How Advertising Expenditures Affect Consumers' Perceptions of Quality

A Psychology-Based Assessment of Brand-, Category-, and Country-Level Moderators

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Although some studies have found the effect of advertising expenditures on perceived quality to be positive and significant, others have shown that, under certain circumstances, advertising expenditures do not impact perceived quality. This paper contributes to the literature on advertising-to-quality perceptions by drawing on the accessibility-diagnosticity model from consumer psychology to examine brand-, category-, and country-level moderators of the expenditures-quality effect. Utilizing a monthly dataset of 898 brands in 48 categories across more than four years, this study provides a comprehensive picture regarding the relationship between advertising expenditures and perceived quality.

INTRODUCTION

The impact of advertising on customers, sales, and profits is one of the most (if not the most) widely researched areas in marketing. Prior empirical research has shown that advertising affects various outcomes of interest to marketers, such as product sales (Sethuraman, Tellis, and Briesch, 2011), stock returns (Srinivasan, Pauwels, Silva-Rosso, and Hanssens, 2009), company risk (McAlister, Srinivasan, and Kim, 2007), price sensitivity (Erdem, Keane, and Sun, 2008), and brand equity (Yoo, Donthu, and Lee, 2000).

One important outcome that advertising influences is perceived quality of offerings (Kirmani and Wright, 1989). Perceived quality plays a foundational role in marketing,influencing many important outcome measures. As an earlier study noted, "It is now well established that it is not quality per se but customers' perceptions of quality that drive preferences and consequently satisfaction, loyalty, sales, and profitability" (Mitra and Golder, 2006, p. 230; see also Aaker and Jacobson, 1994; Anderson, Fornell, and Lehmann, 1994; Anderson and Sullivan, 1993; Rust, Zahorik, and Keiningham,

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- Although advertising expenditures, in and of themselves, have potential signaling value and can positively shape perceptions about the quality of the brand in that way, various moderating factors strengthen or weaken that relationship.
- There is a stronger relationship between the advertising expenditures and perceptions of quality for brands that consumers own (or have used in the past), when economic conditions are more favorable, in categories where consumers are not highly involved, and in categories where new products are frequently introduced.
- That relationship is weaker for high-equity brands and for brands that experience high volatility in advertising expenditures.
- Relative increases in television and outdoor advertising expenditures have the strongest effects on perceived quality, whereas the effect is weaker (and sometimes nonsignificant) for print, radio, and Internet channels.

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1995; Zeithaml, 1988). Other researchers found that perceived quality positively affects product consideration and purchase (Erdem, Swait, and Valenzuela, 2006) and that perceived quality reduces perceived risk (Grewal, Iyer, Gottlieb, and Levy, 2007).

Despite the importance of perceived quality, the evidence from past research on the effect of advertising on perceived quality is not conclusive. Although some studies have found the effect of advertising expenditures on perceived quality to be positive and significant (Akdeniz, Calantone, and Voorhees, 2014; Moorthy and Zhao, 2000), other studies have shown that, under certain circumstances or in specific contexts, advertising expenditures do not—or perhaps even negatively—affect perceived quality (Clark, Doraszelski, and Draganska, 2009; Kirmani, 1997; Kirmani and Wright, 1989). This mixed set of findings suggests that the relationship between advertising expenditures and perceived quality depends on the context. Although several factors have been studied as moderators of the effectiveness of advertising expenditures, past research provides limited insight into why advertising expenditures have a stronger impact on perceived quality for some brands and in some product categories than others.

The current study aims to fill this gap in the literature. Building on the accessibility-diagnosticity model from consumer psychology (Feldman and Lynch, 1988), the authors suggest that, when fewer direct diagnostic quality cues are available to consumers—or when they are difficult to obtain—consumers are more likely to rely on peripheral quality cues such as advertising expenditures. Accordingly, the authors examine how several brand- and category-level factors influence the extent to which quality cues are available to consumers. The empirical analysis in the study covers 898 brands in 48 product and service categories across more than four years (July 2014 to August 2018), providing a substantial basis for uncovering generalizable findings. Results provide support for the authors' theoretical framework regarding the quality signaling effect of advertising expenditures and suggest some guidelines for how marketers might more efficiently allocate their advertising budgets across the portfolio of brands they manage.

CONCEPTUAL BACKGROUND

Perceived quality is defined as "the consumer's judgement about a product's overall excellence or superiority" (Kirmani and Zeithaml, 1993, p. 144). Consumers make quality-related inferences based on many brand actions and characteristics. In addition to more direct antecedents of quality, such as product attributes, physical product appearance (Dawar and Parker, 1994), price (Gerstner, 1985), and product warranties (Boulding and Kirmani, 1993), the literature has examined a variety of other factors affecting perceived quality, including brand name (Rao and Monroe, 1989), country of origin (Maheswaran, 1994), and product line length (Berger, Draganska, and Simonson, 2007), as well as advertising expenditures (Kirmani and Wright, 1989), the focus of this paper.

The notion that nonsalvageable company investments in advertising expenditures affect perceived product quality was first introduced in signaling models developed by economists (Kihlstrom and Riordan, 1984; Milgrom and Roberts, 1986; Nelson, 1974). According to the signaling literature, consumers infer high-product quality when a brand advertises heavily, because rational consumers know that if a low-quality product is heavily advertised, its true (low) quality would be revealed when customers try the product, in particular for an "experience good," a product or service for which quality cannot be ascertained until after purchase. Consequently, advertising expenditures generally will not be recouped because initial customers will not purchase the product in the future and will inform others of its low quality.

