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APPLIED TO THE CANADIAN WINE
INDUSTRY**

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The Market Structure-Performance Relationship Applied to the Canadian Wine Industry

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Abstract

The purpose of this research is to examine the relationship between market structure and performance in the wine sector using data from two Canadian provinces. Investigation is conducted on alternative hypothesis defined as the Structure-Conduct-Performance (SCP) hypothesis, the Relative-Market-Power (RMP) hypothesis and the Efficiency Structure (ES) hypothesis. The performance is measured by the number of awards gained by wineries. Using regression analysis, we find support to the ES hypothesis. The empirical findings suggest that more research should be done on the efficiency structure of wineries in their respective markets.

Keywords: Wine industry, market structure, performance

JEL classification: L11, L66, D40

1. Introduction

The identification of the relationship between a market's concentration levels and its profitability can be attributed to Bain (1951) who hypothesized that a concentrated market structure encourages oligopolistic behavior by competitors. The body of the associated literature is now more commonly known as the *Structure–Conduct–Performance* (SCP hypothesis). Simply stated, the SCP hypothesis expects dominant firms in more concentrated markets to have the capacity through *collusion* to set prices and earn higher profits.¹ The SCP hypothesis posits a positive relationship between concentration and performance (Stigler, 1964), i.e. the market share variable should have only a small impact (at best), and efficiency effects should be small or insignificant.

Alternatively, the *Relative-Market-Power Hypothesis* (RMP) asserts that only firms with large market shares and well-differentiated products are able to exercise market power and earn higher profits (Shepherd, 1982; Rhoades, 1985). Hence, the key variable is market share when investigating the relative market power hypothesis. Positive coefficients for the market share variable would provide support for the RMP hypothesis since it would signify that firms with relatively more market power are associated with higher prices and profit. In addition, if only RMP holds, the coefficient for concentration should be insignificant, and the efficiency variables should be relatively unimportant.

The *Efficient Structure* (ES) hypothesis has evolved as a competing explanation for the positive relationship described by the RMP hypothesis. Demsetz (1973, 1974) and others (Phillips, 1976; Peltzman, 1977; Gale and Branch, 1982) suggested that higher profits are the results of firm's specific advantages, such as greater efficiency, instead of higher market concentration. Firms that are more cost efficient operate with lower relative costs, and can earn economic rents from their cost advantage. The ES hypothesis posits that concentration of the market is the result of the greater efficiency of some firms, which consequently, gain in market share and are more profitable. Those firms can maximize profits either by maintaining

¹ See Feuerstein (2005) for a current survey of the associated body of literature on *collusion* in industrial economics.

the present level of price and firms' size or by reducing price and expanding the firm size (Lloyd-Williams et al., 1994). In this case, the positive correlation between performance and concentration is spurious, and a positive relationship between market share (MS) and performance should be the consequence of efficiency.²

The hypothesis has enjoyed significant support in the banking literature (Gilbert, 1984; Berger and Hannan, 1989 and 1997; Berger, 1995). Among others, Smirlock (1985), Molyneux and Forbes (1995) showed that there is no relationship between concentration and profitability but between profitability and market share (which is used as proxy for the firm's efficiency).

The literature based on structural approaches has investigated how the market structure affects the market competition among firms. Conversely, non-structural approaches assume that factors other than market structure and concentration may affect competitive behavior, such as entry/exit barriers and the general contestability of the market (Panzar and Rosse, 1987).³ A number of studies relevant to the procedure used in this study have been conducted for various industries (Weiss, 1974; Frech et al., 2000 [Hospitals]; Choi and Weiss, 2005; Pope and Ma, 2008 [Insurance], Kari et al., 2002 [Trucking industry], Perekhozhuk et al. (2013) [Hungarian Dairy products])⁴ or markets (Jenny and Weber, 1976 [France]; Neumann et al., 1985 [Germany]; McDonald, 1999 [Australia]). The general objective of these studies was to investigate the factors that affect the structure conduct performance of the specific industries.

To our knowledge, very few investigations have been done in the beverage sector probably due to the lack of accounting or financial data. The paper by Rezitis and Kalantzi (2012) is testing for the degree of market power in the Greek food and beverages manufacturing

² Similarly, the *Quiet Life Hypothesis* of Hicks (1935) explained that firms with greater market power may take advantage of the gains from non-competitive pricing. Berger and Hannan (1998) found that quiet life effects in banking appeared to be several times larger than social losses associated with the mispricing of products from market power.

³ Porter (1980) identified five forces (characteristic of market structure) that influence a market's conduct, which in turn determines the market's performance. Four of the forces can be considered external to the industry: the threat of entry, the threat of substitution, the bargaining power of consumers, and the bargaining power of suppliers. The fifth force, the level of market competition, is conceived of as an internal force and is generically described as the intensity of rivalry among current market competitors. Additionally, Porter (1991) later noted that these dynamics are subject to the influence of regulatory oversight, which may serve as a catalyst (or inhibitor) of innovation in the marketplace.

