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Re-examining the market structure effects on hotel performance using market share inequality

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ABSTRACT

Previous studies have suggested that the Herfindahl–Hirschman Index (HHI) does not adequately account for market structure. To remedy this problem, this article further decomposes the HHI into two components: the number of competitors and market share inequality. Using the metropolitan-level data of tourist hotels in Taiwan, this article estimates the effect of these variables on hotels' profits. This article shows that while a single measure of the HHI does not have a significant effect on hotels' profits, decomposing HHI leads to different results. It shows that increasing the number of competitors may improve hotels' profitability, and by contrast, greater inequalities in market shares may be detrimental to the profit in the room market.

1. Introduction

In the research in industrial organization, a long-standing paradigm, known as the "Structure-Conduct-Performance (SCP)" paradigm, argues that market structure has a direct impact on firms' conducts, and consequently it influences firms' performance such as profitability (Carlton and Perloff, 2005). The SCP paradigm fundamentally argues that since collusive behavior is more likely to exist in markets with greater degree of concentration, higher market concentration facilitates higher profitability; see Bain (1951) and Schmalensee and Willig (1989) for a comprehensive review.

To measure the degree of market concentration, the Herfindahl–Hirschman Index (HHI) is defined as the sum of the squared market shares of all firms in a market. Notably, it is a widely used as a measure of market structure with respect to the firm-composition of markets. As argued by Rhoades (1995), this index is a predominant measure of market concentration, but it does not suffice to account for the inequality of market shares. To exemplify this fact, let us consider two markets with very different shares of constituent firms (S_i) as follows:

$$\text{market}\ \ 1\,(s_1, s_2, s_3, \ldots\ldots s_{100}) = (0.49, 0.01, 0.01, \ldots\ldots 0.01),$$

$$\text{market}\ \ 2\,(s_1, s_2, s_3, s_4) = (0.25, 0.25, 0.25, 0.25)$$

In market 1, firm 1 has a market share of 0.49, and other 99 firms all have an equal market share of 0.01; by contrast, market 2 has four firms with an equal market share of 0.25. While these two markets obviously exhibit great diversity of market share inequality, they have the same HHI = 0.25. In addition, Hannan (1997) points out that the measure of the inequality of market shares may have implications for strategic behavior. For markets with greater inequality, dominant firms are more likely to exploit their market power to preempt the output expansion of other smaller firms or to deter other potential entrants.

This article intends to empirically investigate the relationship between market structure and hotels' profitability using the metropolitan-level data of tourist hotels in Taiwan. To remedy the problems of HHI mentioned above, in light of the approach of Hannan (1997), this article further decomposes HHI into two components: market share inequality and the number of competitors. This article shows that although a single measure of the HHI does not have a significant impact on hotels' profits, decomposing the HHI leads to different results. It shows that increasing the number of competitors may improve hotels' profitability; one possible explanation is that an increasing number of product choices increases consumers' search costs and improve hotels' profitability. It also shows that greater inequalities in market shares may be detrimental to the profit in room market; this is because a greater disparity in shares makes collusion less possible.

Numerous studies have attempted to validate the link between market structure and firms' profitability using either inter-industrial or intra-industrial data. However, only a few studies in this line of research are relevant to the hotel industry. For

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Table 1
Definitions and descriptive statistics of variables.

Variable	Definition	Mean	S.T.D
Profit	Operating profitability	9.9097	19.2660
HHIR	Measurement of market concentration in room market	0.1160	0.0687
HHIF	Measurement of market concentration in F&B market	0.1232	0.0704
Number	Number of competitors	17.9824	8.4310
IEQR	HHI inequality in room market	0.1826	0.0713
IEQF	HHI inequality in F&B market	0.0105	0.0141
Roomq	Room service quality	0.4043	0.2125
F&Bq	F&B service quality	0.1213	0.0941
Chain	Type of operation (1 = chain hotel, 0 = independent hotel)	0.5000	0.5005
Distance	Distance to nearest international airport	50.3891	40.5012

example, Davies (1999) examines the link between market concentration and hotel's profitability using the data of UK. Pan (2005) investigates similar questions using the data of tourist hotels in Taiwan. His results indicate that market concentration has a positive and significant effect on hotels' profitability; moreover, the effect of market concentration in the F&B market is insignificant. Particularly, these studies do not incorporate the inequality of market shares in the empirical model.