The Signaling Effect of Advertising Expenditures

In marketing, the signaling effect of advertising expenditures has been examined in laboratory settings (Kirmani, 1990; Kirmani and Wright, 1989; Moorthy and Hawkins, 2005). In addition to providing evidence for the signaling effect of advertising expenditures, behavioral research provides insight into alternative mechanisms through which advertising expenditures affect perceived quality. A previous study examined some of the underlying reasons for the signaling effect, showing that customers draw inferences from advertising expenditures about the marketer's confidence, the correlation between advertising expenditures and actual quality, and the company's financial strength (Kirmani and Wright, 1989).

Behavioral research has also examined conditions under which the signaling effect is weakened or strengthened. Factors such as product involvement, type of product (*e.g.*, experience good versus search good [a product with characteristics that can be easily evaluated before purchase]), and the level of advertising spending have been examined as potential moderators of advertising's signaling effectiveness (Kirmani, 1990; Kirmani and Wright, 1989; Moorthy and Hawkins, 2005). Several other factors, such as a tendency to rely on peripheral and central cues, perceptions regarding the cost of advertising, and inferences regarding the marketer's desperation have also been used to explain why the signaling effect of advertising expenditures is stronger in some situations than in others.

Researchers who utilized secondary data to examine the effect of advertising expenditures on perceived quality, however, have reached varied conclusions. One study found that advertising spending positively influences perceived quality (Moorthy and Zhao, 2000). Another group, however, did not find significant evidence for the effect of advertising expenditures on perceived

quality (Clark *et al.*, 2009). Most recently, other researchers found that national advertisements and local advertisements positively influence perceived quality, whereas the effect of digital advertisements on perceived quality is not significant (Du, Joo, and Wilbur, 2019). That group also reported considerable heterogeneity in the effect of advertising expenditures on perceived quality across different sectors, although they did not delve into explanations for these differences.

Overall, although past research provides important insights into the signaling effect of advertising expenditures, it leaves many questions unanswered. Specifically, the literature lacks a comprehensive framework to help explain why the effect of advertising expenditures on perceived quality varies depending on contextual factors and across brands and product categories. The current study complements past research by proposing an overarching framework based on principles from a well-established information processing model of advertising effects to examine multiple factors at the brand, category, and country levels.

The Accessibility-Diagnosticity Model of Advertising Effects

One influential information-processing model of advertising effects is the accessibility-diagnosticity model. This model posits that the likelihood that an informational input will be used to make a judgment is determined by the accessibility of the input in memory (*i.e.*, ease of retrieval), the accessibility of other inputs in memory, and the perceived diagnosticity (relevance) of the different inputs (Feldman and Lynch, 1988). In the context of the current study, the focal input is advertising expenditures (as a cue) and the judgment is about a brand's perceived quality. Additional inputs include other marketing mix elements, product attributes, and product experience. In situations in which information regarding advertising expenditures is more accessible, advertising expenditures are seen as more diagnostic regarding perceived quality, and other inputs are less accessible or seen as less diagnostic to customers; according to the accessibility-diagnosticity model, advertising expenditures should have a stronger impact on perceived quality. The authors rely on the accessibility-diagnosticity model of communication persuasion to identify potential moderators of the relationship between advertising expenditures and consumers perceived quality. It should be noted that, although market-level data makes it difficult to formally test the application of the individual-level-based accessibility-diagnosticity model in this setting, the use of the model as theoretical motivation and justification for how various marketplace factors might moderate the relationship between advertising expenditures and perceived quality.

Moderators of the Effect of Advertising Expenditures On Perceived Quality

Several factors may moderate the effects of advertising expenditures on consumer perceptions of product quality. On the basis of their prevalence and importance in the marketplace (and limited by availability of data), the authors identify some notable factors and the way in which their effects are likely to be manifested, and they suggest additional factors for consideration in future research discussion (See Figure 1).

Advertising Expenditure Volatility. If advertising expenditures for a brand have been inconsistent or volatile in the past (*e.g.*,

