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Abstract
Advertising is crucial in influencing customers' perceptions and purchase intentions, and numerous studies have investigated whether advertising expenditure has any significant impact on financial performance. A thorough understanding remains elusive: while several studies document a positive impact, others report that advertising has either a negative or a statistically insignificant effect. Three flaws among existing studies are responsible for this problem: bundling advertising with other forms of marketing, the inadequacy of expenditure as a measure, and a failure to consider contingencies. Deviating from earlier studies, we examine the effect of *advertising productivity* on firm performance rather than the impact of the *absolute* amount of advertising *expenditure*. Moreover, adopting a contingency approach, we evaluate how market conditions of market dynamism, market complexity and market munificence moderate the relationship between advertising productivity and organizational performance. Drawing a multi-industry sample from the USA, this study demonstrates that advertising productivity has a positive impact on capital market-based performance measures, conditional on market conditions. We reveal new insights into when, why and to what extent advertising contributes (or not) to organizations' financial performance.

Keywords: Advertising, advertising productivity, firm performance, market conditions, market dynamism, munificence, complexity, expenditure, marketing investment.

Introduction

Organizations across various industries use advertising to shape and influence customers' perceptions and attitudes towards their products and services (Wies et al., 2019). The US multinational company Proctor and Gamble, for instance, spent $4.39billion on advertising in 2017. When economic times are hard, advertising budgets are routinely vulnerable, suggesting doubt over their direct contribution to organizational performance. Given the significant amount of financial resources spent on various types of advertising media, and its susceptibility to cost-cutting exercises, many earlier studies in the marketing–finance interface explored the nexus between advertising expenditure and organizations' financial performance (Wies et al., 2019). While a number of studies documented that advertising positively influences financial performance (Gu and Li, 2010; Joshi and Hanssens, 2010; McAlister et al., 2016; Shah et al., 2019), numerous other studies demonstrated that advertising has either a negative or a non-significant impact on performance (Lu and Beamish, 2004; Han and Manry, 2004; Eng and Keh, 2007; Meyer and Ujah, 2017; Tackx et al., 2017). In some cases, advertising is bundled with other marketing channels in a composite analysis of marketing communications (Luo and Donthu, 2006), creating noise as to whether investing in advertising itself bears any fruit. The mixed findings of earlier studies in no small part contribute to the ongoing debate about the strategic relevance of marketing-related investments (Hughes et al., 2019).

The mixed findings among earlier research can be attributed to three key problems. First, Luo and Donthu's (2006) seminal paper examines an aggregate measure of marketing communication productivity, which merges advertising expenditure with several marketing communication methods. This approach assumes a high degree of homogeneity and substitutability. However, the purpose of advertising differs from sales promotion or direct marketing, for example. If this were not the case, each form of marketing communication would be substitutive rather than additive in any marketing strategy. If substitutive, a firm could

abandon (for example) public relations entirely because advertising expenditure, or even direct marketing, alone (for example) would be sufficient. But because each method serves a different purpose and reaches customers (or consumers) differently, they are additive or subtractive and not substitutive. A general test of marketing communications then says little about whether advertising specifically provides robust returns. Since advertising is but one component of their calculation, its unique contribution is lost in a composite measure. Moreover, Luo and Donthu (2006) overlook advertising expenditure on specific advertising mediums. Second, all earlier studies investigated the absolute amount of advertising expenditure on organizational performance (Shah and Akbar, 2008; Shah et al., 2019). However, while two hypothetically-identical firms in a given industry with similar product and brand portfolios might spend equal amount of money on advertising, one organization might reap more financial benefit than the other owing to the level of productivity with which it manages its advertising budget. In addition, advertising studies claim that advertising fulfils the VRIN criteria[1] within the resource-based view of the firm. However, advertising expenditure does not do so. Recently, Hughes et al. (2019) showed that the relative contribution of marketing investments to shareholder value depends on the firm's investment productivity (defined as its ability to convert investment expenditure into sales). Therefore, a productivity approach is necessary to overcome the rudimentary metric of absolute expenditure and to locate constructs more causally-adjacent to the phenomenon of interest[2]. Third, almost all previous studies examine the direct and immediate impact of advertising expenditure on financial performance to the exclusion of powerful contingencies such as market conditions (Conchar et al., 2005; McAlister et al., 2016). Resource-based theorists stress the significance of including market

[1] Valuable, rare, inimitable and non-substitutable.

[2] Expenditure is long-linked to financial performance because capabilities necessary to transform expenditure into financial performance are missed. Expenditure is causally-distant to the phenomenon of interest and provides marketing managers with few guidelines as to how claims for greater budget will deliver against senior managers' goals and the pressure they face to deliver shareholder value (see Hughes et al., 2019).

conditions in studying the impact of resources and capabilities on performance (Barney, 1991; Feng et al., 2017). Only one recent study explored how market-related variables affect the relationship between advertising and performance (Havakhor et al., 2019). This study is, nonetheless, limited in that Havakhor et al. (2019) examined the impact of only one type of market condition. In contrast, the effectiveness of the impact of resources and capabilities on performance requires consideration of several market conditions including market munificence, market complexity and market dynamism. Relegating market conditions to simple control variables omits their potential as boundary conditions in (re)shaping the effects and usefulness of advertising investments.

We rectify each of these problems. Drawing a sample from several US-based industries, this study conceptualises and examines *advertising productivity*, defined as the product of advertising efficiency and progression/regression in advertising innovation, on stock market-based, forward-looking measures of financial performance. Second, we theorise the contingent effects of market munificence, market dynamism and market complexity as moderators of the nexus between advertising productivity and performance. We provide scholars and managers with the theoretical, measurement and methodological apparatus needed to understand why and when, and with a more accurate and robust study, the effects of advertising (and specifically advertising productivity) are positive.

This study makes three salient contributions. First, we combine propositions from resource-based (RBV) and dynamic capability (DC) theory to develop arguments that advertising productivity, not the absolute amount of advertising expenditure, positively affects financial performance. Doing so enriches the study of advertising by integrating the *productive capacity* of an organization's resources contained in RBV theory into a framework and test of advertising value. Taking an *input-output* orientation, we provide theory and evidence on the impact of an advertising productivity as a capability to convert resources to performance.

Second, we adopt a dynamic view in studying the advertising–performance relationship as opposed to a static view dominating current studies. A dynamic view overcomes neglect among existing treatments of changes made by organizations in their advertising budget allocation strategy across various advertising media from one time period to another. Doing so also accounts for how a current period's advertising will have spill-over effects onto the subsequent period's advertising outcome. By adopting a dynamic view of advertising investment, we move forward the debate around why advertising investment can result in positive, negative or timid returns to firm performance, locating differences to variance in productivity. Third, we rectify for the neglect of context in theory and empirical analysis and incorporate market conditions as important but omitted external contingencies to understand when advertising will benefit performance. RBV and DC theorists stress the effect of market conditions on the relationship between an organization's resources and its performance. We advance the advertising–performance debate through the investigation of more deep-level market contingencies. By studying different kinds of market conditions simultaneously, this study provides a basis to reimagine the mixed findings of earlier research and sets out the boundary conditions of a positive advertising–performance relationship.

Literature Review, Theory and Hypotheses

Several review articles on the nexus between advertising and financial performance have been published in the past two decades (see Conchar et al., 2005; Shah and Akbar, 2008; Mukherjee et al., 2013). We, therefore, report only a representative set of prior relevant studies (Table 1) to show the persistent gap in the literature surrounding our knowledge of the functioning and value of advertising investment. As reported in Table 1, the results of prior research are mixed. A thorough understanding of why remains elusive. Our review identifies three flaws among existing studies as being responsible for this problem: bundling advertising with other forms

of marketing, the inadequacy of expenditure as a measure, and a failure to consider contingencies.

All prior studies use the *absolute* measure of advertising instead of a *relative* measure, considering only the advertising expenditure of an individual firm without accounting for the advertising expenditure of other firms in the sample. Moreover, there are only three studies that examine contextual variables, and of these, only Havakhor et al. (2019) analysed a type of market condition, turbulence, to the exclusion of other types of market conditions. This neglect for the context in which a firm operates coupled with an overreliance on metrics based on absolute expenditure highlight a key problem: studies of the advertising–performance relationship relies on advertising constructs that are at best long-linked to firms' financial performance. This causal distance coupled with a failure to treat contingencies of the relationship means that a theory of how, why and when advertising investment benefits financial performance is yet to emerge and knowledge of the boundary conditions (re)shaping its effects are thin. Of further concern, studies do not account for advertising expenditure against different advertising mediums (e.g. Shah et al., 2019) and in other instances have bundled advertising with other marketing communication methods (Luo and Donthu, 2006). Doing so generates noise in analyses of the advertising–performance relationship and omits the potential for subtractive (and not substitute) effects among marketing methods or budget allocations. We contest then that mixed findings are a symptom of inadequately measuring and testing advertising and omitting important external contingencies.

