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Market share instability: an application of unit root tests to the cigarette industry

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Abstract

This paper uses market share data to infer the nature of rivalry in the U.S. cigarette industry over the 1934–94 period. Unlike previous studies, which measure rivalry from various constructs of market share instability, we examine the time-series properties of market shares to determine whether or not rivalry is evident. Our empirical results imply that a majority of firm-level market shares are martingales, suggesting market shares have been unstable from 1934–94. This result leads us to conclude that rivalry in the cigarette industry has remained strong.

JEL Classification: L13; L66

Keywords: Market share instability; Convergence; Cigarettes

1. Introduction

Much of the literature in industrial analysis centers on uncovering the nature of rivalry within an industry. To this end, market share data has played a key role in understanding the level of intraindustry competition. For example, several studies (e.g., Hymer & Pashigian (1962), Caves & Porter (1978), Sandler (1988), and Eckard (1991)) use market share data across all, or the largest, firms in an industry to construct industry-wide measures of market share instability. Because greater volatility in temporal market shares is indicative of the

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push-and-pull tactics of intense rivalry, these studies argue that greater instability of market shares coincides with greater rivalry in the industry. Another line of work due to Rhoades (1985) and Rothschild et al. (1991), among others, infer rivalry from movements in the market shares of individual firms.[1]

In this study we adopt an alternative technique to infer the nature of rivalry from individual market share data. Analyzing the time-series properties of market shares, we use unit root tests to examine whether market shares have conditionally converged, or are stationary in the statistical sense. Applying this procedure to the cigarette industry over the 1934–94 period, our empirical results indicate that the majority of market shares in the cigarette industry are martingales, or follow a random walk. This finding suggests that market shares of cigarette manufacturers were unstable, or did not revert to their long-run mean after a shock between 1934–94. As such, the ability of a firm to capture market share at the expense of rivals has remained strong in this industry.

2. Methodology

Recent years have witnessed an explosion of research that examines the time-series properties of economic data. Following the seminal work of Nelson & Plosser (1982), numerous studies have examined data ranging from GDP to pollutant emissions to test for the presence of a unit root. The empirical results from such studies have important theoretical, policy, and econometric implications. For example, if GDP does not contain a unit root, it is considered to be mean reverting, which renders governmental policies as transitory, having effects that dissipate over time. Alternatively, if a series does contain a unit root, or follows a random walk, shocks to the series are deep in nature, permanently affecting the series.[2]

Making use of the attractive properties of the unit root approach, several studies extend the basic model to test for spatial convergence. For example, Quah (1990), among others, tests for regional income convergence by measuring the persistence of random shocks to regional per capita incomes over time. An alternative definition of stochastic convergence, due to Carlino & Mills (1993, 1996), is that the log of relative (to that of the overall economy) per capita income is stationary. This latter type of convergence is termed "conditional" since it is characterized by regions converging to a constant differential. Extending this basic application, List (1999) tests whether "green incomes" have conditionally converged across regions in the U.S.

We use similar empirical tests for market share convergence by examining if shocks to relative market shares are temporary or permanent. In the spirit of Carlino & Mills (1993), Loewy & Papell (1996), and List (1999), we analyze the log of relative market share for firm i at time t, MS_{it} (i.e., log (market $share_{it}$/average market share in the $industry_t$)), which consists of two parts, the time invariant equilibrium differential, MS_i^e and the deviations about this equilibrium, $u_{it,}$ such that:[3]

$$MS_{it} = MS_i^e + u_{it}, \tag{1}$$

where u_{it} is a stochastic process with drift and trend: