Techniques for defining relevant markets and analysing competition in the South African private hospital sector

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Executive summary

The Competition Commission (‘CC’), in the draft Statement of Issues (published 30 May 2014) for the ongoing inquiry into the private healthcare sector of South Africa, has invited stakeholders to provide submissions on the appropriate techniques to be used for market definition and analysis in the context of the inquiry. This note aims to assist in this regard, specifically with reference to market definition for private hospitals. Econex’s work in this area may provide valuable insight into the theoretical and practical issues to be considered.

We start by highlighting that market definition for healthcare providers/products – whilst being an important step in analysing competition – is not a straightforward task. It is emphasised that the most contentious issue has to do with the local geographic market definition. Various reasons for this are discussed, including that the market may be characterised by a lack of price sensitivity and asymmetric information. We illustrate that consequently there are a variety of techniques that have been developed specifically for healthcare provider/product market definition. Eight of the more common techniques are summarised – setting out the conceptual approach, data requirements, advantages and disadvantages of each.

Our focus then turns to an understanding of which techniques have been used by the Competition Tribunal (‘the Tribunal’) in the South African private hospital context in the past. We discuss in particular nine private hospital mergers and the market definition approaches that were relied on by the competition authorities in these instances.

Having provided context for the issues around private hospital market definition, the central part of this note explains how Econex – through work regarding hospital mergers and competition analysis – applies market definition techniques to various data in order to define geographic hospital markets at local, national and provincial levels. Given that the local level market is most contentious, the note focuses on this market segment, with secondary interest in the national and provincial markets.

A brief explanation of different types of datasets that we generally use for hospital market definition is provided. Following this, we illustrate how data from such sources may be matched and organised to demarcate local geographic markets of interest. Our use of the direct competitor and fixed radii techniques for the definition of local geographic markets is motivated, explained, and illustrated.

Finally, we close by highlighting the relevance of this note to the CC’s private healthcare market inquiry. Our experience in trying different techniques – with varying theoretical complexity, data requirements, and revealed/modeled preferences – may provide insight as to how the CC may practically proceed in this regard.
1 Introduction

In the draft Statement of Issues by the CC for the private healthcare inquiry, submissions are requested from stakeholders on “the appropriate techniques to be employed…for defining and analysing healthcare markets”. More specifically it is stated that: “The Panel will consider standard approaches and alternative techniques for defining relevant markets and analysing competition. The Panel will select appropriate methods based on their applicability to the theory of harm under evaluation and the characteristics of the market being assessed.”

The aim of this note is to provide input into this process by providing a short overview of the theoretical literature on such techniques, before applying various techniques to South African hospital markets. We focus on hospital markets as these will be a focus area of the Panel (as indicated in the Terms of Reference). We are aware that the Panel will have to take a pragmatic approach. As stated by the CC: “Pragmatic considerations will also be taken into account including, for example, data limitations, resource requirement, and practical applicability.” Our focus in this note is therefore on the ‘practical applicability’ of the various techniques. This note relies on work by Econex on hospital mergers and competition analysis in hospital markets, in order to keep the overview practical and realistic.

We highlight that this provides input into the intended ‘structural approach’ of the CC in assessing competition, i.e. the defining of markets with the aim of understanding markets shares, concentration, and entry/exit trends. It is recognised, by the scope of the draft Statement of Issues, that this will be complemented with a ‘competitive/performance approach’ in assessing competition. Whilst the first may provide insight into the conditions for market power existence, the second will complement this by providing insight into actual market power exertion. In other words, as stated in the UK inquiry, market definition is a useful tool, but not an end in itself.

2 Defining hospital markets – an overview of the literature

In this section we provide a concise overview of the literature on market definition for hospitals and the complexities therewith.

In competition economics the market is usually defined by applying the hypothetical monopolist test (also known as the SSNIP test). According to the SSNIP test, a ‘market’ comprises all of the products and

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3 See footnote 1.
5 Small but significant and non-transitory increase in price.
regions for which a hypothetical profit maximising monopolist can impose a ‘small but significant non-transitory increase in price’. Accordingly, market definition serves several purposes in identifying the scope of competition in a market. As mentioned recently by the OECD: “The main goal of market definition is to assess the existence, creation or strengthening of market power, which is defined as the ability of the firm to keep the price above the long-run competitive level. The market shares of the respective firms provide an indication of market power.” The OECD has however highlighted that defining markets for healthcare is not a straightforward task: “Concerns about increasing healthcare expenditures are a major motivation for introducing competition in hospital services. While competition on quality can lead to better outcomes, competition on prices has uncertain results. Considering the particularities of healthcare markets, mainly characterised by asymmetric information, clearly defining the scope for competition is key to delivering socially beneficial outcomes.”