[Insert Table 1 here]

When the empirical results of extant studies are mixed and fragmented, a meta-analysis allows results to be integrated and synthesized by the size of an average effect. We therefore

carried out a meta-analysis to confirm our critique of the existing literature. Table 2 reports the results.[3]

[Insert Table 2 here]

The mean effect size (0.26) is statistically significant ($p - value = 0.000$) and the confidence interval around it (0.16 - 0.36) does not contain zero. The amplitude between the upper and lower limits of the interval inform the degree of precision of the estimate of the average effect on the population. The $\boldsymbol{Q}$ statistic of the homogeneity test suggests that the effect sizes of the studies are not homogeneous with each other and. However, the $\boldsymbol{Q}$ statistic does not have enough statistical power to detect heterogeneity when the number of studies is small (Cornwell, 1993; Harwell, 1997; Sánchez-Meca & Marín-Martínez, 1997). Higgins and Thompson (2002, 2003) proposed a heterogeneity index $\boldsymbol{I^2}$ that is not affected by the number of cases and allows investigators to complete the information provided by the $\boldsymbol{Q}$ statistic. It informs not only of the existence of heterogeneity but of the degree of heterogeneity of effect sizes too. The heterogeneity in our test has a high magnitude (96.4%), indicating that there are differential characteristics among the studies which can cause such heterogeneity. These results determine the necessity to examine for possible moderating variables of the effect sizes reported among studies to date.

Theory and hypotheses development

Organizations are bundles of resources used to create competitive advantage in the marketplace (Barney, 1991; Barney et al., 2001). Organizations in each industry vary in the quality and quantity of the resource base they possess (Srivastava et al., 2001). The extent to which an organization can attain superior performance largely hinges upon the degree to which the focal

[3] Our compact meta-analysis concentrates only on studies that reported the effect size (correlation) of the advertising–performance relationship. This information was available for 11 of the 20 studies considered in the literature review. Using a random effects model, the results can be generalized to a wider population of studies with similar characteristics, although not necessarily identical ones.

organization possesses the capability to productively use its resource base (Barney et al., 2001). Productive utilization of resources facilitates the attainment of advantage over competitors. While possessing required resources assists an organization in attaining competitive advantage in the short term, sustaining competitive advantage relies on its capability to reconfigure and reconstitute its resources in keeping with changes in its external environment (Eisenhardt and Martin, 2000; Barney et al., 2001; Srivastava et al., 2001). Ergo, an organization needs to reformulate its resource management strategy over time to retain optimal *productivity* among its resources (Eisenhardt and Martin, 2000). Failing to do so could attenuate productivity, thereby hurting financial performance (Salvato and Vassolo, 2018).

Advertising requires a significant resource investment (Luo and de Jong, 2012; Wies et al., 2019). To achieve and retain productivity in advertising programmes, organizations must reconfigure their resource allocation strategy and expend significant resources across various types of advertising mediums such as TV, radio, newspapers, outdoor, and internet (Salvato and Vassolo, 2018; Havakhor et al., 2019). Advertising moves customers from unawareness to purchase intention of the product by (re)shaping customers' *information* (cognitive), *favourable attitude* (affective) and ultimate *action* (conative) (Shah et al., 2019; Wies et al., 2019). Advertising assumes an information role by informing existing and potential consumers about the existence of products and services, and a persuasion role by assisting organizations in differentiating products and services (Peterson and Jeong, 2010; Luo and de Jong, 2012; Shah et al., 2019). Both information and persuasion roles of advertising can engender customer loyalty, which can increase an organization's financial performance (Wies et al., 2019). Advertising assists organizations in influencing consumer preferences for products and services as a pathway to higher sales revenue (Sridhar et al., 2014). Moreover, advertising activities create market-based assets such as brand equity and customer equity that help stabilize revenue streams and reduce cash flow volatility (Peterson and Jeong, 2010; Joshi and

Hanssens, 2010; Sridhar et al., 2014). Similarly, advertising enhances an organization's visibility among investors, which positively affects stock liquidity, reducing the cost of capital and increasing the market value of the organization (Wies et al., 2019). In turn, advertising *should* exhibit a positive impact on the organization's financial performance.

However, not *all* organizations will benefit equally from their advertising expenditures spent across various advertising media. The degree to which an organization will be able to maximize its financial gains from its expenditures will hinge upon the *productive capability* of the concerned organization (e.g., Donthu et al., 2005; Hughes et al., 2019; Luo and Donthu, 2006), predicted by the RBV. A firm with a higher level of sustained *advertising productivity* over time should reap greater financial rewards. We conceptualize advertising productivity as a product of two components: advertising efficiency and progress/regression in advertising innovation. Retaining an optimal level of advertising productivity over time necessitates reconfiguring and reformulating an advertising programme from one time period to another (Salvato and Vassolo, 2018). A higher level of advertising productivity will engender a cost advantage or a revenue advantage or both for an organization (Peterson and Jeong, 2010; Cheong et al., 2014). Higher advertising productivity will assist organizations in reducing the overall advertising expenditure spent across various advertising media without adversely affecting advertising outputs because of greater input-output efficiency. Better advertising productivity will help organizations to attain higher advertising outputs such as sales revenue though effective utilization of innovative advertising techniques without increasing advertising budget. Accordingly, the effect of advertising cost reduction or advertising outcome augmentation or the combined effect of both should have a positive impact on financial performance:

H_1: *The greater the advertising productivity, the higher is the financial performance of the organization.*

The moderating role of market conditions

Contingency theory postulates that the extent to which an organization benefits financially from its resources and capabilities hinges upon the market conditions in which the focal organization operates (Xue et al., 2012; Feng et al., 2017; Havakhor et al., 2019). Market conditions are thought to either accentuate or attenuate the impact of an organization's productive capability for resource management on financial performance (Feng et al., 2017; Havakhor et al., 2019). Three market conditions are of interest: market dynamism, market munificence and market complexity. We posit that these three market conditions will impact the nexus between advertising productivity and an organization's financial performance.

Market dynamism denotes the frequency, extent and unpredictability of changes that marketplaces undergo (Qu et al., 2011; Xue et al., 2012; Havakhor et al., 2019). Market dynamism brings about changes in customer preferences and attitude, and the development and introduction of new products, innovative technology, or competition (Qu et al., 2011). Such marketplace changes create challenges and opportunities for the organization (Dess and Beard, 1984; Stoel and Muhanna, 2009; Havakhor et al., 2019). Organizations with requisite capabilities can capitalize on these changes and garner more financial benefit in a highly dynamic market. However, while some types of capabilities engender financial benefit in a more dynamic market, others are more beneficial in less dynamic markets (Xue et al., 2012; Salvato and Vassolo, 2018). High market dynamism attenuates the impact of some types of capabilities on performance such that organizations garner more financial benefits from certain types of productive capabilities in a stable marketplace (Keats and Hitt, 1988; Stoel and Muhanna, 2009; Havakhor et al., 2019). We argue that advertising productivity is more useful in a stable market than a highly dynamic market because frequent changes in advertising strategy necessitated by higher market dynamism create confusion about the organization's products and services in consumers' minds (Peterson and Jeong, 2010; Luo and de Jong, 2012;

Havakhor et al., 2019). Its information and persuasion properties are ineffective when advertising content must change regularly in response to high market dynamism. Frequent changes increase cost and harm market-based assets such as customer equity. Frequent changes in advertising programmes cause brand confusion, thereby harming brand equity (Shah et al., 2019; Wies et al., 2019; Havakhor et al., 2019). Consequently, we predict that organizations with a higher level of advertising productivity will garner greater financial rewards in more stable market environments:

H_2: In a less dynamic market environment, advertising productivity will have a greater impact on financial performance.

Market munificence denotes the degree to which the marketplace provides adequate resources and opportunities to existing organizations and new entrants to grow and sustain their business operations (Qu et al., 2011; Xue et al., 2012). It is relatively easier for organizations to survive and achieve growth in a more munificent market as there are abundant growth opportunities (Feng et al., 2017). Conversely, organizations that operate in a less munificent market compete against each other for available limited rent-producing resources (Rueda-Manzanares et al., 2008). In such resource- and opportunity-deficient markets, organizations with better advertising productive capabilities will likely reap more financial benefits. Organizations with better advertising productive capability can design and execute advertising programs with greater efficiency; and organizations with higher advertising productive capacity set the standards for best practices of advertising in each industry. Thus, these organizations can design more impactful advertising compared to competing organizations, thereby positively impacting customers' purchase intention (Luo and Donthu, 2006). In less munificent markets, then, organizations with a higher level of advertising productivity will benefit more than organizations with a lower level of productivity:

H_3: In a less munificent market environment, advertising productivity will have a greater impact on firm performance.

