Original Research Article

How well does advertising work on restaurant performance? A dynamic and quadratic approach

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ABSTRACT

This study investigated the dynamic and quadratic relationships between advertising and restaurant performance. For this investigation, three stage least squares estimation was adopted to analyze the advertising effects of 137 U.S. public restaurant firms from 1991 to 2016. Stock value, sales, and profitability were used as measures of restaurant performance. The findings showed the quadratic effect of advertising spending on all three performance measures, indicating that advertising effects change according to the level of firms' advertising spending. The effect of sales and profitability on advertising spending was also significant, which supports their dynamic relationships in the restaurant context. Restaurant managers are advised to plan their advertising budget by taking into account their different performance goals and changing advertising effectiveness.

1. Introduction

Advertising has become greatly popular and even commonplace in the restaurant industry nowadays (Hyun et al., 2011). It has been widely recognized that advertising creates consumers' product awareness and assists them in making informed purchase decisions; enhances consumer demands and improves profitability; and facilitates gaining competitive advantages over their rivals (Hsu and Jang, 2008; Park and Jang, 2012). Along with the increasing role and importance of advertising, the average spending on advertising per public restaurant firm has grown drastically from $12.2 million in 1991 to $48.1 million in 2016 (Computstat, 2017). According to AdvertisingAge (2015), the restaurant industry ranked fifth in advertising spending across all industries in the U.S. ($6,049 million), and the top restaurant advertisers include McDonald's ($802 million), Starbucks ($445 million), and Taco Bell ($366 million). Despite the widespread prevalence of and enormous investment in advertising, few efforts have been devoted to investigating precisely the relationship between advertising and restaurant performance (Park and Jang, 2012).

The primary approach of previous marketing and finance studies on this topic was to examine advertising effectiveness using accounting performance measures (e.g., sales and profitability) (Acar and Temiz, 2017; Cuaresma and Stoeckl, 2012; Kim et al., 2015; Tellis, 2009). McAlister et al. (2016) argued that accounting performance measures cannot capture a complete picture of advertising effects on firm

performance because the traditional accounting system focuses on tangible assets in a specific short period of time. However, advertising not only boosts immediate consumer demand for marketed products, leading to an increase in sales and profitability, but also creates brand equity which affects consumer purchase accumulatively and persistently (Joshi and Hanssens, 2010; Kim et al., 2015; Wang et al., 2009). Indeed, a substantial delay is often observed between advertising and its financial outcomes (Conchar et al., 2005; Kim and McAlister, 2011). Thus, it is crucial to assess advertising effectiveness in the long run by considering its carryover impact on firm performance (Ali Shah and Akbar, 2008).

Contrary to accounting performance, value performance incorporates current and expected performance (Rao et al., 2004). Stock value, one measure of value performance, reflects the expected value of future cash flows as well as the value of intangible assets (e.g., brand equity and consumer loyalty) (Eng and Keh, 2007). This advantage of value performance has led to the extensive use of stock valuation analysis in assessing advertising effects on overall firm performance in the long run (e.g., Chemmanur and Yan, 2010; Kim and McAlister, 2011; Luo and de Jong, 2012; Srinivasan et al., 2009; Vitorino, 2014). However, the effect of advertising on stock value has been inconsistent in previous studies (e.g., Luo and de Jong, 2012; Tuli et al., 2012). As these findings suggested that the effect of advertising can change according to situations, it is improper to apply the inconsistent findings to the restaurant industry. Moreover, although many restaurant businesses

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have extensively adopted advertising with the purpose of selling out as many products as possible on a daily basis due to product perishability, the extended effect of advertising has rarely been investigated with the stock valuation analysis. Thus, the present study attempted to fill this research gap by comprehensively examining advertising effects on both value performance (i.e., stock value) and accounting performance (i.e., sales and profitability) in the restaurant industry.

This study has two unique features in investigating those relationships. First, we investigated the dynamic relationships between advertising and firm performance based on organizational adaptive learning theory. According to the theory, firms modify their activities based on both the outcomes of the same activities in the past and the analysis of the present business environments (Argyris, 1977; Baker and Sinkula, 1999; Sridhar et al., 2014). Industrial practitioners employing adaptive learning constantly monitor changes in firm performance resulting from advertising to develop an advertising budget and adjust advertising spending (Mantrala et al., 2007). Given this adaptive learning practice, this study attempted to identify the cause-and-reaction chain between advertising and firm performance in the restaurant context.

Second, the present study examined a quadratic effect of advertising on restaurant performance. Fierce advertising competitions in the restaurant industry make it challenging for an individual business to translate its advertising spending into firm performance (Bass et al., 2007; Kim et al., 2015). Furthermore, although advertising is generally beneficial to firms by attracting consumers and creating brand equity, excessive advertising can level off its positive effect increasing marketing and promotion costs and often even have a negative impact on firm performance (Vakratsas and Ambler, 1999). However, many previous studies have simply modelled firm performance as a linear function of advertising spending, which ignored the aforementioned complicated situations (e.g., Han and Manry, 2004; Kim and McAlister, 2011; Peterson and Jeong, 2010). Such a model misspecification may explain the controversy of advertising effects on firm performance in previous studies (e.g., Greuner et al., 2000; Ventoura-Neokosmidi, 2005).

For the investigation of the bidirectional and quadratic linkage between advertising and restaurant performance, the present study specifically 1) examined the association between advertising and sales; 2) evaluated the linkage between advertising and profitability; and 3) identified the relationship between advertising and stock value. Findings of this study shed new light on the dynamic relationship between advertising and firm performance, which enriches the research body of advertising effects in the restaurant industry. The non-linearity (quadratic) assumption creates a new venue to more precisely detect advertising effects on firm performance and redefine their relationship, which is of keen interest to shareholders and managers.

2. Literature review

2.1. Effect of advertising on firm performance

Rust et al. (2004) suggested that the effectiveness of marketing activities, including advertising is assessed from four approaches. The first approach, called *customer impact*, deals with the changes in consumers' mindset that can be aggregately measured with intangible assets (e.g., brand equity and customer satisfaction). In contrast to *customer impact*, the other three approaches, including *market impact*, *financial impact*, and *impact on firm value*, focus on firm performance affected by marketing activities. *Market impact* explains marketing activities' fundamental role of increasing consumer demand whereas *financial impact* investigates profitability considering cost-effectiveness. The *market impact* and *financial impact* perspectives are assessed with accounting performance measures (i.e., sales and profitability, respectively). The fourth perspective called *impact on firm value* is gauged with value performance measures (e.g., stock value and Tobin's q) which are forward looking in that they capture demand and profitability prospects

and their sustainability. For the investigation of advertising effects on overall corporate gains which are reflected as improved firm performance, this study adopted the last three approaches and corresponding measures—namely, *market impact* (i.e., sales), *financial impact* (i.e., profits), and *impact on firm value* (i.e., stock value). The first two approaches describe a business's accounting performance; the last one depicts value performance.

