



## **Antitrust Issues in Defining the Product Market for Hospital Services**

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**ABSTRACT** *In this paper we examine the standard product market relied on by the courts and antitrust agencies in hospital mergers—acute care, inpatient services—and consider whether narrower or broader alternatives may be more appropriate to assess the competitive effects of a hospital merger. To examine how much disaggregation of the standard product market definition may matter for the definition of relevant geographic markets and concentration, we considered patient flows and concentration for the overall inpatient ‘cluster’ and more disaggregated categories of service for two regions of California: San Luis Obispo and Sacramento. We find that a disaggregated approach may involve a relatively small number of inpatient service categories, that the overall cluster masked some variability in the underlying patient flows by service category, and that in San Luis Obispo, the overall cluster masked considerable detail in concentration at the service category level, which appeared to have been much less true in Sacramento.*

*Key words:* Antitrust; Hospitals; Healthcare; Market definition.

*JEL classifications:* K21, I11, L40.

### **1. Introduction**

One important aspect of antitrust merger analysis, upon which enforcement actions may critically depend, is defining the relevant product market. In evaluating hospital mergers, the courts and the antitrust agencies have generally relied on a product market defined by a ‘cluster’ of inpatient, acute care services. Here we examine this standard product market definition and consider whether narrower or broader alternatives may be more appropriate to assess the competitive effects of a hospital merger.

Section 2 briefly describes the role of product market definition in antitrust merger analysis generally. Section 3 deals with specific product market questions that arise for hospital services. In Section 4, we consider product market

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definitions broader than the standard inpatient, acute care cluster. Section 5 examines more narrow product market definitions based on categories of inpatient clinical services. Section 6 concludes.

## 2. Product Market Definition in Antitrust Merger Analysis

Antitrust presumes that high market concentration may permit profitable unilateral output restrictions by merging firms, or alternatively, may make tacit or overt collusion more likely.<sup>1</sup> The competitive dangers of high concentration are only a presumption, however. Other factors, such as obstacles to successful collusion, ease of entry, repositioning by rivals or merger-related efficiencies may overturn the anticompetitive presumptions of high concentration.

Measuring pre and post-merger concentration first requires defining the relevant market. This is done by identifying those firms which are competitors. The relevant market should include all firms whose products are considered reasonable substitutes by buyers. Antitrust has traditionally divided market definition into two parts: product market and geographic market. Product market analysis, which is the focus of this article, identifies competitors based on the characteristics of firms' products or services. Geographic market analysis examines whether firms whose outputs are included within the product market are competitors based on the physical location of sales or production.

The courts have long recognized that grouping products in a relevant market should be based on some notion of cross or own-demand elasticity (often referred to in legal opinions as 'reasonable interchangeability of use'). Yet in many instances, sometimes in response to limited data, the courts have relied on factors other than demand elasticities to define product markets. These factors include similarities in price levels or price movements among products, quality differences, evidence that sellers take into account the marketing and pricing of other sellers, unique production facilities and industry or public 'recognition' of separate markets. Many of these factors have been criticized as poor or even misleading indicators of product substitutability. For example, similarity in price movements among different products may be due to cost commonalities rather than demand side substitution.

The *Merger Guidelines* emphasize demand elasticity as the fundamental basis in defining relevant markets:

A market is defined as a product or group of products and a geographic area in which it is produced or sold such that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future producer or seller of those products in that area likely would impose at least a 'small but significant and non-transitory' increase in price, assuming the terms of sale of all other products are held constant. A relevant market is a group of products and geographic market that is no bigger than necessary to satisfy this test.<sup>2</sup>

A small but significant, non-transitory price increase is generally interpreted by the enforcement agencies as a 5% increase from pre-merger levels lasting for the foreseeable future. The Guidelines' price test starts with a very narrow market candidate and successively broadens the proposed definition by including more products until demand-side substitution is insufficient to make the hypothetical monopolist's price increase unprofitable.<sup>3</sup> Relevant markets are defined for each

product sold by the merging parties. Smaller 'price discrimination' markets may also be defined if it were possible for the hypothetical monopolist to charge different prices to different buyers for the same product.<sup>4</sup>

Plaintiffs and defendants often expend considerable resources contesting the relevant market. Small differences in the accepted market definition can have important consequences for estimating concentration and the attendant risks to competition. This is no less true in the case of hospital services where there are abundant opportunities to present alternative characterizations of the relevant product market.

### 3. General Issues in Defining Hospital Service Product Markets

While the *Merger Guidelines* provide a well-specified framework for defining relevant markets, special analytical or evidentiary issues often arise in particular cases. Hospital services are no exception and indeed are probably one of the more complex markets encountered by antitrust enforcers. These complexities largely involve the multiplicity of services produced by hospitals and heterogeneity among consumers. Important aspects of consumer heterogeneity include differences in medical treatment needs and third-party payer coverage.

#### (A) Multiplicity of Services

A hospital's schedule of charges is typically very detailed, listing a myriad of items related to diagnostic testing, operating room fees, drug and medical device supplies and other ancillary services, in addition to room and board costs.<sup>5</sup> Many of these products and services are not substitutes, and many cannot be put in the same product market on the basis of easy supply-side substitution. Hundreds of separate product markets would appear to suggest themselves.

Aggregating individual hospital inpatient services into one so-called 'cluster market' has been the generally chosen alternative to analyzing these numerous markets. The unique provision of certain services by hospitals and complementarities in production and consumption are the standard rationales for defining an inpatient hospital services cluster market (Vita *et al.*, 1991). If complementarities are strong enough to define a cluster market, a monopolist producer of the cluster could profitably raise price by 5% since it would be unattractive for consumers to source individual components of the cluster from multiple independent sellers.<sup>6</sup>

Some commentators have criticized hospital cluster markets since services are not necessarily grouped according to substitutability in demand or supply. Treatment of heart disease and cancer, for example, represent final goods that are not demand-side substitutes. Concentration measured across clusters may also mischaracterize competition since cluster market shares are based on an average of each firm's share in providing services which individually should be regarded as separate product markets (Baker, 1988). How finely medical treatments should be parsed into separate demand side markets is unclear, but strict application of the *Merger Guidelines* suggests that the number of separate product markets would be large.

Aggregating across treatments which are not demand-side substitutes would create overly broad product market(s) under the *Merger Guidelines*, unless the supply-side substitution criteria were satisfied. Many hospital labor and capital

inputs are fungible across treatments. For example, patients hospitalized for different kinds of infections are likely to be equally treatable by a hospital; treatment regimens may vary only by administering different drugs. In other instances, there are supply-side impediments which would prevent aggregating separate demand-side treatments into a single product market. The array of available treatments can vary significantly from hospital to hospital. Some hospitals do not provide obstetrical services, while others specialize in treating women. Others can treat cancer with drugs or chemicals, but lack the equipment or personnel to treat this disease with radiation. In these and other cases, significant sunk investments or time delays prevent the aggregation of non-demand side substitutes into a broader product market.

More detailed statements about supply-side substitution across treatments are difficult to make without reference to the facts in a particular case. Supply-side substitution between any pair of treatments is likely to vary from hospital to hospital due to several factors. There may be differences in the direct incremental cost of expansion since there may be economies of scope and pre-existing treatment arrays may vary. The foregone profits on the treatments which are substituted away from are likely to vary from hospital to hospital. Finally, some states place regulatory limits on bed expansion, capital expenditures or what services can be offered by the hospital.

Zwanziger, Melnick and Eyre (1994) have proposed dividing hospital services into three major categories for the purposes of antitrust analysis: primary, secondary and tertiary.<sup>7</sup> Emphasizing the physician as the key input into hospital treatments, Zwanziger *et al.* would begin by grouping diagnostic related groups (DRGs) into 48 'service categories' (which we refer to as Zwanziger Service Categories or 'ZSCs').<sup>8</sup> Essentially treating each DRG as a separate market from the demand side, this approach groups DRGs into ZSCs based on the least specialized physician capable of treating those diagnoses. Physician specialties are used as 'markers', which, in effect, identify that range of DRGs that an uncommitted hospital entrant could easily produce with the same personnel and equipment. In applying their methodology to a specific merger case, Zwanziger *et al.* would then combine these service categories into primary, secondary and tertiary care groups based on the fact patterns specific to a particular geographic area. Hospitals whose patients mostly required only primary care would be classified as primary services hospitals, while other hospitals which had a significant proportion of revenues from the highest levels of care would be regarded as providing primary, secondary and tertiary services.

For any demand-side DRG market, one ideally would like to quantify the amount of relevant capacity which can produce other DRGs and which would be shifted into the DRG experiencing an anticompetitive price increase.<sup>9</sup> The approach of Zwanziger *et al.* can be implemented in the context of the *Merger Guidelines* with the simplifying assumption that *all* capacity (as measured by current sales) within a ZSC would be shifted into any DRG within the ZSC for which there was an anticompetitive price increase.<sup>10</sup> Despite this simplifying assumption and other caveats relating to the use of ZSCs as indicators of demand-side substitutes,<sup>11</sup> some sort of disaggregated analysis in the spirit of Zwanziger *et al.* may yield valuable insights for antitrust analysis. In Section 5, we apply part of their approach to actual patient flow data and assess the implications of alternative levels of product market aggregation for geographic market definition and concentration.

*(B) Third-Party Payers*

The overwhelming majority of hospital services are covered either by private or public insurance. Transaction cost factors that are not relevant to individual patients may be important to the buying decisions of plans or employers. Some plans or employers may have a preference for contracting across a wide array of services with fewer hospitals, rather than contracting with a large number of hospitals for various subsets of services. Some experts have argued that the bundle of services for which managed care plans contract should be considered one product market.<sup>12</sup> Services which are individually contracted for (or would be individually contracted for after an anticompetitive price increase) might be analyzed as separate product markets under this approach (Vistnes, 1995).

Although there may be fact situations suggesting otherwise, we suspect that transactions complementarity at the managed care level is a weaker rationale for defining a cluster market compared to aggregating functional or ancillary services into a single product cluster from the patient's perspective. Managed care plans do in fact frequently contract with more than one competing hospital, and the threat of 'carving out' particular clinical services may be a potent negotiating tool. For example, a plan might move all its enrollees to a second hospital with the exception of obstetrics if negotiations with the first hospital for an across the board contract are unsuccessful. Plans may also be able to shift enrollees among hospitals by providing financial incentives for enrollees to choose the lower cost facility for particular treatments.

**6. Is the Standard Hospital Product Market Definition Too Narrow?**

Table 1 presents the product market definitions that were accepted in judicial decisions in hospital merger cases brought by the Department of Justice (DOJ) or Federal Trade Commission (FTC) over the past decade-and-a-half. The table shows that 'acute care, inpatient services' has emerged as the standard definition in hospital merger cases.<sup>13</sup> Acute care, inpatient services is by no means the broadest cluster of services that might plausibly be considered as a product market definition. Outpatient services have been excluded from the accepted cluster as well as services of some hospitals which provide specialized inpatient care and/or serve distinct but limited patient clienteles. We now consider the reasons for these exclusions.

*(A) Outpatient Services*

The treatment of outpatient services has been an important product market issue in several hospital merger cases. In the *US v. Carilion Health System* 1989 decision, the court accepted a combined outpatient/inpatient product market which included non-hospital outpatient providers. The court found that many procedures could be done on either an inpatient or outpatient basis and that insurers had recently restructured reimbursement policies to encourage the use of less expensive outpatient services. Yet as Table 1 shows, Carilion has become an anomaly in light of later decisions which consistently have limited the market to inpatient services. Even defendants now sometimes concede that the relevant product market excludes outpatient services.<sup>14</sup>

Table 1. Product market issues in hospital merger decisions

Case	Year	Accepted product market	Important issues
FTC v. American Medical International	1984	General acute care hospital services	Included hospital outpatient services, excluded non-hospital outpatient services, excluded psychiatric beds due to CON considerations
FTC v. Hospital Corp. of America	1985	General acute care hospital services	Excluded psychiatric hospitals, included psychiatric beds in acute care hospitals, included pediatric hospital beds. Commission accepted product market definition but noted that "perhaps outpatient care should be a separate market or markets"
U.S. v. Carilion Health System	1989	District court held product market included "certain clinics and other providers of outpatient services."	Appeals court noted that "in a merger of two large entities, there is no single product market" with each product market having a different "degree of substitutability between inpatient and outpatient services"
U.S. v. Rockford Memorial Corp.	1990	Acute care inpatient services	Hospital outpatient services excluded
FTC v. University Health	1991	Acute care inpatient services	District court held merging parties "not truly in competition in a meaningful and substantial way at this time". District court decision reversed on appeal. Appeals court noted the merging hospitals "compete effectively for several services"
Adventist Health Systems/Ukiah (FTC)	1992	Acute care inpatient services	Significant outmigration which complaint counsel alleged was attributable to patients seeking tertiary care
U.S. v. Mercy Health Services	1995	Acute care inpatient services offered by both the merging parties	Excluded inpatient psychiatric care, substance abuse treatment, rehabilitation services and open heart surgery
FTC v. Freeman Hospital	1995	Acute care inpatient services	Merger of osteopathic and allopathic hospitals
FTC v. Butterworth Health Corp.	1996	(1) Acute care inpatient services (2) Primary care inpatient services	Different geographic markets relevant to each product market "cluster"
U.S. v. Long Island Jewish and North Shore Health System	1997	Acute care inpatient services. The district court also recognized separate product markets based on the conclusion that the geographic market for these services differed	Plaintiff argued that the relevant product market was "the bundle of acute care inpatient services provided by anchor hospitals to managed care plans"

The differing outcomes between Carilion and later cases underscore the significance of the underlying parameters used to define antitrust markets. Gradual changes in the site of service over time may not have any implications for market definition if they cannot occur sufficiently quickly to undermine an anticompetitive price increase. Outpatient services have expanded over time and much of this growth has been at the expense of inpatient services. But this does not necessarily mean that outpatient and inpatient services are in the same antitrust product market as defined under the *Merger Guidelines*. Technological innovation has been the major force behind the growth of outpatient care. Where a clinical procedure can be done on either an inpatient or outpatient basis, the physician's judgement on the medically more appropriate setting for a particular patient remains important. Moreover, most payers closely scrutinize the site-of-service for submitted claims and will not reimburse for inpatient services that could safely be done in an outpatient setting. Due to these considerations, few, if any, patients (or their insurers) consider relative prices in choosing whether to have a particular procedure performed on an inpatient or outpatient basis, particularly when the hypothetical price change is relatively small.

The exclusion of outpatient services from the standard hospital product market definition does not imply that antitrust enforcers are never concerned about anticompetitive effects in outpatient services. For example, the FTC recently accepted a consent agreement to settle charges that the acquisition of an independent, freestanding surgery center by a hospital in Anchorage, Alaska would reduce competition in a market for outpatient surgery services due to the overlap with the hospital's outpatient surgery services.<sup>15</sup>

#### *(B) Other exclusions*

Other inpatient services have been generally excluded from the relevant product market on the grounds of little demand or supply-side substitution with the services within the standard inpatient cluster. Examples include the services of psychiatric, rehabilitation and chronic disease hospitals.<sup>16</sup> Other providers of inpatient services also have been excluded since they are legally restricted to serve a distinct, but limited patient clientele. Veterans' and active military hospitals are examples. While some veterans and military personnel are able to use hospitals open to the general public, the number that might switch to either a veterans' or active military hospital is generally much too small to defeat an anticompetitive price increase, thereby justifying excluding those hospitals from the relevant product market.

### **5. Is the Standard Hospital Product Market Definition Too Broad?**

#### *(A) Specialty Hospitals*

More problematic for the standard hospital product market definition than exclusions such as veterans' hospitals are the services of specialized producers that compete much more directly with hospitals within the standard cluster market. Women's hospitals and pediatric hospitals are important examples of such specialized producers of acute care, inpatient services. Whether these specialty hospitals—or for that matter, specialty providers of inpatient services outside the standard cluster—should be included in the same market depends on the degree

of demand and supply-substitutability, which may vary considerably from case to case. In the *FTC v. Hospital Corporation of America* (1985), the court excluded psychiatric hospitals due to regulatory constraints and because converting psychiatric beds to acute care "would be a major undertaking".<sup>17</sup> On the other hand, a pediatric hospital was included in the market since the court concluded that the hospital already had in place much of the labor and capital necessary to provide acute care, inpatient services to adults.