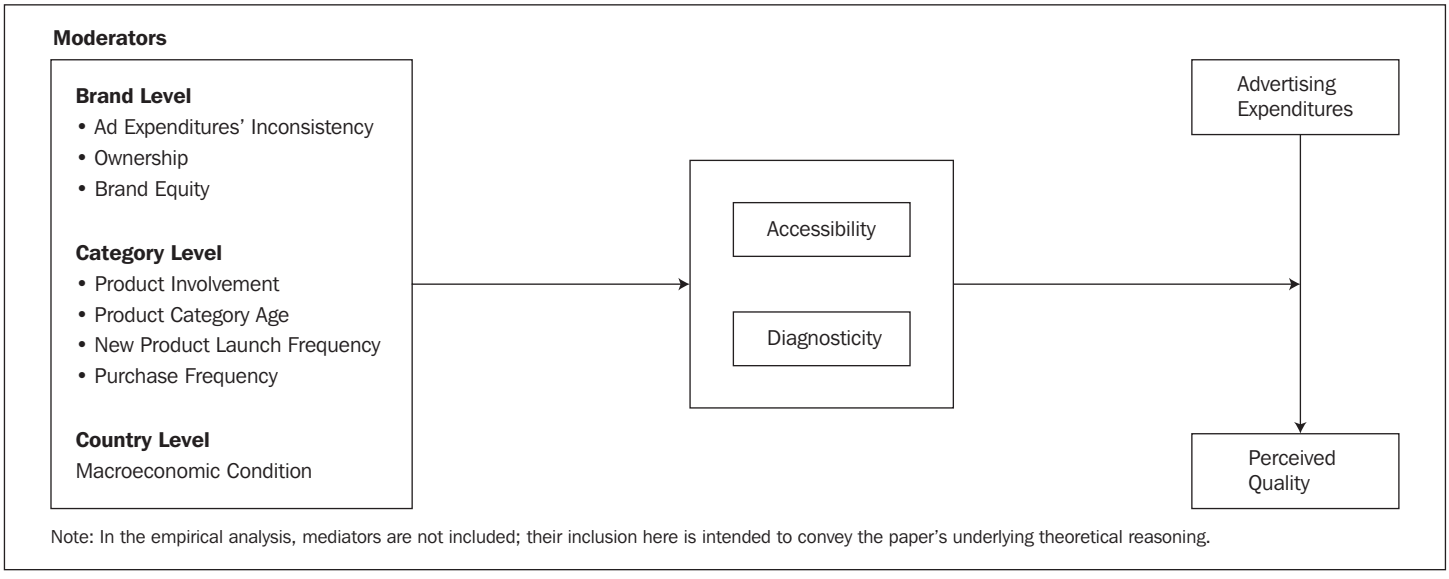

Figure 1 Conceptual Framework

as with "pulsing," spending heavily on advertising sometimes and spending relatively little at other times), advertising expenditures in any particular time period would be less interpretable and diagnostic as a cue. This supposition is consistent with the idea that if attribute volatility signifies uncertainty, consumers weigh it less (Bettman, Luce, and Payne, 1998). As a result, consumers would be less likely to rely on them as a signal or cue in forming quality judgments.

Brand Ownership. If consumers own or use a particular brand, they have firsthand knowledge about its performance and thus have diagnostic information regarding quality based directly on their own product or service experiences (Alba and Hutchinson, 1987; Hoch and Ha, 1986). They should, therefore, be likely to rely less on signals and cues such as advertising expenditures and more on their, at least seemingly, more diagnostic personal experience in forming quality judgments (Brakus, Schmitt, and Zarantonello, 2009). As a result, advertising expenditures should play a less important role in shaping consumer judgments regarding perceived quality for brands that more consumers own or use (Yang, Bi, and Zhou, 2005).

Brand Equity. Because customers are more likely to be familiar with brands that are well-known and well-liked, they are more likely to have the ability to process and assimilate their advertising claims (Hoeffler and Keller, 2003; Keller and Lehmann, 2006). Consumers can also gain more diagnostic information regarding brands that are strong through word-of-mouth, news reports, or firsthand experience (Chattopadhyay and Laborie, 2005). For these reasons, advertising expenditures for strong brands should be less diagnostic and, therefore, not as strongly related to perceived quality.

Product Involvement. When consumers are highly involved in a product category, they are more likely to pay attention to brands and their marketing activities (Zaichkowsky, 1985) as well as to collect or receive product information about specific brands through word of mouth, websites, reviews, and so forth. Although advertising expenditures may be accessible, the relative diagnostic value of advertising expenditures as a cue should be lower in the presence of those other inputs. As such, consumers who are highly involved in a product category should be more likely to focus on product information or message claims rather than signals or cues when assessing quality (Petty, Cacioppo, and Schumann, 1983).

Product Category Age. In older and, therefore, potentially more familiar product categories, consumers are more likely to have had prior personal experiences with brands or have acquired information about them through various sources over time (Hoch and Deighton, 1989; Schmitt, 2009). They, therefore, should be more likely to assess product quality using more diagnostic direct cues rather than relying on advertising expenditures. By contrast, consumers who are less familiar with new product categories, therefore, may be less able to process or use message arguments about brands and products (Campbell and Keller, 2003). In this case, signals or cues are likely to play a more important role for them.

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New Product Launch Frequency. If products are frequently launched in a category, consumer knowledge about any one product and its attributes may be limited (Burke and Srull, 1988; Kumar and Krishnan, 2004). As a result, signals or cues such as advertising expenditures are likely to be more important in forming perceived quality judgments.

Purchase Frequency. In product categories with high purchase frequency, such as consumer packaged goods, customers are likely to have gained more personal experience with the products or services. As a result, they have a greater opportunity to assess product attributes and less need to rely on signals or cues such as advertising expenditures (Kent and Allen, 1994; Tellis, 1988). They, therefore, should be more likely to shape their quality perceptions using more diagnostic product-related information than less diagnostic advertising expenditures.

Macroeconomic Conditions. If economic conditions are favorable, consumers are likely to see their purchases as less risky because they have, or expect to have, more disposable income. Because of this reduction in perceived financial risk, customers may be less attentive to specific product features. On the other hand, if economic conditions are less favorable, consumers may experience fear and uncertainty and be more likely to pay attention to prices and the value of their purchases, as evidenced by the growth in private labels during an economic downturn (Hoch and Banerji, 1993; Lamey, Deleersnyder, Dekimpe, and Steenkamp, 2007). As

a result, consumers might actively seek more information regarding a brand's quality; for instance, by reading reviews or asking the advice of friends to try to avoid making a mistake (Bohlen, Carlotti, and Mihas, 2010). If they do, they will have more diagnostic information available and be less likely to find advertising expenditures as diagnostic when judging perceived quality.

DATA AND MEASURES

The authors used a variety of different data sources for their independent (advertising expenditures), dependent (perceived quality), and moderator variables.

The authors used Kantar's Ad$pender database to collect monthly data on advertising expenditures of brands in the United States. Ad$pender breaks down monthly advertising expenditures across five different advertising platforms: television, Internet, print, radio, and outdoor. The authors combined advertising expenditures across all five platforms to form the brands' total monthly advertising expenditures. They used advertising expenditures to examine the overall relationship between advertising expenditures and perceived quality, as well as its interaction effect with moderating variables.

The authors obtained data on the perceived quality of brands in 28 business-to-consumer sectors from April 2014 to August 2018 from YouGov, an Internet-based market research firm headquartered in London, United Kingdom. Whereas firms such as Young & Rubicam or EquiTrend collect yearly or, at most, quarterly data, YouGov surveys thousands of U.S. consumers on a daily basis. As such, YouGov has become an attractive data source in the marketing literature (Colicev, Malshe, Pauwels, and O'Connor, 2018; Du *et al.*, 2019; Luo, Raithel, and Wiles, 2013).

