of Appendix B clearly show that there are some significant differences in LOCI depending on whether revenue or patient numbers are used. In particular, LOCI calculated on the basis of patient numbers appears to show significantly higher levels of concentration than LOCI by revenue (with the distribution of the chart on slide 25 being significantly more skewed to the left than in the case of revenue shares). The CC also reports that the median LOCI value based on patient numbers is 0.45, which compares to a median LOCI value based on revenue of 0.54. [×].
- 3.29 In this regard, there are a number of reasons why market shares calculated on the basis of patient numbers may be different to revenue shares (e.g. it could reflect the mix of the work undertaken at certain hospitals, the different price levels of the different operators with the PMIs, etc.). Market shares calculated on the basis of volume (e.g. patient numbers) are generally considered to be less informative than revenue shares, which take account of these factors. At a minimum, the CC needs to understand what is driving the differences in these results, and, where there are material differences, provide a clear explanation as to which is the most relevant for its filter analysis.

Ramsay does not have "network" power

- 3.30 In Figure 1 of Appendix B, the CC presents a chart which provides a comparison of the LOCI values when considered for the individual ownership of hospitals and when considered together with the other hospitals within the group (described by the CC as "network ownership"). The CC goes on to state that *"points that lie below the 45 degree line are those hospitals that have a higher network LOCI than their individual ownership LOCI-these hospitals are expected to have a degree of market power that stems from their network ownership, and the fact that the hospitals within those networks draw patients from some common areas"*.¹⁷
- 3.31 Ramsay has replicated the chart in relation to its own facilities. As can be seen below, [×]. This means that the "network" power described by the CC, and referred to in the CC's Theory of Harm 3, is not relevant to the assessment of Ramsay's facilities at the local level. [×] which in fact passes all of the CC's filters and is, therefore, not identified as being a hospital of potential concern.

Comparison of individual ownership and network ownership LOCI for Ramsay

[×]

¹⁷ AIS, Appendix B, Annex 2, paragraph 38.

Fascia counts

- 3.32 In addition to the LOCI analysis, the CC has also carried out a simple fascia count in its local market analysis (a hospital's fascia count is computed by summing the number of competitors that lie within each hospital's catchment area). This is a two-stage process which involves:
- (a) identifying the relevant catchment area; and
 - (b) counting the number of competing fascia within that catchment area.

3.33 These two points are considered in further detail below.

3.34 However, Ramsay notes that in Appendix B, the CC seems to suggest that there are material problems with fascia count analysis. This is despite the fact that fascia counts are readily used in many OFT and CC decisions, and that the CC has still proceeded in using fascia count as a filter in its local market analysis. Rather than seeking to test the sensitivity of the fascia analysis (e.g. with larger catchment areas, with isochrone re-centring, with different catchment area thresholds etc.), the CC seems to have adopted a "one-eyed" approach in favour of the LOCI analysis without considering all the various serious issues that LOCI raises.

The relevant catchment area

3.35 In order to assess the geographic scope of the local market, the CC has carried out a quantitative analysis of private hospitals' catchment areas. More specifically, the CC states that it has sought to identify the catchment areas in which a hospital derives the closest 80 per cent of its insured patients for inpatient services.¹⁸

3.36 However, there are a number of important factors which the CC has failed to take into account in this analysis, which may ultimately lead to very different catchment areas being defined. This in turn will impact directly on the CC's measures of concentration and the number of hospitals which it has identified as a potential concern.

The 80 per cent threshold is flawed for private hospitals

3.37 Whilst the OFT and CC have previously used an 80 per cent threshold for assessing the catchment areas in a variety of sectors, the relevance of the same threshold is far less clear for assessing the geographic scope of the market for private hospitals.¹⁹

3.38 In particular, the 80 per cent threshold fails to take into account the importance (e.g. in terms of providing a contribution to the fixed costs of operating a private hospital) from the remaining 20 per cent of patients from further afield. Unlike the situation for grocery retailers, for example, where a large proportion of costs are variable (e.g. in terms of the cost of goods sold), the costs of operating a private hospital are largely fixed. This means that the remaining 20 per cent of patients from outside the CC's catchment areas are extremely important to the overall profitability and financial viability of a hospital. It is competition for these infra marginal patients which, ultimately, has a significant bearing as to whether a private hospital is commercially viable or not. Accordingly, the methodology adopted by the CC needed to focus upon the choices facing these infra marginal patients and the ability of PMIs to require PH to compete for their same. The fact that the methodology chosen by the CC actually specifically excludes these patients is a further explanation as to why it has produced misleading and biased results and which are as of yet untested by scenario analysis.

¹⁸ AIS, Appendix B, Annex 1, slides 6 and 8.

¹⁹ The joint OFT/CC guidelines on retailer mergers states that "*the approach of identifying a measure that captures about 80 per cent of a store's sales was first used by the CC in a merger case in the 2003 Safeway merger*".

- 3.39 This is confirmed by even [§<]. The obvious effect is that the 80 per cent threshold specifically excludes all these infra-marginal patients, which is what ultimately impacts on the overall profitability and financial viability of a hospital.

