

Is advertising an underappreciated driver of sales growth in B2B markets?

Theoretical perspectives and empirical evidence

ABSTRACT

While firms in consumer markets spend hundreds of billions of dollars on advertising each year, firms in business markets are comparably hesitant to adopt advertising as a means to drive business and generate sales growth. Instead, a widespread belief is that sales success in business markets results from a quality focus and sales force support. Challenging these beliefs, this study proposes that B2B advertising can have effects that are meaningful and unmatched by effects resulting from a quality focus and sales force spending. Furthermore, we hypothesize that B2B advertising can help unlock dormant potentials in the classical success drivers. We test the proposed effects empirically, drawing on more than 12,000 observations of the advertising expenses, quality focus, sales force spending, and sales growth of more than 2,000 U.S.-based B2B firms between 1990 and 2015. This research provides novel insights for researchers and managers concerning the benefits of B2B advertising spending and the interplay between different success drivers in generating sales growth in business markets.

Keywords: B2B advertising; quality focus; sales force; sales growth

1. Introduction

Many managers in B2B firms believe that the main path to sales success is the relational selling of quality products and services, while advertising merely fulfils an ancillary function (Keller and Kotler 2012, Schultz 2012). In this regard, advertising budget data confirm that, to date, advertising does not play a substantial role in B2B markets. In 2015, *AdAge* estimated that the top 100 B2B advertisers have spent a total of \$4.8bn annually on ads.¹ This compares to an annual spend of \$240.5bn by the 100 largest advertisers, which are mostly B2C firms.² Clearly, B2B marketers do not yet perceive advertising as the strategic tool of choice to drive sales. Yet despite its hitherto ancillary role, larger advertising spending to create awareness and build a positive brand image may be an effective marketing strategy also for B2B firms.

B2B firms currently face several challenges that increased advertising could help address. First, owing to tough global competition, it has become increasingly difficult to differentiate B2B offerings on the basis of functional benefits, including quality (e.g., Leek & Christodoulides, 2011; Lindgreen et al., 2010). With a growing number of market players, potential customers have to choose between many offerings that promise similar levels of quality (Elsäßer & Wirtz, 2017). In addition, business customers frequently require tailored solutions for which it is more difficult to evaluate the quality before the purchase. Thus, B2B firms need to communicate additional points of differentiation and create trust in the superiority of the solutions they provide in order to defend and grow sales.

Second, the current research stream on sales force productivity indicates that firms have largely depleted the available opportunities to grow sales using this communication tool (e.g., Chan et al., 2014; Claro & Kamakura, 2017). One example is the low success rate of cold calling to generate additional leads (Levin et al., 2011). Potential buyers often do their own research of possible suppliers upfront and will only contact suppliers that have made it onto

¹<http://adage.com/article/btob/top-100-b-b-advertisers-spent-4-8-billion-b-b-ads/300042/>

²<http://adage.com/article/advertising/world-s-largest-advertisers/306983/>

the buyers' list. Therefore, buyer awareness is a prerequisite to enter the sales cycle. Moreover, a strong reliance on relational selling can make firms vulnerable to customer attrition, since salespeople with valuable customer bonds could leave the organization. Research shows that employee turnover rates are notoriously high for sales jobs (Richardson, 1999). Given these challenges, B2B firms may benefit from more heavily investing in an additional communication form to create awareness and connect with customers.

In summary, advertising could be an underappreciated marketing tool for B2B firms. However, it remains unclear whether larger advertising investments can contribute to firms' competitiveness above and beyond classical means, i.e. investments in the sales force and in a quality focus, since, to the best of our knowledge, research regarding advertising's direct effects on objective sales performance in B2B contexts is missing to date. In addition, advertising may have broader effects by interacting with the classical success drivers in creating sales. In particular, it is unclear whether advertising complements the other success drivers, such as by providing the sales force with more leads, or has a substitutive relationship with them, such as weakening the effects of a quality certification by building a brand which then duplicates the existing quality signal.

Our study addresses these voids in the literature. To this end, we draw on both signaling theory and a behavioral view to conceptualize B2B advertising spending's effect on firms' sales growth as well as its interaction effects. For our empirical investigation, we use a large-scale panel dataset of 12,701 firm-year observations for 2,270 B2B firms.

