4. Methods of analyzing market power

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Abstract

The abusive anticompetitive behaviors arise from the significant market power that certain firms or groups of firms may have. To determine whether a company is in such a position or risk to achieve such a condition, empirical research has developed a series of quantitative tools that facilitate analysis of market power that a firm has in a particular context.

1. Introduction

The purpose of this paper is to highlight the evaluation of market power in the context of the market, especially when it is wanted to analyze if the existence of market power for a firm can lead to abusive behaviors from the firms that are in such a position.

The paper revises the most used quantitative methods used to assess market power and also provides a critical interpretation of their implementation from a methodological perspective, as well as their limits. For this purpose, this papers does not aim to be exhaustive, it rather focuses only on the most commonly used methods to analyze market power, both in academic papers and in competition authorities practice.

According to European approach on analyzing competition cases, a firm (or a group of firms) has significant market power when it can behave independently of its competitors, and ultimately also of its consumers, thus creating the risk of apparition of an abuse of its dominant position.

2. Methods for identification and measurement of market power

The existence of a company in a dominant position, although it may raise a number of concerns about a potential distortion of competition in that market, is not an infringement in itself of competition laws. Only the possible misconducts that a company can show in such a position represent infringements of competition laws, in case of their manifestation. Therefore it is necessary to assess market power it holds firm because then he could review whether it has abused its market position to the detriment of other competitors and / or customers.

A first clue that indicates a significant market power is given by a high market share of the respective company. But the mere existence of a company that has most of the analyzed market does not mean that in any way it is abusing its market position, which is why, as specified in the guidelines on market analysis and the assessment of

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significant market power[95], strictly market share analysis of a company is not sufficient to determine if it has significant market power. In addition to market share, other factors such as quantitative or qualitative analysis have to be taken into account to support findings of such an evaluation.

3. Quantitative Methods

The literature includes a wide range of indicators that can be used to determine whether a firm has market power. Most often this market power is measured as the company's ability to impose a price above marginal cost. Thus most of these tests will consider the company's performance analysis, taking account of its cost structure and other relevant factors. Given the way these tests are constructed, there is a chance that in many cases they suggest the presence of a certain market power (companies aim to make profits, if they are not able to do so, they would have no incentive to work), but the mere existence of market power of a company does not automatically mean that it can act independently of other players in the market.

A. Lerner Index

Using the Lerner index is the most common method of measuring the market power of a firm. Lerner index (L) is calculated using the formula proposed by Abba Lerner in 1934 as the difference between price and marginal cost compared to the price level

$$L = \frac{P - MC}{P}$$

MC   - marginal cost
P   - market price

L can take values between 0 and 1. A Lerner Index value of 0 corresponds to a manifestation of perfect competition (the market price is at the marginal cost), while higher values indicate a certain market power firm.
Marginal revenue (MR) of a firm can be written depending on the price elasticity of demand for the firm said:

$$MR = P\left(1 - \frac{1}{|\varepsilon_i|}\right) = P - \frac{P}{|\varepsilon_i|} \Rightarrow P - MR = \frac{P}{|\varepsilon_i|} \Rightarrow \frac{P - MR}{P} = \frac{1}{|\varepsilon_i|}$$

Going forward, and assuming that the firm is maximizing its profits, which means that marginal revenue equals marginal cost (MR=MC) we can rewrite the Lerner index based on the price elasticity according of the firm.

$$L = \frac{1}{|\varepsilon_i|}$$

ε_i - price elasticity of demand of firm i
    If in the case of perfect competition it is very easy to accept that the Lerner index takes the value 0, this does not mean that any value other than 0 automatically

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[95] Commission guidelines on market analysis and the assessment of Significant Market Power under the Regulatory Framework for electronic communications Community networks and services (2002 / C 165/03), Official Journal of the European Communities 11.07.2002

imply the existence of a monopoly. Lerner Index measures the intensity of competition very well in a market in the presence of a homogeneous products, but in cases of differentiated products where consumers manifest preferences between producers can be reached a Lerner index in the range (0,1).