The catchment area for self pay patients who by their nature do exercise patient choice is wider

- 3.40 In assessing the geographic catchment areas of patients, it appears that the CC has only considered the distances insured patients *currently* travel. This does not provide any meaningful insight upon the actual or potential choices available to either insured or self-pay patients if they wish to compete PH providers against each other.
- 3.41 In this regard, the CC's survey shows that the average travel time for self pay patients is just under 45 minutes.²⁰
- 3.42 If self pay patients are willing to travel further afield, then it is unclear why the same set of choices should not also apply to insured patients. Clearly, if insurers are generally referring patients to their closest hospital (e.g. because it is already in their network and the price of treatment is the same across all facilities due to the national price negotiations, which means that there is little incentive to travel further), then this will understate the actual distances that insured patients are willing to travel.
- 3.43 Indeed, these short travel times and picture of local referral patterns for insured patients reflect, in Ramsay's view, the plethora of available PH capacity available to PMI providers at the local and national level which permits them to easily access the closest PH facility.
- 3.44 However, the CC's approach of focussing upon these PMI referral patterns creates a distorted picture of the geographic market and the actual choices facing patients, which are more clearly demonstrated by the options explored by self pay patients within a significantly wider drive time.
- 3.45 Accordingly, Ramsay considers that focussing on self-pay patients provides a more realistic measure for assessing the geographic scope of the market as it directly reflects the choices facing patients.

Catchment area analysis is not related to the hypothetical monopolist test

- 3.46 Whilst catchment area analysis is often used for the purposes of identifying the location of customers, it is not directly related to the assessment of the geographic market definition, which is ultimately what is relevant for the purposes of a competition assessment. In this regard, many competition authorities worldwide define markets by reference to the so-called "hypothetical monopolist" or "SSNIP" test.²¹ The test seeks to assess how customers would respond to a 5-10 per cent increase in price (or reduction in quality or some other parameter of competition). If a sufficient number of patients would be willing to switch to another provider in a different geographic area then it would suggest that the geographic market is actually wider than is being considered on the basis of a static catchment area approach.
- 3.47 In this regard, the CC's survey shows that price/cost of treatment is an important factor that would encourage patients to travel further for treatment. For example, slide 51 of the CC's patient survey shows that 35 per cent of self pay patients said that they would be willing to travel further for treatment from a lower cost hospital and 29 per cent would travel further in response to lower fees paid to consultants. This is important as on average such patients are already travelling 45 minutes. This suggests that price is a

²⁰ Slides 48 of the CC's patient survey.

²¹ This includes the European Commission, the US Department of Justice and the US Fair Trade Commission, and the OFT and CC.

reason for travelling further afield for self pay patients. Furthermore, in relation to insured patients, if the prices of a particular provider sought to increase prices by 5-10 per cent, it is implausible to suggest that insurers would not seek to divert patients to an alternative provider further away as a result. Indeed, insurers *are already doing* this in order to drive prices down.

- 3.48 Again, as mentioned above, as a large proportion of the costs of operating a private hospital are fixed, this means that it is competition for the infra-marginal patients that is extremely important to the overall profitability and financial viability of a hospital. Focussing solely on the catchment area of PMI referred patients is likely to understate the actual geographic scope of the market given the spare capacity and numerous local options available to PMI patients using their local hospitals. In particular, such an approach fails to shed light upon the key question, namely the options actually available to patients and how patients (and insurers) would react to an increase in price or deterioration in the various other parameters of competition.

Catchment areas need recentring to reflect patient choices

- 3.49 The CC's analysis assumes that the catchment areas should be centred on the hospital in question. However, as previously mentioned in response to Q11 of the Market Questionnaire, given the location of patients and the importance of GP referrals and consultants in determining the patient referral pathway:
- (a) if patient choice is the issue, isochrones generally reflect the main centres of population, rather than each individual hospital (as is frequently done in relation to inquiries in the groceries sector).²² The choices facing patients is ultimately determined by the location as to where they live, and not around the hospital itself²³;
 - (b) given that hospitals are heavily reliant on consultants (i.e. without consultants they cannot provide a service), it may also be relevant to test isochrones on the consultants' NHS practice to highlight the options faced by consultants. As many consultants have practising and admission rights at a number of different private hospitals, this reflects the distance that they are willing to travel to the different private hospitals from their main NHS practice²⁴; and
 - (c) given the importance of GPs to the patient referral pathway, it may also be relevant to centre the isochrones on the location of the main GP surgeries. In this regard, the CC's survey shows that GPs are willing to send patients up to 40 mins away from their home (with many patients being located close to their GP's surgery).²⁵
- 3.50 The different approaches to the catchment area analysis are likely to give rise to very different results, which will have a significant bearing on the CC's measures of concentration and the number of hospitals identified as being of potential concern.

²² This is known as population re-centring. The joint OFT/CC guidelines on retailer mergers states that "*As shoppers often consider the alternatives from their homes, the Authorities have in certain cases re-centred on population centres*".