In the following, we briefly summarize existing theoretical perspectives on the success factors in B2B contexts and introduce the theoretical foundation of advertising as an additional success factor. Next, we present our conceptual framework and hypotheses, which is followed by a description of our sample and measures as well as our model development.

We conclude by discussing our results, highlighting theoretical and managerial implications, and proposing avenues for further research.

2. Background

2.1. Classical theoretical perspectives

A view of B2B transactions, based on economic theory, conceptualizes organizational buying as a highly rational decision process in which customers exhaustively survey the available options in the marketplace and select suppliers on the basis of objective performance dimensions, such as the availability, functionality, and reliability of a supplier's products and services (Hadjikhani & LaPlaca, 2013). If the chosen supplier performs to the buyer's satisfaction, the customer continues to purchase from the supplier and, thus, becomes loyal, while offerings with poor quality are avoided in the future (Baumgarth & Binckebanck, 2011; van Riel et al., 2005). Providing support for this view, studies show that quality is a leading purchase decision criterion in business markets (Abratt, 1986; Michell et al., 2001).

Moreover, organizational buyers use an exhaustive list of performance-related characteristics to describe suppliers, and suppliers, in turn, appear to specifically optimize their offerings such that their customers perceive them as high-performing (Herbst & Merz, 2011). In this classical view of B2B transactions, marketing is an ancillary function in the supplier firm, providing sales collateral and using advertising on a small scale to inform prospective customers about the selling firm's offer (Schultz 2012). Thus, advertising is considered a necessary expense item to create a certain level of awareness in the marketplace, but a firm's focus on quality is seen to eventually determine sales success.

An alternative perspective to the classic economic paradigm in B2B marketing is the interaction perspective (Hadjikhani & LaPlaca, 2013). This perspective emphasizes the importance of personal selling and the relationship-building function of sales interactions for success in B2B markets (Basu et al., 1985; Coughlan et al., 2010; Yeoh & Roth, 1999;

Zoltners et al., 2004). B2B offerings and corresponding value propositions are often complex and the product or delivery of a service require customization to the specific business needs of customers and the value chains they are embedded in (Oliva, 2012). The sales force consults with customers to identify needs and draft solution requirements (Zoltners et al., 2004). In addition to helping customers with functional specifications, the sales force provides emotional benefits to customers (Carsten & Lars, 2011; Kidwell et al., 2011), which recognizes that B2B purchasing is not solely rational but also involves emotional aspects. Specifically, as the business relationship matures, customers increasingly trust their sales contacts and bond socially (Nicholson et al., 2001). Human interactions and social bonds create economic advantages for supplier firms, generating sales success (Ulaga & Eggert, 2006). In a sales force-centric paradigm, advertising also only plays an ancillary role, since the sales force performs key functions, such as providing information and creating customer emotional attachment. According to this view, a B2B firm's sales force investments instead of its advertising investments determine the sales success.

2.2. B2B advertising spending and sales performance

In line with the classical views on sales drivers, B2B marketers currently do not spend much on advertising (Schultz, 2012). Generally, firms focus the advertising budgets they do spend on traditional channels. Specifically, a recent 2019 eMarketer study³ shows that B2B firms spend more than 70% of their advertising budget on trade shows, magazines, and events. In contrast, social media spending, although growing, is only at about 10% of firms' budget, as the Duke University's February 2019 CMO survey shows.⁴

Irrespective of the channels used, firms' limited spending on advertising may mean that they forgo sales potential. Yet, the extent to which advertising generally drives sales in B2B

³<https://www.emarketer.com/content/b2bs-aren-t-spending-big-on-digital-advertising-yet>

⁴<https://cmosurvey.org/results/>

markets is unclear since the literature has not directly addressed the firm performance effects of advertising. In particular, prior research has largely focused on B2B ads' design aspects (Table 1), such as ad position, size, timing, and repetition (Abrahams et al., 2012), incentives, emotions, animations, interactivity, and color (Lohtia et al., 2003), functional appeals, first-person voice, tangibilization, and contact information (Swani & Iyer, 2017), the use of narrative transportation (Anaza et al., 2019), creativity (Baack et al., 2016), co-branding (Erevelles et al., 2008), celebrities (Ferguson & Mohan, 2019a), and emotional appeals (Jensen & Jepsen, 2007). Other studies are not empirical (Gupta & Di Benedetto, 2007) or are specifically concerned with spending during recessions (Srinivasan et al., 2011).

