Texto para Discussão 028 | 2020

Discussion Paper 028 | 2020

Market Share and Leadership Instability in Antitrust Analysis: a Primer

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October, 2020

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Abstract

The paper aims at outlining the main empirical approaches for assessing market share dynamics. Those embody distinct levels of detail and include generic stationary tests for relative market shares, broader leadership turnover indicators and yet leadership convergence assessments between specific firms in a given industry. The potential role of market share dynamics in competition policy is discussed and tentative guidelines are suggested.

Keywords: market share instability; leadership instability; competition policy

1 Introduction

The prevalence of market dominance constitutes an important challenge for a competitive environment. The likely associated market power may not be readily dissipated in the real world. In fact, the lack of substitution between the competitors´ goods and the existence of significant entry barriers may lead to the persistence of the referred dominance. In the ideal textbook setting, one would conceive that free entry would curb abnormal profits. However, the evidence seems to indicate that profitability deviations with respect to some mean level are typically persistent in the long-run and therefore no convergence among firms tend to be achieved [see e.g. Mueller (1986) and the studies therein and yet the survey by Hirsch (2018)]. Geroski (1991) outlines the conceptual aspects pertaining to profit persistence that can provide foundations for the econometric analysis considered in the literature.

More specifically, the case of Brazil has been addressed by Glen et al. (2001) and Resende (2006) and evidence supports highly persistent profitability deviations and thus indicate that market power concerns should be not neglected in that economy.

A distinct, but complementary perspective, pertains to the behavior of market shares, as an indicator of the degree of rivalry in a given market. The emphasis that firms attribute to that aspect is often justified. In the case, of markets where consumers have a significant cost to switch to other producer, he (she) may become locked in with a specific producer, Indeed, it is not uncommon to observe artificially created switching costs, for example in terms of fidelity programs, that do not favor competition [see Klemperer (1995) for an overview]. Resende et al. (2020) provides some evidence in the context of Brazilian airlines. In fact, the emphasis on market share dominance in general contexts, given its role on profitability, had already been stressed by Buzzell et al. (1975).

Large market shares may constitute a necessary but not a sufficient condition for the exercise of market power. However, similarly to preliminary concentration analysis in the context of antitrust assessments, the study of the different aspects of market share dynamics can be informative for competition policy, mainly as an indicative of market rivalry, an element that complements entry barriers analysis.

Brazilian Guidelines for Horizontal Mergers (CADE – 2016) recommends the use of market share instability tests in order to verify the rivalry degree of the relevant markets.[1]

The present paper outlines distinct approaches that were undertaken in the literature to assess market share dynamics. Those are discussed in terms of an increasing level of detail of the associated indicators.

First, it is possible to conceive general tests for the instability of market shares in a given industry or for a set of industries. The underlying logic is that ideally market share deviations, with respect to some reference level (say some overall or sectoral mean), should not be stationary. The empirical implementation involves unit root tests for the referred deviations in a panel setting. The sole application for Brazil appears in Resende and Lima (2005) and related econometric aspects warrant further extensions.

Second, beyond a generic stationarity test, one might be interested in tracking leadership stability that might delineate market dominance outside possible competitive fringes. Summary measures, as those conceived by Geroski and Toker (1996), aim at capturing the degree of leadership turnover and an application for the Brazilian manufacturing industry can be found in Lima and Resende (2004).

Finally, it is important not only to indicate general dominance patterns, as indicated by the previously mentioned empirical strategies, but also to consider indicators that capture approximations of firms towards the leaders. In fact, even if leaderships are not completely challenged it is relevant to evaluate whether relative distances are becoming less severe. Such more detailed aspect has been considered by Sutton (2007) with an empirical and disaggregated analysis implemented for the case of Japan.

The essential aspects of the aforementioned approaches are discussed in the paper and the remainder is organized as follows. The second section discusses the basic elements of the three referred approaches, their underlying logic and possible limitations. The third

[1] The document advances the possibility that stabilty or instability of market shares might be indicative of the actual prevailing rivalry in a given market.

section discusses the possible antitrust implications of market share dynamics and the potential usefulness of the described indicators in that context. The fourth section brings some final comments.