²³ For example, if two hospitals are located either side of a town or city, but the main centres of population are within the town/city itself, then the vast majority of patients may have the choice of either hospital. However, isochrones that are centred on each of the two hospitals individually may ultimately lead to the erroneous conclusion that the two hospitals do not compete (or are not close competitors), when in practice the vast majority of patients have a choice between the two hospitals.

²⁴ Again, isochrones centred on each of the private hospitals may ultimately show that consultants and patients have limited choices between hospitals, when in fact consultants have practising and admission rights at a number of different private hospitals, which is determined by the distance from their main NHS practice.

²⁵ Slide 49 of the CC's patient survey.

The CC has failed to assess the catchment areas of specialist treatments separately

- 3.51 If the CC is to maintain that there are separate product markets for certain different types of specialist treatment such as oncology or cardiology, then the CC should also assess the geographic scope of those specialist treatments separately. It is implausible to suggest that the same radii catchment areas apply for both specialist and non-specialist treatment, which is ultimately resulting in too many hospitals being identified as being of potential concern.
- 3.52 However, the CC appears to have failed to consider the geographic scope of these different specialist treatments separately, with the same catchment area radii applying to both specialist and non-specialist treatment. This means that of the [X] Ramsay hospitals that provide oncology services, [X] have been identified by the CC as not facing a rival fascia and therefore being a hospital of potential concern. This is a major flaw in the CC's analysis. As mentioned in response to Q11 of the Market Questionnaire, Ramsay considers that patients are likely to be much more willing to travel further afield in order to attend treatment centres for a range of conditions which may properly be described as "specialist", which also means that there is generally a need for fewer of these specialist treatment centres in the country.

Other methodological issues

- 3.53 In addition to the substantive points set out above, Ramsay has also identified a number of other potential methodological issues with the CC's catchment area analysis which will impact on the local market analysis:
- (a) the CC states that it has used road distance as the metric to measure patient journeys rather than using drivetimes. However, the CC's analysis gives rise to some very large variations in catchment areas, ranging from a radius of 8 miles to 29 miles for Ramsay's facilities (and from 5 miles to over 50 miles for all operators). Whilst Ramsay acknowledges that catchment areas are likely to vary for a number of reasons including by treatment type, by area of the country, by demographics etc., the catchment areas identified by the CC are often manifestly too narrow (e.g. the catchment areas for Ramsay's [X] hospitals are all significantly smaller than on the basis of a 45 minute drivetime); and
 - (b) the CC also states that "*median catchment areas were used*" for hospitals where there was insufficient patient journey information.²⁶ At this stage, we have been unable to verify whether this applies to any of Ramsay's facilities but would note that taking a median catchment area figure for hospitals where there was insufficient information is a totally arbitrary approach and may bear little resemblance to actual patient behaviour in those areas.

Competitor set

- 3.54 A key factor in relation to any fascia analysis, is to ultimately decide which fascia to include in the competitor set. This raises a number of issues:
- (a) First, the CC's analysis appears to have only included as competing fascia those hospitals that provide the cluster of 16 types of treatment and have in-patient facilities.²⁷ In particular, the CC states on slide 15 of Appendix B that the competitor set consists of "*215 general private hospitals and PPU's*". This means

²⁶ AIS, Appendix B, Annex 1, slide 8.

²⁷ These are obstetrics and gynaecology, general surgery, trauma and orthopaedics, anaesthetists, urology, gastroenterology, ophthalmology, otolaryngology, dermatology, plastic surgery, cardiology, general medicine, neurology, oral and maxillofacial surgery, rheumatology and clinical radiology.

that the CC's analysis excludes the competitive constraints provided by a whole range of different facilities, including:

- (i) all those facilities that do not provide in-patient treatment, but nevertheless compete for daycase patients and outpatients;
- (ii) all those facilities that do not provide the 16 treatment types considered in the CC's product market definition (with oncology considered separately), but nevertheless compete for certain different treatment types (e.g. ophthalmology);
- (iii) paid-for beds in NHS hospitals (which are different to PPU's, but nevertheless compete with private hospital operators); and
- (iv) the constraints provided by the NHS in general.

This is the so called "binary" fallacy to market definition as it treats the competitive constraints as either being zero (from all the fascia outside the competitor set) or perfect (from all the fascia inside the competitor set). As noted above, it has the effect of materially underestimating the total competitor set and thus inflating the measure of concentration above its true level;