Following recommendations from YouGov representatives to utilize more reliable perceived quality scores based on larger samples, the authors used monthly data on perceived quality. Although perceived quality can range from –100 (*i.e.*, if all respondents say the brand is of low quality) to +100 (*i.e.*, if all respondents say the brand is of high quality), the observed values in the authors' data range from –29.28 to 68.88, with a mean of 15.81. After matching YouGov's data on perceived data with Kantar's data on advertising expenditures, the authors' final dataset consists of 898 brands in 28 YouGov sectors, spanning more than four years. The authors list all the brands and sectors used in the sample (See Web Appendix 1).

To measure some of the category-level characteristics, the authors first divided some of the YouGov sectors that covered a broad and heterogenous set of products and services into multiple, more homogenous categories. YouGov, for example, combines brands related to online travel agencies (*e.g.*, Expedia), cruises (*e.g.*, Royal Caribbean Cruises), ground transportation (*e.g.*, Lyft), and amusement parks (*e.g.*, Six Flags) into one general sector called "Travel: Amusement, Cruise, Travel Agents." In such cases, the authors created separate categories for the brands within the large YouGov sector. As a result, they examined the relationship between advertising expenditures and perceived quality across 48 categories rather than 28 YouGov sectors.

The authors next conducted online surveys on Amazon's Mechanical Turk (Mturk.com) platform in May 2019, using items that were developed and used in prior academic research to measure product involvement (*INVOLV*; Dholakia, 2001), purchase frequency (*FREQ*; Farris and Buzzell, 1979), and new product launch frequency (*NPL*; Fischer, Völckner, and Sattler, 2010). To obtain more reliable responses, the authors used several MTurk filters (*e.g.*, an approval rate >95 percent, qualifications for a master's degree, residence in the United States, age >21), included marker items in the survey, and provided survey respondents with appropriate monetary compensation. The authors provide more details on the survey (See Web Appendix 2). Category-specific mean scores exhibit face validity (See Table 1). Tablets and smartphones, PCs and laptops, and Internet service providers and cellular services have the highest scores on product category involvement, for example, whereas juices, mixes, and frozen ready-to-eat meals have the lowest scores.

The authors measured a brand's advertising volatility as the (log-transformed) variance in the brand's monthly advertising expenditures during the 12 months preceding the focal time period (*VOLATIL*). They collected data on each brand's introduction year through searches on Google and Wikipedia and then categorized product categories as old or young on the basis of a median split of the age of brands in the category (product category age; *CATAGE*). The authors defined high-equity brands as those brands that were in the top 100 brands in the United States based on Young & Rubicam's Brand Asset Valuator during the previous year. To examine the role of macroeconomic conditions, the authors collected quarterly data on gross domestic product per capita (*GDPPC*) in the United States from Federal Reserve Economic Data.

Finally, YouGov reports the percentage of customers who have owned or used a brand's offerings. The authors use this to account for customer ownership. The authors summarize variable operationalizations and report the correlations among them (See Table 2 and Table 3, respectively).

METHODOLOGY

The authors' analysis examines the main effect of aggregate advertising expenditures on perceived quality, as well as heterogeneity in this relationship as a function of the brand-, category-, and country-level moderators. The authors use the following panel

Table 1 Customers' Perceptions Regarding Different Categories

	Mean scores for:		
Category	***INVOLV***	***NPL***	***FREQ***[a]
Apparel and shoes	4.68	5.35	3.28
Appliances	4.40	4.90	4.43
Beverages: soft drinks	3.90	4.82	2.55
Beverages: beer	4.37	5.36	2.29
Beverages: spirits	3.99	5.09	3.00
Cameras	4.72	5.47	4.84
Cars	5.12	5.47	4.82
Clothing stores	4.65	5.64	3.34
Computer accessories	4.99	5.49	4.42
Consumer banks	4.92	4.50	4.21
Consumer electronics: audio/visual	5.01	5.40	4.11
Consumer packaged goods: coffee and tea	4.36	4.85	2.76
Consumer packaged goods: dairies	4.61	4.60	2.42
Consumer packaged goods: juices and mixes	3.76	4.74	2.89
Consumer packaged goods: ready meals	3.79	5.40	2.70
Consumer packaged goods: snacks and sweets	4.58	5.64	2.60
Consumer packaged goods: water	4.15	4.25	2.92
Consumer packaged goods: other food products	4.37	5.30	2.58
Credit cards	5.05	5.11	4.41
Department stores	4.78	5.04	3.40
Dining: casual dining	4.48	4.87	2.91
Dining: fast casual dining	4.30	5.22	2.82
Dining: fast food	4.03	5.10	2.72
Dining: steakhouses and top casual dining	4.55	4.49	3.51
Discount stores	4.80	5.22	3.08
Drugs: over-the-counter	4.72	4.98	3.70
Drugs: prescription	4.86	5.27	3.34
Electronic devices: accessories	4.91	5.13	4.21
Financial services	4.78	4.87	4.09
Internet service provider and cellular services	5.24	5.06	4.38
Investment management	4.81	4.26	4.02
Medical devices	4.73	5.01	3.67
Payment systems	4.56	4.70	3.51
PCs and laptops	5.15	5.50	4.55
Restaurants: pizza stores	4.29	5.02	3.23
Shops/restaurants: coffee and donut	4.25	4.82	2.86
Shops/restaurants: ice cream-smoothie	4.34	5.21	3.15
Smart home devices and systems	4.56	5.35	4.14
Software and apps	4.86	5.38	3.63
Tablets and phones	5.16	5.67	4.29
Tools and hardware	4.48	5.00	3.87
Travel: airlines	4.41	3.84	3.98
Travel: amusement, theme, and water parks	4.40	4.51	4.22
Travel: cruises	4.59	4.39	4.87
Travel: ground transportation	4.17	4.32	3.81
Travel: hotels	4.67	4.58	3.78
Travel: other tourist attractions	4.41	4.62	4.23
Travel: online travel agencies	4.40	4.58	4.14

Note: *NPL* = new product launch frequency. [a]Higher values indicate lower purchase frequency (or more interpurchase time).