--Insert Table 1 about here--

The objective of this study is to address the void in the literature by investigating the effect of advertising spending on firms' sales performance. We base our investigation on two theoretical perspectives which suggest that advertising can play an important role in B2B purchase contexts and, therefore, drive sales. First, signaling theory posits that advertising spending could serve as a useful signal for imperfectly informed buyers (Basuroy et al., 2006; Erdem & Swait, 1998). Business customers frequently face an adverse selection problem in that they find it difficult to assess the actual quality of an offer prior to its purchase and use. Potential customers can, however, deduce the quality of offerings based on suppliers' advertising expenses. Specifically, only confident suppliers are likely to invest greater sums in advertising, since an offering that does not live up to its promise will not sell well and, hence, not allow the supplier to recoup the investment (Akdeniz et al., 2014; Basuroy et al., 2006; Kirmani & Rao, 2000).

Second, a behavioral perspective emphasizes heuristic, emotional, and motivational aspects of buying decisions (Basuroy et al., 2006; Iyer et al., 2015). Advertising can address these less rational buying motives of business customers by creating awareness and positive

associations for a product or service, leading to brand equity (Aaker & Biel, 1993). For example, choosing a well-known brand can be an effective selection heuristic for customers when the number of comparable offerings is large, as is the case in many B2B markets. While a behavioral perspective is common in B2C contexts, it has not traditionally been assumed in B2B research (Hadjikhani & LaPlaca, 2013). However, recent branding research suggests that aspects such as brand reputation and emotional value also play a significant role in B2B marketing, underlining the relevance of this perspective (Guenther & Guenther, 2019; Herbst & Merz, 2011; Zablah et al., 2010).

3. Hypotheses

Following from our previous discussion, a behavioral view of business transactions and signaling theory both suggest competitive advantages and, hence, sales benefits from advertising. Since many firms currently neglect this communication form, we test whether advertising creates significant sales growth and, hence, is a meaningful success factor in B2B marketing. Moreover, we examine to what extent advertising interacts with the classical success factors. This investigation is of interest because arguments for both complementary effects and substitutive effects can be derived from theory. However, complementary effects are more likely, as we explain in our interaction hypotheses. Figure 1 illustrates our complete conceptual framework.

--Insert Figure 1 about here--

3.1. B2B advertising spending as a driver of sales success

From a signaling theory perspective, B2B advertising spending is a credible signal concerning the quality of a firm's offer since the firm incurs costs that it needs to recoup (Akdeniz et al., 2014; Basuroy et al., 2006; Kirmani & Rao, 2000). Potential buyers may rely on this signal to address their uncertainty, such as from a lack of sufficient information and

limited experience with a product or service before the purchase (Akdeniz et al., 2014).

Business transactions frequently involve several uncertainties. For one, customers often have specific requirements and may be unsure as to which solution can best address them.

Additionally, customers may lack experiential knowledge regarding the capability of a certain supplier; in particular whether the supplier will live up to its promise and provide the solution at the required quality level. The quality signal that larger advertising expenses send can help reduce buyer uncertainties and, thereby, provide a firm with a sales advantage over competitors.

A behavioral perspective further corroborates a possible sales advantage from B2B advertising. First, advertising can generate demand by creating the level of awareness required to earn a supplier a place on the short lists of potential customers. Increasing global competition has led to an ever-growing number of possible suppliers. In contrast to the classic economic model's assumptions, buyers are usually not fully aware of all available options and, to limit information load, tend to cut information searches short by focusing on known suppliers, such that “in the B2B world, [buyer] brand consciousness equals relevance” (Zablah et al., 2010, p. 250). Similarly, with regard to the interaction perspective, growing competition may curtail sales force productivity as this form of communication becomes increasingly crowded. Advertising, in contrast, is underutilized which can make it a more effective means to reach potential buyers. In addition, advertising helps position an offering more clearly because it usually requires the firm to focus its message and translate complex functional specifications into key value drivers (Anderson et al., 2006). Specifying these value drivers allows customers to better understand what the firm stands for and, thus, can serve as a vital point of differentiation, thwarting commoditization and fending off price competition.