2 Empirical Approaches for Assessing the Dymanincs of Market Shares

2.1 Econometric tests for market share instability

A preliminary test for the evaluation of market rivalry pertains to unit root tests for to market share deviations with respect to some reference point. Such assessment of the stationarity of relative market shares has the underlying motivation that the non-stationarity, associated with the presence of a unit root, would indicate a more dynamic pattern for market shares and therefore the evidence of some non-negligible rivalry.

The simplest application would consider a time series setting where the analysis is carried out for each individual firm in a given market. The usual augmented Dickey-Fuller (ADF) test for unit root for a generic variable of interest and the relevant expression. is indicated below. β=0 clearly would correspond to a unit root in the autoregressive representation on levels and augmentation in terms of lagged differences up to lag p would avoid serial correlation problems.

$$\Delta y_t = \alpha + \beta y_{i,t-1} + \sum_{j=1}^{p} \Delta y_{t-j} + \quad \varepsilon_{i,t} \qquad t = 1,...,T \qquad (1)$$

The referred test considers the null hypothesis that H_0: $\beta = 0$ and the alternative hypothesis that H_1: $\beta_i < 0$ and potentially accommodate more general versions, for example, with time trends.

Gallet and List (2001) provides the seminal contribution in terms of the unit root tests as applied to the log of relative market shares in the US cigarette industry. Specifically, the tests considered the evolution of individual market shares relative to the sector mean value in each period. The evidence for six firms mostly favored the presence of unit roots and an unstable market share behavior that could be consistent with some degree of market rivalry. A potential difficulty of firm-level time series analysis of such is the requirement of a relatively long series. Furthermore, the possibility of increasing the power of the test against near unit root alternatives may also motivate the use of panel data methods.

In that sense, a general dynamic specification for heterogeneous panels can be expressed as follows for a generic variable of interest readily generalizes the previous time series model:

$$\Delta y_{i,t} = \alpha_i + \beta_i y_{i,t-1} + \sum_{j=1}^{p} \Delta y_{i,t-j} + \quad \varepsilon_{i,t} \quad i = 1,...,N \;\; t = 1,...,T \qquad (2)$$

An influential first-generation test for unit root was proposed by Im, Pesaran and Shin-IPS (1997) and generalize previous tests that assumed a common parameter β across different units. The referred test considers the null hypothesis that H_0: $\beta_i = 0 \;\; \forall i$ and the alternative hypothesis that H_1: $\exists$ i such that $\beta_i < 0$. A simple test statistic can be based on the average of the different t statistics corresponding to the autoregressive coefficients of the individual series [the so-called t-bar statistic thus would be the average of the individual Dickey-Fuller (DF) or augmented Dickey-Fuller (ADF) statistics and its distributional behavior was derived by the authors]. However, a first limitation of such test is that it provides a joint assessment of the presence of a unit root rather than allowing unit-specific patterns,

Resende and Lima (2005) considered the referred test in the context of the Brazilian manufacturing for the 1986-98 period and the evidence supported market share instability and thus the existence of market rivalry at some extent. Caution should be exercised not only because of the joint character of the test but also for the cross-sectional independence embodied in the first generation of panel data unit toot tests. In fact, one should expect non-negligible interdependence that would justify second-generation tests that allow for cross-sectional dependence [see Breitung and Das (2005) and Gengenbach et al. (2010) for overviews].

Chu et al. (2007) attempt to address the previous concerns in terms of the analysis of the instability of market shares in the Taiwanese notebook industry. The evidence, with traditional tests, does not allow to reject the null hypothesis of market share instability and therefore suggests the existence of some relevant firm rivalry. However, the authors indirectly make the case for the use of second-generation tests as their testing approach allows for cross-sectional dependence since it is based in a seemingly unrelated regression (SUR) framework that allows for correlations between the errors of the different firms'

equations. The referred approach retains a time series setting and the so-called SUR-ADF test, advanced by Breuer et al. (2001), allows to scrutinize a separate unit root null hypothesis for each individual unit and is particularly suitable for markets with a small number of firms. Such possibility contrasts with the prevalent joint tests encountered in the second-generation panel literature while still addressing cross-sectional dependence.