Market complexity emanates from the number and the diversity of external entities with which an organization must deal to survive and succeed in the marketplace (Keats and Hitt, 1988; Xue et al., 2012). Organizations may encounter various types of market complexity such as competitive complexity, market diversity, resource complexity, and process/facility complexity (Qu et al., 2011). Among these different types of market complexity, competition, however, is one of the most significant facets of a complex marketplace (Keats and Hitt, 1988). A fewer number of competitors characterises a less complex market. In such a concentrated market, each organization is relatively more well-informed about its competitors and can prognosticate how the competing organizations will behave, and, can, therefore, bring out positive changes in its strategies accordingly (Keats and Hitt, 1988; Xue et al., 2012). Consequently, there is less uncertainty and unpredictability about the nature and extent of competitive interaction in a less complex market. A lower level of complexity in the marketplace is conducive to effective deployment of an organization's advertising capabilities, which should consequently augment its impact on financial performance (Qu et al., 2011; Xue et al., 2012). A lower level of market complexity enables organizations with better advertising productivity to design more efficient and effective advertising programs mainly because there is less advertising clutter due to fewer competitors (Havakhor et al., 2019). Organizations with higher productivity in managing advertising are better able to affect the cognition and affection of potential customers in a less complex market (Donthu et al., 2005; Havakhor et al., 2019. Therefore, in a less complex market, an organization's advertising productive capabilities would be expected to engender more financial rewards:

H_4: In a less complex market environment, advertising productivity will have a greater impact on firm performance.

Methodology

Data sources and sample

This study used two secondary data sources. Advertising data were collected from Advertising Age, and performance and control variable data were collected from Compustat. Advertising Age publishes a record of the top 100 leading US advertisers based on yearly advertising expenditure across various advertising media. Advertising data were collected from Advertising Age for 2001-2013. Since we measured advertising productivity change from one time period to another, advertising productivity data were available for the years 2002-2013. Initially, we included all firms that appeared in the top advertisers list for all years. However, private companies, foreign companies and the US government were removed due to incorrect fit or missing performance data. Organizations that appeared only once or twice in the top advertisers list were also removed. Data for some advertising media, and sales performance data for some organizations for some years, were unavailable. Removing firms with missing data was necessary because the data envelopment analysis (DEA)-based Malmquist productivity index is sensitive to missing data. The total number of observations corresponding to each variable is shown in Table 4. All variables were winsorized at the 1% and 99% percentile to address potential outliers.

The study had two stages. First, a DEA-based Malmquist approach was used to measure the level of advertising productivity of the sample organizations. Second, econometric analysis was used to investigate the impact of advertising productivity on performance and the moderating effect of the variables about market conditions.

DEA-based Malmquist Productivity Index

Data envelopment analysis (DEA) is used across various disciplines to evaluate efficiency as it can encompass multiple inputs and outputs. DEA is a non-parametric, linear programming tool to measure the efficiency of decision-making units within a given population involving multiple inputs and outputs (Seiford, 1996; Emrouznejad et al., 2008; Cook and Seiford, 2009). Decision-making units for our study are organizations.

DEA is a powerful tool to measure the *relative* efficiency of sample firms by comparing the efficiency score achieved by an organization with the efficiency scores of other organizations in the sample (Seiford, 1996; Emrouznejad et al., 2008). This *relative* concept is useful for our study because organizations in various industries allocate their advertising budget, taking into account the amount of money spent on advertising by competing organizations. DEA computes a firm's *relative* efficiency score to sample organizations by determining the minimum possible inputs needed to generate a set of outputs, or by determining the maximum possible outputs that can be produced from a given set of inputs. It also identifies the *best practice frontier* or data envelope (Wang et al., 2010). These organizations are the most efficient and industry leaders therein.

This method to measure and track productivity change over time was first proposed by Malmquist (1953) and later modified by Fare et al. (1994). Fare et al. (1994) developed a version of the Malmquist Productivity Index (MPI) using DEA. In the MPI approach, a focal organization's degree of *productivity* is contingent upon its ability to use the least possible amount of *inputs* to achieve the same level of *outputs* from one time period to another (Tavana et al., 2019). The focal organization is *productive* over time if the organization can lessen input utilization while maintaining the same level of output. Otherwise, the organization is *unproductive* (Tavana et al., 2019). *Productive* organizations in the sample form the *best practice frontier*, which dynamically benchmarks other organizations' level of productivity

(Luo and Donthu, 2006). The set of firms in the dataset that are most productive in using their advertising inputs to produce a certain level of advertising outputs are considered the best in managing their advertising programs. Other organizations not part of the *productive frontier* follow these best practice firms to heighten productivity.

The MPI is a product of two components: organization-specific efficiency change and industry-wide change that affect advertising innovation improvement or otherwise (usually termed as technology change). The total factor advertising productivity of an organization might change from one time period to another due to change in the two aforementioned components. The organization-specific *efficiency* component measures the extent to which an organization can heighten productivity due to the enhancement of managerial capability in utilizing the advertising programs. Advertising managers with better managerial capability should attain higher efficiency by reorganizing and reconfiguring advertising mix from one time period to another, thereby positively affecting advertising productivity. The *innovation* component measures the degree to which a given organization can improve productivity owing to incremental and radical innovations in advertising that affect all firms in an industry. Such industry-wide change in *innovations* cause the best-practice frontier to shift from one time period (t) to another (t+1). For example, the advertising industry has undergone a substantial transformation due to innovations in online and offline advertising over the past couple of decades. In sum, the total factor advertising productivity of a firm might change from time period to another because of change in managerial ability in managing advertising mix as well as industry-wide innovations in managing and executing advertising programs. Productivity declines if the value of MPI is less than 1, remains unchanged when the value is equal to 1, and productivity improves when the value of MPI is greater than 1. The same interpretation applies to two sub-components of the MPI.[4]

[4] For more technical descriptions of MPI, see Färe and Grosskopf (1992), Fre et al. (1992) and Bjurek (1996).

Given that our sample organizations make use of their advertising expenditure for multiple media to generate multiple outputs, the DEA-based Malmquist approach is particularly suitable. The variables for measuring advertising productivity are selected based on relevant studies (Luo and Donthu, 2001, 2006; Cheong et al., 2014; Cheong and Kim, 2014; Rahman et al., 2019). This study used the yearly advertising expenditure for six advertising media, namely, TV, Magazine, Newspaper, Outdoor, Radio and Internet as input variables to measure advertising productivity. We used sales revenue and sales growth as advertising output variables (Luo and Donthu, 2001, 2006; Cheong et al., 2014; Cheong and Kim, 2014). This study used MaxDEA Ultra 6.15 software to calculate the advertising productivity of the sample organizations.

The Malmquist approach is intrinsically time-series, which is particularly suitable for exploring advertising productivity as the current period's advertising inputs may have carry-over effects in the ensuing period's advertising outputs (Luo and Donthu, 2006). The Malmquist methodological approach is consistent with the theoretical underpinnings of the study in the RBV since a firm's performance is determined by its ability to convert inputs into outputs—converting advertising inputs into performance outputs (Barney, 2014). Moreover, the dynamic capability extension to the RBV posits that due to market dynamism, organizations tend to alter their input utilization strategy from one time period to another to keep pace with marketplace change (Girod and Whittington, 2017). The Malmquist method is longitudinal and measures how advertising productivity changes from one year to another.

Measures

Advertising productivity was measured using the time-series DEA based MPI method.

This study used *market-to-book ratio* as the primary measure of organizational performance. Most earlier studies used either stock market-based performance measures or

accounting-based performance measures. Market-to-book ratio requires both stock market and accounting data. To attain comparability with prior studies, we used *stock return* as an additional performance variable (Table 3).

We followed existing literature (Keats and Hitt, 1988; Palmer and Wiseman, 1999; Finkelstein and Boyd, 1998) to measure market dynamism, market munificence, and market complexity as our moderating variables. *Market dynamism* refers to volatility or difficulty in predicting discontinuities in a market (Aldrich, 1979; Dess and Beard, 1984). *Market munificence* is reflective of the growth in an industry's operating income (Dess and Beard, 1984). We measured the volatility and growth of industry operating income using a two-step procedure (see Keats and Hitt, 1988; Palmer and Wiseman, 1999). First, the natural logarithm of the total operating income of four-digit SIC industries was regressed against an index variable of years, over a sample period. Then, the antilog of the regression coefficient was used as the measure for operating income growth, and the antilog of the standard error of the regression coefficient was used as the measure for operating income volatility. The regression coefficient captures the growth rate of operating income, and the standard error of the regression coefficient captures the unpredictability (i.e., dynamism) of the operating income growth rate.