Aside from supply side issues, specialty hospitals directly compete with general acute care hospitals for at least some of the latter's patients. Unlike veterans' or active military hospitals, the number of a general hospital's patients that might switch to a nearby pediatric, women's or similar specialty hospital may be too large to ignore. The presence of specialized inpatient providers in a market presents a clear challenge to the standard cluster market definition which might be best addressed through a less aggregated approach.

Some commentators have argued that the standard cluster market definition economizes on scarce enforcement and judicial resources (e.g. see Baker, 1988; Vita *et al.*, 1991). Less aggregated alternatives are more costly analytically and may tend to complicate judicial decision-making. Nonetheless, any gain in economizing on enforcement and judicial resources might be outweighed if the standard definition yields concentration measures that seriously mischaracterize the true degree of competition. If this were true, mergers that should be challenged might be allowed to proceed, while those that are either procompetitive or competitively neutral might be investigated unnecessarily. In some cases, the risk of enforcement errors will be minimal. Concentration measures based on less aggregated product market definitions will tell a story similar to the standard cluster when competing hospitals produce the less aggregated sets of services in similar proportions. Emphasizing price discrimination markets may not add much to the competitive analysis if buyers' demand elasticities are comparable and competing hospitals provide services to buyers in fairly similar proportions.<sup>18</sup> Nonetheless, replacing or supplementing the standard cluster with less aggregated product market definitions may often be preferable.<sup>19</sup> The analysis of mergers of specialty hospitals with general hospitals are most likely to require a product market consisting of some subset of the standard inpatient cluster. Less aggregated definitions should also be considered in mergers of general hospitals which face significant competition from nearby specialty hospitals.

#### *(B) Other Issues*

Less aggregated product market definitions are also important because the relevant product market and the relevant geographic market are often interrelated. The recent *FTC v. Butterworth Health Corporation* (1996) matter, illustrates the possible significance of a less aggregated product market definition for the relevant geographic market. This case involved the proposed merger of two hospitals in Grand Rapids, Michigan. While ultimately finding against the FTC on other grounds, the district court accepted the FTC's claim of two relevant product markets: (1) general, acute care inpatient services, and (2) primary care inpatient services. While the former market corresponded to the standard cluster of previous antitrust cases, primary care services were defined as "basic or less complex services available at most general acute care hospitals, including normal childbirth, gynecology, pediatrics, general medicine and general surgical services".<sup>20</sup> Concentration in these two product markets, while high in both, differed significantly.



Depending on whether market share was measured by beds, discharges or inpatient revenues, post-merger concentration in the overall inpatient cluster, as measured by the Herfindahl–Hirschman Index (HHI) ranged from 2767 to 4521, representing an increase of between 1064 and 1889 points. The primary care inpatient market was even more highly concentrated. There post-merger concentration ranged from 4506 to 5079, reflecting an increase of 1675 to 2001 points. As seen in Figure 1, differences in concentration between the two product markets were largely attributable to differences in the associated geographic markets. While the primary care inpatient market contained only the four hospitals in (or very close to) Grand Rapids, the general acute care inpatient market also included five smaller hospitals located further away. The proposition that there were two different product markets, each with a different relevant geographic market, was based on evidence presented by the FTC that the propensity of patients to travel varies across hospital services.<sup>21</sup> Thus, for many of the more specialized services in the general acute care inpatient market a number of patients are willing to travel long distances, resulting in a larger geographic market for this product group than for the primary care inpatient market. An important lesson here is that the level of product market aggregation can have important consequences for geographic market definition and concentration.

*(C) Further Applications of a Disaggregated Approach*

*Butterworth* may not be representative of all hospital mergers, and the relevant geographic markets in that case may not be typical of all hospital markets. To further examine how much disaggregation might matter, we consider patient flows and concentration for the overall inpatient cluster and more disaggregated categories of service for two regions of California: San Luis Obispo and Sacramento. The markets for hospital services in both these areas would appear to differ considerably from Grand Rapids. In Grand Rapids the merging hospitals are relatively large (529 and 328 beds) and offered a very broad array of services and there were no comparably sized hospitals in the region offering a similar scope of services. In San Luis Obispo the hospitals are much smaller than those in *Butterworth* and offer a more limited array of services. Nonetheless, these hospitals are more typical of the size of most US hospitals.<sup>22</sup> In contrast, Sacramento has a number of hospitals that are much more comparable in size and scope to the relatively large merging hospitals in *Butterworth*.

*(1) San Luis Obispo.* In San Luis Obispo, California we consider a proposed acquisition between Sierra Visa (195 beds) and French (147 beds) hospitals that was the subject of a recent consent order issued by the FTC.<sup>23</sup> This merger is also of interest because it involves the same two hospitals that the FTC broke apart in its very first hospital merger case, *FTC v. American Medical International* (1984).<sup>24</sup> In *AMI* the FTC held that both the city and county of San Luis Obispo comprised relevant markets. The defendants in *AMI* unsuccessfully argued that the relevant market should be expanded to the south to include hospitals in Santa Maria, a city in northern Santa Barbara county (see Figure 2). In the *Tenet* complaint and consent agreement, the FTC alleged that the relevant geographic market was San Luis Obispo county. An inpatient, acute care cluster market was the accepted (or in the case of *Tenet*, alleged) product market in both cases.