- (b) Second, the CC's fascia analysis fails to consider the competitive constraints from those hospitals located outside the catchment area. The catchment areas of these hospitals will overlap (potentially significantly) with the catchment areas of the hospital in question, thereby potentially providing a significant proportion of patients with a choice.²⁸ The CC itself acknowledges that "*catchment areas for nearby firms can overlap, which can lead to measures of concentration that are counterintuitive or misleading*". This is an extremely important point, given that it is the case for numerous Ramsay facilities that patients drawn from one side of a Ramsay catchment may be extremely close to a competing facility which is, however, completely ignored due to the fact it falls outside of the Ramsay catchment assessed by the CC;²⁹
- (c) Third, as mentioned above, the costs of operating a private hospital are largely fixed, which means that it is competition for the infra marginal patients that is ultimately extremely important to the overall profitability and financial viability of a hospital. Due to the importance of these infra marginal patients, it may also be relevant to consider so called "significance ratios", which have been used in the past by the OFT in assessing mergers between private hospital operators. These ratios measure the proportion of patients within the catchment area that overlap with the catchment areas of other hospitals. It is competition for these infra-marginal patients which will ultimately have a significant bearing on the overall profitability of a hospital; and
- (d) Fourth, it is unclear from the AIS the extent to which the CC has defined each independent operator and each PPU as a separate fascia for the purposes of the local market assessment. Clearly, aggregating independent hospitals and/or PPU's together as a single fascia will understate the number and range of competitors in each local market.

3.55 Accordingly, in light of the above, it appears that the CC's fascia analysis has failed to take into account a range of different competitive constraints on the PH operators, both

²⁸ It is noteworthy that previous OFT and CC merger decisions in the sector have considered the extent to which hospitals with overlapping catchment areas compete even if they are not located within the same primary isochrone around the target hospital.

²⁹ AIS, Appendix B, Annex 2, paragraph 8(b).

from within the catchment area as well as from outside the catchment area, which is resulting in the CC's analysis being significantly overstated.

Thresholds/decision role

- 3.56 The CC has identified hospitals of potential concern if they fail one or the other of the following tests:
- (a) those with a weighted average market share by patient numbers of 40 per cent or higher;³⁰
 - (b) those with a weighted average market share by revenue of 40 per cent or higher;
 - (c) those with a weighted average market share by patient numbers or revenue at the network level of 40 per cent or higher; and
 - (d) those that face one or no competing fascia in their catchment area.
- 3.57 Ramsay considers these thresholds to be implausible for a number reasons:
- (a) the additive nature of these tests is both biased and resulting in inconsistent results. In particular, the CC fails to explain why certain hospitals pass certain tests but fail on others. Where the local hospital in question does pass certain tests it is nevertheless identified as an area of potential concern if it fails others. This is as clear a possible demonstration of the role of confirmation bias on the part of the CC in the application of both its initial filter test and, as set out below, its PCA analysis. Ramsay understands that the CC wishes to conduct a preliminary filter. However, by applying two tests, both of which produce large numbers of false positives, the CC has simply created a set of hospitals of "potential concern" that bears no relation to market power and is so large as to be meaningless in terms of permitting the CC to focus the second stage of its inquiry. This will not involve the parties in wasted costs in rebutting the conclusion of the screen, but has distorted the CC's overall current thinking as set out in the AIS;
 - (b) the 40 per cent threshold for the LOCI analysis is itself arbitrary and not a true reflection of competition in the market. In particular, it offers no meaningful comment on absence of relevant switching options to a patient or PMI even within the false confines of the catchment areas constructed by the CC.;
 - (c) a hospital is identified as a potential concern if it fails the LOCI test on the basis of either patient numbers or revenue. This creates a duplicative test that produces inconsistent results;
 - (d) in connection with the fascia analysis, requiring hospitals to face two or more rival fascia in the catchment area around the hospital in question is too high a hurdle. In particular,
 - (i) the analysis completely ignores the constraints on the PH operators from the national price negotiations with the PMIs. It would be sensible to assume that one rival fascia is more than sufficient for the PMIs to be able to negotiate lower prices with the PH operators (e.g. by credibly threatening to direct patients to that rival facility, threatening to de-list, and so on), particularly in the context of the narrow catchment areas constructed by the CC's first screen analysis;

³⁰ Which corresponds to a LOCI measure lower than 0.6.

- (ii) the CC's fascia analysis excludes the constraint from rival fascia located just outside the catchment area (i.e. where there is overlap in catchment areas). This means that the CC's analysis is already failing to take into account the competitive constraints on PH operators from outside the catchment area around the hospital in question, which is having an over-concentrative effect; and
- (iii) the CC's fascia analysis excludes the competitive constraints provided by a whole range of different facilities (e.g. those facilities that do not provide in-patient treatment, those facilities that provide a limited range of treatment types, paid-for beds in NHS hospitals etc.).

- 3.58 Although, bizarrely, the CC claims that there is a meaningful correlation between the LOCI and fascia count analysis (i.e. that they are identifying the same problematic hospitals), the chart on slide 28 of Appendix B in fact shows that this is not the case and the results are, at best, ambiguous. In particular, there are around 32 hospitals (of the 116 hospitals identified as being of potential concern) that fail the LOCI test but pass the fascia count test, whilst there are a further 10 hospitals that pass LOCI but fail on fascia count. Indeed, the fact that some 37 per cent of the hospitals of "potential" concern fail one test but not the other provides clear further evidence, if any were needed, of the arbitrary characteristics of both measures.
- 3.59 Finally, as mentioned above, the CC's own survey evidence confirms that self-pay patients will drive on average 45 minutes for their treatment. Annex 4 confirms that when modelled on a highly conservative basis (i.e. treating the 45 minute *average* drive time as a *maximum* travel time), all of Ramsay's facilities face at least 1 other competing PH fascia plus an NHS hospital with beds to provide private treatment. Moreover, all but [∞] of Ramsay's facilities face at least two rival PH fascias plus an NHS hospital, which further demonstrates the implausibility of the CC's local market analysis.