The greatest challenge posed by Lerner index calculation is estimating the marginal cost. Moreover, another criticism of this method is that actual companies do not have enough information to calculate the marginal cost so as to estimate the level of activity to maximize their profits; they rather add some margin above the average variable cost (cost plus pricing). [96]

Under certain conditions cost plus pricing can be used as an approximation to calculate the Lerner index, so you can use the average variable cost (AVC) in exchange for marginal cost in applying the formula. However there are limitations to such approximations. Applying a margin over average variable cost seems a more close to the empirical experience, approximating the index Lerner, but this is correct only if the company has constant returns to scale, such that AVC is constant (implying that equals also MC). If AVC is not constant, depending on its structure (ascending or descending), the index will be overestimated or underestimated Lerner.

B. Rosse-Panzar test

Rosse and Panzar, in 1977, developed a methodology to test to what extent the behavior of a company is approaching that of a firm in a perfectly competitive in a market. The test envisages revenues at the company and the extent to which they vary depending on the price of production factors.

H statistic defined as the sum of revenue elasticities of the firm with respect to production factors prices. As shown Rosse and Panzar, H statistic differs depending on the degree of competition faced by the company. Depending on the approach, it can be estimated in a simple form[97], based strictly on the influence of production factors, or a more complex form[98] in which besides inputs can be introduced into model a number of control factors specific to the company. Total revenues can be expressed in a log-linear manner according to the prices of inputs and control factors. Expression of log-linear form makes it easy to interpret the coefficients as representing elasticities.

$$\ln TR = \alpha + \sum_{i=1}^{n} \beta_i \ln w_i + \sum_{i=1}^{n} \gamma_i \ln CF_i + \varepsilon_i$$

TR   - total income
w_i - the price of production factor i
CF_i - control factor i

$$H = \sum_{i=1}^{n} \beta_i$$

Accordingly Statistics H will be equal

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[96] John Lipczynski, John Wilson şi John Goddard – Industrial Organization Competition, Strategy, Policy, Second edition, Pearson Education Limited 2005 pag 354-357
[97] John Lipczynski, John Wilson şi John Goddard – Industrial Organization Competition, Strategy, Policy, Second edition, Pearson Education Limited 2005 pag 337
[98] Bikker, Jacob Antoon; Shaffer, Sherrill şi Spierdijk, Laura - The Panzar-Rosse Revenue Test: To Scale or Not to Scale (August 21, 2009). 22nd Australasian Finance and Banking Conference 2009

The intuition of test's construction is relatively simple, especially with reference to the borderline situations, perfect competition and monopoly. In the case of perfect competition, an increase in input prices will result in a proportional increase in costs to producers. In the long term this will change the cost structure, new price increasing with increasing inputs. Because of these adjustments to the cost structure and the number of companies will decrease accordingly, which in the long run will lead to changes in income proportional to price changes. Therefore, in perfect competition H statistic will have value 1.

If the monopolist maximizing his profits, with costs different than zero, it will operate on the elastic side of the demand. In such circumstances an increase in input prices will cause a change in the equilibrium by increasing the cost. The new equilibrium will lead to a decrease in the total revenue of a monopolist, which means that for a monopolist H statistic will have negative value.

H = 1 - firm behavior is consistent with the model of perfect competition
0 <H <1 - firm behavior is consistent with models of monopolistic competition, oligopoly
H <0 - firm behavior is consistent with a model of monopoly.

Even if the Rosse - Panzar test is designed for any company, most of the literature focuses on its application in the banking sector. Although this method is a useful one, based on the underlying microeconomic behavior of economic agents raises a number of challenges with respect to the estimation of these elasticities. The challenge is primarily on the correct identification of all factors of production and control factors to compensate for any data anomalies.

C. Persistence of profit (POP)

All methods of estimating market power based on economic fundaments of structure-conduct-performance paradigm (SCP) or new empirical industrial economics treat companies as they are in equilibrium. Moreover these approaches do not account for possible imperfections of market functioning.

Persistence profit (POP) aims to analyze the time series of a firm's profits, exceeding the static approach of other methods of estimating market power. Approaches using cross-sectional data series captures only the situation at a particular moment in time and there is no certainty that that situation is a long-term equilibrium in which the firm functions.

