COMPETITION AMONG HOSPITALS AND ITS MEASUREMENT: THEORY AND A CASE STUDY

Eyyup Ecevit*, Fatih Ciftci, Yusuf Ag

Bozok University,
Faculty of Economics and Administrative Sciences,
Department of Economics,
66200 Yozgat, Turkey
E-mail: eyyup.ecevit@bozok.edu.tr, eyyupecevit1@hotmail.com
* Corresponding Author

Biographical notes:

Eyyup Ecevit is Assistant Professor of Economics in Bozok University, Turkey. He had his PhD in Economics degree in 2007. He is currently Assistant Manager in Institute of Social Sciences. He attended some international and national conferences. He has written several articles and papers relating to economics and healthcare. He was also involved in projects relating to healthcare and encouragements for student success. His research areas are mainly Macroeconomics, Microeconomics, Healthcare Economics and Economic Theories.

Fatih Ciftci is Research Assistant of Economics in Bozok University, Turkey. He completed his bachelor degree of economics in 2005 and master degree of economics in 2009. He then completed his master thesis about relationship between capital flows and economic growth in Turkey. He is currently a first-year PhD student in economic development and international economics. He attended some national and international conferences on economics. His research interests are economic development, international economics and capital flows, and time-series econometrics.

Yusuf Ag is Research Assistant of Accounting in Bozok University, Turkey. He is studying Master of Accounting in Gaziantep University, Turkey. He received his bachelor degree in 2006. He is currently studying his master thesis titled “IFRS Impact on Firm Financial Performance: An Empirical Study”. He attended several international accounting conferences and submitted some papers. His research areas are Managerial Accounting, Financial Accounting and International Accounting.
Abstract

In recent years, the studies related to the healthcare market, place emphasis on the importance of healthcare competition in terms of high quality services and decreases in the amount of healthcare expenses. To this end, many economists and policy makers recommend different strategies related to competition among hospitals and health systems in the healthcare market. In this paper, to measure the competition level of healthcare market, we use such factors as; determination of competitors and services delivered by hospitals, determination of market scope and the measurement method of basic competition, demonstrating the role of insurance companies. In this respect, $\text{HHI}$ index exhibiting the concentration in local level is used in order to measure competition level among hospitals. Consequently, it is concluded that an oligopoly structure exists in hospital market.

**JEL Classification:** C65, I11, R11

**Keywords:** Healthcare Market, Competition, Hospitals, Measurement of Competition.

1. Introduction

Nowadays, market oriented strategies have underlined the importance of local hospital markets in efforts to slow hospital price inflation. Researchers need expedient definitions of hospital market areas in order to evaluate the influence of competition on hospital behavior. Hospital administrators need those definitions to identify their key impact of new development such as general health insurance. The hospital market area is empirically difficult to calculate even for a single locality.

Hospital market areas can be defined from two perspectives: the individual hospital and the overall market. From the hospital perspective, the relevant market includes other hospitals that compete for the same physicians or patients. From the overall hospital perspective, the relevant market includes the group of hospitals that compete together even if every hospital in the market doesn’t compete with every other hospital. Definitions of hospital market areas based on each perspective are applicable to research, planning, and policy analyses (Garnick et al., 1987).

Hospital market areas are usually considered from a geographic perspective as some or all of the hospitals within a contiguous area. The term “area” may be misleading since some hospitals may be located far from one another may nevertheless be important competitors. Another significant dimension of competition among hospitals is market structure, a characterization of the intensity of competition among hospitals within a market area. It is necessary to distinguish between these two different aspects of market measurement. One is the geographic area that comprises the market; the other is the intensity of competition among actors within the market.
Competition Among Hospitals and its Measurement: Theory and a Case Study

The studies in extensive empirical literature examine the effects of hospital competition on cost, access, and quality of hospital services. While these studies typically find statistically significant effects, there is considerable controversy about the appropriate way to measure hospital competition (Dranove and White, 1994) and whether the findings are accurate if the certain methods are employed. Differences in the measurement of hospital competition arise from two sources. First, researchers disagree on how hospital markets should be defined (Gaynor and Vogt, 2000). Second, the literature lacks consensus on how to measure the intensity of hospital competition once a hospital market has been defined. Assessing the performance of hospital competition measures and evaluating the differences between these measures are difficult because of the lack of comparability across studies. Each study is unique, using different databases, employing different methods and approaches, and specifying different explanatory variables in empirical analyses. Because there is an existing need for such measures in empirical work, this controversy addressed (Wong et al., 2005).

