MEASURING MARKET CONCENTRATION ACCORDING TO EUROPEAN COMPETITION POLICY

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ABSTRACT

For European Commission, the measurement of market concentration is important because it lies at the heart of decisions about whether to approve mergers and acquisitions that might pose a potentially harmful impact on consumers. The most commonly utilized measure of market concentration is the Herfindahl Hirschman Index (HHI), and the change in the HHI from pre-merger to post-merger ("delta").

In first part of the paper I focused on the definition of concentration as it appears in European legislation and on the relevant market by identifying those substitute products or services which provide an effective constraint on the competitive behavior of the products or services being offered in the market by the parties under investigation.

In the second part of the paper, I took an example using the HHI index to see how a merger affects the degree of market concentration. Further, I brought to light several issues regarding the measurement of market concentration and analysis of results as they are addressed by the european competition policy. As a result of this paper, I reached the conclusion that HHI index is more complete and elaborate than other market indicators and I find that a concentration operation (acquisition or merger) between two companies may have an important impact on the degree of market concentration and can lead to anti-competitive effects, requiring detailed analysis of the European Commission.

Keywords: *Herfindahl Hirschman Index; mergers; market concentration; market share*

1. INTRODUCTION

Economic theory indicates that concentration is an important determinant of market behavior and market results. Monopolistic practices are more likely where a small number of the leading firms account for the bulk of an industry's output than where even the largest firms are of relatively small importance. Therefore, in the explanation of business policy, the characteristics of an industry stated in the concentration index are likely to play an important part. This relation to the degree of monopoly has motivated most of the empirical studies involving the measurement of concentration.

Concerns and general suspicion about market concentration have a long history in the United States, dating back to the earliest days of the new republic. That economic and political liberties were seen as inextricably linked fostered the sentiment that the concentration of economic power invariably leads to the concentration of political power. As Dirlam and Kahn (1954, p. 17) observe: „*Clearly we are not devoted to a competitive system only for "economic" reasons. It is also associated with such social and political ideals as the diffusion of private power and maximum opportunities for individual selfexpression. If the economy will run itself, government interference in our daily life is held to a minimum*".

Market concentration is useful as an economic tool because it points the degree of competition in the market. In this regard, Tirole (1988, p. 247) notes that: "*Bain's (1956) original concern with market concentration was based on an intuitive relationship between high concentration and collusion.*"

There are game theoretic models of market interaction that anticipate a future growth in market concentration that will result in higher prices and lower consumer welfare even when collusion in the sense of cartelization (i.e. explicit collusion) is absent. Such examples are Cournot oligopoly and Bertrand oligopoly for differentiated products.

Empirical studies that are projected to test the relationship between market concentration and prices are jointly known as price-concentration studies).

Any study that claims to examin the relationship between price and the level of market concentration is also testing whether the market definition (according to which market concentration is being calculated) is relevant; that is, whether the boundaries of each market is not being determined either too narrowly or too broadly so as to make the defined "market" meaningless from the point of the competitive interactions of the firms that it includes (or is made of).

As a matter of public policy, the measurement of market concentration is important and lies at the heart of decisions about whether to approve mergers and acquisitions that might pose a potentially harmful impact on consumers in terms of both prices and the availability of goods and services. „*These issues have been addressed by antitrust laws in the U.S. dating to the Sherman Antitrust Act in 1890*" [Hays and Ward 2011]. Unlike, it was not until 1989 that EU Policy makers realized the „*usefulness and the necessity of a common merger regulatory framework*" [Lipczynski and Wilson, 2001], and responded with the European Council Merger Regulation (ECMR) on the control of concentrations, „*forced by the increased cross-border activities of European firms in the second half of the 1980s*" [Jacobson and Andréosso-O'Callaghan, 1996].

2. CONCENTRATION IN COMPETITION POLICY

A *concentration* between an incumbent and a potential entrant can raise significant competitive concerns. According european competition policy, „*a concentration shall be deemed to arise where a change of control on a lasting basis results from: (a) the merger of two or more previously independent undertakings or parts of undertakings, or (b) the acquisition, by one or more persons already controlling at least one undertaking, or by one or more undertakings, whether by purchase of securities or assets, by contract or by any other means, of direct or indirect control of the whole or parts of one or more other undertakings. The creation of a joint venture performing on a lasting basis all the functions of an autonomous economic entity shall constitute a concentration*" [Council Regulation (EC) No 139/2004, art. 3].

Control shall be constituted by rights, contracts or any other means which, either separately or in combination and having regard to the considerations of fact or law involved, confer the possibility of exercising decisive influence on an undertaking, in particular by: ownership or the right to use all or part of the assets of an undertaking; rights or contracts which confer decisive influence on the composition, voting or decisions of the organs of an undertaking. Control is acquired by persons or undertakings which: (a) are holders of the rights or entitled to rights under the contracts concerned; or (b) while not being holders of such rights or entitled to rights under such contracts, have the power to exercise the rights deriving therefrom.