Second, through its brand-building function, B2B advertising can create additional value by addressing buyer motives which could allow charging a price premium. Decision makers may deliberately choose well-known brands because they reduce the personal job risk related to business purchase decisions (Brown et al., 2011). In this regard, the popular phrase among purchase agents that “nobody ever got fired for buying IBM” is a case in point. Moreover, a strong supplier brand built through B2B advertising can provide business customers with the opportunity to commercialize this brand, for instance by referring to it when selling to their own customers (i.e., using ingredient branding).

Third, B2B advertising can attach buyers emotionally to the firm, thereby safeguarding a firm’s current sales through greater customer loyalty. In contrast to personal selling where the focal point of attachment is the salesperson, it is the brand in the case of advertising. High turnover rates in sales jobs, which a study estimates to be double the rates of other professions (Richardson, 1999), reduce the stability of social bonds and of networks formed with the customer organization since salespeople tend to broker the relationships between colleagues and employees of the customer organization (Johnston & Marshall, 2016). Moreover, research has shown that customers value B2B brands’ emotional dimensions (e.g., Herbst & Merz, 2011), which may allow charging higher prices and binding customers to the organization. While buyer emotions created through B2B advertising and the sales force overlap on a few dimensions (e.g., conveying trust, sincerity, and reliability), other dimensions (e.g., excitement, charm) appear to be exclusive to advertising and the brand resulting from this investment (Elsäßer & Wirtz, 2017; Herbst & Merz, 2011).

Overall, we propose that B2B advertising has unique advantages that can generate additional sales revenue for a firm by reducing purchase uncertainty, enhancing awareness and reducing information overload, differentiating the firm, increasing buyers’ perceived value, and promoting customer loyalty. We thus state the following hypothesis:

H1. B2B advertising spending has a positive effect on sales growth.

3.2. Interaction of B2B advertising spending with a quality focus and sales force spending

While signaling theory and the behavioral perspective generate the same prediction regarding the main relationship of advertising spending with sales growth, the two theoretical perspectives predict substitutive versus complementary interaction effects of advertising spending with the other success drivers. From a signaling theory perspective, B2B advertising, a quality focus, and sales force spending are signals with similar characteristics: they are default-independent in that a firm incurs the signal costs independent of a failure to deliver to its quality promise (Kirmani & Rao, 2000). According to the theory, similar signals tend to be substitutes and therefore weaken instead of amplify each other's effects (Basuroy et al., 2006; Kirmani & Rao, 2000). However, signaling theory is mechanistic in that it assumes that the mere existence of a signal (e.g., advertising spending per se) leads to a sales response from customers, ignoring the effect of the signal's specific content or nature on customers. In this regard a behavioral perspective differs substantially from a signaling perspective. From a behavioral view, B2B advertising fulfills a different function than a quality focus and sales force spending in creating sales with business customers. These differences are important to consider in order to fully derive effects on a firm's sales success. As we discuss next, an amplifying effect of B2B advertising spending is conceivable on the basis of a behavioral perspective that takes the characteristics of business market transactions and customer responses into account.

3.2.1. B2B advertising spending as an amplifier of a quality focus

Advertising spending can help unlock market potential that a B2B firm can obtain by offering high quality. First, advertising enables a firm with a quality focus to build a strong quality reputation in the market, which increases buyer trust and can result in a volume and price premium. Specifically, prior research has stressed the importance of *communicating* points of

difference to achieve actual differentiation (Davis et al., 2008). Thus, from a mere awareness perspective, B2B advertising can make possibly unknown superior quality broadly known in the market, driving demand. A firm's quality focus in turn can reinforce the credibility of a brand image for quality, especially when current customers that had a positive purchase experience recommend the firm to others. The firm's brand then becomes a strong quality symbol (Erdem & Swait, 1998), which can enhance sales by boosting buyers' perceived value and, hence, willingness to pay.

Second, a strong quality reputation can buffer against the loss of business in the case of isolated performance shortfalls. An important aspect that the classical economic view of business transactions neglects is the distinction between actual product or service quality and customers' *perceived* quality (e.g., Mitra & Golder, 2006; Zeithaml, 1988). Confirmation bias theory holds that individuals are more likely to incorporate information that is consistent with their prior beliefs (Slovic et al., 1977). In this regard, a positive quality image built through B2B advertising can create a positive quality belief in buyers' minds, which can prompt them to emphasize positive product or service performance and give less weight to negative performance experiences if unsystematic.