Competition promises to maximize social welfare by bringing the efficiency in provision of health care along with the socially optimal combination of price and quality in theory. The success of competitive strategies, however, depends on the extent of competition among insurers, hospitals, physicians, and other participants in the health care system and the dimensions in which the competition takes place (Gaynor and Vogt 2000; Luft et al., 1986). In some cases, conditions conducive to competition over price and quality occur naturally. In other cases, considerable resources have been devoted to change market institutions and make policies that attempt to bring about or enhance conditions for competition among participants in health care system (Baker, 2001).

The vast majority of studies rely on data to measure competition. Empirical research on competition almost, by definition, requires data on competition, and even theoretical analyses often make use of data to formulate hypotheses or provide grounding for theoretical constructs. However, a number of issues can make measuring competition in health care markets conceptually challenging. Consider the case of competition between hospitals, where the wide range of services produced by hospitals, complicates measurement. Some studies of hospital competition rely on measures that take all hospitals in a given area to be competitors. These measures identify most metropolitan markets as quite competitive. For some specific services, however, there may be many areas with only a few hospitals that provide the service, and thus much less competition. In this case, choices about the product markets to study and the hospitals to consider as competitors, could easily have an impact
on the conclusions of a research effort; but determining exactly which products are relevant for a given study and which hospitals are, in fact, competitors are generally difficult (Gaynor and Vogt, 2000).

Competition measurement in health care also has to keep pace with ever-changing market dynamics. Recent years have seen increases in the number of hospitals affiliated with health systems or hospital networks. Hospitals that have joined health systems or hospital networks may continue to operate as technically separate entities in the same market, but they may or may not act as true competitors. The most accurate measures of competition will be necessary to account for these relationships, and correctly conceptualizing the circumstances in which they matter can be challenging. Compounding conceptual complexities, the data needed to measure competition is frequently lacking. For hospitals, the data needed to support the development of competition measures have been available for many years, but the data needed to capture competition between physicians and health plans is far from complete (Baker, 2001).

There are many different ways in which competition measures can be used in research, and the intended applications often drive aspects of the design and implementation of measures. We focus here on measurement issues for studies designed to test whether variations in market characteristics, such as the number and size of firms are associated with outcomes, such as prices or quality of care. These kinds of studies question whether hospitals with many competitors offer higher quality services or whether physicians with many competitors offer lower prices. Such studies create a large branch of the literature on competition and shed light on the implications of marketplace changes and potential policy efforts that could influence competition (Garnick et al., 1987; Baker, 2001; Bernstein and Gauthier, 1998).

Theories of the hospital market generally view the hospital as competing for patients, physicians or each of them. Typically one expects hospitals operating like other providers of complex services, differ from others on the basis of mass services, quality and amenities they offer and the price they charge. It has been argued that the hospital market is different. The presence of widespread health insurance allows the individual consumers and their physician-agents to be much less concentrated about the price of care. Patients and their physician agents have the incentive to use every service and pocket cost. Thus, in competing for physician and their patients, hospitals put much more emphasis on the services and amenities they offered than on the price they charged (Morrisey, 2001).
To date, the hospital competition literature has largely consisted of structure-conduct-performance (SCP) studies. These studies concluded that, at least during the 1990s, hospital prices were lower in less concentrated markets. There are several reviews of this literature available (Gaynor and Vogt, 2000; Dranove and White, 1994). There is quite a difference between a few number of studies that examine this relationship separately for not-for-profit and for-profits. Three of these studies find that both not-for-profit and for-profit hospitals set higher prices in more-concentrated markets (Simpson and Shin, 1998). The other two find that not-for-profit hospitals set lower prices in more concentrated markets, while for-profits set higher prices (Lynk, 1995). Although the results from this literature are interesting, SCP methods suffer from well-known deficiencies for testing hypotheses about competitive conduct (Gaynor and Vogt, 2003).

In this paper, we focus on measuring the market concentration by using Herfindahl indexes, seven-hospital firm concentration ratios, e.g., bed occupancy rate, number of stayed patients, existing number of beds, number of out-patients and number of surgical operations in the area among seven largest hospitals. These hospitals are located in the center of Kayseri in Turkey. This study reviews the literature on hospital competition measures, recreates versions of these measures, evaluates these measures, and assesses whether different measures of hospital competition matter in empirical investigations of hospital behavior. We use data from the Statistics Director Department in Kayseri at 2005-2008 period and hospital competition measures are created.