Table 2 Variables and Descriptions

Variable	Operationalization	Source/Reference
Perceived quality (*PQ*)	Percentage of respondents who chose the focal brand in response to the question "Which of the following brands do you think represents good quality?" minus the percentage of respondents who chose the focal brand in response to the question "Which of the following brands do you think represents poor quality?" during each month (a respondent could only choose high-/low-quality brands among those brands for which earlier they had indicated an awareness).	YouGov/ Du *et al.* (2019)
Advertising expenditures (*AD*)	Brand's total monthly advertising expenditures across different advertising channels (log-transformed).	Kantar Media
Advertising volatility (*VOLATIL*)	Variance in total monthly (log-transformed) advertising expenditures (AD) of a brand over the past six months (before the current time period). Higher values suggest more inconsistency.	Kantar Media
Ownership (*OWN*)	Average of percentage of people who are current customers and percentage of people who, in the past, were customers of services/products offered by the brand.	YouGov/ Du *et al.* (2019)
Brand equity (*EQUITY*)	Whether the brand made it (.5) into the top 200 brands in the United States in the previous year, according to Young & Rubicam's Brand Asset Valuator, or not (–.5).	Young & Rubicam
Product involvement (*INVOLV*) (α= .78)	Average of three items ("This category is very important to me," "This category interests me a lot," and "I would rate shopping in this category as being of the highest importance to me"), with each item rated on a 5-point Likert scale.	Mturk survey/ Dholakia (2001); Steenkamp, Van Heerde, and Geyskens (2010)
Purchase frequency (*FREQ*)	Interpurchase time in a product category as measured by the following item: "How often do you purchase a product (or a service) in this category?" Responses were: weekly or more often; once a week to once a month; once a month to once every 6 months; once every 6 months to once a year; once a year to once every 5 years; and once every 5 years or more.	Mturk survey/ Farris and Buzzell (1979)
Product category age (*CATAGE*)	A binary variable indicating whether the product category is old (–.5) or new (.5). The dichotomy is based on median split of average age of all brands in the category.	Google Search, Wikipedia, Factiva
New product launch frequency (*NPL*)	The extent of new product launch intensity in a category as measured by responses to the following item: "In this category, new products and services are frequently introduced" (5-point Likert scale).	Mturk survey/ Fischer *et al.* (2010)
Macroeconomic condition (gross domestic product per capita; *GDPPC*)	Macroeconomic condition of the country as measured by real quarterly GDPPC.	Federal Reserve Economic Data

Table 3 Correlations

Variable	*PQ*	*AD*	*OWN*	*VOLATIL*	*EQUITY*	*INVOLV*	*CATAGE*	*NPL*	*FREQ*	*GDPPC*
PQ	—									
AD	.17	—								
OWN	.72	.29	—							
VOLATIL	.07	–.17	.01	—						
EQUITY	.53	.25	.44	–.01	—					
INVOLV	.02	.18	–.21	–.09	.06	—				
CATAGE	.01	–.10	–.01	.01	–.07	.18	—			
NPL	.19	.11	.13	.06	.16	.21	.02	—		
FREQ	.01	.14	–.29	–.10	.07	.66	.06	–.17	—	
GDPPC	.00	.04	–.04	.02	–.01	.00	.01	.01	.00	—

Note: *PQ* = perceived quality; *AD* = advertising expenditures; *OWN* = ownership; *VOLATIL*.= advertising volatility; *EQUITY* = brand equity; *INVOLV* = product involvement; *CATAGE* = product category age; *NPL* = new product launch frequency; *FREQ* = purchase frequency; *GDPPC* = macroeconomic condition (gross domestic product per capita).

regression model to estimate the effect of advertising expenditures (*AD*), and the moderating role of brand-, category-, and country-level factors, on perceived quality (*PQ*):

$$\begin{aligned} PQ_{it} = {} & \beta_1 + \beta_2 AD_{it} + \beta_3 AD_{it} \times VOLATIL + \beta_4 AD_{it} \\ & \times OWN_{it} + \beta_5 AD_{it} \times EQUITY_{it} + \beta_6 AD_{it} \times INVOLV_i \\ & + \beta_7 AD_{it} \times FREQ_i + \beta_8 AD_{it} \times CATAGE_i + \beta_9 AD_{it} \times NPL_i \\ & + \beta_{10} AD_{it} \times GDPPC_t + CF_{it} + \sum MainEffects + \sum Controls \\ & + u_i + e_{it} \end{aligned} \quad (1)$$

where i denotes brands and t denotes the time indicator (*i.e.*, month). Here, AD_{it} and PQ_{it} represent brand i's total advertising expenditures and perceived quality in month t, respectively. *VOLATIL*, *OWN*, *EQUITY*, *INVOLV*, *FREQ*, *CATAGE*, *NPL*, and *GDPPC* represent moderator variable. Hence, β_3 through β_{10} capture the moderating impacts of brand-, category-, and country-level factors. The authors provide a detailed description of variable operationalization (See Table 2).

In Equation 1, all continuous independent variables (*i.e.*, *AD*, *VOLATIL*, *OWN*, and *GDPPC*) are log-transformed. The authors also considered log-transforming the dependent variable, but *PQ* has negative values. If a constant is added to all values of *PQ* to avoid negative values, the results will be similar to those in the authors' main analyses (See Web Appendix 4, "R1.6").

The log-transformation reduces the impact of outliers and enhances comparability of different coefficient estimates. All independent variables in Equation 1 have been mean-centered (the authors use contrast coding for *EQUITY* and *CATAGE*, which are binary variables). Additionally, the centering helps in reducing collinearity between interaction terms. As a result of centering, correlations between interaction terms in Equation 1 are low and in the acceptable range (See Web Appendix 3).