Market complexity generally implies the number, diversity, and distribution of task environment elements (Aldrich, 1979; Dess and Beard, 1984). Following similar studies (Dess and Beard, 1984; Keats and Hitt, 1988), we used the Herfindahl index of industry concentration (Finkelstein and Boyd, 1998) as the measure of market complexity. The Herfindahl Index (HI) was calculated with the equation:

$$HI = \sum_{i=1}^{n} X_i^2$$

where X is the market share of the ith firm expressed as a ratio and n is the number of

organizations in an industry. The value ranges between 0 and 1. A large value means a decrease in the monopoly power of large organizations due to the growth of small organizations, the entry of new organizations, or a combination therein. A small value means a tendency toward dominance by a smaller number of organizations.

Our stock market-based performance measures can be affected by other organizational strategies in addition to advertising productivity. We, therefore, included six control variables, informed by related finance and marketing studies (Sridhar et al., 2014; Feng et al., 2017; Havakhor et al., 2019). Earlier studies have demonstrated that performance varies based on *firm size* (Dang et al., 2018). We controlled for firm size using the log of total assets of an organization (Dang et al., 2018). We controlled for the organization's *debt leverage* using long-term debt divided by total assets (Horváthová, 2012). We controlled for *selling intensity*, measured as selling, general and administrative expenses divided by total assets. The *research and development* (R&D) activities of the organization can affect stock market-based performance measures (Hughes et al., 2019). We controlled for R&D using R&D expenses divided by total assets. We controlled for *capital intensity* because it can impact performance (Huselid et al., 1997). Capital intensity was measured as invested capital divided by the total number of employees. We controlled for *firm growth*, operationalized as the yearly growth rate of total assets. Table 3 describes the variables used in this study and their data sources.

[Insert Table 3 here]

The relationship between advertising productivity and organizational performance

Appendix 1 reports the total factor advertising productivity analysis of the sample firms. Econometric analysis was then used to examine the impact of advertising productivity on performance and the moderating effect of the market conditions variables.

Model estimation

Despite the inclusion of a set of relevant control variables, time-invariant variables such as organizational culture, advertising managers' creative capability (etc.) are not included in the model. The model, therefore, potentially suffers from omitted variable bias (Germann et al., 2015). Also, the current period's organizational performance might be affected by the previous period's performance, necessitating controlling for the effect of the previous period's performance. While incorporating the previous period's performance as a control variable reduces autocorrelation in the model, it does not entirely remove it (Germann et al., 2015). The correlation between the focal explanatory variables and the error term necessities the use of instrumental variable estimation techniques (Germann et al., 2015).

Among others, Arellano and Bover (1995) and Blundell and Bond (1998, 2000) developed an instrumental variable estimation method based on generalized method of moments (GMM) estimation. In such a model, the lagged values and/or changes in lagged values are used as instruments for the lagged dependent variable (financial performance). Additional instruments are obtained from other endogenous variables included in the model.

System GMM is used as the estimation method. To account for the endogenous effect of the lagged dependent variable, the system GMM estimator makes use of the lagged differences of the dependent variable as instruments for the equation in levels as well as lagged levels of the dependent variable as instruments for the equation in first differences (Arellano and Bover, 1995; Germann et al., 2015; Rutz and Watson, 2019).

To estimate the relationship between advertising productivity and performance measured by stock return and market-to-book ratio and the impact of moderating variables, we used the following specifications:

$$\boldsymbol{Stock\ return_{it}} = \beta + \alpha_0 Stock\ return_{it-1} + \alpha_1 Advertising\ productivity_{it-1} +$$

$$\alpha_2 Market\ dynamism_{it-1} + \alpha_3 Market\ munificence_{it-1} + \alpha_4 Market\ complexity_{it-1} +$$

$$\alpha_5 Market\ dynamism_{it-1} \times Advertising\ productivity_{it-1} + \alpha_6 Market\ munificence_{it-1} \times Advertising\ productivity_{it-1} + \alpha_7 Market\ complexity_{it-1} \times Advertising\ productivity_{it-1} + \alpha_8 Firm\ Size_{it} + \alpha_9 R\&D\ Intensity_{it} + \alpha_{10} Leverage_{it} + \alpha_{11} Selling\ Intensity_{it} + \alpha_{12} Capital\ Intensity_{it} + \alpha_{13} Firth\ growth\ rate_{it} + \eta_i + \varepsilon_{it}$$

$$\boldsymbol{Market\ to\ book\ ratio_{it}} = \beta + \alpha_0 Market\ to\ book\ ratio_{it-1} + \alpha_1 Advertising\ productivity_{it-1} + \alpha_2 Market\ dynamism_{it-1} + \alpha_3\ Market\ munificence_{it-1} + \alpha_4 Market\ complexity_{it-1} + \alpha_5 Market\ dynamism_{it-1} \times Advertising\ productivity_{it-1} + \alpha_6 Market\ munificence_{it-1} \times Advertising\ productivity_{it-1} + \alpha_7 Market\ complexity_{it-1} \times Advertising\ productivity_{it-1} + \alpha_8\ Firm\ Size_{it} + \alpha_9 R\&D\ Intensity_{it} + \alpha_{10} Leverage_{it} + \alpha_{11} Selling\ Intensity_{it} + \alpha_{12} Capital\ Intensity_{it} + \alpha_{13} Firth\ growth\ rate_{it} + \eta_i + \varepsilon_{it}$$

where i and t represent firm and year, respectively; $\eta_i$is the possible firm-specific component of the error term and ε_{it} is the error term. We lagged the advertising productivity change and moderating variables by one year.

To detect the presence of endogenous regressors in the models, a Durbin-Wu-Hausman (DWH) test was conducted. This test determines whether the possible endogenous regressors in the model are exogenous. If the test statistic is significant, the tested variables must be treated as endogenous as the null hypothesis establishes the absence of endogeneity. We conducted a DWH test for each of the variables in both models to detect possible endogeneity among the variables. In the first model, *stock return*, the results confirmed the presence of endogeneity in two variables, leverage and firm growth rate:

(leverage： $Chi^2_{Durbin-Wu-Hausman\ test} = 8.241, p - value = 0.0041$; firm growth rate: $Chi^2_{Durbin-Wu-Hausman\ test} = 4.093, p - value = 0.0431$).

In the second model, *market-to-book ratio*, the result confirmed the presence of endogeneity in the variable leverage*:* (leverage: $Chi^2_{Durbin-Wu-Hausman\ test} = 18.33,\ p - value = 0.0000$).

Consequently, in the first model, the variables leverage and firm growth rate, and in the second model, the variable leverage, were treated as endogenous regressors. All the other variables were treated as exogenous variables.

The presence of endogenous regressors in the model necessitated the adoption of the instrumental variable approach to estimate the coefficient parameters. We used a dynamic panel data method: System GMM. GMM estimation method is particularly appropriate for several reasons. First, the specified model encompasses endogenous variables. Second, the performance of the sample firms may show persistence over the sample period. Such persistence in the dependent variable requires use of an autoregressive regression model. System GMM is designed for an autoregressive model (Arellano and Bover, 1995; Blundell and Bond, 1998). Third, unlike other instrumental variable approaches such as two-stage least square (2SLS), system GMM does not require finding instruments from other sources. In this research, the second lag of the endogenous variables were included in the estimation as instruments. Additionally, system GMM is robust to panel-specific heteroscedasticity and serial correlation (Capezio et al., 2011; Ullah et al., 2018; Rutz and Watson, 2019).

Descriptive statistics and correlation matrix

Descriptive statistics are shown in Table 4. The correlation matrices for each of the models appear in Tables 5 and 6. The correlation between advertising productivity and stock return is positive but not significant. The correlation coefficient between advertising productivity and market-to-book ratio is negative but not significant. Market dynamism and market munificence have a positive correlation with stock return and market-to-book ratio, but only the second was

significant with stock return. The market complexity variable has a negative but non-significant correlation with stock return, but a positive and significant one with market-to-book ratio.

In summary, the correlation coefficients are inconclusive. It is necessary to analyse the regression coefficients of these variables in the econometric model because the strength and direction of a relationship between two focal variables changes in the presence of other pertinent variables. Variance inflation factors (VIF) were calculated to examine multicollinearity among the explanatory variables. The VIF ranged from 1.02 to 2.03 (Table 4), which is below the cut-off of 10 for multiple regression models (Shieh, 2011). Multicollinearity is of no concern.

[Insert Tables 4, 5 and 6 here]

Main findings

Table 7 shows the findings of the system GMM estimation. The first column reports the results of model 1 for *stock return* and the second column reports the results of model 2 for *market-to-book ratio*. In both models, advertising productivity is the main explanatory variable. The findings demonstrate that the coefficient estimate of advertising productivity is positive and significant at the 0.01% level in both models ($\alpha_1 = 15.92, p - value = 0.000; \alpha_1 = 4.842, p - value = 0.003$). These results support Hypothesis 1.