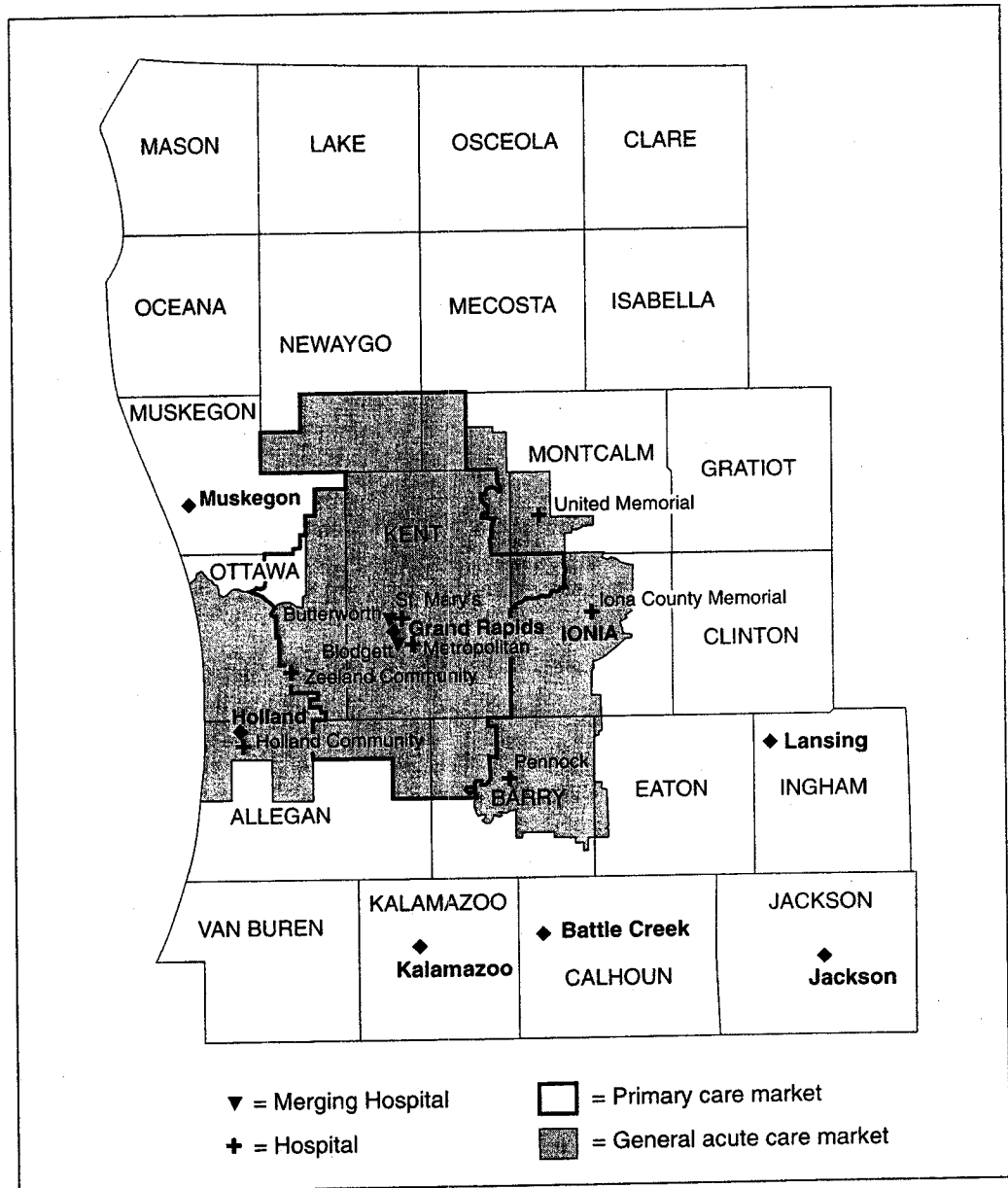


Figure 1. Relevant geographic markets (Butterworth/Blodgett).

How different would the case against a merger of Sierra Vista and French look if less aggregated, inpatient service markets were analyzed? To answer this question, we apply part of the approach of Zwanziger *et al.* (1994). That is, in addition to considering the traditional inpatient cluster, we also examine a number of the Zwanziger Service Categories or ZSCs discussed in Section 3. We use 1993 patient flow data from the California Office of Statewide Health Planning and Development (OSHPD) to compare the city, county, and county plus Santa Maria areas as possible geographic markets under the full inpatient cluster and under less aggregated groupings of inpatient services. Concentration levels in these alternative relevant markets are calculated assuming the ownership structure as of the time of Tenet.<sup>25</sup>

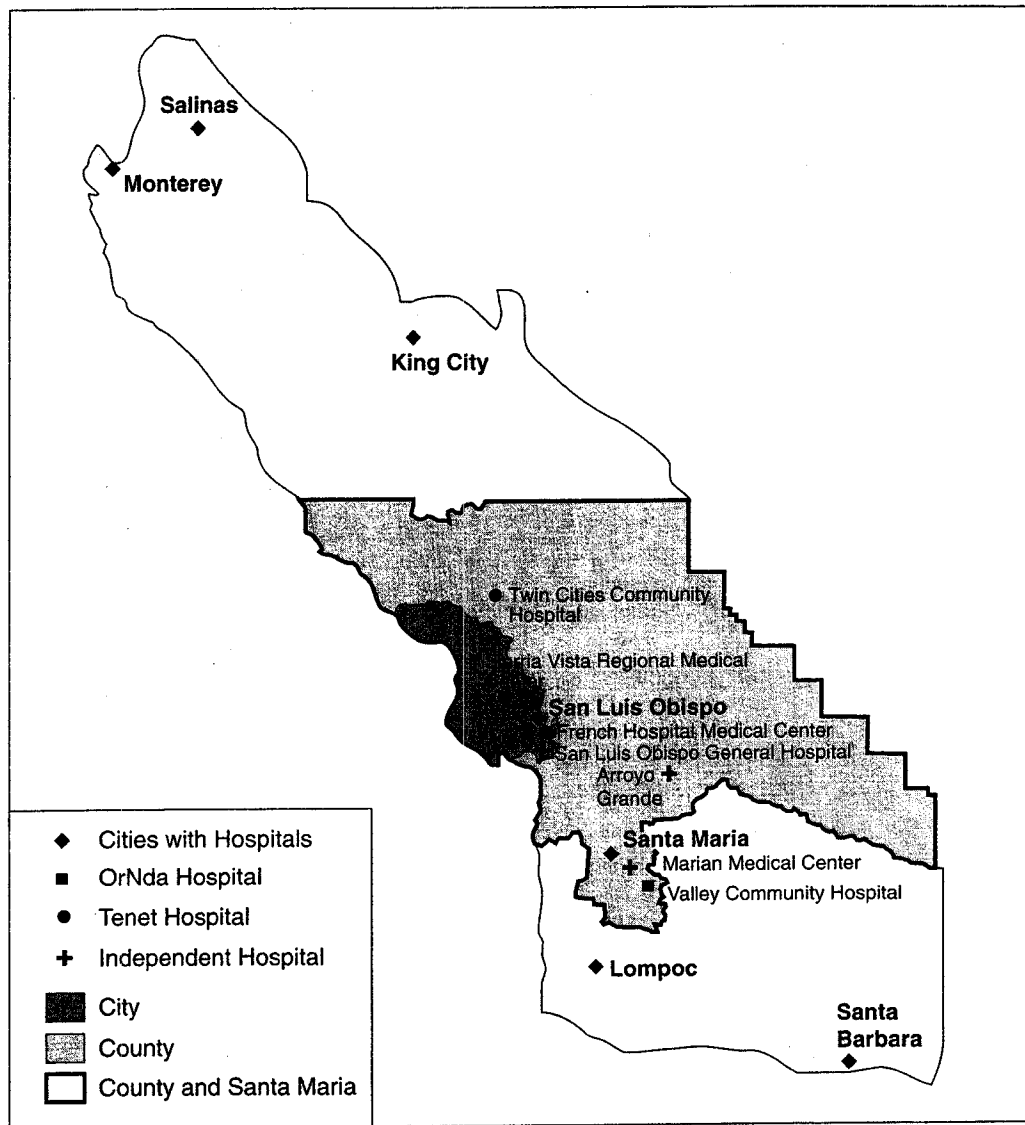


Figure 2. Relevant geographic markets (Tenet/OrNda).

The first part of Table 2 identifies those Zwanziger Service Categories (ZSCs) which account for most of the combined patient volume of Sierra Vista and French hospitals. As the first part of Table 2 shows, 17 ZSCs accounted for about 91% of the hospitals' admissions.<sup>26</sup> As noted previously, one argument for inpatient cluster product market definition is analytical simplicity. The distribution of admissions across ZSCs for French and Sierra Vista indicates that the large majority of the merging hospitals' output could be analyzed by considering only a fairly small number of important clinical services. Given that these 17 ZSCs represent the vast majority of the merging hospitals' output, we do not analyze the remaining 23 ZSCs provided by the hospitals.

We now consider the implications of the full inpatient cluster and the less aggregated ZSCs for geographic market definition. Numerous types of evidence are used in assessing geographic markets in hospital antitrust matters. For example, the views of managed care firms and their experience in selective contracting,

**Table 2.** 90% volume (by Zwanziger service category)

San Luis Obispo			
Category	Sierra Vista/French Admissions	Total admissions (%)	Cumulative (%)
Surg, OB/gynecology	1363	17.9	17.9
Surg, orthopedics	1105	14.5	32.4
Surg, general	638	8.4	40.8
GM, miscellaneous	535	7.0	47.8
GM, gastroenterology	436	5.7	53.5
GM, cardiology	416	5.5	59.0
Surg, vascular	342	4.5	63.5
GM, pulmonology	331	4.3	67.8
General medicine (GM)	313	4.1	71.9
Surg, cardiology <sup>a</sup>	236	3.1	75.0
Surg, urology	219	2.9	77.9
Surg, orthotics	208	2.7	80.6
Spec, urology	201	2.6	83.2
Sp Svc, Sp neurology	185	2.4	85.6
Sp Svc, Inv cardiology	159	2.1	87.7
GM, neurology	156	2.0	89.7
Surg, neurology w cran <sup>b</sup>	122	1.6	91.3