For market share inequality, this article incorporates the inequality in the room market as well as in the food and the beverage (F&B) market. This specification follows a similar one in Pan (2005), and the justifications for incorporating these two separate measures are as follows. First, hotels face different competitors and potential entrants in the room market and F&B market. Second, the relative importance of F&B revenue is a distinctive feature of tourist hotels in Taiwan as well as other Asian countries (Chen and Chang, 2012; Whitla et al., 2007). Finally, the profit margins in room markets and F&B markets may vary considerably. On account of these reasons, this article incorporates the measures of market structure in both the room market and the F&B market.

2. Data and methodology

This paper attempts to investigate the impact of market structure on hotel profitability using the property-level data of international tourist hotels (hereafter, ITHs) in Taiwan during the time frame from 1996 to 2009. The data used in this article comprise all the ITHs in three metropolitan areas in Taiwan: Taipei, Taichung, and Kaohsiung; more than half of the Taiwanese ITHs are located in these three metropolitan areas. The advantage of using metropolitan-level data lies in the accurate measurement of the market structure of three distinct geographic regions: northern area (Taipei), central area (Taichung), and southern area (Kaohsiung).

To investigate the questions mentioned above, we formulate two regression models as follows:

$$\text{PROFIT}_{it} = \alpha_0 + \alpha_1' \,\text{HHI}_{it} + \alpha_2' X_{it} + u_i + \varepsilon_{it}. \quad (1)$$

$$\text{PROFIT}_{it} = \beta_0 + \beta_1' \,\text{Number}_{it} + \beta_2 \text{IE}_{it} + \beta_3' X_{it} + u_i + \varepsilon_{it}. \quad (2)$$

In Eq. (1), the variable PROFIT_{it} denotes a hotel i's profitability in the year t, and it is calculated by the ratio of net operating profits before tax to operating costs; the variable HHI_{it} denotes the Herfindahl–Hirschman Index. In Eq. (2), the variable Number_{it} stands for the number of other competitors in the market where the hotel i is located in the year t; the variables IER and IEF represent the market share inequality of room market and F&B service market respectively. In addition, X is a vector of exogenous variables that affects the profitability of hotels, such as hotel characteristics and macroeconomic variables. Finally, the component u_i is the random disturbance that characterizes the ith observation and is a constant over time. Note that Eq. (2) decomposes the HHI into two components: the number of competitors and market share inequality. Table 1 presents the definitions and the descriptive statistics of the variables used in this article.

Following the approach of Rhoades (1995), this paper measures the inequality of market shares by summing up the differences between market shares of contiguous hotels; that is, $\text{IE} = \sum_{i=1}^{n}(\text{MS}_i - \text{MS}_{i+1})$, where MS_i represents the market share of the hotel i. Furthermore, the regression model includes both variables IER and IEF because of the relative importance of F&B revenue, which is a distinctive feature of tourist hotels in Taiwan as well as other Asian countries (Whitla et al., 2007; Yeh et al., 2012). For example, F&B revenue accounts for 44.2% of total revenue, higher than 42.4% constituted by room revenue, for international tourist hotels in Taiwan between 1996 and 2007; likewise, F&B revenue accounts for 41.8% of total revenue for tourist hotels in Hong Kong (Cho and Wong, 2001).

Similar to Wang et al. (2006), this article uses the ratio of housekeeping staffs per guestroom and the ratio of F&B staff per floor area as a proxy for room service quality (Roomq) and F&B service quality (F&Bq), respectively. The rationale for using this measurement of service quality is that sufficient staff numbers may lead to a reduction of each client's waiting time.

Amongst other explanatory variables, the variable Chain denotes a dummy that indicates whether a hotel joins a hotel chain; the variable Dis represents the distance from each hotel to the nearest international airport. Numerous studies have shown that that joining hotel chains has a significant impact on hotels' performance (Chen, 2007; Chiang et al., 2004; Hwang and Chang, 2003), and Hu et al. (2010) argue that the financial performance of a hotel greatly depends on its location.

As indicated by Demsetz (1973), a causality problem may exist between market structure and firms' profitability because both may be affected by some common covariates such as efficiency. Hence, in the regression models of Eqs. (1) and (2), the market structure variables (HHI, Number, and IE) are likely to be endogenous in estimating hotels' profits. To account for this endogeneity problem, this paper uses the lagged values as the instruments for estimating hotel's profitability. This approach follows the one proposed by Alexander (1997), who further demonstrates that the estimates are asymptotically unbiased in his model provided that the residuals are not serially correlated.

3. Results and discussions

We estimate Eqs. (1) and (2) by employing the panel-data regression models, and Tables 2 and 3 report the empirical results. In Table 2, we find that all market structure variables are statistically insignificant; as previously mentioned, this may be caused by the endogeneity problem. To avoid this problem, we use the lagged values of those variables to estimate the models. Furthermore, to