These measures are based on the four most common ways of defining hospital market areas (i.e., geopolitical boundaries, fixed radius, variable radius, and patient flow) and the two most frequently used methods of capturing hospital competition intensity within a market area (i.e., number of hospitals and the Herfindahl–Hirschman Index, $HHI$).

This study stands on phenomena of competition among hospitals. Section 2 assesses competition measurement among hospital market. The third section focuses on empirical study. The conclusion is contained in Section 4.

2. Competition measurement among hospital market

Competition measurement among hospital market requires consideration of a number of conceptual issues. This section considers five of the most important ones. Three of them are classic issues: identifying the products and competitors of interest, identifying market areas and choosing basic measures. The remaining two highlight the role of more recent marketplace changes: considering
the impacts of forces that modify traditional competitive dynamics and accounting for the effects of health insurance firms that engage individuals’ activities.

2.1. Identifying the products and competitors of interest

Measures of competition are quite clearly defined for a single "product". In theory, the amount of competition that a firm experiences in the market for a given product depends on the possibilities for substitution that its actual or potential customers have (Gaynor and Vogt, 2000). Firms offering a product with numerous substitutes face strong competition. Constructing strong measures of competition depends on identifying the relevant substitution possibilities as clearly as possible. This requires careful identification of the products of interest and the firms that produce these products or substitutes (Baker, 2001).

i. Identifying the products

Specificity in product definition will generally improve measures. The more closely the product or products selected for measurement match the actual product under consideration and potential substitutes, the stronger the measure will be. A study related to the effects of competition between hospitals on open heart surgery outcomes should use measures of competition designed around open heart surgery and include the hospitals that compete in the market for that product. Measures linking all hospitals in one area, even hospitals that do not and could not easily offer open heart surgery, are apt to be less accurate (Baker, 2001).

Identifying the right products to study is not always straightforward. Subtle variations in products may be important to customers. For example, in the view of a patient, a visit to a world-renowned specialist may be very different from a visit to another physician in the same specialty but without the same reputation, thus the two physicians may participate in the different product markets. After the identification of one or more products as a measurement, the next step is to identify the firms that compete in the product market. Economic theory suggests that many benefits of competition will be obtained even if there are only a few firms offering the same product in question, as long as the threat exists that a new firm may set up operations to use the gap left by the incumbents (Robinson and Luft, 1985).

As in the case of product definitions, clearly identifying the set of competing firms can be challenging. For example, to determine which providers might be potential entrants in a market is often difficult. Existing research has tended to use measures that are broader rather than narrower,
including a wide range of potential competitors. Broader measures are easier to be computed and will be effective in many cases, but they do not require the best measures for every study.

In some cases, measures need to cover multiple products. The studies related to the impact of competition on overall hospital revenues, for example, implicitly encompass a large number of hospital services. When the outcomes of interest are aggregated over multiple products, the most accurate measures of competition will represent the aggregation of the amount of competition faced in the market for each constituent product. For an academic hospital providing mainly tertiary services, for example, a measure of competition for a study related to effect of competition on overall hospital revenues might best reflect mainly the amount of competition the hospital faces for its tertiary services and place less emphasis on competition for other primary services offered by the hospital. On the contrary, for a public hospital, this can be well (Zwanziger and Melnick, 1988).

ii. Identifying the competitors of hospitals

Following the selection of market area definition, researchers must decide how to measure the intensity of competition within the market area. The number of hospitals in the market is a frequently used measurement tool. It has the advantages of being intuitive and easy to implement. It is also an appealing measure in studies where the number of hospitals in a market influences a hospital’s behavior more than the relative sizes of the hospitals in the market (Baker, 2001).

Economic theory posits that firms are in the same market if the pricing and production decisions of one firm affect the demand of goods and services of other firms. Some researchers have suggested that cross elasticities of demand with respect to price (or nonprice variables of interest) can be used to determine market areas (Luft et al., 1986). Under this approach, products or services that have a high degree of substitutability indicate that they are in the same market. However, determining hospital markets using this approach has not been discussed by researchers because of the unavailability of the necessary data (i.e., hospital prices). Consequently, researchers have turned to other strategies for defining hospital market areas (Zwanziger and Melnick, 1988).

A disadvantage of this measure is that it does not reflect differences in market share. For example, a hospital in a market where 5 hospitals locate and each hospital has a 20% market share, will operate differently than a hospital in a market where one hospital has 80% market share and the remaining 4 hospitals each have 5% market share (Wong et al., 2005).
Because hospital market definitions based on the theory are not easily applied in empirical studies on hospital behavior, researchers use more expedient definitions of hospital markets. In general, researchers use four broad approaches to define hospital markets: geopolitical boundaries, fixed radius, variable radius and patient flow.

2.2. Identifying the geographic market area

After identifying the set of firms that offer the product of interest, the next step is to identify those that compete with one another. In principle, there is a competition among firms if they are viewed by customers as substitutable firms, in other word, when a firm raised its prices or lowered its quality, the customers surely give their preference to another firm. In health care, this is most frequently associated with geographic proximity and thus tends to come down to identifying the geographic area over which to define measures.

Computational ease is the primary advantage of using definitions based on geopolitical boundaries. Geopolitical boundaries also have the advantages of capturing potential competitors and of being compatible with socioeconomic data that are frequently available in the county (Garnick et al., 1987). A disadvantage of using counties to define hospital market areas is that they are arbitrarily defined from the perspective of hospital competition (Wong et al., 2005).

i. Geopolitical boundaries

Of these four methodological approaches, definitions based on geopolitical boundaries, such as counties, Metropolitan Statistical Areas (MSAs) and Health Service Areas (HSAs) are the most frequently employed (Gaynor and Vogt, 2000). Computational ease is the primary advantage of using definitions based on geopolitical boundaries. Geopolitical boundaries also have the advantages of capturing potential competitors and of being compatible with socioeconomic data that are frequently made available at the county, MSA, or HSA levels (Garnick et al., 1987).

A disadvantage of using counties to define hospital market areas is that they are arbitrarily defined from the perspective of hospital competition. The use of MSAs, which are designed to enclose an area with a high degree of economic and social cohesion, might be more defensible theoretically. However, biased measures of the amount of competition hospitals facing can result from using either approach to define hospital markets. Overestimates of the amount of competition facing a hospital result when a hospital in a relatively large county or MSA competes with only a few neighboring hospitals in close proximity. However, hospitals within the county or MSA are counted
as the hospital’s competitors. Underestimates of the amount of competition a hospital facing occur when a hospital within geopolitical boundary competes with a hospital located just outside of the boundary (Wong et al., 2005).

ii. Fixed radius

Horwitz and Nichols (2007) proposed, as an alternative definition of hospital market, the fixed radius approach that avoids some of the drawbacks of definitions based on geopolitical boundaries. Under the fixed radius approach, every hospital is assigned a unique market area, where is enclosed by a circle centered on the hospital and defined by a fixed radius. The fixed radius approach has the advantage of including a hospital’s nearby competitors located on the other side of a geopolitical boundary. They emphasized the role of physicians in determining the hospital where patients are admitted. They assumed that physicians would be willing to travel no more than 15 miles between hospitals. Therefore, they recommended fixing the radius at 15 miles.

Luft et al. (1986) found that a 13.5 miles fixed radius is the median distance, and a 17.6 miles fixed radius is the mean distance, necessary to capture 90% of a hospital’s patients in urban areas of City, thereby lending support to the use of the 15 miles fixed radius definition. Nevertheless, the fact that the radius is fixed is a limitation of this approach. Hospitals have catchment areas that vary in size, and rural hospitals and hospitals that provide tertiary services typically draw patients from an area greater than that defined by the 15 miles fixed radius definition (Wong et al., 2005).

iii. Variable radius

The third approach, proposed by Phibbs and Robinson (1993) and updated by Gresenz et al., (2004), allows the size of a hospital's market area to vary. Because HSAs are based on flows of patients, they can be classified as a patient flow or a “mixed” method. However, we follow the practice of Gaynor and Vogt (2000) and Meltzer et al. (2002) and categorize them as a geopolitical boundaries method. Selective contracting, which began in California in 1982, has increased the role of insurers in determining the hospital where patients are treated (Wong et al., 2005).