To account for the possible endogeneity of advertising and partial out the exogenous variation in advertising expenditures, the authors constructed a control function (CF) based on an instrumental variable. For the instrument, they followed past research (Han, Mittal, and Zhang, 2017; Sridhar, Germann, Kang, and Grewal, 2016) and used average monthly advertising expenditures across all other brands in the category to operationalize competitors' advertising expenditures. The independent variable is sufficiently strong with the first-stage *F* statistic exceeding an acceptable threshold of 10. In the robustness section, the authors used an instrument-free approach to address endogeneity (*i.e.*, adding a Gaussian copula term to the model), which led to similar results.

The main effects of the moderators are included (See Equation 1, *MainEffects*). The authors also include additional control variables such as month fixed effects (to capture seasonality) and a linear time trend. Unobserved brand-specific heterogeneity is captured by the random effect (u_i). Cluster-adjusted robust standard errors are estimated at the brand level. The error term (e_{it}) is assumed to be normally distributed.

RESULTS

The authors incrementally added blocks of covariates and moderators to arrive at model M1.3, which corresponds to Equation 1 (See Table 4). They found that the effect of advertising expenditures on perceived quality is positive and significant at the mean level of all other covariates (.283, $p < .01$). Because the variable advertising expenditures has been log-transformed, the coefficient estimate for advertising expenditures suggests that a one-percent increase in advertising expenditures leads to an increase of .283/100 units in the brand's perceived quality. This result is consistent with the significant effect of advertising expenditures on perceived quality found in prior work (Du *et al.*, 2019).

The effect of advertising expenditures on perceived quality is significantly moderated by six (of the eight) factors the authors examined (at the .10 level), suggesting considerable systematic heterogeneity in this relationship.

VOLATIL

Consistent with the earlier discussion, the authors find that advertising expenditures have a weaker impact on perceived quality for brands with more variation in monthly advertising expenditures (–.005, $p < .05$). This finding is in line with the moderating role of inconsistency on the effectiveness of brand signals reported by Erdem and Swait (1998).

OWN

The effect of advertising expenditures on perception of quality is stronger when a brand is owned by more customers (.064, $p < .001$), in contrast with the authors' earlier argument regarding the decreased role of advertising signal diagnosticity when customers own the brand. The result could be due to an increased accessibility of advertising expenditure signals if customers are more likely to notice and be attentive to advertisements for brands they own. As such, it is possible that, for brands that customers own, increased accessibility of advertising expenditures outweighs the reduction in diagnosticity of advertising expenditure as quality signals.

EQUITY

Consistent with the authors' earlier arguments, they found that the effect of advertising expenditures on perceived quality is weaker for high-equity brands (–.112, $p < .05$). It appears that, for

Table 4 Effects of Brand-, Category-, and Country-Level Factors on the Relationship between Aggregate Advertising Expenditures and Perceived Quality

Covariate	M1.0: Month FEs and Brand RE	M1.1: M1.0 + Main Effect Variables	M1.2: M1.1 + Interactions	M1.3: M1.2 + Control Function
AD	.089†	.089†	.092†	.283***
Interactions				
AD × *VOLATIL*			–.005**	–.005**
AD × *OWN*			.064†	.064†
AD × *EQUITY*			–.113**	–.112**
AD × *INVOLV*			–.106**	–.104**
AD × *FREQ*			.038	.037
AD × *CATAGE*			.035	.034
AD × *NPL*			.085***	.084***
AD × *GDPPC*			1.492**	1.486**
Main Effects/Controls				
VOLATIL		–.001	–.005	–.005
OWN		4.324†	4.330†	4.245†
EQUITY		–.231	–.045	–.034
INVOLV		–.734	–.751	–.963
FREQ		3.385†	3.412†	3.364†
CATAGE		–.858	–.847	–.693
NPL		4.708†	4.717†	4.785†
GDPPC		–1.827	–1.884	–.347
Month FEs	Included	Included	Included	Included
Brand RE	Included	Included	Included	Included
Control Function				Included
Intercept	15.489†	15.489†	15.440†	15.487†
Number of observations	43,081	43,081	43,081	43,081
Number of brands	898	898	898	898

Note: FE = fixed effect; RE = random effect; *AD* = advertising expenditures; *VOLATIL* = advertising volatility; *OWN* = ownership; *EQUITY* = brand equity; *INVOLV* = product involvement; *FREQ* = purchase frequency; *CATAGE* = product category age; *NPL* = new product launch frequency; *GDPPC* = macroeconomic condition (gross domestic product per capita). *$p < .10$; **$p < .05$; ***$p < .01$; †$p < .001$ (significance assessed with brand cluster-adjusted standard errors).

high-equity brands that are generally well-known by customers, the reduced diagnosticity of advertising signals caused by the abundance of more diagnostic cues (*e.g.*, word of mouth, online reviews) dominates the higher accessibility of advertising expenditure signals for high-equity brands. Alternatively, this result could be due to a ceiling effect—that is, high-equity brands have less room for perceived quality growth as a result of increase in advertising expenditures.

INVOLV and *NPL*

Also consistent with the authors' arguments, the effect of advertising expenditures on perceived quality is stronger in categories with lower levels of product involvement (–.104, $p < .05$), and categories with higher new product launch frequency (.084, $p < .01$). These findings further affirm the relevance of contextual factors as influences on the diagnosticity of the relationship between advertising expenditures and perceived quality. The finding regarding product category involvement also provides support for the hypothesis put forth in Kirmani (1990) regarding the moderating role of involvement, for which no significant effect was found in the empirical setting.

GDPPC

As expected, the effect of advertising expenditures on perceived quality is stronger when the economy is stronger (1.486, $p < .05$).

FREQ and *CATAGE*

Finally, the moderating effects of product category purchase frequency (.037, $p > .10$) and category newness (.034, $p > .10$) were positive but not statistically significant.