⁴ See Edwards et al. (2006) for a survey in agricultural products.

industry and the paper by Parsons and de Vanssay (2013) is measuring market power in the Japanese beer industry.

The purpose of this research is to examine the relationship between market structure and performance in the wine sector. In this study, we are using data from two Canadian provinces. Because of the lack of financial or accounting data, performance is measured by the number of awards gained by wineries. We calculate Herfindahl indices to test the SCP hypothesis and market shares to test the RMP hypothesis. Control variables are introduced as efficiency variables in the equation. The results provide support to the Efficiency-Structure hypothesis.

The next section presents the theoretical model of structure and performance. Data on the Canadian wine markets and empirical results are presented in the following sections.

2. Theoretical model of structure and performance

Traditionally, the most usual way of testing both hypotheses has been to introduce concentration and market share as explanatory variables of performance, on the assumption that market share will reflect the effect of efficiency. In this case, if the market share positively affects profitability, and concentration is not significant, the hypothesis of efficiency is not rejected.

To test the SCP hypothesis, the first static measure is the well-known Herfindahl-Hirschman concentration index calculated with the market shares (q_i) of all companies in a market:

$$H = \sum [q_i]^2$$

The advantage of this measurement is that it makes it possible to calculate a "number equivalent" of companies ($N^* = 1/H$) where N^* is the potential number of companies of the same size which could exist on the market for a given degree of concentration.⁵

⁵ In the empirical literature, several measures of competition are used among which the Herfindahl index and the Price Cost Margin (or Lerner index) are the most popular ones. These measures have been criticized by Boone (2008a and 2008b) who introduces a Relative Profit Differences measure. Boone shows that as competition increases, profits of the most efficient firm will rise more than the least efficient firm.

As competition increases, profits of the most efficient firm will rise more than the following efficient firm. The hypothesis is similar to the Relative Profit Differences measure introduced by Boone (2008a and 2008b). In order to test this alternative hypothesis, the second measure is Kwoka's (1977) Dominance index:

$$D = \sum [q_i - q_{i+1}]^2$$

This emphasizes the gap between successive firms when they are ranked by size. The values of this measure range from 1 to 0, with the former value indicating a monopolistic market. Conversely, the closer to zero the measure is, the lower is the power of any single company.

Previous studies like Smirlock (1985) or Molyneux and Forbes (1995) specified the relationship with performance as follows:

$$\text{Performance } \pi = f[CR, MS, X]$$

Where CR is the concentration measure of the market, MS is the market share variable (q_i) which captures firms' superior efficiency in obtaining a larger portion of the market and X_i are firm specific variables that could affect the efficiency of the firm. As an alternative to the Herfindahl index, the dominance index is used as a CR variable.⁶

The significance of MS in the equation would imply support for the RMP hypothesis or the efficient structure hypothesis. Berger and Hannan (1997) have argued that the validity of the market share variable in testing for efficiency is dependent on whether the variable can be considered as a proxy for the efficiency of larger firms rather than as a measure of market power.

Alternatively, the significance of the concentration ratio would support the traditional SCP hypothesis. The age of the company and size of the domain are the control variables in the regression.

⁶ Since both variables are perfectly correlated, they cannot be used simultaneously in a regression.

3. The Canadian wine markets: Okanagan and Niagara

In 2011, if we account only for wine producers (excluding fruit wines and ciders), there are about 390 wineries in Canada producing a little more than 4 million cases of wine (table 1). Ontario's premier wine regions include Niagara Peninsula, Lake Erie North Shore and Prince Edward County. British Columbia hosts the second largest producing regions including the Okanagan Valley, Fraser Valley and Vancouver Island and Similkameen Valley. Quebec is in the third place with currently 67 registered wineries.

Table 1: Canada wine producing regions in 2011, from West to East

| | Producers | Area (ha) | Production (Cases) |
|---|------------|-------------|--------------------|
| British Columbia | | | |
| Vancouver area (Fraser Valley and Island) | 25 | 190 | 100,300 |
| Okanagan Valley | 128 | 2790 | 1212,160 |
| Other sub-regions | 20 | 100 | 43,200 |
| Ontario | | | |
| Niagara Peninsula | 85 | 2550 | 1752,780 |
| Lake Erie North Shore | 12 | 440 | 679,400 |
| Prince Edward County | 27 | 195 | 73,000 |
| Other sub-regions | 5 | 40 | 9,200 |
| Quebec | | | |
| All regions | 67 | 420 | 122,720 |
| Atlantic Provinces | | | |
| New Brunswick, Nova Scotia, PE Island | 21 | 175 | 114,200 |
| | | | |
| Totals | 390 | 6900 | 4,106,960 |
| Source: WineAccess, Canadian Wine Annual 2012 | | | |

Each year, Canadian wineries are ranked by a performance score based on the number of medals awarded by a jury of expert and published by WineAccess.⁷ In 2010 and 2011, among the top 25 wineries, 20 are from the Okanagan valley and 12 from the Niagara Peninsula (the sum of the two years does not add to 25). None are from any other region in Canada. The

⁷ Wine Access magazine, its website and all associated programs have been discontinued in 2013. Awards are posted by the Canadian Wine Trail ([//canadianwinetrail.com/](http://canadianwinetrail.com/)).

study will therefore focus only on these two largest producing regions for which the area of production is very similar.