The evidence obtained by Chu et al. (2007), with the more general testing strategy, corroborates the instability of market shares in that Taiwanese industry and suggests, in principle, some possible competition.

Altogether, the previous discussion suggests some possible steps in the preliminary analysis of market share instability:

i) Calculate market shares of the different firms at the most disaggregated level so as to comply, as closely as possible, with a relevant market consideration. Thus, one would have a dataset with a panel structure either for some particular industry or for a set of industries or proceed with firm-level time series analysis should longer series be available;

ii) Calculate market shares´ deviations with respect to some reference level, for example the mean level of the market share in a given industry;

iii) In the case of a panel dataset, implement tests for cross section dependence or in the case of long time series consider a test that allows for cross-sectional dependence;[2]

iv) Given the steps (i) through (iii), implement a unit root test either jointly for a set of firms or for individual firms. The non-rejection of the null hypothesis would indicate unstable relative market shares' and therefore suggest some degree of market rivalry.

[2] Second generation tests for panel data unit root assume cross-sectional dependence. See Sarafidis and Wansbeek (2012) for a discussion on those tests.

The applications of econometric tests in the context of market shares are still scarce and the panel structure can be potentially useful and warrant different investigations as for example the panel autoregressive distributed lag (ARDL) formulation proposed by Nowak-Lehmann et al. (2011) that highlight some short-run aspects of market share dynamics. [3] In any case, even the general assessment of market instability can provide a preliminary screen to evaluate the competitive environment to be complemented with more specific analyses of market shares as discussed in the next sections.

2.2 General leadership turnover indicators

Another important analysis that can be implemented, based on market shares, is related to the to the assessment of explanatory factors determining the identity of the leader and possible market share profiles emerging from the leadership behavior in the markets. The literature has focused on the sources of leadership persistence and to a less extent to specific market share patterns.

As important sources of leadership persistence the following topics were analysed: Gruber (1992) investigates the role of innovations in determining leadership persistence; Deneckere et al. (1992) states that the identity of the leader is crucially related to the share of loyal consumers (not identified a priori).[4]

Theoretical models can partially explain leadership, but do not predict specific profiles for market share over time.

[3] Earlier indicators for the market share instability as for example the one suggested by Hymer and Pashigian (1962), are based on the computation for each firm of the change in its share of total industry assets so as to obtain the absolute value upon the sum of those changes. The more unstable are market shares, the higher the index. However, the application involved aggregate indexes at two-digit industries.

[4] In addition to the possible role of innovations in shaping market shares and leadership dynamics, it is worth mentioning the importance of advertising in markets subject to significant product differentiation [see e.g. Eckard (1987), Das et al. (1993) and Bird (2002)].

Geroski and Toker (1996) is an important example in the literature that investigates the turnover of market leaders. Two indicators, based on a structure of firm leadership modelled in terms of a Markov process, were suggested by Geroski and Toker (1996).

$$D_1 = 1 - 2.p_x \qquad (3)$$

where p_x stands for the probability of a firm exiting the group of top 5 leaders in a given market. If p_x equals 0 (D_1=1), one faces a complete immobility scenario. Perfect mobility (D_1=0) is obtained when p_x=1/2, case in which both survival in top 5 or exit have the same probability.

The second indicator suggested by the authors is the following:

$$D_2 = 1/p_x \qquad (4)$$

D_2 measures the expected duration of survival in the group of top 5 leaders. If $D_2 \rightarrow \infty$, there is complete immobility in the market whereas with D_2=2 perfect mobility arises.

Lima and Resende (2005) calculates these two indicators to Brazilian industry. These authors also calculate an additional indicator suggested by Bartholomew (1973):

$$D_3 = \sum_i \sum_j p_{ij}|i - j| \qquad (5)$$

where i denotes the firm rank in the initial year, j the rank in the final year and p_{ij} the transition probability between rank I in the period t and rank j in the period t+1. This indicator assigns larger weights to broader rank shifts. This measure is limited as it only captures mobility within the 5 leaders group, without incorporating entry during the analyzed period.

Kato and Honjo (2006) also study the turnover of market leaders in Japanese manufacturing using data from 1975 to 2002. The authors argue that Japanese domestic markets appear to have special characteristics, because several types of cartels, such as recession cartels, rationalization cartels, and export-import cartels, had been exempted from the application of Antimonopoly Act, in order to protect domestic industries by avoiding overt competition under the rapid macroeconomic growth. The historical

background may turn competition between firms more difficult. In this respect, research that focuses on Japanese industries might be of some interest to the discussion of competition policy. They use a nonparametric approach suggested by Kaplan and Meier (1958) to estimate the duration of market leadership. The survival function is given by:

$$\hat{S}(t) = \prod_{j|t_j \leq t} \left(1 - \frac{d_j}{n_j}\right) \qquad (6)$$

let d_j denote the number of industries in which the identity of the first-ranked firm changed at time t_j. Also, let n_j denote the number of industries in which the identity of the first-ranked firm has not yet changed at t_j and therefore still 'at risk' of experiencing it.

The authors also investigate the impact of some explanatory variables to turnover. The main results obtained are: (i) market leaders tend to maintain their positions in concentrated industries and consumer good industries; (ii) turnover of market leaders is more likely to occur in growing industries and R&D-intensive industries; (iii) leadership positions are more stable in industries where cartels were legally sanctioned.

Cable (1997) suggests a mobility index which is connected to the change in the level of seller concentration. The index of mobility over the time interval 0, t is defined by:

$$M_t = \sum_{i=1}^{n} (m_{it} - m_{i0})^2 \qquad (7)$$

where m_{it} represents the market share of firm i at period t and m_{i0} is the market share of the same firm i in the initial period. This index can also be written as follows.

$$M_t = \Delta HHI + 2(HHI_0 - \rho . s_t . s_0 + 1/n) \qquad (8)$$

In the above equation ρ is the correlation between market shares at successive dates, s denotes standard deviations and n is the number of firms at time t, 0 or both, and HHI

represents the usual Herfindahl-Hirschman index, a concentration index that can be obtained by the sum of squared market shares of all firms in the industry.[5]

Those authors relate this measure to market variables, such as price and advertising, to identify the main factors affecting market share variations.

2.3 More detailed leadership indicators

Sutton (2007) develop a different approach to estimate the duration of leadership. This paper develops a model establishing a relationship between the standard deviation of the market share variation divided by market share ($\sigma(\Delta m_t/m_t)$) and market share (m_t). This measure investigates the existence of a scaling relationship, firms with higher market shares tend to have lower standard deviation.

An important advance of this paper is the analysis of the gap between the leader and the second firm in each market over time. One does not need to observe turnover in rank of the firms in the market to verify rivalry. If the gap between the leader and the second firm in a given market reduces significantly over time there is an additional evidence of rivalry in this market. The normalized gap (modeled as a random walk) is defined as follows.

$$\frac{\sqrt{m_1}-\sqrt{m_2}}{\sqrt{2}\sigma(\sqrt{m_i})} \qquad (9)$$

$\sqrt{m_1}-\sqrt{m_2}$ is the gap between the market shares of the leader (m_1) to the second firm in the market (m_2). This author shows that if the distribution of shocks to $\sqrt{m_i}$ is normal with standard deviation equal to σ, changes in $\sqrt{m_1}-\sqrt{m_2}$ are normal with standard deviation equal to $\sqrt{2}\sigma$.

Thus, indicators that capture the approximation between leader firms can be a useful complement to more general analyses of market share dynamics.

[5] See Resende (1994) for an overview of concentration indexes.

3 Market Dynamics: Considerations for Antitrust Policy

CADE's Merger Guidelines (2016) discuss the relevance of market share instability tests as an important tool to analyse the rivalry degree in a given market. It can be seen in page 36 of these guidelines, that market share instability is recognized as indicating, to some extent, the prevalence of market rivalry.