The estimated coefficients of the interaction between market dynamism, market munificence, and advertising productivity are negative and significant at 1% in model 1 (stock return) ($\alpha_5 = -14.78, \mathrm{p} - \mathrm{value} = 0.000; \alpha_6 = -1.131, \mathrm{p} - \mathrm{value} = 0.000$); and negative and significant at the 5% and 1% levels, respectively, in the second model (market-to-book ratio) ($\alpha_5 = -3.829, p - value = 0.011; \alpha_6 = -0.978, p - value = 0.000$). In less dynamic and less munificent market conditions then, advertising productivity has a greater impact on financial performance. These results support Hypothesis 2 and 3. However, the

results for Hypothesis 4 are mixed. We find support for market-to-book ratio ($\alpha_7 = -0.106, p - value = 0.000$), but not for stock return ($\alpha_7 = 0.0464, p - value = 0.150$). As a complementary measure of model fit, the $Wald\ Chi^2$ statistic (Table 7) confirms that at least one coefficient is statistically different from zero in both models.

Concerning control variables, organizations with lower R&D intensity, lower leverage, lower capital intensity, and higher growth rate ($\alpha_9 = -0.098, \text{p} - \text{value} = 0.000; \alpha_{10} = -0.139, \text{p} - \text{value} = 0.013$; $\alpha_{12} = -0.071, \text{p} - \text{value} = 0.003$; $\alpha_{13} = 0.380$, p − value = 0.000) perform better as measured by stock return. Organizations which are smaller size, have lower R&D, lower leverage, lower selling intensity, lower capital intensity, and higher growth rate ($\alpha_8 = -0.338, \text{p} - \text{value} = 0.000; \alpha_9 = -0.171, \text{p} - \text{value} = 0.000; \alpha_{10} = -0.813, \text{p} - \text{value} = 0.000$; $\alpha_{11} = -0.207$, p − value = 0.000 ; $\alpha_{12} = -0{,}207, \text{p} - \text{value} = 0.000$; $\alpha_{13} = 0.049, \text{p} - \text{value} = 0.000$) perform better as measured by market-to-book ratio.

[Insert Table 7 here]

Additional analyses and robustness checks

Market dynamism and market munificence were remeasured to investigate whether our results are robust to alternative measures. We used volatility in sales and growth in sales as alternative measures of market dynamism and market munificence. The same approach and two-step procedure (described earlier) were used to derive the growth rate and volatility of industry sales (Keats and Hitt, 1988; Palmer and Wiseman, 1999).

Table 8 contains the results of this analysis. The findings demonstrate that the coefficient estimate of advertising productivity is positive and significant at the 10% level in model 1 (stock return) and at the 1% level in model 2 (market-to-book ratio) ($\alpha_1 = 16.51, \text{p} - \text{value} = 0.055; \alpha_1 = 8.188, \text{p} - \text{value} = 0.007$). The results show that the higher the

advertising productivity, the greater is performance, supporting Hypothesis 1. The estimated coefficients of the interaction between market dynamism, market munificence, and advertising productivity are negative and significant at 10% and 1% levels, respectively, in the first model (stock return) ($\alpha_5 = -15.18, p - value = 0.078; \alpha_6 = -1.314, p - value = 0.000$); and negative and significant at the 5% and 1% levels, respectively, in the second model (market-to-book ratio) ($\alpha_5 = -6.911, p - value = 0.023; \alpha_6 = -1.250, p - value = 0.000$). In less dynamic and less munificent market conditions, advertising productivity has a greater impact on financial performance. However, in the first model (stock return), the estimated coefficients of the interaction between market complexity and advertising productivity is not significant ($\alpha_7 = 0.029, p - value = 0.317$). In the second model (market-to-book ratio), it is significant at 1% ($\alpha_7 = -0.110, p - value = 0.000$). The results for Hypothesis 4 are inconclusive. In conclusion, our main results are not sensitive to alternative measures of the moderating variables.

[Insert Table 8 and 9 here]

A second sensitivity analysis was performed using different operationalizations of firm size. Research in corporate finance (Dang et al., 2018) has shown that different operationalizations of firm size cause the coefficients of regressors other than firm size to change in strength, sign and significance. Consequently, we reran the regressions (Table 9) using the natural logarithm of the number of employees and the natural logarithm of total sales to test the sensitivity of the main findings.

The first and third columns of Table 9 report the results of model 1 and 3 where stock return is the dependent variable, and the second and fourth columns reports the results of model 2 and 4 where the dependent variable is market-to-book ratio. The results show that the coefficient estimate of advertising productivity is positive and significant in all models at the

1% level except model 3 (5% level). ($\alpha_1 = 9.127, \text{p} - \text{value} = 0.005$; $\alpha_1 = 5.525, \text{p} - \text{value} = 0.001$; $\alpha_1 = 10.76, \text{p} - \text{value} = 0.034$; $\alpha_1 = 5.027, \text{p} - \text{value} = 0.004$). The results confirm that the higher the advertising productivity, the greater is performance as measured by stock return and market-to-book ratio. Similarly, the estimated coefficients of the interaction between market dynamism, market munificence, and advertising productivity are negative and significant at 1% levels in model 1 ($\alpha_5 = -8.377, p - value = 0.009; \alpha_6 = -0.735, p - value = 0.005$); at the 1% level in model 2 ($\alpha_5 = -4.714, p - value = 0.002; \alpha_6 = -0.796, p - value = 0.000$); at the 5% level and 1% level, respectively, in model 3 ($\alpha_5 = -9.715, p - value = 0.043; \alpha_6 = -1.021, p - value = 0.007$); and in model 4 ($\alpha_5 = -3.941, p - value = 0.013; \alpha_6 = -1.052, p - value = 0.000$). Again, in less dynamic and less munificent market conditions, advertising productivity has a greater impact on financial performance. As was found in preceding regressions, in the first and third models (stock return), the estimated coefficients of the interaction between market complexity and advertising productivity is not significant ($\alpha_7 = 0.038, p - value = 0.267$; $\alpha_7 = 0.020, p - value = 0.596$); although in the second and fourth model (market-to-book ratio), it is significant at the 1% level ($\alpha_7 = -0.078, p - value = 0.003$; $\alpha_7 = -0.110, p - value = 0.000$). Again, the results related to Hypothesis 4 are partly supported. These results corroborate that our main findings are not sensitive to measures of firm size.

Graphical representation of findings

We graphically represented the main findings of to visualise the moderating effects. As Figures 1, 2 and 3 show, organizations with higher levels of advertising productivity perform better financially. The inclination of the lines reveals that the impact of advertising productivity on organizational performance is higher in less dynamic and less munificent environments. When the slope (inclination of the straight line) is greater, the higher the impact of advertising

productivity on performance. This situation occurs in low dynamism and low munificence market conditions for both dependent variables. However, the graphs related to market complexity do not fit these results. For stock return, the inclination of the straight line is no different between less complexity and high complexity market condition. This does not occur for market-to-book ratio though, where organizational performance is higher in less complex environments.

[Insert Figures 1, 2 and 3 here]

Discussion and Conclusion

Marketing and advertising managers are under increasing pressure from senior management to demonstrate how advertising contributes to shareholders' wealth creation (Hughes et al., 2019). Given this, a corpus of studies in Marketing, Finance and Accounting explores the link between advertising and financial performance; but their results are mixed. Our study provides scholars with a causally-adjacent conceptualization and measure of advertising *productivity* and accompanying theory that accounts for the market context of a firm to advance knowledge on when, why and how investing in advertising may reward a firm's financial performance.

Our study deviates from earlier studies by investigating the impact of relative *advertising productivity* on financial performance, as opposed to the absolute amount of advertising *expenditure* seen exclusively among prior studies. Grounded in RBV and its capabilities extension, we theoretically argued and empirically demonstrated that advertising productivity has a positive effect on financial performance. Furthermore, in line with the propositions of resource-based theorists, we incorporated three contextual variables as moderators of the nexus between advertising productivity and financial performance. The results show that market dynamism, market munificence and market complexity negatively moderate the relationship between advertising productivity and performance.

We provide scholars and managers with the missing theoretical, measurement and methodological apparatus to now understand why, when and how investing in advertising can increase (or not) financial performance. We correct for the absence of theory and present a treatment of advertising investment with causally-adjacent logic to financial performance. By revealing three important omitted boundary conditions in a multi-industry study, our findings provide a basis to understand the mixed findings seen among expenditure-performance studies to date and reinvigorate research on the advertising–performance interface. Theoretically, we can attribute mixed findings to a lack of advertising productivity (a capability to be efficient in use of advertising expenditure and advertising innovation) and to market conditions attenuating its value-creating benefits.