Overall, the study demonstrates the usefulness of the accessibility-diagnosticity model for explaining the relationship between advertising expenditures and perceived quality. The authors demonstrate the robustness of their findings to alternate model specifications (See Web Appendix 4).

Additional Analysis: The Role of Different Advertising Channels

Another important and managerially relevant issue is whether the relationship between advertising expenditures and perceived quality varies across different advertising channels. To provide insight on this important question, the authors report analyses in which they conduct regressions of perceived quality on five variables: monthly television, Internet, radio, print, and outdoor advertising expenditures (See Table 5). Across different analyses, the authors generally found that (relative increases in) television and outdoor advertising expenditures have the strongest effects on perceived quality and that the effect is weaker (and sometimes nonsignificant) for print, radio, and Internet channels.

The authors believe this heterogeneity in the effectiveness of advertising expenditures on perceived quality across different channels can be attributed to the informativeness of advertisements in each channel. In an earlier examination of information content in advertisements in the television, radio, print, and outdoor channels, researchers found that print media contained the most quality cues in their advertisements, followed closely by radio (Abernethy and Franke, 1996). The channels with the fewest number of quality cues were television and outdoor, which both contained less than half of the quality cues present in radio and print advertisements. Combining the current study's findings with Abernethy and Franke's results suggests that advertising expenditures in channels with fewer quality cues (*i.e.*, television, outdoor) have stronger impact on perceived quality than advertising expenditures in channels with more quality cues (*i.e.*, print, radio, and Internet).

GENERAL DISCUSSION

Perceived quality is a fundamentally important marketing consideration that influences a range of critical marketing outcomes. Prior research, however, on the relationship of advertising expenditures to perceived quality has yielded mixed results. The authors build on work in economics and marketing and argue that advertising expenditures by the company affect advertising

Table 5 The Effect of Advertising Expenditures on Perceived Quality across Different Advertising Channels

Variable	N3.0	N3.1	N3.2	N3.3
TELEVISION	.044	.034†	.029†	.020***
INTERNET	.017**	.001	.006	.003
PRINT	.015***	.022***	.011*	.009
RADIO	.020**	.013	.021**	.017*
OUTDOOR	.031***	.028*	.028**	.027***
Controls				
Brand FEs	Included	Included	Included	Included
Year FEs	Included	Included	Included	Included
Quarter FEs	Included	Included	Included	Included
Brand × Year FEs	Included		Included	Included
Brand × Quarter FEs		Included	Included	Included
Brand × Year × Quarter FEs				Included
Five Control functions	Included	Included	Included	Included
Intercept	14.881†	14.953†	14.967†	15.025†
Number of observations	43,081	43,081	43,081	43,081
Number of brands	898	898	898	898

Note: The authors use five control functions to account for the endogeneity of advertising expenditures in each channel. To construct each of the control functions, the authors use an instrumental variable by utilizing average monthly advertising expenditures across all other brands in the category in a particular advertising channel. All five predictors (*TELEVISION*, *INTERNET*, *PRINT*, *RADIO*, and *OUTDOOR*) have been log-transformed so that the coefficients for different channels can be comparable (i.e., the coefficients capture change in perceived quality due to a 1-percent increase in advertising expenditures in that channel). FE = fixed effect; RE = random effect.*$p < .10$; **$p < .05$; ***$p < .01$; †$p < .001$.

costs perceived by consumers, which, in turn, affects consumer perceptions of quality.

The theoretical foundation of the this research is a well-established theory of consumer decision making, the accessibility-diagnosticity model. This model maintains that consumers form judgments on the basis of the available information that they can recall and the applicability or relevance of that information to the decision at hand. The accessibility-diagnosticity model can be applied to explain how advertising expenditures can serve as a cue for perceived quality. It thus provides valuable theoretical structure and insight as to which variables might moderate the effectiveness of quality cues. To explore those moderating factors, the authors combined a number of different datasets to create a monthly dataset composed of 898 brands in 48 categories across more than four years.

The authors found that, consistent with the findings by Du and colleagues (2019), advertising expenditures positively affected perceived quality, although the magnitude of the effect was not large. The authors found support for the majority of their expected moderator effects. As expected, the authors found a stronger relationship between the amount of advertising expenditures and perceptions of quality for brands that consumers own (or used in the past), when economic conditions are more favorable, and in categories in which consumers are not highly involved or if new products are frequently introduced. Also, as expected, the results indicate a weaker relationship between the amount of advertising expenditures and perceived quality for high-equity brands and for brands with high volatility in advertising expenditures.

Thus, contrary to the authors' initial expectations, they found a stronger relationship between advertising expenditures and perceived quality for brands that consumers owned (or used in the past). The authors' initial hypotheses were built on diagnosticity-related arguments—that is, when consumers have tried a brand, they have more diagnostic information about the product and, hence, would rely less on advertising expenditure signals. It might be, however, that ownership and usage also positively influence the accessibility of advertising expenditure signals. When consumers own or use a brand, for example, advertising expenditures of the brand may be more noticeable and accessible to them. As such, it is possible that, for brands that customers own (or have owned in the past), the increased accessibility of advertising expenditures dominates the effect of any reduced diagnosticity.

Theoretical Implications

The current study highlights the usefulness of the accessibility-diagnosticity model in explaining when and why advertising expenditures affect perceived quality. In general, heterogeneity in the effects of advertising expenditures on perceived quality can be usefully predicted by understanding whether, in a certain context, the diagnostic value of advertising expenditures is larger or smaller.

Interestingly, for the result that deviated from diagnosticity's predictions (*i.e.*, product ownership, as noted earlier), the variation in the effect of advertising expenditures on perceived quality can be theoretically explained by the accessibility-diagnosticity model in terms of the change in accessibility of advertising expenditures. Taking into account the potential changes in both accessibility and diagnosticity of advertising expenditures, thus, is necessary for understanding when advertising expenditures will have a stronger impact on perceived quality. As such, the framework based on the accessibility-diagnosticity model helps explain the extant marketing literature on the signaling effect of advertising expenditures.