In defining the ‘scope’ for competition, it is customary to consider both the product (or service) market and the geographic market. We discuss how these two markets are generally defined in the relevant literature for hospitals.

2.1 Product market definition

The initial step in any product market definition exercise is to identify whether substitutes exist for the product or service in question. In this regard, Motta states that these products should not merely share similar characteristics; they should exercise a competitive constraint on each other. Furthermore, when determining whether close substitutes exist, one needs to consider both demand-side substitution and supply-side substitution. In the context of private healthcare markets, demand-side substitution would relate to whether patients have any genuine substitutes (procedures/treatments) available to them. Supply-side substitution would consider possible substitutes available for the healthcare providers.

In healthcare services there is likely to be limited demand-side substitution across treatment types. A coronary stent procedure, for example, is unlikely to be a substitute for an appendectomy procedure. Nevertheless, for a particular treatment there may be a variety of approaches, such as the number of procedures available to treat cataracts.

Similarly, supply-side substitution would need to assess the ability of a hypothetical monopolist of a particular treatment to raise prices, reduce service quality or increase waiting times without other providers of similar treatments supplying the treatment in question. If a hypothetical monopolist is unable

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8 For simplicity, we use the term ‘product market’ in this note.
to increase prices due to supply-side substitutability it may be appropriate to include the capacity of the other providers in the market.\textsuperscript{11}

If no demand-side or supply-side substitution for individual treatments exist, each treatment should be defined as a separate product market – a task which would require some degree of clinical expertise. Whilst this theory seems agreeable, in practice hospital markets vary between being subject to an aggregated or disaggregated product definition. This should however always be based on well informed reasoning and take into account the nature of the inquiry.

In the literature, it is not uncommon that the relevant hospital market is defined as one more broadly for acute inpatient care. For example, this has historically been the case in the US: “In the case of hospital care, the relevant product market has not been an issue of contention in merger cases. The generally accepted product market definition has been to ‘cluster’ products, leading to a typical product market definition of ‘general acute care hospital services’.”\textsuperscript{12} The reason for this is clear, while there is limited demand side substitutability between procedures, most hospitals offer the overall bouquet of services.

Alternatively however, product markets may be defined based on the hospital characteristics of servicing in-patients/out-patients or patients for particular types of procedures. In the UK inquiry, for instance, the service markets are defined as “hospital services for individual specialties and, for each specialty, separate markets for in-patient, day-patient and out-patient care.”\textsuperscript{13} This more disaggregated approach, whilst perhaps more theoretically sound, may not always be practical or accurate – given the dynamics of healthcare.

As insurers usually contract for a wide range of services with acute hospitals, it is arguable that outpatient services are also part of the relevant market. This is because rival outpatient providers may constrain the pricing of inpatient services, not simply by direct substitution, but also by the insurer being able to punish a hospital for high inpatient prices by diverting outpatients to outpatient facilities not owned by the hospital. Therefore, the cluster of services around which the provider-insurer negotiations are centred may be broader than inpatient services.

Generally therefore, merger cases internationally as well as in South Africa have favoured an approach where there is a distinction between the type of hospitals, i.e. primary, secondary and tertiary hospitals, rather than between individual procedures. We are primarily interested in the question of who can exert a competitive constraint on whom and on this basis hospitals that offer the same type of services should fall

\begin{itemize}
\item \textsuperscript{11} Ibid.
\item \textsuperscript{13} UK Competition Commission, 2014. Private Healthcare Market Investigation – Main Report. 2 April 2014, pp. 5-12 – 5-14.
\end{itemize}
within the same market. In the South African case, the important question is whether public hospitals exert a competitive constraint on private hospitals, and we deal with this issue in section 4.