PART 2 - PRICE CONCENTRATION ANALYSIS

4. INTRODUCTION AND SUMMARY

- 4.1 This part of the annex provides a high-level response by Ramsay to the CC's price-concentration analysis ("**PCA**") presented in Annex 3 of the AIS. The analysis looks at whether PH operators possess market power in local areas in relation to self-pay prices, by examining whether there is evidence of a causal relationship between self-pay prices and concentration (using the two measures of concentration mentioned in part 1 above, namely catchment area/fascia count analysis and weighted market shares (LOCI)).
- 4.2 The CC uses two methodologies for its PCA. The first is a simple graphical analysis which examines whether the average prices of eight different procedures decreases as concentration falls, and the second is an econometric analysis to identify whether competition has an impact on self-pay prices for the same eight different procedures. The CC concludes that:
- (a) the simple graphical analysis produces mixed evidence of the impact of competition on self-pay price levels in relation to both measures of concentration. The CC accepts that "*there is no clear, overarching pattern across the graphs*"³¹;
 - (b) the econometric analysis provides no evidence of a statistically significant relationship between concentration and self-pay price levels under the fascia count methodology³²;
 - (c) however, the LOCI methodology finds "*a statistically significant relationship between self-pay prices and concentration*".³³
- 4.3 Despite these contrary results, the CC concludes (in paragraph 68 of the AIS) that "*our analysis shows a statistically significant relationship between price and concentration, indicating that prices are expected to be, on average, higher in more concentrated local markets*". The CC goes on to say that "*our current thinking is that some private hospital operators have market power in local areas*" and suggests that its PCA analysis is consistent with this theory of harm.
- 4.4 At the outset, Ramsay notes that it is unable to provide a comprehensive response to the PCA given that the relevant Appendix and associated annexes do not provide sufficient information to conduct a complete theoretical and statistical evaluation of analysis, including, among other things, descriptive statistics³⁴ for each variable and details of the econometric technique used.³⁵ Accordingly, due to the lack of information in the present report and the CC's intentions to undertake further analysis, Ramsay reserves the right to comment on the CC's PCA, in light of further analysis undertaken by the CC and any information gathered by Ramsay's economic advisors in the data room.
- 4.5 However, Ramsay has a number of serious reservations in relation to the analysis, and, more importantly, the conclusions that the CC is trying to derive. In particular, the results are obviously internally inconsistent depending on the methodology used.
- 4.6 In particular, the PCA conducted on the basis of the fascia count analysis in fact shows that there is no relationship between concentration and self pay prices. Moreover, the

³¹ AIS, Appendix B, Annex 1, slide 21.

³² AIS, Appendix B, Annex 1, slide 29.

³³ AIS, Appendix B, paragraph 18.

³⁴ Descriptive statistics measure the central tendency (i.e. mean, median and mode) and the variability (i.e. standard deviation and range).

³⁵ Ramsay also note that the CC state that "[t]hese results are subject to further analysis and tests, which means that our findings could change".

graphical analysis presented in respect of the LOCI based measure itself demonstrates ambiguous results which vary according to the treatment type considered. On any objective basis, the analysis plainly does not support the CC's general conclusion that the analysis provides an indication of a causal relationship between price and concentration and it is very surprising that the CC has chosen to represent them in this way. This further highlights the confirmation bias in the CC's approach by focusing on the results that purport to show a pricing effect, but exclude the results that show otherwise.

- 4.7 Ramsay has various other concerns regarding the reliability and robustness of the CC's analysis:
- (a) there are material concerns regarding the quality and consistency of the data used in the analysis (e.g. in relation to the comparability of the data between operators, and the comparability of the data within the CCSD codes etc.);
 - (b) as mentioned in part 1 above, there appears to be an inherent bias in the LOCI measure of concentration, which has an over-concentrative and self fulfilling effect. Accordingly, it is far from clear whether LOCI is a reasonable proxy for market power;
 - (c) the CC's econometric modelling appears to suffer from a number of potentially serious issues (e.g. as a result of variables omitted from the regressions and endogeneity), which potentially biases the results; and,
 - (d) the results do not appear to be robust to different cuts of the data (e.g. by treatment type, by operator etc.).
- 4.8 As a result, Ramsay does not believe that the CC can reasonably rely on this analysis as evidence of the adverse effects of market power at the local level, and therefore this analysis cannot be used to support the CC's Theories of Harm 1 and 3.
- 4.9 It should also be noted that the econometric model which estimates the impact of LOCI on self-pay prices shows that a decrease in concentration at Ramsay's hospitals (i.e. more competition) actually leads to higher prices. This is contrary to the CC's general conclusion that higher concentration leads to higher prices, and is contrary to the CC's Theories of Harm.
- 4.10 Accordingly, to the extent that the CC wishes to rely on this analysis, it should be noted that **it shows that Ramsay does not have local market power with respect to any of its facilities.**³⁶