Contributions to theory

Drawing on resource-based theory, this study puts forward a conceptual model and treatise for a positive effect of advertising productivity on financial performance. Conceptualized as advertising efficiency and progress/regression in advertising innovation, our analysis shows that advertising productivity positively impacts performance. These findings help disentangle the mixed findings of prior studies by shedding new light on the nexus between advertising and organizational performance (Joshi and Hanssens, 2010; McAlister et al., 2016; Meyer and Ujah, 2017; Tackx et al., 2017; Shah et al., 2019). RBV theorists suggest analysis of the productive capacity of a specific resource to provide a causal logic for why advertising investment, which originates from expenditure but in itself is long-linked to performance, can manifest improvements in organizational performance. The productive capacity of an organization's hinges on its ability to generate an optimum level of desired output using its resources as inputs. In keeping with this reasoning, the study of the effect of advertising productivity on performance requires simultaneous consideration of advertising inputs and

advertising outputs to deduce which firms will generate rents and at a rate advantageous against their competitors. Prior studies, however, examined only the impact of advertising *inputs* on performance to the exclusion of advertising *outputs*. Different degrees of advertising productivity explain prior findings reporting increases in advertising expenditure failing to drive performance (Lu and Beamish, 2004; Han and Manry, 2004; Eng and Keh, 2007; Meyer and Ujah, 2017; Tackx et al., 2017). This discussion yields our first contribution: we advance the advertising–finance literature by providing a theory and conceptualization of advertising productivity and demonstrate empirically the significance of adopting productivity treatments to understand the impact of marketing-related resources on performance. We develop theory through a conceptualization of advertising that is causally-adjacent to financial performance and provide a capability explanation to appreciate the contribution of advertising.

Previous studies examine the direct and immediate impact of advertising on financial performance, neglecting its boundary conditions. RBV and capability theorists contend that in studying an organization's resources on performance, it is essential to consider external boundary conditions. Our study included three market conditions, namely, market munificence, dynamism and complexity, and demonstrated that these market conditions impact the nexus between the focal variables. Our results expand on earlier studies that reported a positive effect of advertising on performance (Graham & Frankenberger, 2000; Sridhar et al., 2014; Shah et al., 2019), but failed to consider the context-sensitivity of their results (cf Luo and Donthu, 2006; Havakhor et al., 2019). Including important omitted market conditions into our model generates a more complete theory of the relationship between advertising (productivity) and performance. This yields our second contribution. Too often studies relegate external market conditions to mere control variables. Instead, our theory integrates them as contingencies in the advertising–performance interface and reveals how market munificence, dynamism and complexity attenuate the contributions of advertising productivity. Given that advertising

productivity is causally-adjacent to performance versus advertising expenditure, and the efficient use of expenditure (as a resource) forms the basis of productivity (as a capability), our theory and analysis explain competing findings in the advertising–performance literature. We enrich theory by revealing when and why advertising productivity may influence financial performance and situate these explanations in three new boundary conditions: market munificence, dynamism and complexity.

Implications for managers

Advertising and marketing managers should concern themselves with the level of advertising productivity, not advertising budgets, as a driver of financial performance and as a new marketing KPI. Advertising managers should assess the conversion of advertising budgets into outputs (to attain advertising efficiency). Advertising managers should also allocate advertising budget across various media in such a manner that they can minimize the advertising budget for the most output (to attain advertising innovation). Managing these aspects dynamically augments advertising productivity as a capability over time. Also, managers should account for market conditions of dynamism, munificence and complexity because the effect of advertising productivity on performance varies depending on these market conditions. Advertising managers of organizations that operate in less munificent, less dynamic and less complex markets should enhance advertising productivity because the positive effect of advertising productivity on performance is greater in such market conditions. When conditions are dynamic, advertising productivity alone is not enough.

Limitations and future research

This research offers important directions for future studies. First, we drew our sample from US-based organizations only. Future studies should examine other countries to broaden

generalizability. Second, the sample consists of only top advertisers in the US. Whether our results generalize to organizations with smaller advertising budgets requires further analysis. Third, in using the Malmquist Index to measure advertising productivity, we could not incorporate some advertising output variables such as customer attitude towards the advertised brand. Future research may combine qualitative and quantitative methods to explore this phenomenon. Fourth, our data runs over a period where marketers were reallocating budgets to new media. We partly capture this in our advertising innovation component. The relative productivity of new media is a matter requiring further study, and particularly for any spill-over effects.

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Table 1: Representative research on Advertising and financial performance

	Operationalization of advertising	*Moderators*	*Performance variables*	*Key findings*
Assaf et al., 2017	Firm advertising expenditure	Corporate social responsibility (CSR)	Sales and market value added (the stock market's estimation of net present value)	The results suggest that firms with higher levels of CSR enjoy higher returns on advertising spending than firms with lower levels of CSR
Comanor & Wilson, 1967	Two measures of advertising intensity: - Advertising outlays per dollar of sales for firms with assets greater than $500,000. - Average advertising expenditures per firm among firms which account for 50 per cent of industry output.		Profit rate: market performance and market power	The results show a significantly positive influence of advertising on profit rates which provide a measure of both market performance as well as the existence of market power
Connolly & Hirschey, 1984	Advertising intensity: advertising normalized by sales		Sales	The results confirm large positive partial effects of advertising intensity on relative excess value normalized by sales
Core et al. 2003	Advertising expenditures		Market-to-book equity	The results do not find influence of advertising on market value
Eng & Keh, 2007	Advertising expense; advertising expense /brand sales	Brand value	Future operating, operationalized as future accounting returns; ROA (return on assets) or stock price return, operationalizing market performance as future stock returns: brand sales or brand-operating income	The results suggest that advertising and brand value of the benefit firm by improving future accounting performance but do not affect growth in the market value of the firms

Erickson & Jacobson, 1992	Estimates of unanticipated advertising expenditures as deviations from the amount predictable based on the lagged one-and two-year past value of advertising		Accounting profits, market value	Results is that the impact of advertising is not greater than that of other expenses
Graham & Frankenberger, 2000	Amount of advertising change		Earnings	The results inform that, depending on the type of product, changes in advertising expenditures are significantly associated with earnings up to 4 years following the year of the expenditures.
Havakhor et al., 2019	Ratios of advertising to sales	Environmental conditions	Firm performance: Tobin's Q ratio	The results support that the interaction between IT and advertising has a negative effect on firm performance in turbulent environments but a positive effect in stable environments
Hirschey & Wichern, 1984	Television advertising intensity normalized by sales		Market-value measures of profitability	There is a positive effect of advertising on market value
Kim et al., 2019	Advertising expenses adjusted by total sales		Firm performance: size-adjusted cumulative abnormal return of the earnings announcement; stock return over one year	The results indicated this research revealed that long-term performance among hospitality firms was associated with increased advertising expenses after a global financial crisis
Kwoka, 1993	Advertising expenditure		Sales	Advertising has a short-term effect on sales, but changes in style seem to have improved sales for several years

Lev & Sougiannis, 1996	Advertising intensity: advertising expenses over sales		Operating income, sales	The results show a positive impact of advertising expenditure on operating income (before advertising)
Megna & Mueller, 1991	Advertising capital		Sales, market shares, profit	Positive and significant advertising effects have been found for cosmetics and toiletries, toys and distilled beverages companies
Meyer & Ujah, 2017	Marketers' discretionary advertising expenditures (estimate the predicted values of discretionary advertising expenses as we control for firm size and its leverage position).		Sales and profitabiliy (ROA, ROS and ROcA)	The results showed a negative relationship between marketers' discretionary advertising expenditures and firm performance
Peterson & Jeong, 2010	Advertising expenditures: annual advertising media and promotional expenses		Brand value, firm-level financial performance	On average, the results show a positive relationship between advertising expenditures and brand value
Picconi, 1977	Advertising expenditure		Sales, market share, share of industry sales	The results do not confirm a significant correlation between advertising and the increase in future sales
Rahman et al., 2019	Direct to end-user (DTE) advertising efficiency		Firm profitability: return on assets (ROA), return on equity (ROE), gross profit margin (GPM) and net profit margin (NPM).	The positive impact of DTE advertising efficiency on B2B firms' profitability.
Shah et al. 2019	Advertising expenditures	Size and sector	Future earnings and market value	Advertising expenditures are significantly positively associated with firms' future earnings and market value

Simon, 1969	Advertising expenditure	Liquor sales	The effect of advertising on liquor sales is spread over a relatively long time
Sougiannis, 1994	Advertising expenditure	Earnings market value	The results show a strong relationship between earnings, capital stock, advertising, and R & D expenditures
Sridhar et al., 2014	Annual advertising expenditure /total assets	Sales; firm value (Tobin's Q)	The results indicate that advertising spending increase sales and firm value. In addition, firm spending in advertising is positively affected by sales but negatively by firm value
Weiss, 1969	Advertising is estimated total advertising expenditures (measured and unmeasured)	Profit rates	The results suggest that it is possible that the net relationship between advertising and profit rates would fall to non-significance if ads could be depreciated over more realistic lives

Table 2: Meta-analytic results

k	Range of correlations		Range of sample sizes		N	M_r	Confidence interval		Q	I^2
	Lower	Upper	Lower	Upper			Lower limit	Upper limit		
11	0.03	0.88	15	6815	16572	0.26***	0.16	0.36	277.78***	96.4

***p<0.001. k: number of effect sizes; N: total sample size; M_r: effect size; Q: homogeneity test statistic; I^2: scale-free index of heterogeneity.