In order to identify any abnormal behavior, empirical analysis aims to test the persistence of profits at the firm level using a standardized level of profit by eliminating the average profits in the market. Such analyzes cover both short-run analysis of the POP and the long run.

$$\pi_{i,t}^S = \pi_{i,t} - \overline{\pi_t}$$

$\pi_{i,t}$ – Profit for firm i in period t
$\overline{\pi_t}$ – Average profit at market (or industry) in period t
$\pi_{i,t}^S$ – Standardized profit for firm i in period t

In the short run if the market is close to perfect competition model, without barriers to entry, any abnormal profit is removed quickly by competitive forces. Such profits will tend to disappear very quickly, leading to a very low correlation (or lack of correlation) between profit levels (standardized) in two successive periods.

Conversely, if the market is characterized by high barriers to entry, or a reduced competitive pressure, it may take longer for the abnormal profits are eliminated by competitive forces. This will translate into a higher correlation between standardized profits of a firm for two successive periods.

The POP can be estimated using an autoregressive model of order 1 for the standardized profit of each company:

$$\pi_{i,t}^s = \alpha_i + \lambda_i \pi_{i,t-1}^s + \varepsilon_{i,t}$$

λ_i – Shows the intensity of short-term persistence of profit

λ_i coefficient can range between 0 and 1. Values close to 0 suggests that there is low correlation between two consecutive values of standardized profit, rejecting the existence of a persistent profit, while values closer to 1 suggest that in the short run there persistent profits.

Using an autoregressive model of order 1 with $0 \leq \lambda_i < 1$, standardized profit will tend in the long to an average of $\mu_i = \alpha_i / (1- \lambda_i)$. The sign of α_i parameter indicates whether the standardized profit of the firm is above average (positive value of α_i) or below it. If μ_i is 0 for all companies, then there is no persistence of profits in the market, but if it differs from 0, for some companies positively and for others in a negative way, then there is a presence of long-term profit. [99]

Also the interpretation of POP can also be made based on the graph of the plotted time series of standardized profit and its interpretation follows the intuition presented above.

For greater refinement of the method, the profit can be decomposed after the proposed methodology of Porter and McGahan (1999) to better isolate the specific effects of company and industry-specific effects. Decomposition of the profits in this manner can capture further information that can be used in identifying sources of profit at the firm level (access to resources, capacity for innovation, etc).

4. The necessity of using qualitative methods

Although quantitative methods can bring substantial value added to the analysis, when applied and interpreted correctly, there is still a behavioral component of the companies that cannot be strictly captured by quantitative tests. Moreover as quantitative tests are usually benchmarked for perfect competition and they focus on defining market power as the power to impose a price above marginal cost, often these tests analyzing firm behavior will always capture the existence of market power to a certain degree, depending on a number of factors such as the analyzed industry, the number of competitors in this market, the degree of homogeneity of the product, etc.

In those circumstances, to consider whether a company has SMP, that is when not only has the power to impose a price above its marginal costs but to behave independently of its competitors and customers, the qualitative aspects must also be kept in mind.

Depending on their granularity, the data can capture or not some temporary changes in prices, so that some temporary shocks on prices that could be the result of manifestation of market power of the firm, may or may not be caught in mathematical

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[99] John Lipczynski, John Wilson şi John Goddard – Industrial Organization Competition, Strategy, Policy, Second edition, Pearson Education Limited 2005 pag 341-346

modeling. Therefore it is important to observe the behavior of firms to determine whether certain price shocks are caused by specific industry events (conditions of supply and demand) or firm behavior.

5. Conclusion

Even though the progress of empirical industrial organization led the improvement of certain quantitative methods, they still cannot be widely used and commonly applied in analyzing any situation. Analysis of market power, like any analysis concerning aspects of competition, remains firmly anchored in context so that the mere use of quantitative methods, most often, is not sufficient to determine the existence of SMP that a firm may have. Such analyzes should be completed in most of the cases with qualitative analysis that account for the assessment of business activity and the environment in which it operates.

Also, for better interpretation of the current situation in the market it is preferred in addition to static analysis also the observation of the phenomenon in its dynamics on a time horizon long enough to avoid interpretation of temporary situations as situations of long rung equilibrium or normal functioning of firms or markets.

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