Concentrations with a Community dimension must be notified to the Commission prior to their implementation. Where a concentration raises serious doubts as to its compatibility with the market, the Commission can carry out detailed on-the-spot investigations.

The competition authorities may measure market concentration using the number of pregnant competitors in the market. This measure is most useful when there is a gap in market share between significant competitors and smaller rivals or when it is difficult to measure revenues in the relevant market. The competition authorities also may consider the combined market share of the merging firms as an indicator of the extent to which others in the market may not be able readily to substitute competition between the merging firms that is lost through the merger.

Three proxies have received attention in the literature for determining whether a firm (or group of firms) has the ability and incentive to raise or maintain prices above competitive levels (or achieve other anticompetitive effects): (1) the Lerner Index; (2) market shares and (3) the Herfindahl-Hirschman Index ("HHI"), which turns market shares into a measure of market concentration.

Using the *Lerner Index* as measure of market power is difficult because there are both theoretical and practical problems. The main theoretical difficulty is that "the *Lerner Index does not offer a competitive benchmark except in perfectly competitive markets,*

where the Lerner Index should be zero" [Elzinga, 1989]. The most remarkable practical obstacle to broader application of the Lerner Index is determining the firm's marginal cost of production at any given point in time. Without a measurement or reasonable estimate of marginal cost, the ratio is incalculable. Furthermore, exogenous economic factors, such as shifts in consumer demand or the cost of inputs, could result in spectacular and misleading changes.

A *market share* is the fraction or percentage of a relevant market controlled by a specific market participant. Market shares can calculated based on: sales revenues; capacity and units. Therefore, "*market share calculations permit courts and agencies to determine how many sales the defendant will lose if it raises prices*" [Hay, 1992]. The greater the firm's market share, the less likely that other firms will be able to enlarge production to defeat the unilateral price increase.

But market share analysis has attracted its share of criticism. Some critics contend that because market share calculations require product and geographic market definitions, they can become complex and expensive undertakings.

Other critics accuse that market share analysis may not create accurate insights into market power. If product and geographic markets are defined too broadly, market shares will underestimate the firm's ability to raise or maintain prices above competitive levels in the relevant market. Because market shares are based upon historical data, some argue that they may be less useful in analyzing potential competitive effects in volatile or dynamic markets. Others argue that historical market share data may not reflect the ability of existent and potential competitors to modify production in the relevant market through expansion or entry.

The definitions of *relevant market* represents an intermediate step in the investigation. The European Commission made precisely this point in its Notice on the Definition of Relevant Market for the Purposes of Community Competition Law published in December 1997. In para. 2, the Notice states that: "*Market definition is a tool whose purpose is to identify in a systematic way the competitive constraints that the undertakings involved face. The objective of defining a market in both its product and geographic dimension is to identify those actual competitors of the undertakings involved that are capable of constraining their behavior and of preventing them from behaving independently of any effective competitive pressure.*"

The Commission Notice on the definition of the relevant market refers to three competitive constraints which can act on the undertakings: demand substitutability, supply substitutability and potential competition.

The concept of substitutability is the key of the relevant market definition. Products that should be included in the relevant market and the geographical area of the market are determined by the extent to which consumers can easily choose between substitutable products (demand substitutability), or by the extent to which undertakings can easily shift their production to obtain such substitutable products (supply

substitutability). Demand substitutability has the most important role in defining the relevant market, being an efficient and direct force of constraint. Supply substitutability influences the relevant market only when it has effects similar to those of demand substitutability, namely effectiveness and direct character. The potential competition, the third form of competitive constraint, is usually analysed in a stage following market definition, generally when the position of the undertakings within the relevant market has already been established.

The relevant market has two components: the product market and the geographic market. Defining the relevant market consists in combining the product market and the geographic market, after they have been defined previously. Most of the time, we start by defining the product market and then we continue with geographic market definition.

The relevant product market comprises all the products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use. The products do not have to be identical to be considered substitube and therefore to be included in the same market and also their prices do not have to be identical. „*The relevant geographic market comprises the area in which the undertakings concerned are involved in the supply and demand of products or services, in which the conditions of competition are sufficiently homogeneous and which can be distinguished from neighbouring areas because the conditions of competition are appreciably different in those area. The geographic market can be identified at local or regional level, at national or international level*". [Bozian L., 2009].

There is a test for the relevant market which is now used in both the US and EU, and increasingly elsewhere as well. This test is called variously the hypothetical monopolist test, the *SSNIP test* or the 5–10% test. The test is consistent with the principles that we have outlined above for relevant market definition. In particular, it asks a specific form of the question "Is this a market worth monopolizing?" The starting point for the test is the narrowest set of products that could plausibly be considered a separate market. The "Small but Significant and Nontransitory Increase in Price" (SSNIP) is usually taken to be either 5% or 10%.

The European Commission has adopted this test. The Market Definition Notice paragrf 17 provides that: „*The question to be answered is whether the parties' customers would switch to readily available substitutes or to suppliers located elsewhere in response to a hypothetical small (in the range 5% to 10%) but permanent relative price increase in the products and areas being considered. If substitution were enough to make the price increase unprofitable because of the resulting loss of sales, additional substitutes and areas are included in the relevant market. This would be done until the set of products and geographical areas is such that small, permanent increases in relative prices would be profitable*".

3. HERFINDAHL-HIRSCHMAN INDEX (HHI) METHODOLOGY

The index was originally proposed and used in the field of industrial economics by Herfindahl (1950) and Hirschman (1964) independently of each other.

For the first time, in 1982, the Department of Justice in US replaced the standard four firm concentration index (C4) with the Herfindahl-Hirschman index (HHI) as its. Since then, the HHI has been used in the analysis of horizontal mergers in which parties combine their productive capacities in a relevant market to operate as a single firm. Whereas C4 adds up the market shares of the top four firms to calculate industry concentration, "*HHI is more complete and elaborate in that it uses a weighted average of market shares of all firms*" [Anbarci and Katzman, 2005].

Concentration ratios have two significant deficiencies as proxies for the effectiveness of competition in an industry. First, they do not take account of the relative sizes of the leading companies. For example, a market which has four firms each with a 20% market share will have the same C4 ratio as a market in which the leading four firms have market shares of 55%, 20%, 3% and 2%. But it is probable that the competitiveness of the two markets will differ. For instance, in the latter case there is a clear potential "leader" for the other firms to follow, whereas in the former case their might be fierce competition to become the largest firm (particularly if there are significant economies of scale in production). The second problem stems from taking into account neither the total number of firms in the market nor the market shares of smaller companies.

Unlike the N-firm concentration ratio:

1. The HHI reflects the degree of market share inequality across the spectrum of firms that participate in a market. The influence of smaller firms is lessened. The influence of larger firms is emphasized.

2. Thus, higher values of the HHI reflect the combined influences of both unequal firm sizes and the concentration of activity among a few large firms.

It consists of the sum of squares of firm sizes, all measured as percentages of total industry size.

$$HHI = \Sigma(S)_i^2$$

where S is the proportion of market share for the ith firm. Scale goes from zero to 10.000, with 10.000 indicating that a single company controls 100% of the market share in a given industry.

Although it is best to include all firms in the calculation, lack of information about very small firms may not be important because such firms do not affect the HHI significantly. While the absolute level of the HHI can give an initial indication of the competitive pressure in the market post-merger, the change in the HHI (known as the 'delta') is a useful proxy for the change in concentration directly brought about by the merger.

One can show that the post-merger change in the HHI caused by the merger of any two market participants will always equal 2 times the product of the merging firms' market shares. For any two firms, A and B, with market shares a and b respectively, A and B's pre-merger contribution to the market HHI is $a^2 + b^2$. If firms A and B merge, their combined contribution to the post-merger HHI is $(a + b)^2$. Basic algebra shows that $(a + b)^2 = a^2 + 2ab + b^2$. The difference between the post-merger HHI and the pre-merger HHI is, therefore, $(a + b)^2 - (a^2 + b^2) = 2ab$.

We will take an example of measuring market concentration to see what implications has a merger between two companies upon the HHI. Suppose that the market shares of the 7 firms participating in a relevant market are 25, 20, 15, 15, 10, 10, and 5. The HHI for this market will be:

Table 1

Firm	Market share %	Squared market share
1	25	625
2	20	400
3	15	225
4	15	225
5	10	100
6	10	100
7	5	25
Total	100	HHI = 1.700

Own calculations using random date

HHI can be calculated using data from the table: HHI $= 25^2 + 20^2 + 15^2 + 15^2 + 10^2 + 10^2 + 5^2 = 1.700$

From the example, if the second and third largest firms in the market were to merge, what will happen with the HHI index? To archive the result, we have to calculate the new HHI index under existing market shares after merger:

Table 2

Firm	Market share %	Squared market share
1	25	625
2 and 3 merge	25 + 10 = 35	1225
4	15	225
5	10	100
6	10	100
7	5	25
Total	100	HHI = 2.300

Own calculations using random date

We seen in the table that after the merger of firms 1 and 2 square of market share is much higher than the sum of squares of individual shares before concentration. The merger increases HHI from 1.700 points to 2.300

points. The difference between the post-merger HHI and the pre-merger HHI (delta) is 2.300 - 1.700 = 600 points.