2.2 Geographic market definition

The relevant geographic market is a highly significant issue in almost all antitrust matters regarding hospital markets. The geographic market for private hospital services often consists of two market tiers – one national and one local\(^\text{14}\). The national market is the result of the interactions and negotiations between the private healthcare providers and medical aid schemes, whereas the local geographic market for private healthcare is related to the fact that most patients have to travel to hospitals for treatment. The literature indeed indicates that patients prefer to minimise the distance travelled\(^\text{15}\). Given these distinctly different markets for different points of analysis, geographic markets are customarily defined independently using a ‘dual/multi-perspective approach’\(^\text{16}\).

2.3 Complexities

Accurately defining a hospital’s market, in particular its geographic market, is not a straightforward task and conventional techniques may not always follow theoretically sound reasoning. This was noted by the Competition Tribunal (‘the Tribunal’) in the merger between Netcare Hospital Group (Pty) Ltd and Community Hospital group (Pty) Ltd\(^\text{17}\). Specifically, a number of characteristics of the private hospital market make the use of conventional market definition techniques problematic. The following elements have been identified in the literature\(^\text{18}\) as contributing to the difficulty in defining the boundaries of markets in private healthcare:

- Asymmetry of information between consumers and producers: Patients may not have the knowledge to determine which service provider will provide the most suitable care. In addition, patients may be unable to determine the appropriate trade-off between the cost and quality of care.
- The widespread use of private health insurance for the funding of private healthcare services implies a distinct separation of payment and consumption. This may make patients insensitive to price changes by individual hospitals.
- The complex interaction between multiple parties in this industry makes it very difficult to determine which interactions should be considered important and which not.

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\(^{14}\) See Competition Tribunal of South Africa in the matter between Life Healthcare Group, & Amabubesi Hospitals & Bayview Private Hospital. Competition Tribunal Case No. 11/LM/Mar10.

\(^{15}\) See footnote 10, p. 9.

\(^{16}\) Phodiclinics (Pty) Ltd & others & Protector Group Medical Services (Pty) Ltd & others. Case No. 122/LM/Dec05, p.11. This approach has also been referred to by the Tribunal in more recent hospital mergers.

\(^{17}\) Netcare Hospital Group (Pty) Ltd & Community Hospital group (Pty) Ltd. Competition Tribunal. Case No. 68/LM/Aug06.

\(^{18}\) As summarised in: See footnote 10.
The second point above complicates the use of the SSNIP test for defining hospital markets. This point has been highlighted by various authors prominent in the field of healthcare economics, including Varkevisser et al. (2008)\textsuperscript{19} and Gaynor et al. (2011).\textsuperscript{20}

In this regard, it should also be noted that the product and geographic market definitions are often related. For example, in the healthcare sector it is reasonable to assume that patients would be willing to travel different distances to receive different types of treatment. Patients may be more willing to travel further for complex or life-threatening care than they would for relatively minor or routine healthcare. This assertion was confirmed in a 1997 hospital merger\textsuperscript{21} in the United States, where the court found that separate markets for healthcare exist – one for primary and secondary healthcare services and a separate one for tertiary care services. Cardiac surgeries or oncology therapies are examples of tertiary healthcare services. Each market defined in this way was identified as having a different geographic scope, with a more expansive geographic market defined for tertiary care than for primary and secondary care.

Given these complexities, specific techniques for market definition have had to be developed and applied in the context of healthcare providers and products.

\section{3 Market definition techniques – an overview}

In this section we provide a short overview of the specific techniques for market definition in the context of healthcare provider/product markets.

The spectrum of techniques for defining the local market is distinguishable between traditional methods and more modern approaches. A range of techniques available to define geographic markets is presented in Figure 1. Herein the traditional approaches are given on the left-hand side, with green and dashed borders, while the more modern techniques, which tend to be more in accordance with theory but are plagued by significant data requirements, are given on the right-hand side. We explain these as well as additional techniques. Given the positive relationship between the complexity, theoretical soundness and the data requirements, the choice of technique is typically dependent on data availability.