2.1.1. Effect of advertising on accounting performance

The *market impact* approach is to use sales to measure advertising effects. Effective advertising can increase product awareness amongst the public and encourage purchases from responsive consumers in the short run (Chauvin and Hirschey, 1993; Luo and Donthu, 2001). Accordingly, advertising is expected to boost consumer demand, which is a driving force for sales increase (Assaf et al., 2015). Such an advertising–sales linkage has been demonstrated in many previous studies in general business disciplines (e.g., Cuaresma and Stoeckl, 2012; Eng and Keh, 2007; Yiannaka et al., 2002). This positive impact of advertising on sales has also been confirmed in the restaurant industry (e.g., Kim et al., 2015; Park and Jang, 2012, 2015).

Under the *financial impact* approach, another accounting performance measure, profitability, is used to assess advertising effects. In addition to sales increase, advertising offers many other financial benefits, including reduction in distribution costs, price premium, high entry barriers, economies of scale, and second-mover advantages (Ali Shah and Akbar, 2008; Kaul and Wittink, 1995; Sridhar et al., 2014). These benefits are expected to generate earnings gains for a business; thus, profitability is indicative of advertising effectiveness (Andras and Srinivasan, 2003; Notta and Oustapassidis, 2001). However, some previous studies failed to detect the positive relationship between advertising and profitability (Martín-Oliver and Salas-Fumás, 2008; Ventoura-Neokosmidi, 2005). Others even found that advertising has a negative impact on profitability (Greuner et al., 2000; Kim et al., 2015). These inconclusive findings indicated that advertising effects may vary based on different levels of advertising spending, meaning there is no guarantee that advertising carries positive returns (Ali Shah et al., 2009; Peterson and Jeong, 2010). Banerjee and Bandyopadhyay (2003) further suggested that a non-linear relationship between advertising and profitability may exist. Upon the non-linearity assumption, the present study particularly investigated the quadratic effect of advertising on profitability. The rationale of the quadratic advertising effects is explained in Section 2.1.3.

2.1.2. Effect of advertising on value performance

Besides accounting performance measures including sales and profitability, value performance measures such as stock value have been useful in assessing advertising effects. It has been widely recognized that advertising has both the short- and long-run impacts on consumer purchase (Conchar et al., 2005; Joshi and Hanssens, 2010). Advertising stimulates consumers' immediate product selection, which instantaneously and directly changes firm performance (Kim et al., 2015). Advertising also persistently affects consumers' purchase decisions by creating their sustainable memory for advertised products (Vakratsas and Ambler, 1999). This carryover outcome called intermediate effect is demonstrated through brand equity over the long run (Wang et al., 2009). Although sales and profitability can effectively capture an instantaneous effect of advertising, these two accounting measures are restricted in reflecting a carryover effect in that they only show a business's financial outcome in a given short period of time (Ali Shah and Akbar, 2008; Conchar et al., 2005). As these advertising effects on firm performance are likely to accrue in the subsequent future periods of time, it is challenging to precisely match advertising spending with the corresponding changes of sales and earnings (Kim et al., 2015). Thus, the accounting performance measures would create a bias in estimating the advertising effects (Peterson and Jeong, 2010). On the other hand, stock valuation analysis is helpful for assessing both

instantaneous and carryover effects of marketing activities, as stock value reflects the current and future profitability of firm investments or spending (Ali Shah and Akbar, 2008). In this sense, stock value can be supplemental to accounting performance in effectively measuring advertising effects (Ali Shah and Akbar, 2008; Hirschey, 1982).

The relationship between advertising and stock value could be explained from three perspectives. First, compelling advertising is persuasive and informative, so that consumers are attracted by the emphasized advantages of an advertised product or reasonably induced to select the product (Bagwell, 2007). The increases in consumer demand led by advertising positively affect firm accounting performance, which is further reflected on the rising stock value. These persuasive and informative views explain the primary path by which product advertising has an impact on stock value through sales and profitability. Second, the spillover effect provides an alternative explanation for the relationship between advertising and stock value (Kim and McAlister, 2011; Srinivasan and Hanssens, 2009). Product differentiation addressed in an advertisement helps build brand equity for the business (Ali Shah and Akbar, 2007; Gu and Li, 2010). Improved brand awareness and brand perception can spill over into decisions of both consumers and investors, thereby driving the demand for familiar brands and the investment in their stocks (Frieder and Subrahmanyam, 2005; Kim et al., 2015; Luo and de Jong, 2012). This spillover effect is applied to not only product advertising but also institutional advertising that promotes corporate identity (Ali Shah and Akbar, 2008). Third, advertising itself is a signal of a firm's financial health and competitiveness, which is called signaling effect (Luo and de Jong, 2012; Peterson and Jeong, 2010). The act of advertising, regardless of its content, indicates that the firm's financial condition is healthy enough to fund marketing activities and invest in product quality (Lou, 2014; Wang et al., 2009). Accordingly, the increase in advertising spending leads to a rise in the firm's stock value reflecting the expectation of higher future cash flow (Kim and McAlister, 2011; Tuli et al., 2012).

Given the aforementioned rationales, stock value has been used in previous studies to examine advertising effects on firm performance. Luo and de Jong (2012) derived abnormal stock returns from the Fama-French four-factor model to measure changes in stock value and then adopted panel fixed-effects estimation to investigate the influence of advertising spending on stock value, confirming their positive relationship. Furthermore, some previous studies verified the positive relationship between advertising and stock value in diverse industries, including automobiles, athletic shoes, personal computers, pharmaceuticals, and many others (Joshi and Hanssens, 2010; Osinga et al., 2011; Srinivasan et al., 2009). However, several studies reported contradictory results. For example, Tuli et al. (2012) showed that advertising has an impact on stock returns in the retail industry only when a retail firm experiences a significant increase in its earnings. Conchar et al. (2005) investigated 88 models for the relationship between advertising and stock value, but did not find supporting evidence for 21 of the models. Han and Manry (2004) showed the negative impact of advertising on the stock value of Korean firms using Ohlson's equity valuation framework. Kim and McAlister (2011) found that for the non-leading national advertisers, advertising spending is negatively related to abnormal stock returns. The inconsistency of advertising effects makes it difficult to apply such existing findings to the restaurant industry, suggesting that the sign and size of advertising effects may vary depending on industrial contexts. Thus, it is necessary to examine advertising effects on stock value specifically in the restaurant industry. In addition, the inconsistent results on the relationship between advertising and firm performance may be attributable to different advertising effects according to the level of advertising spending (Luo and Donthu, 2006). In this reasoning, the present study proposed a non-linear (quadratic) relationship between advertising and stock value as the assumption of the research model.