Sacramento			
Category	Sacramento Admissions	Total admissions (%)	Cumulative (%)
Surg, OB/gynecology	24938	23.9	23.9
Surg, general	8506	8.2	32.1
Surg, orthopedics	8266	7.9	40.0
GM, miscellaneous	7062	6.8	46.8
GM, cardiology	6856	6.6	53.3
GM, gastroenterology	6018	5.8	59.1
GM, pulmonology	5499	5.3	64.4
GM, general medicine	4531	4.3	68.7
Surg, urology	3295	3.2	71.9
Surg, vascular	2836	2.7	74.6
Spec, oncology	2836	2.7	77.3
Surg, cardiology	2679	2.6	79.9
Sp Svc, Inv cardiology	2248	2.2	82.0
GM, endocrinology	2098	2.0	84.1
Surg, orthotics	1896	1.8	85.9
Sp Svc, Sp neurology	1711	1.6	87.5
GM, neurology	1561	1.5	89.0
Sp Svc, chemotherapy	1560	1.5	90.5

<sup>a</sup>No admissions at Sierra Vista Hospital.<sup>b</sup>No admissions at French Hospital.

hospital documents discussing competitors, and physician admitting privileges are all carefully considered. One frequently applied test based on an analysis of patient flow data was developed by Elzinga and Hogarty (1973, 1978). Under an Elzinga-Hogarty (E-H) test, geographic markets are identified when two critical statistics are satisfied. The LIFO, or 'little-in from outside' statistic measures the percentage of patients residing in a candidate geographic market who received

services at hospitals in the same market. Since this statistic measures the outflow of patients we refer to this measure as the 'outflow' ratio. The LOFI, or 'little out from inside' statistic measures the percentage of patients treated at hospitals in a candidate market who were residents of the same market. Since this statistic measures the inflow of patients we refer to this measure as the 'inflow' ratio. Under the E-H benchmarks, if both statistics are at least 75%, a geographic area qualifies as a 'weak' market. If the two statistics are at least 90%, the area qualifies as a 'strong' market.<sup>27</sup> It is important to note that while 75% and 90% are commonly cited thresholds, there is no well recognized 'bright line' standard to apply.

The first part of Table 3 presents the E-H statistics for the overall cluster and the 17 ZSCs for candidate geographic markets of (1) San Luis Obispo City, (2) San Luis Obispo County and (3) San Luis Obispo County plus an area including Santa Maria.<sup>28,29</sup> San Luis Obispo City fails even the weak E-H test for the overall cluster, primarily because residents from outside the city constitute a large percentage of admissions to city hospitals.<sup>30</sup> The 17 ZSCs for the city do not fare much better for the same reason. In this case, use of the overall cluster does not obscure any very small geographic market that might be revealed by disaggregation.

The county satisfies the weak E-H criteria for the overall cluster. Adding the city of Santa Maria to the county market does not make a significant difference in the flow statistics. Turning to the 17 ZSCs, we see that the cluster masks some variability in patient flows in the individual service categories. For one ZSC, GM (Pulmonology), representing about 4% of the merging hospitals' admissions, the E-H criteria are strongly satisfied for the county market. For 12 services, representing slightly more than 64% of the hospitals' admissions, the criteria are weakly satisfied.

On the other hand, for four categories, accounting for almost 22% of the hospitals' admissions, the E-H statistics for the county do not satisfy the weak criteria. Orthopedic surgical services, representing almost 15% of the merging hospitals admissions, just fails because the inflow statistics is too low; this criterion is met for the county plus Santa Maria area. The three surgical categories for cardiology, orthotics and neurology with craniotomy also fail the E-H weak test. However, unlike orthopedics where the patient flow into the county was too great, the outflow statistics for these three categories were too low to meet the E-H weak criterion. For the county plus Santa Maria area, the weak criteria are satisfied for surgical orthotics and surgical neurology. However, the outflow statistic for surgical cardiology is much lower in this larger area compared to the county alone, suggesting competitive influence from more distant hospitals to the north and south. It is worth noting that the services for which the county does not satisfy the weak E-H criteria are tertiary services where it is generally expected that patients are willing to travel further for services.

In sum, the county is a weak E-H market for the cluster product market and for less aggregated service categories that account for about 64% of Sierra Vista and French's admissions. For one service (GM, Pulmonology), representing slightly over 4% of the merging hospitals' admissions, the E-H criteria are strongly satisfied for the county market. For four services, representing almost 22% of the merging hospitals' admissions, the E-H statistics do not meet the weak criteria at the county level.<sup>31</sup>

In addition to possibly understating or overstating the size of the relevant geographic market, the overall cluster may also mask differences in concentration

**Table 3.** Elzinga-Hogarty statistics (by Zwanziger service category)

San Luis Obispo						
Category	City		County		County and Santa Maria	
	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow
Cluster	88	45	84	87	88	88
Surg, OB/gynecology	94	36	86	94	97	90
Surg, orthopedics	85	33	83	74	81	84
Surg, general	87	54	86	87	87	88
GM, miscellaneous	86	53	84	87	85	88
GM, gastroenterology	91	56	89	87	92	87
GM, cardiology	92	64	89	88	93	87
Surg, vascular	81	33	81	83	75	88
GM, pulmonology	94	60	92	90	94	90
General medicine (GM)	89	48	90	86	94	87
Surg, cardiology <sup>a</sup>	81	28	71	82	59	88
Surg, urology	82	51	80	87	81	87
Surg, orthotics	82	64	73	93	77	90
Spec, oncology	84	55	83	90	78	90
Sp Svc, Sp neurology	91	59	88	89	82	87
Sp Svc, Inv cardiology	85	42	82	82	83	86
GM, neurology	97	47	86	83	86	86
Surg, neurology w cran <sup>b</sup>	67	21	73	85	75	87

Sacramento						
Category	City		County		MSA	
	Outflow	Inflow	Outflow	Inflow	Outflow	Inflow
Cluster	83	56	81	79	86	85
Surg, OB/gynecology	88	62	86	86	90	91
Surg, general	84	53	80	77	85	84
Surg, orthopedics	80	46	80	68	84	78
GM, miscellaneous	73	60	72	82	77	87
GM, cardiology	84	60	84	84	88	87
GM, gastroenterology	85	61	81	84	86	87
GM, pulmonology	81	64	83	88	87	90
GM, general medicine	87	62	85	84	89	88
Surg, urology	87	51	85	75	89	82
Surg, vascular	84	37	73	56	78	68
Spec, oncology	77	54	76	76	82	82
Surg, cardiology	86	30	80	48	84	61
Sp Svc, Inv cardiology	83	42	83	66	87	77
GM, endocrinology	84	62	80	84	85	88
Surg, orthotics	87	45	86	69	89	79
Sp Svc, Sp neurology	68	65	68	86	72	88
GM, neurology	86	59	81	78	85	83
Sp Svc, chemotherapy	81	31	73	52	82	65

<sup>a</sup>No admissions at Sierra Vista Hospital.<sup>b</sup>No admissions at French Hospital.

in individual services. Even if a hospital has a low share of a region's total patients, it may have a high share in certain important services; conversely, a high share of all area patients does not necessarily imply that the hospital has a strong position in all services.