Table 3: Data sources and operationalization of variables

Types of variables	Variable	Operationalization	Data Source
Outcome variables	Stock return	Current year's share price-close multiplied by common share outstanding plus dividends minus previous year's share price-close multiplied by common share outstanding divided by previous	Compustat

		year's share price-close multiplied by common share outstanding	
	Market-to-book ratio	Share price-close divided by book value per share	Compustat
Explanatory variable	Advertising productivity	Measured using DEA-based Malmquist productivity Index (MPI)	Advertising age and Compustat
Moderating variables	Market Dynamism	Two-step procedure: 1. The natural logarithm of the total operating income of four-digit SIC industries was regressed against an index variable of years, over the sample period. 2. The antilog of the standard error of the regression coefficient was used as the measure for operating income volatility.	Compustat
	Market Munificence	Two-step procedure: 1. the natural logarithm of the total operating income of four-digit SIC industries was regressed against an index variable of years, over the sample period. 2. The antilog of the regression coefficient was used as the measure for operating income growth.	Compustat
	Market Complexity	Herfindahl index of concentration	Compustat
Control variables	Firm size	Log of total assets	Compustat
	R&D intensity	Research and development expense divided by total assets	Compustat
	Leverage	Long term debt divided by total assets	Compustat
	Selling intensity	Selling, general and administrative expense divided by total assets	Compustat
	Capital intensity	Invested capital divided by total number of employees	Compustat
	Firm growth rate	Yearly growth rate of total assets	Compustat

Table 4: Descriptive statistics

	Obs	Mean	SD	Min	Max	VIF
Stock Return	1220	0.1225	0.3941	-0.7377	1.7213	
Market-to-book ratio	1221	3.5373	5.7221	-30.288	26.026	
Advertising productivity	908	1.1120	0.7804	0.1956	5.5747	1.02
Market dynamism	1261	1.0115	0.0085	1.0028	1.0443	1.17
Market munificence	1261	1.0537	0.0680	0.9061	1.3001	1.55
Market complexity	1261	0.2080	0.1693	0.0239	0.9633	1.34
Firm size	1259	10.505	1.4805	6.7702	14.477	1.82
R&D Intensity	819	0.0355	0.0398	0.0000	0.1585	1.59
Leverage	1248	0.2031	0.1390	0.0000	0.7250	1.31
Selling Intensity	1095	0.2680	0.1806	0.0151	0.9593	2.03
Capital Intensity	1226	445.41	434.06	10.571	1895.1	1.89
Firm growth rate	1248	0.0870	0.2459	-0.4124	1.5334	1.06

Table 5: Correlation matrix I

		1	2	3	4	5	6	7	8	9	10	11
1	Stock Return	1,00										
2	Advertising productivity	0.04	1,00									
3	Market dynamism	0.04	0.02	1,00								
4	Market munificence	0.11*	0.03	-0.11*	1,00							
5	Market complexity	-0.02	-0.02	0.01	-0.04	1,00						
6	Firm size	-0.01	0.02	0.11*	-0.09*	-0.14*	1,00					
7	R&D Intensity	-0.01	0.10*	0.05	0.43*	-0.33*	0.08*	1,00				
8	Leverage	0.02	-0.04	-0.09*	-0.11*	-0.06*	-0.16*	-0.31*	1,00			
9	Selling Intensity	-0.06*	-0.02	-0.02	-0.04	0.17*	-0.58*	-0.01	-0.08*	1,00		
10	Capital Intensity	0.09*	0.05	0.12*	0.20*	-0.15*	0.51*	0.17*	-0.13*	-0.56*	1,00	
11	Firm growth rate	0.32*	0.19*	0.01	0.21*	-0.02	-0.02	0.15*	-0.11*	-0.07*	0.11*	1,00

*p<0.05

Table 6: Correlation matrix II

		1	2	3	4	5	6	7	8	9	10	11
1	Market-to-book ratio	1.00										
2	Advertising productivity	-0.02	1.00									
3	Market dynamism	0.01	0.02	1.00								
4	Market munificence	0.04	0.03	-0.11*	1.00							
5	Market complexity	0.07*	-0.02	0.01	-0.04	1.00						
6	Firm size	-0.15*	0.02	0.11*	-0.09*	-0.14*	1.00					
7	R&D Intensity	0.09*	0.09*	0.05	0.43*	-0.33*	0.08*	1.00				
8	Leverage	-0.09*	-0.04	-0.09*	-0.11*	-0.06*	-0.16*	-0.31*	1.00			
9	Selling Intensity	0.10*	-0.02	-0.02	-0.04	0.17*	-0.59*	-0.01	-0.08*	1.00		
10	Capital Intensity	-0.06*	0.05	0.12*	0.20*	-0.15*	0.51*	0.17*	-0.13*	-0.56*	1.00	
11	Firm growth rate	0.06*	0.19*	0.01	0.21*	-0.02	-0.02	0.15*	-0.11*	-0.07*	0.11*	1.00

*p<0.05

Table 7: Results of dynamic panel data regression analysis using System GMM

	Model 1: Stock Return	***Model 2***: Market-to-book ratio
Stock Return $_{(t-1)}$	-0.103***	
	(0.0169)	
Market-to-book ratio $_{(t-1)}$		-0.036***
		(0.00322)
Advertising productivity $_{(t-1)}$	15.92***	4.842***
	(-1.860)	(10.96)
Market dynamism $_{(t-1)}$	0.239***	0.104**
	(-2.828)	(43.52)
Market munificence $_{(t-1)}$	0.082***	0.175***
	(0.145)	(-5.089)
Market complexity $_{(t-1)}$	-0.116***	-0.001
	(0.052)	(0.748)
Market dynamism $_{(t-1)}$ x Advertising productivity $_{(t-1)}$	-14.78***	-3.829**
	(-1.770)	(10.02)
Market munificence $_{(t-1)}$ x Advertising productivity $_{(t-1)}$	-1.131***	-0.978***
	(0.111)	(-1.074)
Market complexity $_{(t-1)}$ x Advertising productivity $_{(t-1)}$	0.0464	-0.106***
	(0.033)	(0.351)
Firm size	-0.025	-0.338***
	(0.006)	(0.129)
R&D intensity	-0.098***	-0.171***
	(0.169)	(-5.053)
Leverage	-0.130**	-0.813***
	(0.155)	(-1.021)
Selling intensity	-0.027	-0.207***
	(0.050)	(-1.508)
Capital intensity	-0.071***	-0.207***
	(2.60e-05)	(0.001)
Growth rate	0.380***	0.049***
	(0.027)	(0.301)
$\boldsymbol{Wald\ Chi^2}$	35518.72***	637512.07***
Arellano-Bond test for AR(2) (p-value)	0.322	0.356
Hansen test (p-value)	0.355	0.829
No. Observations	534	528

Beta standardized. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Results of dynamic panel data regression analysis using System GMM

	Model 1: Stock Return	***Model 2***: Market-to-book ratio
Stock Return $_{(t-1)}$	-0.111***	
	(0.018)	
Market-to-book ratio $_{(t-1)}$		-0.008***
		(0.002)
Advertising productivity $_{(t-1)}$	16.51*	8.188***
	(-3.632)	(20.52)
Market dynamism $_{(t-1)}$	0.155*	0.241***

	(-8.217)	(44.31)
Market munificence $_{(t - 1)}$	0.048*	0.170***
	(0.280)	(-3.681)
Market complexity $_{(t - 1)}$	-0.123***	-0.0377*
	(0.062)	(0.615)
Market dynamism (t - 1) x Advertising productivity (t - 1)	-15.18*	-6.911**
	(-3.618)	(20.38)
Market munificence (t - 1) x Advertising productivity (t - 1)	-1.314***	-1.250***
	(0.095)	(-1.042)
Market complexity (t - 1) x Advertising productivity (t - 1)	0.029	-0.110***
	(0.030)	(0.189)
Firm size	-0.003	-0.184***
	(0.005)	(0.0822)
R&D intensity	-0.094***	0.025
	(0.238)	(-2.518)
Leverage	-0.112*	-0.273***
	(0.201)	(0.559)
Selling intensity	-0.014	-0.027
	(0.051)	(0.598)
Capital intensity	-0.064***	-0.130***
	(2.01e-05)	(0.001)
Growth rate	0.345***	0.0323***
	(0.031)	(0.179)
$\boldsymbol{Wald\ Chi^2}$	238982.15 ***	150496.79***
Arellano-Bond test for AR(2) (p-value)	0.225	0.331
Hansen test (p-value)	0.999	0.509
No. observations	534	528