2.1.3. Quadratic effect of advertising on firm performance

Based on the discussions in Sections 2.1.1 and 2.1.2, it is anticipated that the non-linear relationship exists between advertising and firm performance (i.e., accounting performance and value performance). The quadratic relationship seems to be especially applicable to the restaurant industry characterized by advertising clutter. This quadratic effect of advertising in the restaurant industry can be explained by the wear-out effect referring to the decay in the advertising effects. The wear-out effect often results from repetitive advertisements (Bruce et al., 2012; Naik et al., 1998) which are common in the restaurant industry (Kim et al., 2013). When consumers continue to be exposed to repeated advertisements in a certain period, their interests in the advertised product decrease. Moreover, once consumers acquire enough information about the advertised product, they are likely to perceive the advertisements as worthless (Bruce et al., 2012). In this regard, advertising effects on restaurant businesses may decrease beyond the optimum level of advertising spending, and then become negative with excessive advertising spending which deteriorates firm performance. The present study investigated such a potential quadratic relationship between advertising and restaurant performance.

2.2. Effect of firm performance on advertising

The relationship between advertising and firm performance can be bidirectional, rather than unidirectional from advertising to firm performance. The adaptive learning theory in the organizational behavior discipline could be used to support this dynamic relationship between advertising and firm performance (Mantrala, 2002; Sridhar et al., 2014). Adaptive learning is a primary perspective of organizational behavior that explains the cyclical process of implementing strategies, evaluating the performance of the strategies, and modifying the strategies based on the performance results and present business environments (Slater and Naver, 1995; Vakratsas and Ma, 2009). Firms employ adaptive learning strategies for effective resource management. In the decision-making process of resource allocation for advertising, firms' adaptive learning takes three forms. First, Vakratsas and Ma (2009) indicated that a firm's adaptation behavior occurs in response to demand trends. The demand for a product measured by sales shows consumers' responses to its advertising strategy. The continuous increase in sales indicates that the advertising strategy is effective in creating product demand. Accordingly, more resources may be allocated to this advertising strategy, which is expected to place the firm in a better position of the marketplace. Sridhar et al. (2014) investigated the impact of sales on advertising spending among high technology firms between 1990 and 2011 and confirmed their positive relationship. Second, advertising budget could be driven by profitability (Mantrala et al., 2007). As with sales, improved profitability leads managers to invest more in advertising that has been proven to be effective (Joshi and Hanssens, 2010; Mantrala et al., 2007). The third form of firm adaptation is the reaction to stock value. The growth in stock value means that the strategy adopted by the firm at present can generate economic benefits in the long run. Thus, the firm is inclined to maintain this successful strategy without making any significant modifications (Markovitch et al., 2005). On the other hand, a firm is likely to take more aggressive actions to reverse the negative status quo when the decline in its stock value is observed (Markovitch et al., 2005). Intensive advertising can be one of the strategic options in distressing situations (Srinivasan et al., 2011). Sridhar et al. (2014) suggested that firms significantly increase the advertising spending when their stock returns decrease. Upon the aforementioned rationales built on adaptive learning theory, this study expects that past firm performance impacts the present decision on advertising spending.

In sum, based on the discussions thus far, the present study posits the dynamic and quadratic relationships between advertising spending and firm performance. By investigating these relationships, the present study ponders three research questions: 1) Does advertising affect firm
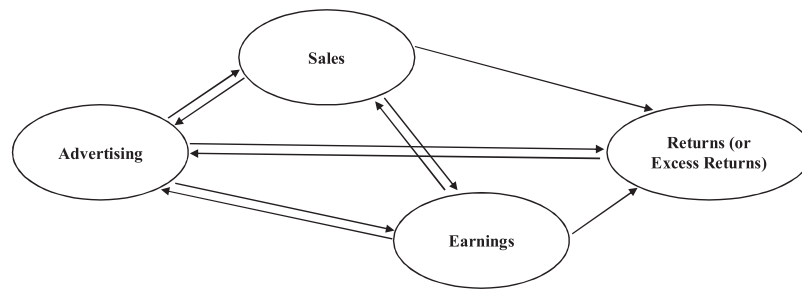
Fig. 1. Proposed research model.

Table 1
Variables and measures.

Variable	Measure
Advertising (ADV)	Annual advertising expenditure / Total assets
Advertising squared (ADVSQ)	The quadratic term of ADV calculated as $(ADV - Mean)^2$
Sales (SALE)	Annual sales / Total assets
Sales squared (SALESQ)	The quadratic term of SALE calculated as $(SALE - Mean)^2$
Earnings (EAR)	Return on assets calculated as Annual operating earnings / Total Assets
Earnings squared (EARSQ)	The quadratic term of EAR calculated as $(EAR - Mean)^2$
Stock return (RET)	Annual stock return calculated as $(Market\ capitalization(MC)_t - MC_{t-1} + Dividend_t) / MC_{t-1}$
Excess stock return (ERET)	Annual excess stock return measured by the difference between RET_t and Market Index $Return_t$ which is defined as $(S\&P\ 500_t - S\&P\ 500_{t-1}) / S\&P\ 500_{t-1}$
Growth in advertising (ADVG)	Annual growth in advertising expenditure calculated as $(ADV_t - ADV_{t-1}) / ADV_{t-1}$
Growth in sales (SALEG)	Annual growth in sales calculated as $(SALE_t - SALE_{t-1}) / SALE_{t-1}$
Growth in earnings (EARG)	Annual growth in earnings calculated as $(EAR_t - EAR_{t-1}) / EAR_{t-1}$
Industry size (IS)	Natural log of the total annual sales in the restaurant industry
Industry growth (IG)	Annual growth in industry size calculated as $(IS_t - IS_{t-1}) / IS_{t-1}$
Industry competition (IC)	Annual four-firm concentration in the restaurant industry calculated as the sum of square of market shares of the four largest restaurant firms (HHI)
Market share (MS)	The ratio of annual sales to industry size
Financial leverage (FL)	The ratio of total liabilities to total shareholders' equity
Firm fixed-effects (u_i)	Firm invariant estimator, i = 1 to 137
Year fixed effects (r_t)	Year variant estimator, t = 1991 to 2016

performance in the restaurant industry?; 2) Are restaurant advertising effects on firm performance quadratic?; and 3) Does restaurant firm performance, in turn, affect their advertising spending in the following period? The conceptual model of the dynamic and quadratic relationships is illustrated in Fig. 1.