**Table 4.** Herfindahl statistics (by Zwanziger service category)

San Luis Obispo						
Category	City		County		County and Santa Maria	
	Change	Post-merger	Change	Post-merger	Change	Post-merger
Cluster	2763	6663	1817	5685	1509	4061
Surg, OB/gynecology	461	5012	440	5178	996	3684
Surg, orthopedics	1961	9453	1396	8586	1879	6578
Surg, general	2761	6969	1578	5675	1646	4315
GM, miscellaneous	3148	7292	1830	5816	1410	4034
GM, gastroenterology	2933	6800	1444	5013	1306	3713
GM, cardiology	3609	7485	1372	4866	1116	3524
Surg, vascular	2054	9942	2930	9005	2099	6907
GM, pulmonology	3007	6704	1466	5300	1257	3781
General medicine (GM)	3904	8030	2040	5516	1634	4112
Surg, cardiology <sup>a</sup>	0	10000	0	10000	0	7948
Surg, urology	2629	7012	1557	6024	1555	4382
Surg, orthotics	4291	9905	3171	8593	2792	6188
Spec, oncology	3695	8782	2064	6876	1669	4648
Sp Svc, Sp neurology	3754	8692	1841	6122	1517	4260
Sp Svc, Inv cardiology	1042	9755	4548	9677	2802	6649
GM, neurology	3600	7551	2581	6462	1813	4549
Surg, neurology w cran <sup>b</sup>	0	10000	0	9839	0	6508

Sacramento			
Category	City HHI	County HHI	MSA HHI
Cluster	2834	2311	1728
Surg, OB/gynecology	2778	2683	2045
Surg, general	2554	2400	1795
Surg, orthopedics	2427	2283	1794
GM, miscellaneous	2449	2283	1699
GM, cardiology	2663	2459	1652
GM, gastroenterology	2449	2269	1592
GM, pulmonology	2262	2228	1549
GM, general medicine	2436	2236	1618
Surg, urology	2766	2584	1875
Surg, vascular	3598	3668	2964
Spec, oncology	2544	2367	1755
Surg, cardiology	4552	4552	4277
Sp Svc, Inv Cardiology	2780	2782	2237
GM, endocrinology	2367	2237	1623
Surg, orthotics	2840	2715	2011
Sp Svc, Sp neurology	2316	2322	1624
GM, neurology	2638	2388	1822
Sp Svc, chemotherapy	3348	3136	2516

<sup>a</sup>No admissions at Sierra Vista Hospital.

<sup>b</sup>No admissions at French Hospital.

The first part of Table 4 presents post-merger HHIs and HHI changes for the city, county and county plus Santa Maria areas.<sup>32</sup> Focusing on the county area, the merger under the full cluster would yield a post-merger HHI equal to 5685, an increase of 1817 points over pre-merger levels. The *Merger Guidelines* consider a

market to be highly concentrated if the post-merger HHI exceeds 1800. The *Merger Guidelines* presume that anticompetitive effects are likely in a highly concentrated market if a merger increases concentration by 100 points or more. According to these criteria, post-merger HHIs and HHI changes at the ZSC level generally paint a similarly ominous picture. Only in surgical cardiology and surgical neurology with craniotomy, which account for 4.7% of combined Sierra Vista and French admissions, would the cluster approach overstate competitive dangers according to *Guidelines'* presumptions and that is simply because for these two ZSCs there is no competitive overlap between Tenet and OrNda. Nevertheless, Table 4 shows considerable variability in post-merger HHI levels and changes across ZSCs, not only for the county but also for the city and county plus Santa Maria areas.

In sum, examining a Sierra Vista/French merger at a lower level of product market aggregation than that of the standard inpatient cluster uncovered interesting details regarding the E-H statistics and concentration. While antitrust liability in this matter is unlikely to have been dependent on whether the cluster or less aggregated approaches were employed, the less aggregated approach suggests that anticompetitive effects might not be uniform across the cluster. If each of the service categories constitute relevant product markets and if concentration and hospital prices are positively related as shown by some previous studies, then price increases across some services within the cluster would be quite uneven.<sup>33</sup> For example, the 440 point HHI increase in OB/gynecology in the county market would likely reflect a much lesser change in the competitive environment than the 4500 point increase in invasive cardiology, where the merger would have created a near monopoly.

(2) *Sacramento.* We now apply the cluster and ZSC approaches to the somewhat more urbanized market of Sacramento, California. Sacramento County contains five rivals which together own nine hospitals (see Figure 3).<sup>34</sup> We do not analyze this region in the context of a particular merger transaction, but only consider how patient flow and concentration vary throughout the cluster.

The second part of Table 2 identifies those ZSCs which account for over 90% of the combined patient admissions at hospitals in Sacramento County. As was the case with San Luis Obispo, a relatively limited number of ZSCs appear to account for the vast majority of the hospitals' admissions. Whereas in San Luis Obispo 17 ZSCs accounted for over 90% of the merging hospitals' admissions, in Sacramento 18 ZSCs accounted for over 90% of admissions at hospitals in the county. Further, virtually all of the same services were involved.<sup>35</sup>

The second part of Table 3 presents the outflow and inflow statistics for hypothetical geographic markets consisting of (1) the city of Sacramento, (2) the county of Sacramento and (3) an area consisting of hospitals and patients in various zipcodes in Sacramento County and parts of El Dorado and Placer County, which we refer to as the MSA market (see Figure 3).<sup>36</sup> As with San Luis Obispo, the hypothetical city market does not meet the Elzinga-Hogarty criteria for a weak geographic market because of considerable inflow of patients from outside the city boundaries. As with San Luis Obispo, the county satisfies the weak criteria. Adding patients and hospitals in zipcodes from neighboring areas outside the county further raises the inflow and outflow ratios and to a somewhat greater degree than in San Luis Obispo.



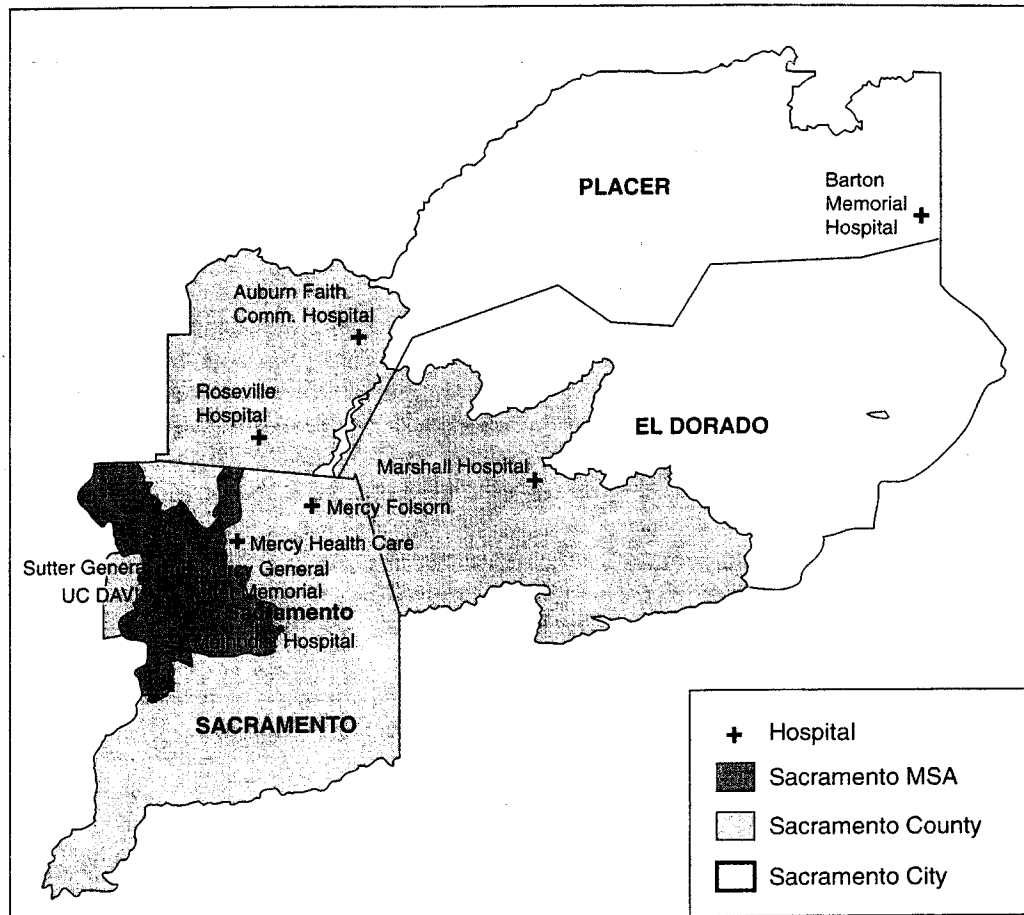


Figure 3. Hypothetical geographic markets (Sacramento).