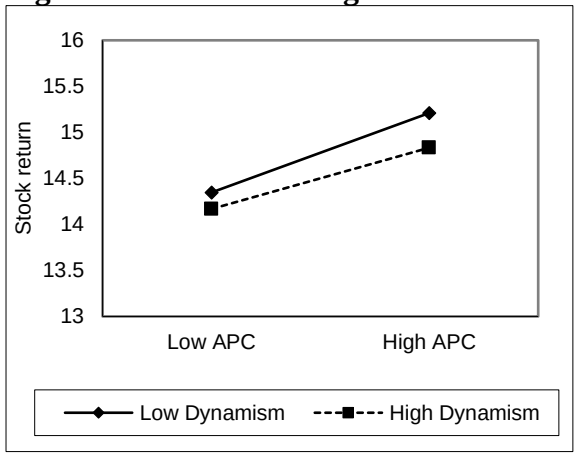
Beta standardized. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Results of dynamic panel data regression analysis using System GMM

	Model I: Stock Return$_a$	***Model II:*** Market − to − book ratio$_a$	***Model III:*** Stock Return$_b$	***Model IV:*** Market − to
Stock Return $_{(t-1)}$	-0.077***		-0.086***	
	(0.012)		(0.0192)	
Market-to-book ratio $_{(t-1)}$		-0.301***		-0.037***
		(0.007)		(0.003)
Advertising productivity $_{(t-1)}$	9.127***	5.525***	10.76**	5.027***
	(-1.386)	(10.74)	(-2.147)	(11.80)
Market dynamism $_{(t-1)}$	0.192***	0.126*	0.198***	0.122**
	(-2.288)	(66.61)	(-2.976)	(45.36)
Market munificence $_{(t-1)}$	0.066***	0.228***	0.075**	0.209***
	(0.160)	(-7.797)	(0.201)	(-5.868)
Market complexity $_{(t-1)}$	-0.127***	0.021	-0.099***	0.034
	(0.058)	(-1.040)	(0.0595)	(0.733)
Market dynamism (t - 1) x Advertising productivity (t - 1)	-8.377***	-4.714***	-9.715**	-3.941**
	(-1.346)	(10.06)	(-2.006)	(10.66)
Market munificence (t - 1) x Advertising productivity (t - 1)	-0.735***	-0.796***	-1.021***	-1.052***
	(0.105)	(-1.098)	(0.154)	(-1.276)
Market complexity (t - 1) x Advertising productivity (t - 1)	0.038	-0.078***	0.020	-0.110***
	(0.0353)	(0.437)	(0.0392)	(0.306)
Firm size	-0.009	-0.144***	-0.017	-0.302***
	(0.006)	(0.284)	(0.007)	(0.123)
R&D intensity	-0.108***	-0.078*	-0.103***	-0.206***
	(0.191)	(-6.186)	(0.228)	(-4.877)
Leverage	-0.109*	-0.649***	-0.115**	-0.833***
	(0.165)	(-2.270)	(0.153)	(-1.069)
Selling intensity	-0.006	-0.078*	-0.009	-0.184***
	(0.033)	(-1.505)	(0.0594)	(-1.503)
Capital intensity	-0.072***	-0.331***	-0.052*	-0.226***
	(2.42e-05)	(0.001)	(3.16e-05)	(0.001)
Growth rate	0.364***	0.038***	0.369***	0.033***
	(0.021)	(0.313)	(0.0250)	(0.334)
$\boldsymbol{Wald\ Chi^2}$	42993.11***	25150.14***	56548.40***	210954.76***
Arellano-Bond test for AR(2) (p-value)	0.372	0.174	0.358	0.368
Hansen test (p-value)	0.310	0.883	0.998	0.898
Observations	534	528	534	528

Beta standardized. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. a: The firm size variable corresponds to the natural logarithm of the number of employees. b: The firm size variable corresponds to the natural logarithm of total sales

Figure 1: The moderating effect of market dynamism



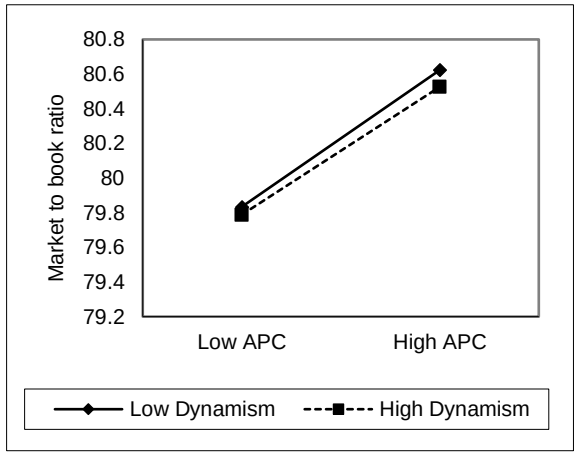
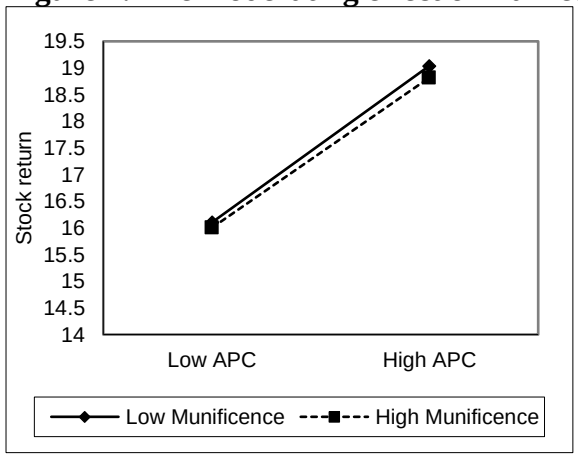


Figure 2: The moderating effect of market munificence



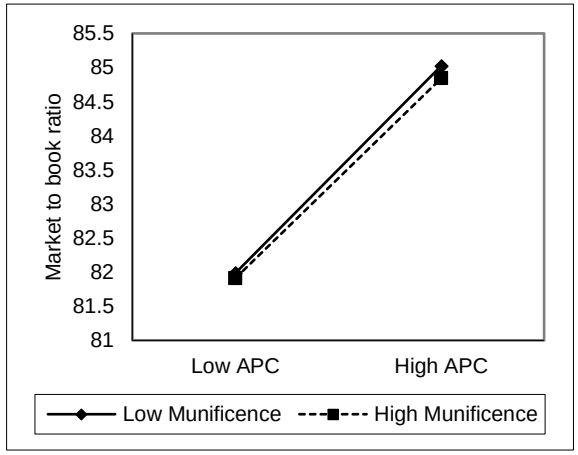
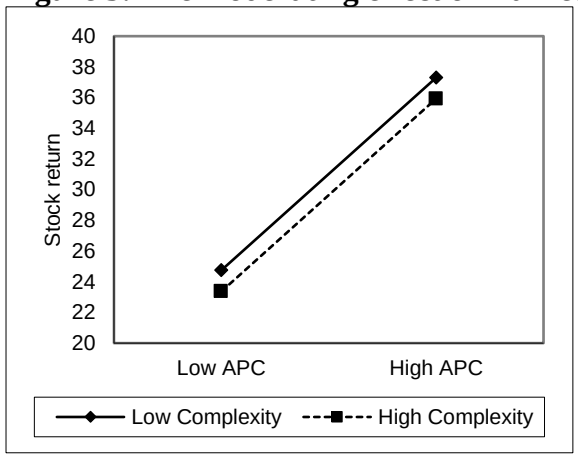
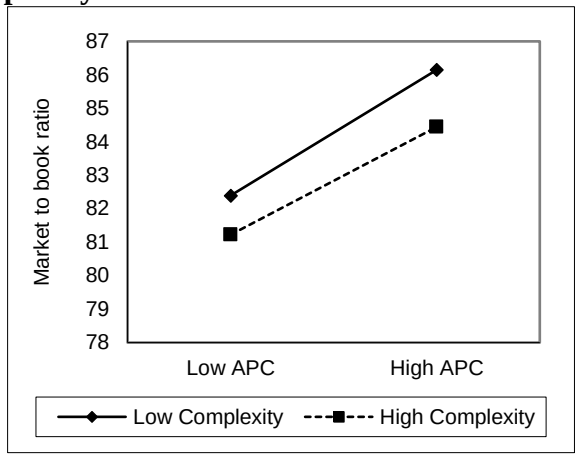


Figure 3: The moderating effect of market complexity





Appendix 1: Geometric mean of sample firms (MPI)

Year	Efficiency	Innovation	MPI
2002	0.9869	0.9835	0.9706
2003	1.0092	0.985	0.9941
2004	1.0121	0.8201	0.8301
2005	0.9444	0.9431	0.8907
2006	0.9879	0.9624	0.9508
2007	1.0745	0.8472	0.9104
2008	0.8722	1.2187	1.0629
2009	1.0136	0.9644	0.9775
2010	0.9502	1.0791	1.0254
2011	1.0581	1.0197	1.079
2012	0.968	1.0265	0.9937
2013	0.9594	0.9838	0.9438