3. Methodology

3.1. Data

This study derived 26 years (1991–2016) of annual financial and stock price data on restaurant firms (SIC code 5812) and stock market index (S&P 500) from the Compustat and the Center for Research in Securities Prices database. The observations that had no value in any financial variables or stock prices were excluded from the sample. We then deleted four outliers that were detected using the absolute value of standardized residual (Tabachnick and Fidell, 2006). Consequently, this study used 1096 observations from 137 restaurant firms for data analysis.

3.2. Model and variables

To test the proposed dynamic relationships among advertising, two accounting performance measures, and stock value, this study constructed a system of equations model consisting of the following models:

$$ADV_t = \beta_1 ADV_{t-1} + \beta_2 SALE_{t-1} + \beta_3 EAR_{t-1} + \beta_4 RET_{t-1} + \beta_5 SALESQ_{t-1} + \beta_6 EARSQ_{t-1} + \beta_7 RETSQ_{t-1} + \beta_8 ADVG_{t-1} + \beta_9 SALEG_{t-1} + \beta_{10} EARG_{t-1} + \beta_{11} IS_t + \beta_{12} IG_t + \beta_{13} IC_t + \beta_{14} MS_t + \beta_{15} FL_t + u_i + r_t + \varepsilon_t \quad \text{(Model 1)}$$

$$SALE_t = \gamma_1 SALE_{t-1} + \gamma_2 ADV_t + \gamma_3 ADVSQ_t + \gamma_4 EAR_{t-1} + \gamma_5 ADVG_t + \gamma_6 SALEG_{t-1} + \gamma_7 EARNG_{t-1} + \gamma_8 IS_t + \gamma_9 IG_t + \gamma_{10} IC_t + \gamma_{11} MS_t + \gamma_{12} FL_t + u_i + r_t + \varepsilon_t \quad \text{(Model 2)}$$

$$EAR_t = \delta_1 EAR_{t-1} + \delta_2 ADV_t + \delta_3 ADVSQ_t + \delta_4 SALE_t + \delta_5 ADVG_t + \delta_6 SALEG_t + \delta_7 EARG_{t-1} + \delta_8 IS_t + \delta_9 IG_t + \delta_{10} IC_t + \delta_{11} MS_t + \delta_{12} FL_t + u_i + r_t + \varepsilon_t \quad \text{(Model 3)}$$

$$RET_t\ (\text{or } ERET_t) = \theta_1 RET_{t-1}(\text{or } ERET_{t-1}) + \theta_2 ADV_t + \theta_3 ADVSQ_t + \theta_4 SALE_t + \theta_5 EAR_t + \theta_6 ADVG_t + \theta_7 SALEG_t + \theta_8 EARG_t + \theta_9 IS_t + \theta_{10} IG_t + \theta_{11} IC_t + \theta_{12} MS_t + \theta_{13} FL_t + u_i + r_t + \varepsilon_t \quad \text{(Model 4)}$$

Model 1 is the advertising equation which describes advertising expenditures (ADV) of restaurant firms as a function of previous firm performance. It includes firm sales (SALE), operating earnings (EAR), and their growth rate (SALEG and EARG) and stock returns (RET or ERET). The quadratic terms of SALE, EAR, and RET (SALESQ, EARSQ and RETSQ) are additionally included in Model 1 to investigate the non-linear effects of previous firm performance on ADV at present. Models 2 and 3 (sales and profitability equations) express firm accounting performance, SALE and EAR, as a function of ADV and its growth (ADVG). The quadratic term of ADV (ADVSQ) is also added to the models to check the non-linearity of ADV. Model 4 consists of two stock value equations which specify RET and ERET as a function of advertising variables (ADV, ADVG and ADVSQ) and accounting performance variables including SALE, SALER, REVG, and EARG. In addition, all models have a lagged dependent variable to address serial correlation and three industrial variables (IS, IG, and IC) to control for industry-level effects.

Table 1 provides detailed descriptions of the variables. This study used each restaurant firm's annual advertising expenditure, annual sales, and annual profit to represent endogenous variables of ADV, SALE, and EAR, respectively. The variables are deflated by total asset to

control for the effect of firm size. Their growth rate variables of *ADVG*, *SALEG*, and *EARG* are measured by changes in the endogenous variables in relation to the previous year. *ADVSQ*, *SALESQ*, and *EARSQ* are quadratic terms of *ADV*, *SALE*, and *EAR*, which are computed by the mean-centered method that squares the variables centered at the mean. This method helps address multicollinearity between the original variable (e.g., *ADV*) and its quadratic form (e.g., *ADVSQ*) (Koh et al., 2009). Two stock returns of *RET* and *ERET* are the measures of stock value. *RET* is stock return calculated as the annual growth in the stock value of individual restaurant firms. *ERET* is excess stock return beyond the market index return calculated as the difference between individual stock return and the market index return. This study included industry size (*IS*), industry growth (*IG*), and industry competition (*IC*) in the models, which were widely used to capture the effects of industry factors (Kim et al., 2018; McAlister et al., 2016; Wang et al., 2009). *IS* refers to the total sales in the restaurant industry. This study takes the natural log of the total restaurant sales to hold the normality assumption. *IG* is given by an annual growth in the total sales in the restaurant industry. *IC*, measured by the Herfindahl-Hirschman Index (HHI), represents the level of competitiveness among firms within an industry. The increase in *IC* indicates that competition within the restaurant industry eases. In addition, this study used market share (*MS*) and financial leverage (*FL*) to control for the effects of firm-specific factors, following previous studies on advertising effects (Eng and Keh, 2007; Koh et al., 2009; Luo and de Jong, 2012; Srinivasan et al., 2009). *MS* is defined as a firm's sales divided by the total sales in the restaurant industry while *FL* represents the capital structure of a firm measured by the debt-to-equity ratio. Finally, the year (*r*) and firm (*u*) estimators were added to the models to capture the unobserved time and individual firm effects.