Against the backdrop of the above discussion, a B2B firm with a quality focus should be able to generate additional sales success when it simultaneously invests in advertising, since advertising allows building a more widely known brand reputation for quality, which, in turn, can increase demand and the firm's power in price negotiations, as well as guard against sales losses. Thus:

H2. B2B advertising spending strengthens the effect of a B2B firm's quality focus on its sales growth.

3.2.2. B2B advertising spending as an amplifier of sales force spending

B2B advertising spending can also increase the sales force's productivity by facilitating multiple sales process stages, resulting in a larger sales volume that a firm can obtain from its

sales force spending alone. First, in the initial prospecting stage, B2B advertising can generate leads for the sales function. Buying firms tend to do their own, independent research before they actually contact a salesperson. Advertising creates brand awareness and hence can increase a firm's chances of being part of the initial research stage, which is key to entering the sales cycle. Advertising may also have a wide reach, thereby enabling the firm to be considered by a larger number of buyers. Second, during the stage of identifying and presenting the solution, aggregated performance drivers described in B2B advertising messages can help salespeople to precisely communicate an offer's value propositions, thus making the sales pitch to the customer more convincing (Lynch & de Chernatony, 2007). Third, during the closing stage, research has traced back sales success to a salesperson's personality, social competence, and professional knowledge (e.g., Weitz et al., 1986). Business customers also attribute personality characteristics (e.g., competent) and social qualities (e.g., likable) to B2B brands and use these to inform their purchase decision (Bendixen et al., 2004; Herbst & Merz, 2011; Zablah et al., 2010). Fourth, during the stages of the actual delivery and longer-term relationship building, the sales force usually depends on the contribution and commitment of other employees in the supplier firm (Gonzalez et al., 2013; Johnston & Marshall, 2016). Advertising communicates a concise image that a firm wants to achieve with its customers and not only external recipients but also internal recipients, i.e. the supplier firm's employees, receive this message. From this perspective, B2B advertising can provide an organization's employees with a shared vision—centered around the customer—and this mindset can promote intra-firm collaborations, helping the sales force in their after-sales support and long-term relationship building with customers.

Besides supporting the sales process, the brand that B2B advertising creates can bind sales employees to the firm and thus provide a remedy to the high employee turnover in the sales profession and associated costs, including the loss of customers and associated sales. Prior

research confirms the power of brands as effective employee retention tools (Berthon et al., 2005; Tavassoli et al., 2014). As firms retain sales employees, the knowledge, skills, and customer relationships that the employees have built up over years remain productive firm assets, safeguarding and enhancing a firm's sales success.

In sum, a B2B firm that relies strongly on its sales force, as indicated by large sales force spending, should be able to generate additional sales success from simultaneously investing in advertising, due to advertising's potential to make selling more effective and bind sales employees to the firm. Therefore:

H3. B2B advertising spending strengthens the effect of a B2B firm's sales force spending on its sales growth.

4. Methodology

4.1. Sample

We used U.S. firms included in the COMPUSTAT North America database as our sampling frame. This frame is highly representative, since the total annual revenues of COMPUSTAT firms account for a major part of the U.S. gross domestic product. For our empirical investigation, we focused on firms operating in B2B industries, as determined on the basis of firms' four-digit Standard Industrial Classification (SIC) codes (e.g., Srinivasan et al., 2011). The Appendix provides a list of the industries in our sample. We downloaded B2B firms' annual financial information from the COMPUSTAT North America database for the time period from 1990 to 2015. As we explain below, to address first-order and second-order serial correlation in our dependent variable, we added the predicted one-year and two-year lagged error terms as controls to our estimation model, meaning that we needed at least three consecutive years of data per firm to include an observation in our dataset. Moreover, data on all model variables had to be available so that we could include an observation. For instance, we did not include firms with missing data on their advertising spending in the sample,

similar to approaches used in prior research (e.g., McAlister et al., 2007). The sampling procedure resulted in a dataset comprising 12,701 firm-year observations of 2,270 firms operating in 173 different industries. The table in the Appendix shows the firms' descriptive statistics, including the number of observations and firms, as well as their mean revenues, assets, age, and number of employees. We report these descriptive statistics at the industry group level, instead of the industry level, for legibility reasons. On average, the firms in our dataset had \$2.7 billion in annual revenues, \$3.5 billion in assets, 7,561 employees, and had been in operation for more than 13 years.