5. CONCERNS WITH THE DATA

- 5.1 The fundamental factor affecting any econometric analysis is the quality and reliability of the data. If the data is unreliable, then the econometric analysis will result in the CC reaching inaccurate conclusions as regards the impact of local area competition.
- 5.2 In this regard, Ramsay has serious reservations regarding the quality and reliability of the data used in the CC's analysis, as highlighted in Ramsay's response to the data questionnaire of 7 September 2012. It is not sufficient for the CC to claim that it has sought to minimise the errors in the data, as there are material risks that the errors (and cleaning of data) bias the results and lead to inaccurate conclusions.

³⁶ This result is also statistically significant at the 1 per cent level.

The data cleaning process

- 5.3 Ramsay has serious concerns about the data cleaning methodology used by the CC (set out at slide 70) and believes there is a potential inherent bias in this methodology. For example, step three of the data cleaning process states "*exclude[s] all data that has a price below 50% of the relevant median*". However, the CC has provided no evidence to justify why all treatments priced below 50 per cent of each hospital's median should be "dropped" from the dataset. Notably, because the step excludes lower priced episodes from the treatment, it is likely to upwardly bias the pricing measure which raises doubts about the CC's analysis.
- 5.4 Ramsay also believes that simply deleting "*prices that do not appear credible*" may actually fail to take account of certain discounts and adjustments that are applied to self-pay patients bills. Ramsay would expect the CC to seek to match any discounts/adjustments with the original transaction rather than just dropping this data. If this is not done, the overall episode price will not reflect the actual treatment received and price paid by self-pay patients.

The scope of the cleaned dataset

- 5.5 The CC's dataset covers eight "focal" treatments. These treatments are considered to be an appropriate scope on the basis that they are "*representative of the self-pay PH market as a whole; and... amenable to the type of analysis we are conducting*".³⁷ The focal treatments are the top eight treatments by patient visits, and meet the CC's market and geographic coverage criteria (i.e. they are provided by 4 or more hospital groups and 30 or more hospital sites, respectively).³⁸
- 5.6 However, this dataset appears to be very restrictive, meaning that it is unlikely to be representative of the wider population (i.e. the other treatments undertaken by the five hospitals under consideration and the wider market).
- 5.7 In particular, the threshold for the geographic market coverage criteria is too low, and the criteria appears to be flawed. While it takes into account the number of sites, it does not seem to account for the location and distribution of these sites across Great Britain.³⁹ Moreover, the focal treatments only cover 43 per cent of total treatment by revenue (68 per cent by patient visits), and are heavily skewed towards just two treatments, hip replacements (20 per cent of revenue) and knee replacements (12 per cent of revenue). Six out of eight of the focal treatments account for less than 10 per cent of revenue in total. Accordingly, whilst any results may be internally consistent, the CC cannot meaningfully extrapolate the results to make generalisations about the wider self-pay market (nor the wider private healthcare market).

Categorisation of treatments

- 5.8 As Ramsay explained in its response to the data questionnaire of 7 September 2012, the price for treatments that are categorised under the same CCSD code will vary significantly depending on a number of different factors, including: the complexity of the procedure, the biological variation of the patient and the individualised nature of healthcare; the prosthesis used; and, whether patients elect to stay in hospital longer than is clinically necessary.⁴⁰ This variability is highlighted by the CC's histograms (at slide 10 and 11 of Appendix B, Annex 3) which are graphical representations of the variation in prices.

³⁷ AIS, Appendix B, Annex 3, slide 8.

³⁸ AIS, Appendix B, Annex 3, slide 8.

³⁹ For example, if 25 out of the 30 hospital sites for a particular treatment are located in the South East of England, the resulting analysis is unlikely to be representative of the impact of local market concentration in Great Britain.

⁴⁰ Paragraph 1.1, Ramsay Health Care UK's submission titled "Private healthcare market investigation – Request for data from private hospital operators".

These histograms show that the distribution of prices for the focal treatments vary significantly, which is likely to reflect, at least in part, the differences in the treatment received by individual patients (and therefore totally unrelated to any measure of concentration).

- 5.9 In this regard, the regression model contains eight treatment dummy variables to control for the impact of type of treatment on the episode price.⁴¹ Treatment dummy variables constructed in this way only account for the "average" variation in price across each of the eight CCSD codes, but do not capture the substantial degree of variation of treatment price which arise within each CCSD codes. Accordingly, this simplistic approach fails to account for the substantial degree of price differentiation between treatments classified within each CCSD code, and will therefore be unable to control for the impact of treatment type on episode price.
- 5.10 Although this error may not bias the estimated coefficient, it will result in larger error terms which will undermine the statistical significance (and other diagnostic) tests.