3.3. Model estimation

As all the dependent variables were taken to be independent variables in the system of four models, this study performed the Durbin-Wu-Hausman (DWH) test to check if endogeneity was present and endogeneity was identified in the system (Table 2). The result indicated that the coefficients estimated by ordinary least squares might be biased and inconsistent (Green, 2013). In addition, as the endogenous variables are firm performance measures and advertising expenditures which are closely intertwined, contemporaneous correlations among error terms in the system might arise. The Breusch-Pagan test was thus conducted and the test results confirmed that the error terms were significantly correlated (Table 2). Based on these results, the three stage least squares (3SLS) estimation was applied to the system to address both the endogeneity and contemporaneous correlation problems. To control time-variant effects and firm-specific effects, the two-way fixed-effects model was also employed along with the 3SLS estimation.

4. Results

4.1. Descriptive statistics

Table 3 summarizes the descriptive information of the primary variables. The mean value of advertising expenditures was 0.05,

Table 3
Summary statistics.

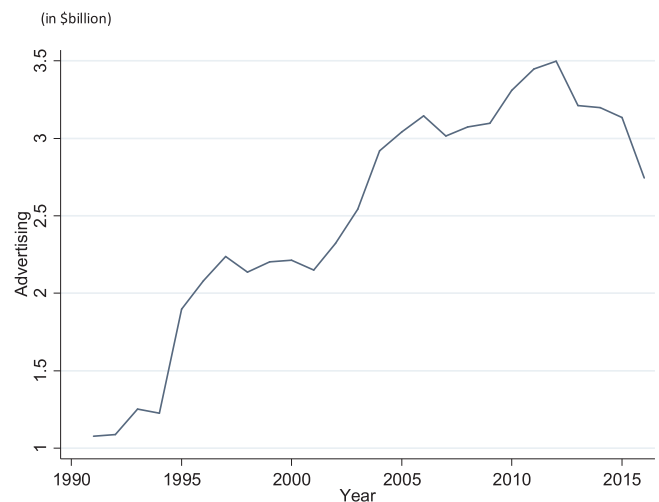| Variable	Mean	SD	Minimum	Maximum
ADV	0.049	0.040	0.000	0.398
SALE	1.614	0.732	0.016	5.281
EAR	−0.008	0.203	−1.161	0.831
RET	0.137	0.693	−0.999	9.976
ERET	0.049	0.683	−1.299	9.886
ADVG	0.141	1.318	−0.937	43.924
SALEG	0.080	0.926	−0.986	26.522
EARG	0.066	21.161	−167.36	110.989

(in $billion)

Fig. 2. Advertising spending of public restaurant firms.1991–2016.

indicating that a restaurant firm spent, on average, 5% of its total assets on advertising. The average growth rate of advertising expenditures appeared to be 14.1%. During the study period (1991–2016), the annual advertising expenditures of public restaurant firms appeared to have an upward trend until 2012 and then decreased over the last 4 years (Fig. 2).

Firm sales showed a mean value of 1.61, implying that the average sales volume of a restaurant firm was 1.61 times the total assets. Thus, a restaurant firm generated, on average, sales of $1.61 by using $1 of firm assets. The average annual sales of a restaurant firm grew by 8.0% over the period. The mean value of operating earnings was -0.01, indicating that the average operating earnings a restaurant firm created with $1 of assets was -$0.01. The annual growth in operating earnings was 6.6% on average. The mean value of stock returns was 0.14, meaning that the stock value of a restaurant firm increased annually by 14%. Excess stock returns had a mean value of 0.05, implying that the annual stock return of a restaurant firm exceeding the market index return was 5% on average.

4.2. Estimation results

We adopted the 3SLS approach to estimate the system of equations consisting of four models. The coefficient estimates of variables are

Table 2
Diagnostic tests.

	Model 1 (ADV)	Model 2 (REV)	Model 3 (EAR)	Model 4(RET or ERET)
DWH test for endogeneity	$F = 82.52^{***}$	$F = 227.19^{***}$	$F = 5.96^{**}$	$F = 3.78^{*}$ (1.95)
LM test: single equation	$\chi^2 = 1.12$	$\chi^2 = 0.85$	$\chi^2 = 0.27$	$\chi^2 = 0.09(0.06)$
entire system	$\chi^2 = 0.78$			
Breusch-Pagan test	$\chi^2 = 128.66^{***}$			

Note: 0.001***, 0.01**, 0.05*. The value in parenthesis shows the test result for Model 4 with excess stock returns.

Table 4
Estimation results.

|	Model 1 (ADV)	Model 2 (SALE)	Model 3 (EAR)	Model 4 (RET)	Model 4 (ERET)
AR term	0.744***	0.624***	1.332***	− 0.098**	− 0.084*
ADV		6.058**	0.338	− 3.592	− 1.277
ADVSQ		− 27.403***	− 18.858***	10.554*	14.926***
SALE	0.002		− 0.008	0.272**	0.220*
EAR	0.015***	0.202***		0.155**	0.389***
RET	− 0.001				
SALESQ	− 0.004***				
EARSQ	0.002***				
RETSQ	− 0.000				
ADVG	0.000	0.189***	0.009	− 0.063	− 0.010
SALEG	− 0.000	0.024**	− 0.077***	− 0.259	− 0.133
EARG	− 0.000	0.000	− 0.000	− 0.000	0.000
IS	− 0.186	− 3.549	− 1.351	− 16.084	− 1.468
IG	− 0.033	− 2.413	− 0.217	1.110	3.758
IC	− 0.000	− 33.032	− 0.001	− 0.006	0.002
MS	0.001	0.012	0.003	− 0.081*	− 0.091**
FL	− 0.000	− 0.000	0.000	0.000	0.000
R^2	0.797	0.751	0.828	0.142	0.134
F-statistics	36.92***	21.48***	70.93***	4.53***	4.20***

Note: 0.001***, 0.01**, 0.05*.
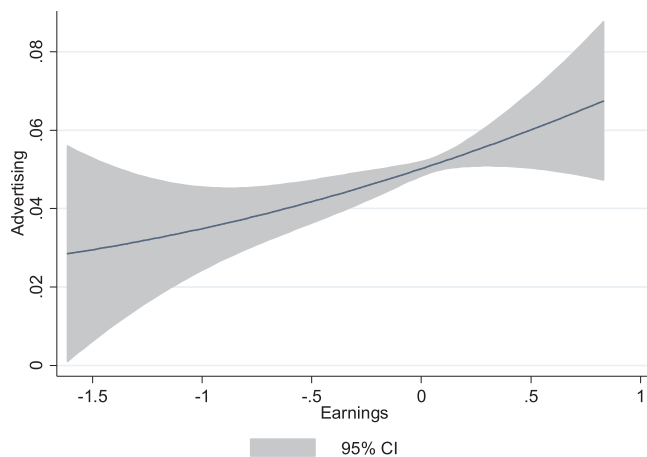
Fig. 3. The effect of profitability on advertising.
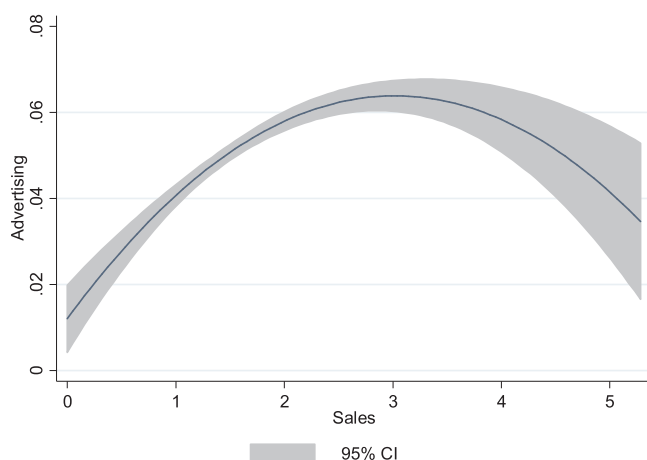