4.2. Measures

To measure our key variables of interest and control variables, we matched data from multiple sources. The sources include the COMPUSTAT North America database, the COMPUSTAT Segment Files, Bureau van Dijk's Orbis database, and annual company filings to the U.S. Security and Exchange Commission.

4.2.1. Sales growth

We measured sales growth as the ratio of the current period's sales revenue and the prior period's sales revenue. We obtained the sales revenue from the COMPUSTAT North America database. An increasingly successful B2B firm should be able to create stronger customer preference resulting in one of two outcomes, or both: an improved price premium and/or an increased unit sales advantage (e.g., Aaker, 1991; Persson, 2010). These advantages show in a larger sales revenue.

4.2.2. B2B advertising spending

Our B2B advertising spending measure is similar to measures used in the literature (e.g., Currim et al., 2012). Specifically, we used firms' advertising expenditure recorded in the COMPUSTAT North America database, expressed as a percentage of sales revenue. The measure ensures comparability between firms since the variable is expressed in relative terms

instead of absolute terms. We used the prior period's sales revenue, such that the denominator is the same as for the dependent variable, thereby ensuring that random shocks affect both variables equally and therefore cancel out and do not affect our estimates. Our results are robust to using the current period's sales revenue as the denominator instead.

4.2.3. Quality focus

A firm's focus on quality can be difficult to measure, even for managers who may subjectively misjudge the quality of their firms' offering and the resulting customer satisfaction (Hult et al., 2017). However, quality audits by independent third parties can objectively indicate a firm's quality focus. We therefore used a firm's ISO 9001 certification as a third-party indicator of a firm's quality focus. ISO 9001 certifies a firm's quality management and is available for all company types, including product and service firms. ISO certifiers assess whether a firm's quality management is supported by a strong customer focus, leadership, employee engagement, planning and assurance processes, continuous improvements, evidence-based decision-making, and supplier relationship management. ISO certifiers require firms to renew the certification every three years to ensure currency.

Since no database of ISO certified firms currently exists, we turned to firms' annual reports to stakeholders in order to verify the certification status. Annual reports are critical means for management to justify and explain a firm's activities and performance to stakeholders. An ISO 9001 certificate is a powerful signal to demonstrate a strong quality focus to stakeholders and therefore, if obtained, managers are likely to refer to it in the annual report. From a modeling perspective, a measurement error occurs when managers do not disclose an existing ISO 9001 certification and this error leads to more conservative significance tests, since an increased error in the estimation model makes detecting small effects more difficult.

To collect our sample firms' annual reports, we used the U.S. Security and Exchange Commission's Edgar system and the company central index key, cik, from the COMPUSTAT

North America database. According to U.S. filing regulations, annual reports are available for publicly listed firms and private firms with publicly traded debt only. We return to this point in our study's limitations discussion.

We used the R software to perform an automated text analysis of the annual reports, using "ISO 9001" as the search term. We manually checked all annual reports with hits in the initial search and marked the firm-years with a valid ISO 9001 certificate, resulting in a dummy variable with a value of one for those firm-years and zero otherwise.

4.2.4. Sales force spending

Data on firms' sales force spending are not readily available for all U.S. firms and therefore require a proxy. For instance, the leading data source for U.S. firms, *Selling Power*, collects sales force data only for the 500 firms with the largest sales forces and only provides data on the number of salespeople, but no financial information regarding salaries, benefits, and related selling expenses (e.g., Kim & McAlister, 2011). However, using the *SellingPower* firms and data, recent research demonstrates that selling, general and administrative (SG&A) expenses are a valid proxy for firms' sales force spending, possessing high content validity and construct validity with the advantage of substantially less truncated samples when researchers use SG&A expenses (Ptok et al., 2018). Particularly, Ptok et al. (2018) conclude that "SGA, and especially its modification SGA – ADV, seems to represent sales force spending relatively well" (p. 1002). According to COMPUSTAT's data definitions, advertising spending is part of the SG&A expenses (Using the Data Guide, Chapter 5). We therefore subtracted advertising spending from SG&A to obtain our measure of firms' sales force spending.