Comparability of the data across the operators

- 5.11 The CC's PCA examines whether competition has a causal impact on self-pay prices using a "pooled" dataset across five operators (BMI, HCA, Spire, Nuffield and Ramsay). As set out in the 7 September 2012 response, Ramsay considers that any econometric analysis based on data pooled across hospital operators is likely to be meaningless given the inconsistent data collection methods between hospitals operators.
- 5.12 The PCA model includes a dummy variable for each operator. The CC seems to suggest that this dummy variable controls for "[d]ifferences in each operators dataset – e.g. BMI data may be recorded slightly differently to Spire data in a way that we cannot observe".⁴² However, this appears to be a crude and one-dimensional approach which will fail to capture the substantial degree of heterogeneity between the different operators' datasets which is likely to be complex in nature. The CC acknowledges this issue (at slide 5) in relation to its measure of episode price, but concludes that "*any inconsistencies are expected to be minor and limited*". This statement appears to be nothing more than an assumption with no supporting evidence, and severely understates the potential impact of this issue on the validity of the analysis and the estimated results.
- 5.13 In the context of the above, Ramsay believes that the various operators' data are unlikely to be comparable and therefore cannot be meaningfully aggregated. If aggregated, the model must contain a comprehensive set of controls to capture these differences in each operators' dataset, which, at present, does not appear to be the case.

Time period considered

- 5.14 The data used in the analysis covers three years (2009 to 2011).⁴³ The model specification includes three time dummies to control for any annual changes in self-pay prices. However, there is likely to be a certain amount of time series variation in episode prices, due to changes in various factors which influence operators' pricing strategies, including cost inflation, the complexities of procedures changing over time, and the introduction of innovative procedures. The model only controls for common elements of time series variation between operators, but excludes the key factors that ultimately vary between operators.

⁴¹ This dummy variable is part of the basic control group.

⁴² AIS, Appendix B, Annex 3, slide 17.

⁴³ AIS, Appendix B, Annex 3, slide 16.

- 5.15 Moreover, as the CC's analysis only covers a relatively short time period, the results may not correspond to past or future developments in the market. Accordingly, the CC should be aware that the results may be sensitive to the time period under consideration.

6. MEASURES OF CONCENTRATION

Patient coverage

- 6.1 The PCA uses two measures of concentration, the fascia count and LOCI method. The CC states that both measures of concentration have been calculated using Healthcode data because it "*provides a more complete and consistent picture of patient journeys than the hospital data...*".⁴⁴ The Healthcode data covers insured patients rather than self-pay patients, which are the subject of the analysis. There is therefore a disconnect between the measure of concentration, and the episode price and other explanatory variables.

Hospital coverage

- 6.2 Moreover, as noted in Part 1 above, the Healthcode data does not cover 23 per cent of the 223 private hospitals analysed by the CC. This means that any concentration measures calculated using this data is likely to overstate and therefore will not be a good proxy for the competitive constraints facing hospitals in their local markets.

Issues with LOCI measures

- 6.3 The CC has conducted the PCA analysis using the LOCI measure of concentration as an alternative to fascia counts. As set out in Part 1 above, Ramsay has serious doubts about the CC's use of LOCI as a measure of concentration, and, most importantly, whether it is a reliable indicator of market power.
- 6.4 Accordingly, Ramsay has serious doubts as to whether the econometric model using LOCI is actually picking up a statistically meaningful relationship in relation to the impact of market power on self pay prices. In reality, if LOCI is not a reliable predictor for market power, any relationship that is observed may be entirely spurious. This point is emphasised by the results of the econometric assessment using fascia count, which finds results that are inconsistent with the LOCI analysis.

7. THE CC'S ECONOMETRIC MODELLING

Modelling issues

- 7.1 The following modelling issues generally arise in price concentration analysis of this nature:
- (a) observed or unobserved variables which are omitted from the regression model (known as omitted variable bias);
 - (b) mis-measured variables which arise due to differences between "true" values of variables and the measures/proxies used in the econometric analysis (known as measurement error bias); and,
 - (c) issues with jointly determined variables (where the dependent variable (in this case price) and one or more explanatory variables (for example, concentration) are both jointly determined by a common factor in the system).
- 7.2 If one or more of the above issues are present in the model, it results in endogeneity (which describes the phenomenon of explanatory variables in the model being correlated

⁴⁴ AIS, Appendix B, Annex 3, slide 13.

with the error term). The presence of these issues have severe consequences for the validity of the entire econometric analysis in terms of:

- (a) biasing the estimated impact of concentration on self-pay prices;⁴⁵ and
- (b) biasing the results of any statistical significance tests of the impact resulting in "false positive results" (i.e. concluding that a higher degree of local competition results in a statistically significant decrease in self-pay prices, when in reality no such relationship exists).

7.3 The CC has not, however, provided any indication about how their current analysis has sought to address these problems. The CC has also not provided any detail of what pre- and post-regression diagnostic tests have been completed to test for the existence of econometric problems which often arise in empirical studies of this nature.⁴⁶

7.4 Accordingly, for an empirical assessment to produce an unbiased causal estimate of the impact of concentration on self-pay price, any endogeneity present in the model must be corrected for. In this regard, Ramsay notes that the CC abandoned the price concentration analysis in the recent Statutory Audit market investigation, largely due to missing demand- and supply-side variables which would have resulted in endogeneity.⁴⁷ This is a common problem with this type of econometric analysis.