Fig. 4. The effect of sales on advertising.

reported in Table 4. In the advertising equation (Model 1), lagged advertising expenditures ($\beta = 0.744$, $p < 0.001$) and lagged operating earnings ($\beta = 0.015$, $p < 0.001$) had a significantly positive impact on advertising expenditures, indicating that the increased advertising expenditures and operating earnings in the previous year lead to higher advertising expenditures in the following subsequent year. The quadratic term of lagged operating earnings ($\beta = 0.002$, $p < 0.001$) was also significantly related to advertising expenditures. The shape of this quadratic effect was clearly increasing concave-up (Fig. 3), signifying that as earnings increase, their positive effect on advertising expenditures rises gradually. However, the quadratic term of lagged sales was significantly negative ($\beta = -0.004$, $p < 0.001$), implying that the growth in sales does not always drive higher advertising expenditures in the subsequent year. The quadratic effect of sales is represented as an inverted–U shape (Fig. 4), which has a maximum point at the sales of 3.141. Initially advertising expenditures increased along with sales growth, but the positive effect of sales on the advertising expenditures declined as sales increased further. After passing the maximum point, the advertising expenditures even dropped. The coefficient for lagged stock returns was not statistically significant on advertising expenditures.

In the analysis of the sales equation (Model 2), lagged sales ($\beta = 0.624$, $p < 0.001$), lagged sales growth ($\beta = 0.024$, $p < 0.01$), and operating earnings ($\beta = 0.202$, $p < 0.001$) all had a significantly positive impact on sales. The coefficients for advertising expenditures ($\beta = 6.058$, $p < 0.01$) and their growth ($\beta = 0.189$, $p < 0.001$) were also significantly positive on sales, which is consistent with previous findings from Cuaresma and Stoeckl (2012); Dekimpe and Hanssens (1995), and Park and Jang (2012). Moreover, a significantly negative quadratic impact of advertising expenditures ($\beta = -27.403$, $p < 0.001$) was found on sales. This study plotted this curvilinear relationship between advertising expenditures and sales, controlling for other variables, in Fig. 5, which showed an increasing concave-down pattern. Firm sales increased with higher advertising expenditures up to the expenditure value of 0.356. Then, despite any increases in advertising expenditures, the sales remained steady.

Findings from the analysis of the earnings equation (Model 3) showed that sales did not have an impact, but lagged operating earnings ($\beta = 1.332$, $p < 0.001$) had a significantly positive impact on operating earnings. Sales growth ($\beta = -0.077$, $p < 0.01$) was significantly negative on operating earnings indicating that an acceleration in sales growth deteriorates profitability. Although advertising expenditures had no significant impact, the quadratic term ($\beta = -18.858$, $p < 0.001$) was significantly negative on operating earnings. This curvilinear relationship between advertising expenditures and operating earnings, after controlling for the other variables is presented in Fig. 6. The relationship appeared to be inverted–U shaped with a maximum point at the advertising expenditure of 0.094. In other words, firm earnings
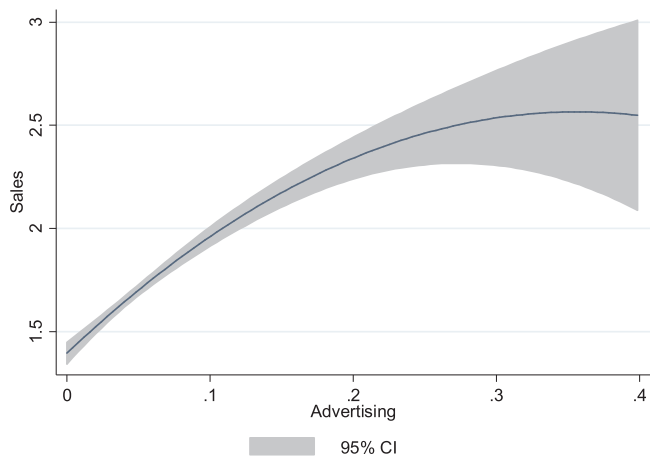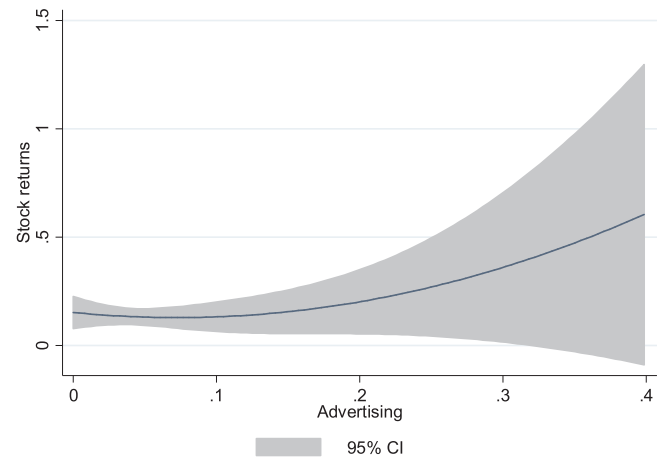
Fig. 5. Advertising effect on sales.
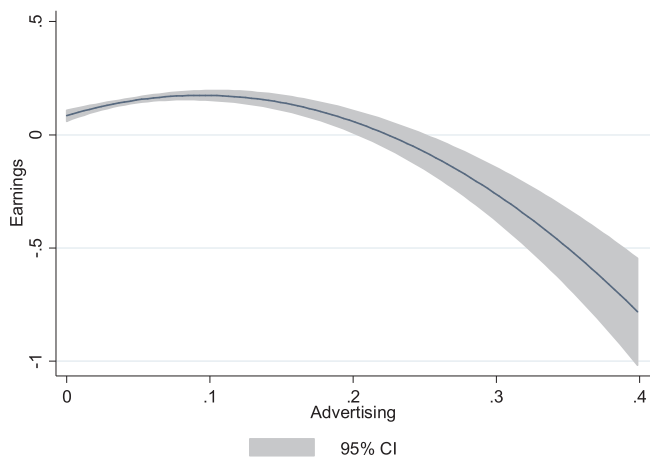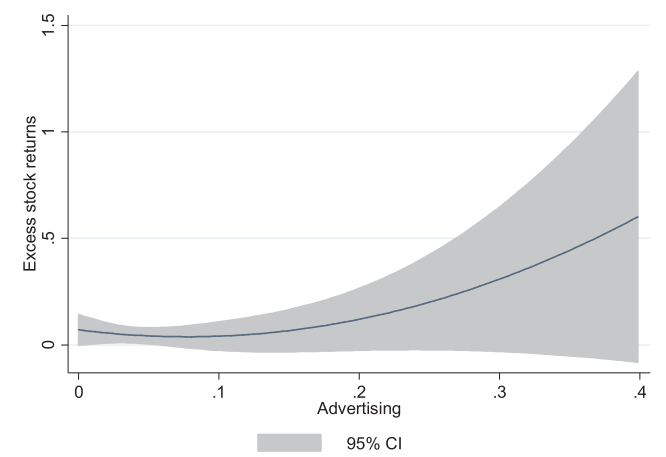