The methods described in this paper can complement the market share instability tests mentioned in CADE´s Merger Guidelines. Four different methodologies are discussed in this paper:

1) Market-share instability test – time series (ADF), preferably with some allowance for cross-sectional dependence;

2) Market share instability test – panel data with cross-sectional dependence;

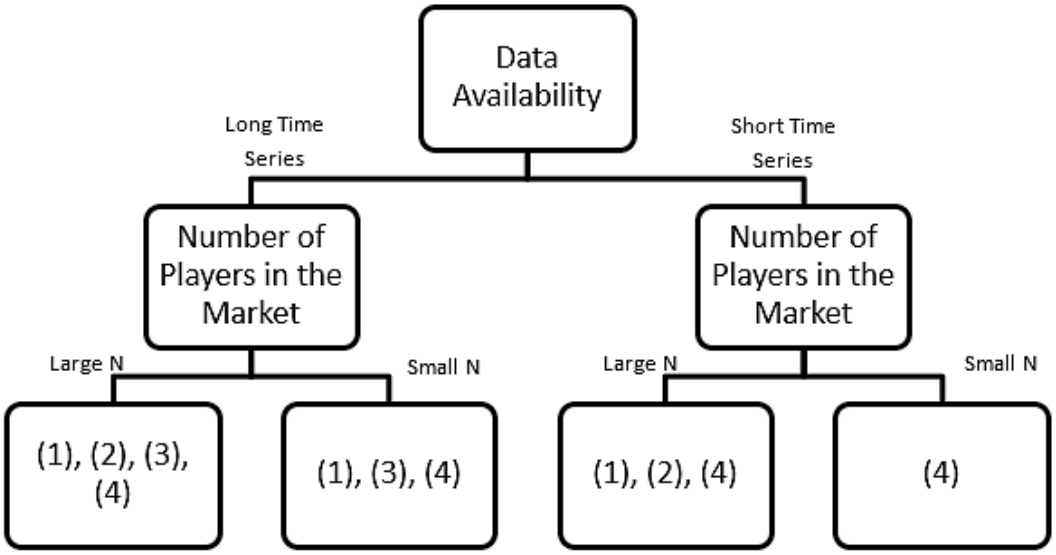
3) Turnover of market leaders;

4) Market share gap analysis.

The use of each method depends basically on data availability[6] and on the number of firms[7] (N) in the analysed market. Taking those aspects into consideration, this paper proposes that the methods should be used according to the following scheme:

[6] In order to use unit root test it is usually necessary to work with at least 60 monthly observations. If panel data tests were conducted it is possible to use shorter time series.

[7] The minimal value of N to use panel data techniques depends on the method to be implemented. For this reason this paper do not recommend a minimal value for N.



This tentative scheme highlights the concern on the sample size that might render different approaches as meaningful. In particular, tests of market share instability may have a stringent requirement in terms of long time series data availability. In fact, traditional accounting sources that are more available for academic research can be somewhat limiting. However, antitrust practitioners often have access to monthly proprietary data provided by marketing companies and therefore the aforementioned approaches are likely to be feasible.

4 Final Comments

The paper aimed at presenting and highlighting the essential features of different empirical approaches for evaluating market share dynamics. The referred indicators displayed different levels of detail that ranged from a more general market share instability analysis to a characterization of specific leadership indicators that had either a more aggregate nature or aimed at capturing more specific relative leadership changes.

Typical preliminary screens in the scope of competition policy focuses on the definition of the relevant market and then in the calculation of concentration indexes that are complemented with qualitative analyses that involve, for example, the evaluation of the potential existence of significant entry barriers at the particular industry under scrutiny.

The present work contends that indicators of market share and leadership dynamics may also offer a valuable and complementary toolbox for antitrust analysis in its preliminary stage. However, the different initial screens will not preclude the necessity of more detailed quantitative studies in some more complex cases. In particular, the assessment of market power and collusive practices are likely to benefit from careful econometric studies, albeit the ever present difficulty in obtaining the necessary detailed data.

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