The next table 2 shows the market structure of producers for the two regions. The analysis is based on the production of wine bottles (by cases) rather than the size of the area of production. The level of production is 45% higher in the Niagara region (see table 1) which presents also a much higher level of concentration with a number equivalent of producers of 11 compared to 29 for the Okanagan region. The market power of the largest producers in the Niagara region is also much higher as shown by the dominance index.

Table 2: Market structure for the two largest producing regions in Canada

| | Okanagan Valley | Niagara Peninsula |
|--|-----------------|-------------------|
| Nb of wineries | 115 | 72 |
| Herfindah index H | 0.0343 | 0.0912 |
| Nb equivalent N* | 29 | 11 |
| Dominance index D | 0.00077 | 0.03014 |
| Note: The number of wineries is limited by data availability | | |

4. The empirical analysis

In this study, performance is measured by the score related to the number of awards gained by wineries rather than the financial performance of the wineries. The regression for the performance equation is an OLS analysis with 187 wineries. Market shares are calculated for each company in their two regions and the concentration level by region is measured by the Herfindahl index or the Dominance index. The correlation matrix (Appendix 1) shows no evidence of multicollinearity among the variables.

The results presented in table 3 provide a strong support for either the Relative-Market-Power (RMP) hypothesis or the Efficiency (ES) hypothesis. Nor the Herfindahl index or the Dominance index are significant in the equation. Instead, the coefficient associated with the

market-share value is positive and significant. If only RMP holds, the coefficient for concentration should be insignificant, and the efficiency variables should be relatively unimportant.

Two control dummy variables for efficiency are added in the equation. The age of the winery has a negative but non-significant impact on the performance. Outreville (2011) shows a similar result for wineries in the Québec wine market. On the other hand, the size of the winery, measured by the number of ha of the domain, is positive and significant. This result would suggest that larger firms, probably because of economies of scale, are more efficient, and because of greater efficiency are able to gain in market share and are performing better in terms of measured quality. This result provides support to the ES hypothesis.

Table 3: Results of the empirical analysis

| <i>Variables</i> | <i>Coeff</i> | <i>Std Error</i> | <i>T-statistic</i> | | <i>Coeff</i> | <i>Std Error</i> | <i>T-statistic</i> | |
|--|--------------|------------------|--------------------|--|--------------|------------------|--------------------|--|
| Constant | 287,04 | 302,13 | 0,95 | | 246,33 | 219,03 | 1,12 | |
| Herfindahl Index | -1241,14 | 4352,79 | -0,29 | | | | | |
| Dominance Index | | | | | -2406,22 | 8438,84 | -0,29 | |
| Market-Share | 493,08 | 122,62 | 4,02 ** | | 493,08 | 122,62 | 4,02 ** | |
| Age | -18,73 | 20,29 | -0,92 | | -18,73 | 20,29 | -0,92 | |
| Size | 9,23 | 3,67 | 2,51 ** | | 9,23 | 3,67 | 2,51 ** | |
| R-squared/ F-statistic | 0.26/15.9 | | | | 0.26/15.9 | | | |
| Note: ** significant at the 0.01 level | | | | | | | | |

5. Conclusion

The purpose of this research is to examine the relationship between market structure and performance in the wine sector using data from two Canadian provinces. The paper investigates alternative hypotheses, i.e. the Structure-Conduct-Performance (SCP), the Relative-Market-Power Hypothesis (RMP) and the Efficiency (ES) hypothesis. The number

of awards gained by wineries rather than the usual financial performance measures performance. Using regression analysis, we find support to the efficiency hypothesis.

The empirical findings suggest that more research should be done on the efficiency structure of wineries in their respective markets. The ES hypothesis posits that performance is the result of firm's specific advantages that firms with greater efficiency can gain in market share, control prices and be more profitable. A study of the prices and costs structure, unfortunately not available for our study, would certainly provide more interesting results to this issue. A replication of this analysis in other markets would certainly provide a useful validation.

6. References

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Appendix 1: Correlation matrix

| | Herfindahl | Market Share | Size | Age |
|--------------|------------|--------------|--------|-------|
| Herfindahl | 1.000 | 0.039 | 0.0595 | 0.109 |
| Market Share | 0.039 | 1.000 | 0.648 | 0.701 |
| Size | 0.059 | 0.648 | 1.000 | 0.536 |
| Age | 0.109 | 0.701 | 0.536 | 1.000 |