a. Advertising effect on stock returns

Fig. 6. Advertising effect on profitability.

b. Advertising effect on excess stock returns

Fig. 7. Advertising effects on stock value.
a. Advertising effect on stock returns.
b. Advertising effect on excess stock returns.

increased as advertising spending rose until the earnings reached the maximum point, but then the earnings, conversely, declined with higher advertising expenditures. When advertising expenditures were higher than 0.224, the earnings became negative.

The analysis results of two stock value equations are shown in Model 4. When stock returns regress, the effects of sales ($\beta = 0.272$, $p < 0.01$) and operating earnings ($\beta = 0.155$, $p < 0.01$) were significantly positive whereas lagged stock returns ($\beta = -0.098$, $p < 0.01$) and sales growth ($\beta = -0.259$, $p < 0.05$) had a significantly negative impact. For the analysis on excess stock returns, this study found that sales ($\beta = 0.220$, $p < 0.05$) and operating earnings ($\beta = 0.389$, $p < 0.001$) were significantly positive, but lagged excess stock returns ($\beta = -0.084$, $p < 0.080$) had a significantly negative impact. In both stock value equations, advertising expenditures had no impact, but their quadratic effect was signficantly positive on stock returns ($\beta = 10.554$, $p < 0.05$) and excess stock returns ($\beta = 14.926$, $p < 0.001$). Fig. 7 depicts the curvilinear relationships between advertising expenditures, and both stock returns and excess stock returns. Specifically, Fig. 7.a shows that the relationship between advertising expenditures and stock returns appeared to be increasing and concave-up. Overall, stock returns were steady until they reached a minimum point at the advertising expenditure of 0.073, but then increased as advertising expenditures rose. Excess stock returns in Fig. 7.b showed a similar shape as that of stock returns. Excess stock returns increased with higher advertising expenditures despite a steady state (or a very slight decline) in the first place (up to a minimum point at the advertising expenditure of 0.076).

With respect to industry factors, there was no significant variable in

all models. These findings imply that industry characteristics did not influence advertising activities, accounting performance, and value performance in the restaurant industry. Among firm-specific factors, market share was found to have significantly negative impacts on stock returns ($\beta = -0.081$, $p < 0.05$) and excess stock returns ($\beta = -0.091$, $p < 0.01$).

5. Discussion

Advertising shows a quadratic linkage with two accounting performance measures; sales and profitability. Specifically, the relationship between advertising and firm sales is illustrated with an increasing concave-down shape. Advertising positively influences firm sales when it is initially launched. However, with the further increase of advertising spending, consumer responses to advertising decline and eventually level off. This finding substantiates the wear-out effect of advertising widely discussed in previous studies (Bruce et al., 2012; Pieters et al., 2002). The relationship between advertising and profitability is illustrated with an inverted–U shape—that is, the increase in advertising spending initially improves profitability, but profitability deteriorates beyond the optimum level of advertising spending and then becomes negative at a certain high level. Such a variation in the relationship between advertising and profitability may result from

advertising clutter in the restaurant industry along with the wear-out effect. In a highly advertising-intensive marketplace like the restaurant industry, competitors tend to strongly respond to a firm's increased advertising spending, which reduces the firm's marginal benefits from advertising (Jose et al., 1986; Wang et al., 2009). Furthermore, the increase in advertising spending is even detrimental to firm performance unless the marginal benefits cover the additional spending on advertising (Kim et al., 2015).

The findings also indicate that incremental advertising spending improves stock value, which is consistent with Gu and Li (2010); Srinivasan et al. (2009), and Vitorino (2014). However, this positive relationship between advertising and stock value is not linear because stock returns are stagnant when advertising spending stays low. Similarly, the effect of advertising on excess stock returns forms an increasing concave-up shape. These quadratic effects of advertising on stock value are completely opposite of the ones on sales and profitability, suggesting that the carryover effects of advertising have a different pattern from its instantaneous effects. When a restaurant's advertising spending is low, high advertising intensity in the marketplace seems to restrict the carryover effects by hindering consumer memory creation or facilitating the decay of consumer memory for brands (Burke and Srull, 1988; Danaher et al., 2008). However, further increase in advertising spending leads to higher stock value, reducing the adverse effect of high advertising intensity, which is different from the relationship between advertising and accounting performance. This result could be attributable to brand equity that has an accumulative impact on consumer purchases in the long run. Advertising effects are steady (or slightly detrimental) until consumers become familiar with a brand; after then, the effects increase (Laroche et al., 2006). This spillover effect of advertising via brand equity along with the signaling effect can explain the effects of advertising on stock value from an investor's perspective. Increased brand awareness and familiarity by advertising can help firms draw more attention from investors (Chemmanur and Yan, 2009; Lou, 2014). Advertising can also be a signal of companies' strong financial and competitive position (Vitorino, 2014). Investors are likely to invest in firms appealing to them with brands, financial well-being, and/or competitiveness (Barber et al., 2008; Joshi and Hanssens, 2010). Thus, the attention-grabbing effect of advertising may result in an increase in stock value.