3.1 Fixed isochrones or radii

This defines a fixed catchment area around a hospital, either by geographic distance (radii) or by travel time (isochrones), and assumes this as the relevant local geographic market. For the radius test, data on patient addresses are required. This may be obtained from hospital records. For the isochrone test, data on patient travel times are required. This may be obtained from a well-conducted survey. Despite the simplicity of these tests, there are two main criticisms of this approach. Firstly, fixed distance/time is usually arbitrarily set. Secondly and specifically for hospital markets, these tests do not take into account patient heterogeneity – i.e. some patients may be willing to travel further for certain healthcare. The first issue may be overcome by specifying the fixed distance/time based on evidence gained from various different sources. Further validation may be made through adjusting the threshold and testing the results’ sensitivity. The second issue may also be overcome to some degree by evidence – gained by research into the heterogeneity of the patients and products in question.

3.2 Critical loss

The critical loss test defines the relevant geographic market as the smallest set of hospitals that would have to be included in the market to make a SSNIP profitable. The critical loss is the percentage of sales at which the hypothetical monopolist makes the same profit before and after the SSNIP. The data required for such a test are those for hospitals’ variable profit margins and those for expected patient switching following a SSNIP. The first may be obtained from hospitals’ financials and the second from a

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22 See footnote 10.
well-conducted survey. The main downside of this test is that it assumes that patients are price sensitive, which, as outlined in section 2.3, is not usually the case, especially for medical scheme patients.

3.3 Elzinga-Hogarty (E-H)

This test, also known as the E-H test, uses hospital patient-flow data to isolate a geographic area around a hospital where few patients are exiting and few are entering. The definition of ‘few’ is usually set between 10–25%. The data required are all patient flow patterns for all (potentially) relevant areas. Despite being a very common methodology used to define hospital markets, there are cautions around its use: 1.) The threshold, usually defined between 10–25%, is often arbitrary. 2.) It is backward looking (based on existing patient data). Consequently, the danger in applying this test is not usually in overstating the extent of the relevant market, but rather in understating where patients have gone in the past, not where they could go in the face of a hypothetical SSNIP.3) In general, patient flows and consequently the E-H test should be used cautiously, especially in markets where products/services are not homogenous and the choices of consumers are influenced by a host of other factors, not relating to price.

3.4 Direct competitor

This test defines a market identifying which other hospitals directly constrain the behaviour of the merged entity. The data required are simply those for patient flows for different hospitals. The approach works by measuring the degree to which the primary service areas (‘PSAs’) of other hospitals overlap with the PSA of the hospital of interest. McCarthy and Thomas explain: “A PSA is generally defined as the smallest set of zip codes from which the hospitals in question draw 90% of their patients. It is supposed to approximate where the hospitals compete for and draw patients from on a regular basis. The only exception to the 90% rule is for teaching hospitals, where we have found that a 75% PSA provides a safer measure of where the hospitals regularly get their patients from. A substantial overlap indicates that the hospital of interest could lose a significant margin of its patients to the other hospitals should it try to raise its price or lower its quality compared to competitive levels. A small overlap, on the other hand, suggests that, at least currently, the patients who live in the PSA of the hospital of interest do not commonly use the other hospitals that are apparently serving different geographic areas.”

3.5 Time elasticity

This test involves estimating a model of patient choice of hospitals by a logit demand function, where the probability of a patient choosing a particular hospital is dependent on variables that represent

25 A model that measures the relationship between a categorical dependent variable and one or more independent variables, with natural logarithms of the odds as the predicted value of the dependent variable.
characteristics of the hospital and patient. The name of the test is such as travel time is usually one of the independent variables included in such an analysis. This test requires a large sample of granular data on patients’ demographics and clinical records, as well as hospitals’ characteristics such as mix of offerings and quality. The advantages of this test are that it deals with heterogeneity and patients’ price insensitivity. The main disadvantages however are that it does not allow for any price sensitivity (i.e. for private patients or those with co-payments) and it assumes that patients maximise their welfare over a variety of variables (this is not always the case, i.e. hospital-funder networks may dominate all other factors for some patients). But most importantly, this test requires very granular data for robust estimation – which is a constraining factor in most instances.

3.6 Competitor share

This test estimates price elasticities for hospitals as a function of market shares of other competitors. This is usually done for each sub-market based on a treatment/procedure and hence requires price data for each insurer-patient pair for all hospitals that may be in a potential market. As with the ‘time elasticity’ approach this test is performed by a logit demand function. The main shortcomings of this approach are similar to that of the ‘time elasticity’ approach – notably data requirements that are not feasible and inability of the theoretical model to account for certain realistic dynamics.