To interpret this result, first we must see which are the thresholds taken into account by European merger policy when a merger is subject to review.

4. EU GUIDELINES ON THE ASSESSEMENT OF MERGERS

Market shares and concentration levels provide useful first indications of the market structure and of the competitive importance of both the merging parties and their competitors.

Normally, the Commission uses current market shares in its competitive analysis. The European Commission has traditionally become concerned about the market power of firms when their market share is above 40%. The UK domestic competition authorities have traditionally seen 25% as a threshold figure for significant market power. However, current market shares may be adjusted to reflect reasonably certain future changes, for instance in the light of exit, entry or expansion (Case COMP/M.1806 — Astra Zeneca/Novartis, points 150 and 415). Post-merger market shares are calculated on the assumption that the post-merger combined market share of the merging parties is the sum of their pre-merger market shares. Certain mergers, by reason of the limited market share of the companies concerned, are not likely to significantly impede effective competition. An indication to this effect exists, in particular, where the combined market share of the merging firms does not exceed 25%. This indication derives from Recital 32 of the EC Merger Regulation. However, it does not apply to cases where the proposed merger is likely to give rise to co-ordinated effects.

To complement the above indicia, the Guidelines also apply the Herfindahl-Hirschman Index ("HHI"), and the change in the HHI from pre-merger to post-merger ("delta") as first indications of the change in competitive pressure in the market following the merger. It should estimate of the market share in value (and where appropriate volume) of all competitors (including importers) having at least 5 % of the geographic market under consideration. On this basis, provide an estimate of the HHI index pre- and postmerger, and the difference between the two (the delta). After this, it must be indicated the proportion of market shares used as a basis to calculate the HHI and the sources used to calculate these market shares and provide documents where available to confirm the calculation.

The Guidelines indicate that the Commission is unlikely to identify competition concerns in a market with a post-merger HHI below 1.000, and that such cases normally do not require extensive analysis.

The Commission is also unlikely to identify competition concerns in a merger:

- with a post-merger HHI between 1.000 and 2.000 and a delta below 250,

- with a post-merger HHI above 2.000 and a delta below 150 except where some special circumstances are present,

which somehow invalidate the HHI as a useful proxy for the change in competitive conditions. This may relate, by way of example, to the following instances: (a) a merger involves a potential entrant, or a recent entrant with a small market share; (b) one or more merging parties are important innovators in ways not reflected in market shares; (c) there are significant cross-shareholdings among the market participants; (d) one of the merging firms is a maverick firm with a high likelihood of disrupting coordinated conduct; (e) indications of past or ongoing coordination, or facilitating practices, are present; (f) one of the merging parties has a pre-merger market share of 50% or more (V. Verouden, 2004).

5. CONCLUSIONS

Merger policy is seen as preventing excessive market concentration and monopoly power. The concern is that excessive concentration may cause a substantial lessening of competition or the creation of a dominant position, which may increase prices and reduce consumer welfare. The lessening of competition resulting from a concentration is more likely to be substantial, the larger is the market share of the incumbent, the greater is the competitive significance of the potential entrant, and the greater is the competitive threat posed by this potential entrant relative to others.

In the analysis undertaken, the HHI index is 2.300 and the delta is 600. According to Commission Guidelines "*is also unlikely to identify competition concerns in a merger: with a post-merger HHI above 2.000 and a delta below 150*". But HHI post merger and delta in our analysis exceeds the thresholds, therefore we are in front of an anticompetitive mergers (in practice of Europe Union, high post-merger HHIs and large changes in HHIs tend to be associated with anticompetitive mergers). But, not all mergers with these characteristics create or enhance market power. In markets with highly differentiated products, mergers may allow for unilateral price increases irrespective of market shares or HHI calculations.

In my opinion, HHI is more complete and elaborate than other market indicators like concentration rate or market share, because it is a weighted average of market shares of all firms. Concentration ratios do not take account of the relative sizes of the leading companies. For example, a market which has four firms each with a 20% market share will have the same C4 ratio as a market in which the leading four firms have market shares of 55%, 20%, 3% and 2%. But it is very probable that the competitiveness of the two markets will differ. For instance, in the latter case there is a clear potential "leader" for the other firms to follow, whereas in the former case their might be fierce competition to become

the largest firm (particularly if there are significant economies of scale in production).

Further, the HHI reflects the degree of market share inequality across the spectrum of firms that participate in a market. The influence of smaller firms is lessened and the influence of larger firms is emphasized. Thus, higher values of the HHI reflect the combined influences of both unequal firm sizes and the concentration of activity among a few large firms.

Also, special attention should be paid to markets with many players and low concentration which can sometimes be cartelized markets, whilst highly concentrated markets can be characterized by fierce competition when, for instance, entry into and exit from the market are very easy. So that a detailed investigation should be initiated by European Commission after the measuring the concentration.

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