Although the current research focused on signaling aspects of advertising expenditures, the authors believe that the accessibility-diagnosticity model framework could be extended to examine attitudinal consequences of other signaling cues, such as promotions (Inman, McAlister, and Hoyer, 1990), price (Anderson and Simester, 2009), coupons (Inman and McAlister, 1994), product assortment (Broniarczyk, Hoyer, and McAlister, 1998), market presence (Stahl *et al.*, 2012), and distribution intensity (Rajavi, Kushwaha, and Steenkamp, 2019). Similar to advertising expenditures, these cues do not directly convey quality-related information but might affect customer attitudes by signaling marketers' effort, financial strength, and confidence in their product or service offerings (Kirmani, 1990).

Managerial Implications

The signaling effect of advertising expenditures is sometimes referred to as "burning money" or "throwing money down the drain" (Zhao, 2000, p. 390). Despite the negative connotation implied by these expressions, the signaling impact of advertising can be important to companies. On the basis of the authors' findings, brand managers can make the case that advertising expenditures, in and of themselves, have potential signaling value and can positively shape perceptions about the quality of the brand. The current work, however, also paints a more nuanced picture of the relationship between advertising expenditures and perceived quality.

To avoid "throwing their money down the drain," marketing managers should take into account the moderating factors that the authors examined when designing advertising strategy. If, on the one hand, brands are in categories low in involvement, or if new products are frequently introduced in that category,

for example, their advertising budget likely will have a stronger impact on customer perceptions regarding the quality of their brand's offerings. Marketing managers can refer to category-specific values for these variables (See Table 1).

On the other hand, the authors also found that the more volatile and inconsistent a brand's advertising pattern is, the less impact its advertising expenditures will have on perceived quality. Past research in marketing has extensively looked at advertising pulsing strategies and their consequences (Mahajan and Muller, 1986; Teixeira, Wedel, and Pieters, 2010). Although pulsing strategies benefit brands with respect to certain objectives (*e.g.*, generating awareness), brand managers should be aware of the potential disadvantage of a pulsing strategy on the impact of their advertising expenditures on the accessibility and consumer perceptions of quality. These findings are in line with the concept of flow signals, according to which the trajectory of signals over time can significantly influence consumer perceptions (DeKinder and Kohli, 2008).

In good economic times, advertising expenditures have a stronger impact on perceived quality, and therefore brand managers can focus on promoting their brands as much as their budgets allow them. In difficult economic times, however, advertising expenditures have less impact on perceived quality. This could be due to customers' more careful search for quality-related information to ensure, given limited budgets, that they purchase the right product. As such, in difficult economic times, when many brand managers are forced to cut their advertising expenditures (Lamey, Deleersnyder, Steenkamp, and Dekimpe, 2012), advertisements should be designed strategically to directly communicate quality to consumers. Of course, it is important to recognize that advertising may be more effective in recessions if competitors lower their spending (Lamey *et al.*, 2012).

Limitations and Future Work

Contrary to the hypothesis that the authors developed, they found the moderating effect of brand ownership on the relationship between advertising expenditures and perceived quality to be positive. The authors believe that this occurred because the impact of the changes in accessibility outweighs the effect of the changes in diagnosticity. This finding raises several questions, such as: When is the effect of changes in accessibility greater than that of changes in diagnosticity? The authors encourage researchers to explore related questions using multiple methods, including laboratory settings.

Relatedly, the authors' findings were generally in line with the accessibility-diagnosticity model's predictions, thereby giving them some confidence regarding the underlying mechanisms at play. Because of the aggregate nature of their data, however, it is not feasible to pin down the exact process(es) involved. The authors, therefore, urge consumer researchers to use laboratory or field experiments to examine more closely the impact of changes in the accessibility and diagnosticity of advertising expenditure cues across different scenarios. Additionally, more disaggregate data could help researchers avoid aggregation bias, uncover additional novel patterns, and identify more accurate estimates (Tellis and Franses, 2006). Research should also examine the effects of different patterns of advertising expenditures and exposure (*e.g.*, flighting versus pulsing versus smooth expenditures) on perceived quality.

Although the authors' data included a variety of brands and product categories, the geographical scope was limited to the United States. Research has shown that consumer behavior varies considerably across different markets and cultures (De Mooij and Hofstede, 2002). Specifically, when it comes to using market signals in forming attitudes regarding perceived quality, Dawar and Parker (1994) found considerable heterogeneity across different cultures (on the basis of Hofstede's framework), although their study did not examine advertising expenditures. Future research should investigate cross-cultural heterogeneity in the effect of advertising expenditures on perceived quality.

For practical reasons, the authors' analysis does not account for other factors that could potentially affect perceived quality. Price, customer service quality, price promotions, distribution intensity, and product warranties could all potentially influence perceived quality. As such, the analysis does not provide evidence on the relative importance of advertising in comparison with other factors. Future research can examine this issue. Additionally, future research could examine other potential brand-, category-, and country-level moderators of the relationship between advertising expenditures and perceived quality. In so doing, future research could investigate other variables that could potentially influence the accessibility and/or diagnosticity of advertising cues, such as other advertising creative strategies, cultural differences in advertising acceptance, the category's share of budget, and brand relevance in the category. The difference between hedonic and utilitarian and between consumable versus durable categories is also worth exploring.

Finally, although the accessibility-diagnosticity model is a well-established theoretical framework in the consumer behavior literature, future research could draw on other complementary theoretical frameworks, such as the elaboration likelihood model of persuasion, to examine other variables that could potentially moderate the relationship between advertising expenditures and perceived quality. JAR

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