3.7 Willingness to pay

The test estimates patients’ willingness to pay (WTP) using a logit demand function and based on specific diagnoses and patients’ characteristics. High WTP is inferred as higher market power of a hospital over an insurer in negotiations. This test requires a large amount of granular patient data from surveys and hospital records. The main advantages of this test are that it directly accounts for hospital-medical scheme negotiations and that it takes into account patient heterogeneity. The central disadvantage however is that it is based on WTP, which may be biased due to pre-determination and future uncertainty.

3.8 Fully structural model

This test is similar to the ‘critical loss’ test, except that it accounts for the possibility that a chain of hospitals is acting together in implementing a SSNIP. The critical loss test defines the relevant geographic market as the smallest set of hospitals that would have to be included in the market to make a SSNIP by a set of hospitals profitable. The data required for such a test are those for hospitals’ variable profit margins and those for expected patient switching following a SSNIP, as well as patients’ characteristics. Whilst theoretically sophisticated, the main downside of this test (beyond the data requirements) is that it assumes that patients are price sensitive, which, as outlined in section 2.3, is not usually the case, especially for medical scheme patients.
3.9 Summary of techniques

The above list of techniques is not exhaustive. There are, for example, also those that rely on geographical information systems (GIS) data to form catchment areas. However, the list provided summarises the techniques most commonly used – albeit some in more academic settings than others.

The techniques provided may be grouped in different ways – one of which may be the level of theoretical complexity and data requirements, as illustrated in Figure 1. Another way may be in terms of those that rely on ‘modeled preferences’ or those that rely on ‘revealed preferences’. The latter refers to existing patient flows – which may provide an objective understanding of patients’ choices and willingness to travel. There are advantages and disadvantages to each. Revealed preferences may be considered objective, but account for a period past. Modeled preferences may be subject to measurement error (especially if data is lacking), but may be forward looking.

Ultimately, the facts of each specific case should indicate which tests should be used, but the general principle is that more than one of these tests should preferably be used, to give a more robust result.

4 Markets defined in previous private hospital competition cases in South Africa

Section 2 highlighted the complexities of hospital market definition and section 3 followed on from that by discussing the various techniques available to deal with these complexities. This section now turns to the practical application of techniques in the South African private hospital sector, with an explanation of the choice of techniques employed to date.

For practical purposes, the Tribunal, in cases pertaining to private hospitals, has tended to aggregate the individual treatments and services into the broad grouping of the provision of ‘private hospital care’. This product market scope has consistently been used since the first Afrox merger in 2001. With specific reference, this specification has been supported by the Tribunal in the mergers between:

- Afrox Healthcare & Amalgamated Hospitals (2001) (‘the first Afrox merger’)
- Afrox Healthcare Ltd & Wilgers Hospital Ltd (2002) (‘the second Afrox merger’)
- Mediclinic Corporation Ltd & Curamed Holdings (2002)
- Mediclinic Investments (Pty) Ltd & Wits University Donald Gordon Medical Centre (Pty) Ltd (2005)

27 Afrox Healthcare Ltd & Wilgers Hospital Ltd. Competition Tribunal. Case No. 15/LM/Feb02.
• Phodiclinics (Pty) Ltd and DJF Defty (Pty) Ltd, & New Protector Group Holdings (Pty) Ltd (2006)\(^{31}\)
• Netcare Hospital Group (Pty) Ltd & Community Hospital Group (Pty) Ltd (2006)\(^{32}\)
• Life Healthcare Group (Pty) Ltd Amabubesi Hospitals (Pty) Ltd & Bayview Private Hospitals Ltd (2010)\(^{33}\)
• Life Healthcare Group (Pty) Ltd & Joint Medical Holdings (JMH) (2011)\(^{34}\)

This aggregation of private hospital services broadly accounts for both the provision of general and specialised healthcare services. In defining the relevant market in private hospital mergers in South Africa, the Tribunal has consistently excluded public hospitals, as they have not been evidenced to offer a general competitive constraint to private hospitals.

With regard to the geographic definition of hospital markets, more recent competition cases have utilised patient flow data, as for example in the 2011 merger between Life Healthcare Group and Joint Medical Holdings. Therein the geographic market was determined based on a multi-perspective approach, taking account of where patients lived relative to the merging parties hospitals.