In San Luis Obispo, we noted the overall E-H statistics masked some variability in the underlying patient flows by service category. In Sacramento this observation appears to hold even more strongly. Thus, while the inflow and outflow statistics for the county for the overall cluster weakly satisfy the E-H criteria, for seven out of the 18 ZSCs considered, representing over 25% of the hospitals' admissions, the criteria are not satisfied. For two categories (Sp Svc, Sp neurology and GM, miscellaneous), representing about 8.5% of the county hospitals' admissions, the outflow criterion was not satisfied. For, Sp Svc, Sp neurology, this criterion was not met at the MSA level either. For three categories, (Surg, orthopedics, Surg, cardiology and Surg, orthotics), representing about 12.3% of the county hospitals' admissions, the inflow criterion was not satisfied. For Surg, cardiology this criterion was not satisfied at the MSA level either. Finally, for two categories (Surg, vascular and Sp Svc, Chemotherapy) representing about 4.2% of the county hospitals' admissions, neither criterion was satisfied for the county market while the inflow criterion was not satisfied at the MSA level. As with San Luis Obispo, most of the services for which the E-H criteria are not satisfied appear to be tertiary in nature. However, at least one, GM miscellaneous, does not appear to easily fit into this category.

In the case of San Luis Obispo we noted that the overall HHI masked considerable variability in the underlying HHI statistics. As seen in the second part

of Table 4, this would appear to be less of an issue in Sacramento where the ZSC concentration statistics comport fairly well with the concentration statistics for the overall cluster. Hospitals in the Sacramento area by and large appear to be equally strong across the cluster. Possible exceptions are Surg, vascular, Sp Svc, chemotherapy, and especially Surg, cardiology, where the HHIs appear somewhat higher than is the case for the overall cluster. Nevertheless, none of these categories satisfy the E-H weak criteria at the county or MSA levels largely because of inflow from more distant areas.

In sum, several observations emerge. We see in both San Luis Obispo and Sacramento that a disaggregated approach may involve a relatively small number of inpatient service categories. Second, we observe in both markets that the overall cluster masked some variability in the underlying patient flows by service category, with this observation holding much more strongly in Sacramento. Third, our study of San Luis Obispo indicated that the overall cluster masked considerable detail in concentration at the service category level. This appears to be much less true in Sacramento.

In general, disaggregation is likely to matter most where hospitals are more 'unbalanced' or dissimilar in the range of services that they provide. Clearly, the analysis of specialty hospitals with general hospitals are most likely to require a product market consisting of some subset of the standard inpatient cluster. Less aggregated definitions should also be considered in mergers of general hospitals which face significant competition from nearby specialty hospitals.

## 6. Concluding Remarks

In this paper we examined what has become the standard product market definition in hospital merger cases—acute care, inpatient services—and considered whether that definition is either too narrow or too broad. Research findings and the bulk of the evidence adduced in antitrust investigations to date do not support expanding the product market to include outpatient services. We then considered whether the standard inpatient, acute care cluster might mask details important to the competitive analysis of a merger by examining two hospital markets, San Luis Obispo and Sacramento. The former market involved a small number of hospitals offering a limited range of services, while the latter involved a more urbanized market consisting of a number of comparatively large hospitals and hospital systems. The analysis indicated that the cluster approach masked considerable variability in the concentration statistics across the inpatient categories that make-up the overall cluster in San Luis Obispo, although they were highly concentrated throughout. Further, the cluster masked some variability in the underlying patient flow statistics by service category in both markets, although this observation appears to have held much more strongly in Sacramento. This indicates that disaggregation can provide a fuller understanding of the potential competitive effects of a merger in a variety of market configurations.

Moreover, our analysis suggests disaggregation may involve a relatively small number of inpatient service categories. To the extent this conclusion is generalizable to other hospital mergers, analytical economy arguments for the use of the standard inpatient cluster approach are misplaced. Indeed, even a very limited disaggregation of the standard inpatient cluster can significantly enrich the competitive analysis as the recent *Butterworth* matter shows. Nevertheless, how often antitrust outcomes would be affected by a given level of aggregation is unclear. For

example, our analysis of the *Tenet* matter suggests that had less aggregated data not been available, the antitrust outcome would have been the same. Additionally, in many situations the data needed to apply a disaggregated approach will not be available and antitrust enforcers will have to rely on more aggregated product market definitions to analyze the competitive effects of a merger. The key questions for further study are the extent to which supply side flexibility at the individual hospital level justifies aggregating services which are not demand-side substitutes, when disaggregated approaches can be applied given existing sources of data, and how much disaggregation of services will actually affect antitrust outcomes.

### Notes

1. Department of Justice and Federal Trade Commission *Horizontal Merger Guidelines*, April 1992 (hereafter *Merger Guidelines*). Concentration reflects competitors' market shares, and is expressed by the Herfindahl-Hirschman Index (HHI). The HHI is calculated by summing the squares of the individual shares of all market participants. The *Merger Guidelines* set out specific HHI levels and individual firm market shares for which varying degrees of anticompetitive risks are presumed.
2. 1992 *Merger Guidelines*, Section 1.0. While the courts have made increasing use of the *Merger Guidelines*' methodology, they are not bound to follow it.
3. A similar iterative process involving increasingly distant firm locations is implemented when defining the relevant geographic market.
4. The profitability of an anticompetitive price increase also depends on how fast producers of goods or services not now in a product (or geographic) market can enter or switch production into that market. The 1992 *Merger Guidelines* divide potential supply-side substitution into short and long-run components. The short-run component includes firms that are able to respond to an anticompetitive price increase within a year without expending significant sunk costs of entry or exit. Ideally, some estimate of the output response of these so-called 'uncommitted entrants' should be reflected in market concentration measures. The *Merger Guidelines* deal with slower or more costly supply-side responses under a separate 'entry' analysis.
5. Charge-based pricing is becoming less common under managed care. Payments to hospitals increasingly take the form of per diem, per patient stay, or 'capitated' payments. A capitated payment is a fixed payment per plan enrollee which is made to the provider regardless of whether hospital services are actually utilized. For any of these alternative payment methods, different levels of reimbursement may be negotiated between a plan and a hospital and may vary according to a number of factors, such as the patient's specific clinical treatment, medical diagnosis, or risk category. Charge-based reimbursement is still relevant for patients with indemnity insurance and for those managed care plans which negotiate discounts from a hospital's standard charge schedule.
6. Cluster markets have been identified at the level of specific hospital services (e.g. room and board, nursing services, diagnostic tests, drugs and supplies, etc.) and also across 'treatments', referring to the patients' medical condition (e.g. childbirths, appendectomies).
7. Zwanziger *et al.* (1994) define primary services as very basic hospital services, such as obstetrics, simple surgeries and general medicine such as the treatment of pneumonia; secondary services require more specialized equipment and personnel, while tertiary services are even more specialized and generally are provided by teaching hospitals on a regional basis.
8. DRGs refer to a system of classifying patients based on medical diagnoses and surgical procedures. Originating with Medicare in the implementation of prospective payment to hospitals during the 1980s, the DRG system has been widely adopted by payers and providers as a way of classifying patients.
9. For a more general discussion of how opportunity costs limit the amount of capacity that would be shifted into a market by uncommitted entrants, see Baker (1997).
10. By contrast, the cluster approach implicitly assumes that capacity to produce *any* DRG within the cluster could be easily shifted to produce any other DRG within the cluster for which there was an anticompetitive price increase.

It should also be noted that there are additional caveats about DRGs as indicators of demand side substitutes. First, DRGs do not fully capture many differences in patient care. The severity of illness can vary considerably among patients classified within the same DRG, and as a result competition in a DRG between two hospitals may be overstated if the hospitals systematically differ

in the acuity level of patients treated. Second, there may be errors in the DRG coding of patient conditions, some of which may be non-random. For example, individual hospitals may have a tendency to characterize patient conditions differently.

11. First, the ZSC approach assumes that a hospital's ability to shift its personnel, equipment and other inputs across ZSCs is congruent with that of physicians' abilities and incentives to shift their human capital across diagnoses. It is not clear why this would always be true. Additionally, focusing on the least specialized physician in defining service groups may not correctly define a competitively related set of DRGs. While less specialized physicians may be unable to treat patients outside some narrow subset of DRGs, more highly trained physicians might begin providing lower level service should prices for those services increase, subject to capacity and opportunity cost considerations.
12. The emergence of hospital networks may also have significance for hospital product market definition. These networks often consist of primary care feeder hospitals and a tertiary anchor or hub hospital. Many hospitals are now part of even broader provider networks that encompass physician groups, outpatient clinics, home health services, subacute or rehabilitative care and their own PPO or HMO health plans. Some payers may have a strong preference for contracting with such networks rather than stand-alone hospitals. Conceivably there may be situations in which the relevant antitrust product market is even broader than the acute care inpatient cluster.
 