Horwitz and Nichols (2007) also computed hospital market areas using a fixed radius of 5 miles. This finding suggests that the fixed radius approach is based generally on the flow of patients and, therefore, makes it more appealing. Like the fixed radius method, the variable radius method defines a hospital’s market as the area contained in a circle centered on the hospital. However, instead of using a fixed radius to draw the circle, the third method allows the radius to vary so that it
captures 75% (or 90%) of the hospital’s discharges. Thus, the variable radius method defines a unique market area of a unique size for every hospital (Wong et al., 2005).

iv. Patient flow

The fourth method, the patient flow approach, also creates a unique market area of a unique size for every hospital. Like the variable radius definition, the patient flow approach directly uses patient origin data. However, it does not constrain the hospital’s market area in a circular region. Instead, a hospital’s market is defined as the collection of geographic areas (typically zip codes) that send a nontrivial amount of patients to the hospital in the circle with miles radii and that collectively account for 40–95% of a hospital’s discharges.

Not all of these options are available to every study. Sometimes, data limitations leave the use of standard geographic areas as the only feasible option. Where there is a choice of definitions, neither more flexible but potentially endogenous variable market area definitions nor less flexible but almost certainly exogenous standard geographic area or fixed radius definitions are clearly superior. The most thorough path is to investigate the robustness of results to the use of both types of measures and evaluate discrepancies in the light of the magnitude of the potential for endogeneity bias in the specific case studied. The more likely there is to be serious endogeneity, the less favorable the market area measures are variable.

Some research suggests that the practical differences between different fixed and variable radius definitions are frequently small. In one study, Phibbs et al. (1995) reported finding high correlations between measures for hospitals computed using counties, 15-miles fixed radii, and two variable market area measures. Gruber (1994) used both fixed and variable radius measures in his study of hospital provision of uncompensated care and found consistent results. Phibbs and Robinson (1993) also compared fixed and variable radius measures and found broad consistency for many (although not all) hospitals. Research continues on these issues and may produce better methods for measurement in the future (Kessler and McClellan, 2000).

With a geographic market area defined for each firm, the set of competitors can be established by simply identifying all potential competitors whose market areas overlap with the market area of the related firm. The amount of competition can be assessed using information about the number of competitors, their characteristics, and the extent to which their market areas overlap.
The preceding discussion focused on the case whose goal was to measure the amount of
competition individual firms facing. In some studies, measurement cannot be conducted at the level
of the firm. For example, some data sets record outcome measures for areas, like average health
plan premiums by MSA. Or, researchers can observe the premiums paid by individuals in a
household survey without data on the specific health plan. In either case, the premiums may be
hypothesized to be the result of competition between firms serving the area. In these cases,
competition measures should identify the firms whose market areas include the area where the data
are observed. In principle, the market areas used to determine this can be based on standard
demographic definitions, fixed radius measures, or variable market area definitions, subject to the
same strengths and weaknesses described above.

2.3. Choosing a basic measure of competition

Most studies related to competition rely on one of two standard competition measures that capture
the classic determinants of competition: the number and relative sizes of firms. In economic theory,
producer markets for a homogeneous product sold to many rational buyers will be competitive if
there are many small sellers. The presence of more firms is thus typically associated with more
competition. The classic economic definition of competition also requires that all of the firms be
small in the sense that none of them is large enough to dictate the price in the market. More
generally, markets with more evenly balanced firms are apt to be more competitive than markets
where there are some firms that are larger and more powerful than their neighbors (Gaynor, 2006;
Kessler and McClellan, 2000).

The most widely used measure of competition in literature is Hirschman-Herfindahl index (HHI);
the index is defined in equation (1):

\[ HHI_k = \sum_{j=1}^{n} \frac{d_{jk}^2}{R_k} I \left( d_{jk} \leq R_k \right) \quad (1) \]

Where \( d_{jk} \) is the distance between hospital \( j \) and \( k \). \( R_k \) is the distance boundary that defines the
hospital \( k \)’s market, and \( I \) is an indicator equaling one, if hospital \( j \) were located within the distance
boundary. Once the relevant competitors in the market are defined, the HHI index for hospital \( k \)
simply equals to the sum of each competitor’s share in the market (Lien et al., 2009).

Although HHI is easy to calculate, applying this index involves two practical problems. First, one
needs to define the competing services in the market. Hospitals offer a wide variety of medical
services, including outpatient, inpatient and community services. Second, one needs to define the market boundary that includes relevant competitors ($R_k$).