Patient flow data and the E-H test were also used in the Protector merger (December 2005). However in this case the Tribunal found that this did not allow a ‘final finding’.\(^{35}\) The Tribunal found that other indicia were required in conjunction with the results of the E-H test. This is in line with the approach often taken in the US, where other indicators such as witness testimony, industry views, strategic documentation and physical location are also relevant in addition to patient flow analysis.

In older studies, patient flow data have not always been readily available. In these instances markets have commonly been defined based on a fixed kilometre radius from the hospital of interest. This methodology was used, for example, in the first\(^{36}\) and second\(^{37}\) Afrox mergers, in which the relevant geographic market was considered to be the 20km–40km radius from the merging hospitals. This methodology and radius was also used in the analyses of the Curamed merger.\(^{38}\) In the Protector merger the same methodology was used, but the radius was specified as 60km.\(^{39}\)

\(^{30}\) Mediclinic Investment (Pty) Ltd & Wits Donald Gordon Medical Centre (Pty) Ltd. Competition Tribunal. Case No. 75/LM/Aug05.
\(^{31}\) Phodiclinics (Pty) Ltd & others and Protector Group Medical Services (Pty) Ltd & others. Competition Tribunal. Case No. 122/LM/Dec05.
\(^{32}\) Netcare Hospital Group (Pty) Ltd & Community Hospital Group (Pty) Ltd. Competition Tribunal. Case No. 68/LM/Aug06.
\(^{34}\) Life Healthcare Group (Pty) Ltd & Joint Medical Holdings Ltd. Competition Tribunal. Case No. 74/LM/Sep11.
\(^{35}\) See footnote 31, p.15.
\(^{36}\) See footnote 26, p. 4.
\(^{37}\) See footnote 32, p. 2.
\(^{38}\) See footnote 28.
\(^{39}\) See footnote 31, p. 12.
Having discussed the theory of hospital market definition and the historical application thereof in South African competition cases, the remainder of the note relates to Econex’s work in this regard. We explain the type of data that we access from various sources, the application of this to defining hospital markets of interest, and the (potential) relevance of this for the healthcare inquiry. The focus in sections 5 and 6 is on the local geographic market. Nevertheless, the provincial and national markets for hospitals are also important and Econex has worked on this as well, as will be explained in section 7.

5 Application: practical aspects and data requirements

A number of data sources are used by Econex to determine geographic markets of interest for private hospital services in South Africa. The sources generally include (1) patients’ admission data received from the hospitals of interest, (2) data and information for all South African private hospitals collated by Econex for HASA and (3) direct competitor data originating from the relevant hospital management. These sources may be combined in order to derive the boundaries of the relevant local geographic markets for hospitals of interest and subsequent market concentration measures. In addition, the data described by point (2) may be used to calculate national and provincial market shares for all private hospitals in South Africa. Brief details of the various data sources generally applied are discussed below.

5.1. Patient admissions data

Patient admissions data from the relevant hospitals are obtained in order to establish the patient flow boundaries of the specific geographic market. Requested for inclusion in this dataset is a range of information including the postal code associated with the patient’s address. In the absence of physical street addresses, which may result in ethical and computational difficulties, the postal codes are considered suitable for calculating the primary service area of each hospital. The potential use of third party postal facilities by patients introduces a concern that it may affect the scope of the defined local geographic markets. However, in our analyses to date we consider the effect on the scope to be negligible as it is conceivable that, if individuals utilise third party postal facilities, they are likely to either live or work in close proximity in most instances.

5.2. Private hospital dataset

The patient admissions data may then be matched to bed data for the relevant hospitals. For this purpose we have, in more recent years, made use of a private hospital dataset that we compiled for HASA. This dataset provides detailed information for 280 private hospitals in South Africa including the number of beds available at each hospital.
5.3. Quantitative data received from hospitals

We also compile a quantitative dataset, obtaining data from each individual hospital. The management of the hospital under analysis is requested to identify if surrounding hospitals are considered as competitors or not. This analysis is not limited to private hospital competitors – public facilities which are viewed by the hospital as competitors are also included.

6  Application: defining local markets

This section briefly describes the process of delineating local geographic markets for individual hospitals in South Africa, using the data sources described above.