Omitted variables

7.5 In order to isolate the impact of concentration on prices, the chosen PCA model must control for all the factors which determine the price at which operators set treatments. This includes the characteristics of each patient, as well as demand- and supply-side factors. Ramsay believes that the analysis does not include sufficient control variables required, in particular the patient level controls, which is creating an omitted variable bias. This means that the analysis does not provide any meaningful information about whether concentration has an impact on price levels (as various important factors that do affect prices are not included in the model).

Patient level controls

7.6 The CC's PCA analysis includes the following variables to control for the impact of patients on episode price: the patient's age, the patient's gender and the patient's length of stay. This model specification suggests that these are the only patient characteristics which influence episode price levels.

7.7 However, the interactions between patient characteristics and episode price is more complex than the model suggests. The analysis of whether concentration has an adverse impact on market outcomes, must control for sources of price variation at the patient level, including:

- (a) other demographic and social factors which are likely to impact a patient's health, such as race, weight, and unhealthy lifestyle choices (e.g. smoking and excessive drinking);
- (b) any pre-existing conditions (co-morbidities) which are unrelated to the particularly surgical procedure under consideration, and likely to increase the complexity of the procedure, the length of stay and recuperation after the procedure, and therefore the episode price;

⁴⁵ In terms of both direction and magnitude of the effect.

⁴⁶ E.g. dataset issues and model misspecification errors.

⁴⁷ Paragraph 7.56, Statutory Audit Market Investigations for Large Companies. Provisional Findings Report.

- (c) country of origin for self-pay patients as there is a higher prevalence of pre-existing conditions in certain countries, e.g. Africans are more likely to have sickle cell anaemia and Cyprus has one of the highest prevalence of diabetes in the European Union; and,
- (d) any in-hospital complications associated with the surgery which occur within or after the operation. These complications may either be general or specific to the particular treatment.⁴⁸

Operator level controls

- 7.8 In addition to the patient level controls, the evaluation of whether concentration has an adverse impact on market outcomes, must also include appropriate controls for factors which result in self-pay prices varying between the operators. For example, operators can choose which types of treatment options to offer within a treatment group. This means that the treatments offered by each operator at each of its hospitals can vary significantly. The chosen service offer is driven by the individual hospitals business model/strategy, therefore there is an unobserved operator effect.
- 7.9 Moreover, to the extent that self-pay prices are generally set within a range of the prices agreed with the PMIs for equivalent types of treatment, then the self pay prices are affected by prices agreed with the different PMIs.

Direction of causation

- 7.10 The key assumption underlying the CC's chosen model specification and all of its analysis and thinking is the direction of causation. The model assumes that self-pay prices are determined by the level of concentration in the local area, and causation only flows in this direction. However, this need not be the case. In order to produce an accurate estimate of the relationship between price and concentration, the CC must therefore be clear as to the direction of causation. If causation is not appropriately accounted for, there are severe consequences for the validity of the entire econometric analysis.

8. PCA RESULTS

8.1 Robustness

- 8.2 Econometric studies must consider a number of approaches to estimating a model in order to identify the robustness of the outcomes of the analysis to different model specifications and econometric techniques. The PCA Annex set out the results of the initial sensitivity analysis undertaken by the CC.⁴⁹

- 8.3 The results of the analysis clearly show that the CC's analysis is neither quantitatively robust nor consistent with economic theory, for example:

- (a) The graphical technique provides limited evidence of a negative correlation between concentration and the fascia count methodology;
- (b) The econometric analysis finds no evidence that concentration, measured by fascia count, has a statistically significant negative impact on self-pay prices. However, the CC claims to have found such a relationship when fascia count is replaced with LOCI;

⁴⁸ In hospital complications are typically correlated with age (i.e. are a confounding factor), and will therefore result in omitted variable bias if an appropriate measure is not included in the model.

⁴⁹ Slide 30 and 31, Appendix B, Annex 3.

- (c) Only four out of eight econometric models split by CCSD code find a statistically significant relationship between concentration (measured by LOCI) and the price paid for the treatment by self-pay patients; and
- (d) Only three out of five econometric models split by operator find a statistically significant relationship between concentration and self-pay prices. It should be noted that the model which estimates the impact of concentration on Ramsay's prices under LOCI produces a highly positive statistically significant impact (significant at the 1 per cent level). However, this indicates that a decrease in concentration (i.e. more competition) leads to higher prices, which is inconsistent with economic theory and the CC's Theory of Harm.

8.4 The CC states that the results of the econometric analysis are reliable and "*appear robust*".⁵⁰ However, the fact that the econometric analysis using different measures of concentration, different methodologies and different cuts of the aggregated dataset result in wholly inconsistent results, indicates that this statement is highly questionable.

⁵⁰ AIS, Appendix B, Annex 3, slide 30.