The findings of this study provide evidence that sales and profitability affect advertising spending decisions of restaurant firms, supporting the organization adaptive learning theory. The significant effect of profitability on advertising demonstrates that the adaptive learning process based on concrete evidence of advertising's cost-effectiveness is routinized in the restaurant industry. Through this routinized dynamic learning process, restaurant firms could develop the ability to effectively manage resources by capitalizing on their advertising effectiveness (Vakratsas and Ma, 2009; Wang and Ahmed, 2007). Practically, improved profitability increases the financial resources to be allocated to the advertising strategy (Ali Shah and Akbar, 2008; Kim et al., 2015) and, thus, can trigger a virtuous circle between the effective strategy and improved financial health. The present study also proves the negative quadratic impact of sales on advertising spending, which is inconsistent with the findings from some previous research (e.g., Lou, 2014; Sridhar et al., 2014) that indicated the linear effect of sales. A potential explanation for the quadratic relationship in our results is that

restaurant firms tend to reduce advertising spending when they reach the targeted goal of sales because increased sales cannot always contribute to profitability and rather impair profitability at a certain level of advertising spending. Indeed, our findings indicate that advertising leads to increases in sales even at the levels of advertising spending where profitability is negatively affected by advertising. It indicates that profit gains from increased sales due to advertising cannot cover the advertising expenses so that profitability declines despite increased sales. Such findings suggest that many restaurant firms pursue sales maximization via advertising at the expense of profitability (Kim et al., 2013). Once the targeted goal of sales is attained, these restaurant firms may have an incentive to reallocate resources in order to pursue profits.

The findings of the present study report the insignificant impact of stock returns on advertising spending, which is inconsistent with previous studies (e.g., Chakravarty and Grewal, 2011; Sridhar et al., 2014). This impact implies that restaurant firms rarely view advertising strategies as a viable way to improve their stock value when the stock value drops.

6. Implications

From a theoretical perspective, this study contributes to hospitality literature in several ways. First, this study incorporates the stock valuation approach into the investigation of advertising effects on firm performance. This approach reflects the combination of instantaneous and carryover effects of advertising on a firm's value performance. The findings show that unlike two accounting performance measures, stock returns and excess stock returns generally increase as advertising spending is higher, suggesting that the overall impact of advertising on restaurant firms is positive in the long run. Second, this research highlights the dynamic and quadratic relationships between advertising and firm performance, which is different from the unidirectional linkage investigated in previous hospitality studies. In particular, the interdependencies of advertising spending, sales, profitability, and stock value provide a value-creation chain of restaurant operations. Third, the dynamic model adopted in the present study allows us to confirm the applicability of organization adaptive learning in the restaurant industry. Sales, profitability, and advertising spending in the past play a critical role in making advertising spending decisions at present.

From a managerial perspective, the findings provide useful guidance for the advertising practice in the restaurant industry. First, the negative quadratic relationship between advertising and accounting performance shows a risk of raising advertising spending blindly. A restaurant firm is penalized when its advertising spending significantly deviates from the optimum level. Therefore, to maximize the advertising effect, it is critical for a restaurant business to detect the optimum spending point and get as close to the point as possible.

Second, different quadratic patterns of advertising effects on sales, profitability, and stock value are helpful for industry practitioners to design advertising strategies to achieve distinct goals. For example, based on our findings, advertising spending could be adjusted corresponding to different managerial goals at four stages (Table 5). In stage 1 ($ADV < 0.094$), as restaurant firms spend more on advertising, sales and earnings increase while stock returns and excess stock returns remain steady. In stage 2 ($0.094 \leq ADV < 0.224$), sales, stock returns, and

Table 5
Changes in advertising effects at different levels of advertising spending.

	Stage 1(ADV < 0.094)	Stage 2(ADV < 0.224)	Stage 3(ADV < 0.356)	Stage 4(0.356 ≤ ADV)
SALE	Increase	Increase	Increase	Steady
EAR	Increase(positive earnings)	Decrease(positive earnings)	Decrease(negative earnings)	Decrease(negative earnings)
RET	Steady	Increase	Increase	Increase
ERET	Steady	Increase	Increase	Increase

excess returns increase with higher advertising spending, but earnings decrease even if they are still positive. In stage 3 ($0.224 \leq ADV < 0.356$), advertising effects on firm performance are the same as those in stage 2, except that the earnings are negative. In stage 4 ($0.356 \leq ADV$), higher advertising spending leads to the increases in stock returns and excess returns. By contrast, sales become steady and the deficit in earnings expands. Given these findings, marketers are advised to spend less than 9.4% of firm assets on advertising (stage 1) when they attempt to improve sales and profitability without consideration of stock value. On the other hand, if marketers aim to increase stock value, it is recommended that they raise their advertising spending over 9.4% of their assets (stages 2, 3, and 4). In this case, three different advertising strategies can be formulated based on the distinct objectives. When both accounting performance and value performance are important to the marketers, the advertising spending between 9.4% and 22.4% of firm assets (stage 2) is desirable because restaurant firms can improve all sales, profitability, and stock value in that range. If the marketers are interested in increasing sales and stock value despite a loss in profitability, their advertising spending may need to be in stage 3 (22.4%–35.6%). Finally, if the marketers are extremely concerned about stock value regardless of accounting benefits, they are advised to spend more than 35.6% of firm assets on advertising (stage 4). While the aforementioned practical suggestions have been proposed based on the findings, industry practitioners should be cautious that the results are drawn from mean-based estimation, and thus our suggestions may not be applicable to all individual businesses.

7. Conclusions and future study

This study employed stock valuation analysis to investigate the relationship between advertising and firm performance in the restaurant industry. Our findings supported the quadratic effect of advertising on both accounting performance and value performance. This study also demonstrated their bidirectional relationships, which confirmed adaptive learning behavior of restaurant businesses.

This study has some limitations. First, the present study overlooked the qualitative aspects of advertising. Future studies could incorporate advertisement distribution channels, types (e.g., production and institutional advertising), and creativeness into the assessment of advertising effectiveness. Second, this study only investigated public restaurant firms with the financial information available to the public. However, as the public firms are relatively large-scale operations, the findings may not be generalizable to small and mid-sized restaurant firms. Further studies are encouraged to explore advertising effects on firm performance with a broader restaurant sample. Third, we used the ratio of sales to assets and return on assets as the measures of accounting performance. Although this approach has been a common practice in previous studies on this topic, a fuller understanding of advertising effects should wait for replications of the analysis using different measures (e.g., profit margin, return on investment). In addition, given that restaurant segments have different target markets, it would be interesting to investigate the impact of restaurant segments on advertising effects.

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