6.1  Choice of techniques

In our analyses, we are constrained in the choice of technique by data availability. As explained above, we typically access three sources of data: data on patient origin (by postal code), data on competing hospitals (usually only bed numbers; no patient data for these competitors), and information on competitors (by name) as perceived by the individual hospital management. Within this context we use two tests to define local geographic markets for private hospitals of interest – the direct competitor test and the fixed radii test. These fall within the broad category of ‘older’ tests on the left-hand side of Figure 1. The E-H\textsuperscript{40} test is also based on patient flows, but as we generally do not have sufficient data on patient flows to competing hospitals, we do not perform this test. The direct competitor test is however also based on patient flows and similar to the E-H test. The fixed radii test is similar to the isochrones test.

6.2  Methodological issues and specifications for the direct competitor test

Patient flow data has been used on previous occasions to perform the E-H test in defining the hospital local geographic markets.\textsuperscript{41} This has also been recognised as a standard approach by the South African competition Tribunal\textsuperscript{42}, although they point to some of the theoretical problems with this test, as discussed in section 3.3.

The empirical work undertaken by Econex employs the direct competitor test rather than the E-H test to approximate the local geographic market definition for hospitals. The reason is two-fold. Firstly, as alluded to in section 3.3, the E-H test is not entirely appropriate for hospital geographic market definition because hospital goods and services are differentiated. Secondly, the patient-level data that are available from the hospitals which we have in the past analysed accounts only for the patients that visited those hospitals. What this means is that one cannot infer patient-flow patterns in both directions for entire regions

\textsuperscript{40} Elzinga-Hogarty test, as described in section 3.3.


\textsuperscript{42} See footnote 31.
because there are no data pertaining to how these and other patients make use of other hospitals. For instance, we can define a market by considering the LIFO\textsuperscript{43} measure, i.e. how many patients from other regions travel to the facility of interest. However, relying only on that facility’s data, there can be no analysis of how all patients from inside the region utilise hospital facilities outside the region, i.e. LOFI\textsuperscript{44}. The only way to employ the E-H test would be to make the assumption that all hospital patient flow patterns are identical to that of the facility of interest, which, in our view, is implausible given the differences in facilities and regional representation of hospitals in South Africa.

On the other hand, the direct competitor test is a similar criterion that is more attuned to the available data and incurs more acceptable assumptions. The direct competitor test seeks to determine the relevant geographic market by identifying which hospitals directly constrain the behaviour of the hospital of interest. The approach works by measuring the degree to which the primary service areas\textsuperscript{45} (PSAs) of other hospitals overlap with the PSA of the hospital of interest. A substantial overlap indicates that the hospital could lose a significant margin of its patients to the other hospitals should it try to raise its price or lower its quality compared to competitive levels. A small overlap, on the other hand, suggests that, at least currently, the patients who live in the hospital’s PSA do not commonly use the other hospitals that are apparently serving different geographic areas.\textsuperscript{46}

By combining the above mentioned approach with an assumption that the PSA of each hospital of interest is its geographic market and that the other hospitals located inside the PSA have the same PSA, one is able to define local geographic hospital markets. While there may be other advantages and disadvantages to this approach, it is not \textit{a priori} biased to overstate or understate the degree of competition faced by a particular hospital. This is the case because the exclusion of competitor hospitals that fall just outside the PSA in the geographic market definition is offset by the assumption that the included hospitals located inside the PSA have exactly the same PSA. The second assumption implies that the included hospitals compete with the hospital of interest for all of the customers in the PSA that it serves, which is not the case in practice.

In applying the direct competitor test, it is deemed appropriate to calculate two local geographic markets with two different threshold percentages of 75% and 90%. The markets defined by these thresholds may then be compared to those determined via the fixed radii test as an assessment of the suitability of these thresholds. The 75% and 90% thresholds are often used as benchmarks in the application of the E-H test in the literature, and are usually referred to as the weak (75%) and strong (90%) versions of the test. These thresholds are in line with the catchment methodology applied by the UK CC in its recent private

\textsuperscript{43} “little-in-from-outside”
\textsuperscript{44} “little-out-from-inside”
\textsuperscript{45} A contiguous geographic area surrounding the hospital from which it receives 75% of its total admission volume.
healthcare market investigation, where catchment areas around hospitals are defined on the basis of the distance for which 80% of patients travel less than a certain distance.