The simplest type of measure counts the number of competing firms. This is an appealing, frequently easily implementable, and intuitive approach. Its drawback is that it does not capture the relative sizes of firms, which can play an important role in competition. Both the number and relative size of firms are better captured in the $HHI$, perhaps the most common measure of competition. The $HHI$ for a market is the sum of the squared market shares of all of the firms competing in the market. For example, in a market with three firms, one with 50 percent market share and two with 25 percent market share, the $HHI$ would be $[0.5^{sup.2}] + [0.25^{sup.2}] + [0.25^{sup.2}] = 0.375$. Reductions in the number of firms and concentration of market share into fewer firms increases the $HHI$, so that higher $HHI$ values are consistent with less competitive markets. Figures resulting from this calculation are typically multiplied by 10,000, with 10,000 indicating no competition (monopoly) and 0 corresponding with the hypothetical case of an infinite number of equally sized firms. $HHI$s are the standard measure used by the Department of Justice and Federal Trade Commission in evaluating the degree of concentration in markets for antitrust policy and are frequently used in empirical work in economics, health services research, and other disciplines (Baker, 2001).

While $HHI$s do capture the relative sizes of firms where simple counts of firms do not, they are also subject to some criticism. First, the relationship between $HHI$ and market structure is not a one-to-one correspondence. Markets with the same $HHI$ can have different underlying structures, which can complicate interpretation. Entry threats are also difficult to capture with $HHI$s. Finally, there are circumstances in which the dependence of $HHI$s on market shares can be problematic. In particular, in situations where market-shares respond to firm or product characteristics of interest, using $HHI$s based on them could lead to biased measures (Baker, 2001; Lien et al., 2009).

Whether counts of firms or $HHI$s are better depends on the specifics of the study. In some cases, there may be clear reasons to use one measure instead of the other. For example, some models of medical arms races suggest that hospitals need to adopt new technologies that their competitors already have in order to maintain their reputation. In this case, it seems most plausible that the number of competing hospitals with a given technology matters more than their relative sizes. In general, tending toward more exogenous counts of firms can be advantageous, but in cases where there is a large amount of variation in the sizes of competing firms, the advantages of using $HHI$s
are larger. Where possible, the most thorough approach would be to use both measures and compare the results (Kessler and McClellan, 2000).

2.4. Health insurance firms

Managed care has raised numerous issues with respect to competition. Traditional indemnity insurance was characterized by fee-for-service reimbursement, unmonitored utilization, and free choice of providers. Managed care plans often place limits on the providers their beneficiaries may use, take a more active role in determining the care they receive, and shop intensively for providers with whom they will contract and to whom they will subsequently direct their patients. They have typically shown themselves to be quite willing to take their business elsewhere if their interests are not met. In essence, then, they substantially increase the mobility of customers, which can substantially increase the amount of competition between physicians, hospitals, and other providers. Since managed care plans seem to focus on price in their selection of providers, managed care growth may most directly lead to increased price competition (Dranove and White, 1994).

Variations in the presence of managed care across markets and over time may change the dynamics of competition. In cases where competition research includes parts of the country or time periods with differing levels of managed care prevalence, including interactions between competition measures and managed care prevalence measures would likely improve measurement.

It is important to be conceptually clear about the relationship between managed care and competition. In particular, the term "competition" is frequently bandied about in discussions of managed care, but the presence of managed care is, by no means, synonymous with competition. Growth in the strength of managed care organizations affects markets in a number of ways, including shifting the underlying financial incentives facing providers, changing provider preferences about treatment, and changing the availability of new technologies. In principle, these may all bring about changes in prices, costs, treatment patterns, and the like, but they are all different from competition.

Managed care organizations are sometimes said to increase competition because of their aggressive market behavior. However, competition need not be associated with the fierceness with which firms pursue potential customers. A market containing one firm with 99 percent market share and one small but very aggressive firm with 1 percent share would not be very competitive in the sense that virtually all of the power would reside in the larger firm.
Managed care is also sometimes tagged as being competitive when what it has really done is change the definition of the product market. Managed care organizations may, for example, prefer to purchase a broad bundle of services rather than separately purchase physician, hospital, and other services. Thus, individual hospitals and individual physician groups may not be able to compete very effectively in a market dominated by managed care because they provide a less desired product. Larger organizations that integrate hospitals, doctors, and other providers may be better able to offer it. This can certainly change the fortunes of providers but need not technically reflect competition as traditionally defined.