Similarly, although its arguments were ultimately rejected by the district court, the Justice Department recently attempted to define a relevant product market consisting of "the bundle of acute inpatient services provided by anchor hospitals to managed care plans". (See *US v. Long Island Jewish Medical Center and North Shore Health System, Inc.* 1997). Thus, the Justice Department argued that managed care plans must include one of two highly regarded Long Island hospitals in their networks or else the plans would be at a substantial disadvantage.
13. Acute care, inpatient services markets have also been alleged in the numerous complaints which accompanied consents that settled other hospital merger cases to come before the agencies.
14. For example, in *US v. Mercy Health Services* (1995), both the respondents and the Justice Department agreed that the relevant product market was limited to acute care inpatient services. However, in *FTC v. Butterworth Health Corporation* (1996), the defendants argued that outpatient service providers compete with hospitals for at least some of the services that are provided on an inpatient basis or would if inpatient price rose. The court explicitly rejected the defendant's proposal to broaden the product market.
15. See Complaint and Order in *Columbia/HCA Healthcare Corporation*, FTC Docket No. C-3544 (1994).
16. The mergers of psychiatric or rehabilitation hospitals may be challenged by the antitrust agencies as reducing competition within product markets for those specialized services. See Complaint and Order in *Columbia/HCA Healthcare Corporation*, FTC Docket No. C-3627 (1995), alleging an inpatient psychiatric services product market and Complaint and Order in *HEALTHSOUTH/ReLife*, FTC Docket No. C-3570 (1995), alleging an inpatient rehabilitation services product market.
17. *Hospital Corporation of America* at 390.
18. The risk of incorrectly blocking a merger is likely to be reduced if antitrust enforcers possessed better information on the responsiveness to price increases for those buyer groups whose demands are relatively elastic. If the buyer groups that are most likely to search out product and geographic alternatives appear unable to avoid a merger-related, anticompetitive price increase, then it is likely that other buyer groups with fewer alternatives would also be made worse off, though perhaps by a smaller degree since sellers may have been price discriminating against them to a greater degree before the merger. This scenario may generally apply to hospital merger cases. Antitrust enforcers often can develop better evidence on sensitivity to price changes based on the experience of managed care entities or employers practising selective contracting as compared to buyers or insurers who have not have extensively used such cost-control practices.
19. However, the data to analyze patient admissions and revenue at more disaggregated levels will not always be readily available.
20. *FTC v. Butterworth Health Corporation* (1996) at 10. The FTC's economic expert in that case testified that this primary care market corresponded to ZSCs with a "general medicine classification, a general surgery classification, and an obstetrics/gynecology classification, with pediatrics scattered throughout those". (Leffler transcript at 217.)
21. Evidence presented by the FTC to support these geographic markets included the views of third-party payers and patient flow data. In *US v. Long Island Jewish and North Shore Health System* (1997) the district judge also recognized that patient flows differ for primary/secondary and

- tertiary care and that this justified separate geographic and product markets for each category of service.
22. In 1992 the average number of beds per hospital was 174 with approximately 70% of all community hospitals having fewer than 200 beds (American Hospital Association, 1993.)
  23. See consent and complaint in Tenet Healthcare Corporation, FTC Docket No. C-3743 (1997) (hereafter referred to as Tenet complaint and consent agreement).
  24. Both matters involved the same two hospitals in the city of San Luis Obispo. However, there were some differences in overlap with respect to hospitals located outside the city given ownership changes over the years. In our analysis we consider only the ownerships in place at the time of the more recent matter.
  25. At the time of the proposed merger, Tenet owned the Sierra Vista hospital in San Luis Obispo city and Twin Cities Community Hospital, an 84-bed hospital located within the county, about 22 miles north of San Luis Obispo city. OrNda owned French Hospital in San Luis Obispo city and the 70-bed Valley Community Hospital in Santa Maria. In addition to the four hospitals owned by Tenet and OrNda, there were three other nearby hospitals operated by independent players: San Luis Obispo General Hospital, a 64-bed hospital operated by the San Luis Obispo County government; Arroyo Grande, a 79-bed Community Hospital, located thirteen miles south of the city of San Luis Obispo; and Marian Medical Center, a Catholic hospital with 130 acute care beds located in Santa Maria.
  26. Zwanziger *et al.* (1994) constructed 48 such categories. The merging hospitals provided a total of 40 of these categories.
  27. Elzinga and Hogarty (1978) also consider a market strong if the inflow and outflow statistics average 90% or higher.
  28. We directly calculate inflow and outflow statistics for the three areas because they were raised as geographic markets in either *AMI* or *Tenet*. A complete E-H analysis would start with the location of the merging hospitals and then add geographic units to the candidate market until the weak or strong criteria are satisfied.
  29. The 'city' market consists of zipcodes in San Luis Obispo City as well as the nearby towns of Los Osos, Morro Bay and Avila Beach (see Figure 2). This approximates the city market found in *AMI*.
  30. In the original *AMI* decision, the judge held that the city of San Luis Obispo constituted a relevant market, despite the high inflow of patients, because residents from outside the city were using city physicians and were unlikely to switch physicians in response to anticompetitive behavior by city of San Luis Obispo hospitals.
  31. It should be noted, however, that while these services failed to meet the weak criteria, they missed by a relatively small amount (4% or less), suggesting that even for these services the county came close to defining a weak market under the E-H criteria. Such 'near misses', with the aid of other evidence, might present a useful starting point for evaluating a relevant geographic market.
  32. The HHI is computed by summing the squares of each participants' market share. For example, a market consisting of four firms with market shares of 30%, 30%, 20% and 20% has an HHI of 2600 ( $30^2 + 30^2 + 20^2 + 20^2$ ).
  33. Researchers analyzing California's experience with managed care contracting have found a positive relationship between hospital prices and concentration. For example, Dranove *et al.* (1993) found that an increase in the HHI from 2500 to 5000 would result in a price increase of approximately 3% for a basket of hospital services. Melnick *et al.* (1992) found that where a merger leads to a reduction in the number of competitors from three to two (and assuming that the competitors have equal market shares), a change in the HHI from 3000 to 5000 would result in an increase of 9% in the per diem price for medical/surgical services. Lynk (1995) has presented evidence that this relationship does not hold for non-profit institutions, but other more recent studies have called into question this result (e.g. see Keeler, Melnick and Zwanziger (1997) and Simpson and Shin (1998)).
  34. There are three hospital systems in Sacramento County. The Catholic Healthcare West hospital system consists of three hospitals: Mercy General, with 324 licensed acute care beds, Mercy Healthcare Sacramento, with 349 licensed beds, and Mercy Folsom, with 89 licensed acute care beds. Sutter owns two hospitals, Sutter General, with 221 licensed beds and Sutter Memorial, with 341 licensed beds. Kaiser also operates two hospitals in the area, one with 304 beds and one with 223 beds. In addition to the three systems, there are two single-hospital providers, Methodist with 349 beds and the University of California-Davis Medical Center with 475 beds. All of these hospitals are located within the city of Sacramento except Mercy Healthcare, which is located just

- outside of northeastern Sacramento City, and Mercy Folsom, located in an eastern suburb of Sacramento, about 18 miles from downtown.
35. Exceptions were that Sacramento included endocrinology and chemotherapy among its top volume services while San Luis Obispo did not; and Sacramento did not include Craniotomy among its top volume services, while San Luis Obispo did.
  36. There are three single hospital providers in the MSA market that are not within the county market. These are the 201 bed Roseville Hospital and 108 bed Auburn Community Faith Hospital in Placer County, and the 104 bed Marshall Hospital in El Dorado County.

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