Because the local markets defined by the direct competitor test only consider hospitals within areas from which patients originate, this is a very conservative approach. It gives no indication of hospitals found in nearby geographic areas from where few patients originate.

6.3 Methodological issues and specifications for the fixed radii test

The fixed-radii technique involves setting distance radii around each hospital, which signifies the area from which patients originate. This approach is similar to the isochrones technique, which determines the catchment area based on drive/travel time. Given different travel times to a hospital, the isochrones technique does not result in circular markets around the relevant hospitals, as the fixed radii approach does.

The fixed radii technique involves the selection of arbitrary radii around each hospital in order to define the local geographic markets. Given that the Tribunal has stated in the past that hospitals are likely to compete within a 20–40 km radius it is determined that it is best to set multiple distance radii as well as include a subjective radius. Accordingly we generally set radii at 5km, 10km, 15km and 20km distances around the hospital of interest. In addition, we usually request that relevant hospital management state which hospitals outside the 20km radius should be considered as competitors, with motivations as to their selections.

6.4 Identifying local geographic markets using the direct competitor test

This section considers how the direct competitor test is performed. Given that the fixed radii test is more straightforward and commonplace in the South African context, we do not discuss this in more detail.

The direct competitor test for determining the relevant local geographic market makes extensive use of the admissions data received from the hospital of interest to calculate cumulative percentages of patient flow. This entails ordering the postal codes of patients’ origin according to the number of observations. The percentage admissions originating from each postal code are subsequently calculated. The ordered list is then used to determine the increasing cumulative percentage of admissions. The cumulative percentage, in turn, determines which postal codes are to be included in the 75% (narrow) and 90% (broad) threshold defined markets. During these calculations, care is taken to include all postal codes with the same number of observations in cases when the cut-off threshold falls between two specific postal codes on the ordered list.

Given that the local geographic markets are defined around each hospital, the postal code area associated with the relevant hospital is automatically included irrespective of how many patients originate
from the hospital postal code. This step is included as it would not make theoretical sense to exclude a hospital within its own geographic market. Implied in the decision to automatically include each hospital’s postal code in the local geographic market is the assumption that hospitals in a common postal code are competitors.

7 Application: defining provincial and national markets

In section 6 we showed how one may apply various datasets, such as those described in section 5, to define local markets for hospitals of interest. In addition to this, and as a result of the HASA dataset that we compiled (described in section 5), we are able to better understand national and provincial markets for all private hospitals.

These ‘markets’ would not convey information as to how private hospitals compete locally, where competition is based largely on non-price characteristics. Rather, they may provide insight as to how private hospitals compete at a national and provincial level, with a focus more on pricing as a basis for competition. As referred to in section 2.2, this may provide insight into the landscape for annual negotiations between private hospitals and medical schemes/administrators.

8 Application: defining markets for the healthcare inquiry

Sections 5–6 discuss the experience of Econex in practically and realistically defining local hospital markets and thereby assessing competition. For the purposes of the inquiry, the CC is expected to have access to more extensive data than what has been available to us. It may accordingly be possible for the CC to improve on the methods used, as described in this note.

For example – provided with the correct data from inquiry participants – the CC will be able to perform the E-H or direct competitor test, without requiring assumptions due to data restrictions. Whilst such patient flow tests have incurred criticism for theoretical reasons, they have been widely used in hospital markets and offer a valuable validation technique to the fixed radii technique, which has historically been applied in South Africa. Using patient flows, rather than (or in addition to) fixed radii techniques (formed based on qualitative questionnaires) is also in line with what was used in the UK private healthcare inquiry. Therein geographic markets were defined based on catchment areas – areas where 80% of a hospital’s patients originate, with validation techniques based on qualitative questionnaires. Should the CC have more granular patient and hospital data, even more sophisticated techniques may be tried, as alluded to in section 3. In this regard, one may consider the value added by using modeled preferences rather than revealed preferences.

We are able, contingent on approval by the relevant authorities, to assist in compiling datasets – such as those mentioned in section 5 – that will be relevant for the inquiry. As referred to at the end of section 4
and expanded on in section 7, we have also compiled hospital data, most relevantly bed numbers and related market shares, for all private hospitals both nationally and provincially. This may assist the CC in the definition of local geographic markets, but also in the definition of more aggregated markets to understand the distribution of private hospitals in relation to the distribution of other private healthcare stakeholders.