3. Empirical study

Developed by O.C. Herfindahl and A.O. Hirschman, \( HHI \) index is an indicator to show the degree of competition between firms in a same market. This index is calculated as a sum of squared market shares of firms can be shown in equation (2);

\[
HHI = \sum_{i=1}^{n} s_i^2 \quad (i = 1,2,\ldots,n) \quad (2)
\]

Where \( n \); refers to the total number of firm in a market and \( s_i \); the market share of \( i \) th firm. In this equation, because only the hospitals in Kayseri are considered, it is assumed that \( I \) coefficient in the equation (1) is equal to 1. \( HHI \) index value can range from “0” to “1”. The more its value is close to “1”, the more intensity of market is high. If that value is closer to “0”, then the relevant market is more competitive.

As shown in Table 1 and Table 2, there are \( HHI \) index data of sample market where probable competitors locate and actively operate between the years 2005 and 2008 in Kayseri, Turkey. These indexes are calculated according to the indicators of 5 different markets. Table 1 shows the \( HHI \) index data used as a measurement of competition in markets where all public and private hospitals locate, Table 2 shows the \( HHI \) index data used as a measurement of competition only for private hospitals.
As shown in Table 1, the lowest competition among market indicators is in the indicator of number of out-patients. According to this indicator, there is an increase in competition between 2005 and 2008. On the one hand, in other market indicators, there is no significant change in competition between same years. On the other hand, the indicator of bed occupancy rates can be considered as the most intensive competition.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing number of beds</td>
<td>0.43581</td>
<td>0.4367</td>
<td>0.43457</td>
<td>0.43148</td>
</tr>
<tr>
<td>Number of out-patients</td>
<td>0.72644</td>
<td>0.64052</td>
<td>0.59609</td>
<td>0.50379</td>
</tr>
<tr>
<td>Number of stayed patients</td>
<td>0.34205</td>
<td>0.28673</td>
<td>0.30487</td>
<td>0.29325</td>
</tr>
<tr>
<td>Number of surgical operations</td>
<td>0.34623</td>
<td>0.2849</td>
<td>0.31762</td>
<td>0.30092</td>
</tr>
<tr>
<td>Bed occupancy rates</td>
<td>0.16342</td>
<td>0.17097</td>
<td>0.15964</td>
<td>0.17572</td>
</tr>
</tbody>
</table>
As it shown in Table 2 including $HHI$ index data of private hospitals, according to the indicators of existing number of beds, number of out-patients and number of stayed patients, there is a decrease in $HHI$ index data, that is, the competition in these indicators is more intensive among private hospitals.

As a result, the competitiveness of private hospitals is lower than public hospitals, in other word; public hospitals are more dominant in relevant market. Besides, it is concluded that private hospitals have more competitive market structure among themselves.

4. Conclusion

Competition measurement has been an important component of strategies to understand the impacts of marketplace changes and policy initiatives on health care. Ongoing changes in the health care system promise to make it more important to understand the forces influencing competition and the implications of competition for health care delivery and costs. However, these changes also seem likely to make measurement of all of the relevant dimensions of marketplace behavior more difficult. In a changing environment, continued attention to important conceptual issues in measurement can contribute to strong measures of competition. Careful attention to developing measures that capture the right products and firms is important, although it may be appealing to use easily available generalized measures.

Perhaps more importantly, is the requirement to develop data needed to support better measurement. Even when carefully constructed in its conceptual foundations, the data is often lacking in a number of key areas. It is also difficult to measure the degree of integration between health care firms. Serious studies to develop better sources of data in order to improve competition measurement can make a crucial contribution to competition literature.

In our empirical study, we measured the level of competition in hospital market by the data covering annual observations of public and private hospitals between 2005 and 2008 in Kayseri, Turkey. This measurement is calculated using $HHI$ index. As a result of $HHI$ index including five different market indicators, the index value of market where all public and private hospitals locate imply that the sample market has an oligopolistic structure rather than competitive. But it is concluded that according to the $HHI$ index data only for private hospitals, the competition in related market is relatively more intensive. Consequently, in the sample of hospital market, public hospitals increase market concentration and these hospitals are more dominant in the sample market.
Eyyup Ecevit, Fatih Ciftci, Yusuf Ag- *Competition Among Hospitals and its Measurement: Theory and a Case Study*

**References**