4.2.5. Control variables

We followed recent studies that include sales growth as the dependent variable and controlled for several covariates (e.g., Kohtamäki et al., 2013). Since our study is at the firm-level, we

focused on firm-level covariates, in contrast to product-specific/service-specific variables. Specifically, we controlled for a firm's number of patents to take into account a firm's innovation assets. We obtained these data from the Bureau van Dijk Orbis database and employed a standard-log transformation (\log) to redress skewedness (Wooldridge, 2012).⁵

Moreover, we controlled for the concentration of a firm's customer base, since high dependence on only a few customers can limit growth prospects. We used data from the COMPUSTAT Segment Files, which include the revenues that firms generate from their major customers. Regulations require U.S. firms to report these revenues (SFAS 14). We used a concentration index, which is conceptually similar to the Herfindahl-Hirschman index for industry concentration. Specifically, we operationalized customer concentration as the sum of the squared revenue shares of a firm's major customers (Patatoukas, 2012). A hypothetical firm that generates all its revenues from one customer would have a score of one on the index, while firms with more diversified customer bases would have scores between one and zero.

Moreover, we took into account slack resources, which can enable a firm to react more flexibly to market opportunities. We measured slack resources with the current ratio, which is the ratio of quickly liquefiable current assets, including cash reserves and short-term investments, and short-term payable current liabilities (e.g., Kohtamäki et al., 2013). We used the log to address skewness in the raw data.

In addition to these control variables, we took into account unobservable fixed effects related to particular industries and years. B2B industries may differ in terms of the maximum level of customer preference that firms operating in these industries can reach. For instance, industrial equipment manufacturers may be able to generate stronger preference, on average, than small parts manufacturers, due to the products' comparably higher importance for

⁵For the standard-log transformations of variable var , we calculated $\log(var+1)$ to accommodate small values.

customers' business success. Thus, we included industry indicators based on firms' four-digit SIC codes to control for these possible between-industry differences. We also included indicators for the different years in our sampling period to control for possible between-year differences.

Table 2 summarizes our variable operationalizations and Table 3 shows the descriptive statistics and correlations. We winsorized all variables at the 1% level to redress the influence of outliers (McAlister et al., 2016). On average, the sample firms realize positive sales growth. They spend little on B2B advertising—only about 3% of their revenue—while the sales force spending is substantially larger. About one in ten observations shows a strong quality focus. On average, the sample firms own more than one patent, have a diversified customer base (i.e., a small customer-base concentration), and have positive slack resources. All correlations between the variables are below the standard cut-off value ($< .70$), suggesting that multicollinearity is not a concern in our data (Cohen et al., 2003).

-- Insert Table 2 about here --

-- Insert Table 3 about here --

4.3. Model development

To test our conceptual framework, we specified a regression model, which we further refined on the basis of econometric specification test results.

$$(1) SGr_{it} = \beta_0 + \beta_1 AdSp_{it} + \beta_2 QuF_{it} + \beta_3 SFSp_{it} + \beta_4 QuF_{it} \times AdSp_{it} + \beta_5 SFSp_{it} \times AdSp_{it} \\ + \beta_6 Pat_{it} + \beta_7 CCon_{it} + \beta_8 Slck_{it} + \sum \beta_I Ind_i + \sum \beta_Y Y_{rt} + \varepsilon_{it}$$

The model relates the sales growth of firm i in period t (SGr_{it}) to the firm's B2B advertising spending ($AdSp_{it}$), quality focus (QuF_{it}), and sales force spending ($SFSp_{it}$), while controlling for patents (Pat_{it}), customer-base concentration ($CCon_{it}$), slack resources ($Slck_{it}$), as well as industry effects (Ind_i) and year effects (Y_{rt}). ε_{it} is the model's i.i.d. error term.

We performed three econometric tests for serial correlation, heteroscedasticity, and endogeneity to determine the need to adjust our model. With regard to serial correlation, the Cumby–Huizinga test (Cumby & Huizinga, 1992) shows serial correlation ($p < .05$) up to a lag of two (i.e., for lag one and two, turning insignificant at lag three and beyond) in the model’s error term. This result indicates a certain persistence in the dependent variable and this persistence is common in performance measures, since firms' good or bad performance often lingers for multiple years. Furthermore, the Breusch–Pagan test (Breusch & Pagan, 1979) indicates heteroscedasticity in our data ($p < .01$). To assess endogeneity, we performed the Durbin–Wu–Hausman test (Hausman, 1978), which compares the efficient, but potentially inconsistent (i.e., due to endogeneity), OLS estimates with the consistent, but less efficient, estimates from an instrumental variable (IV) model. We followed standard procedure in the literature (e.g., Malshe & Agarwal, 2015) and used the lags of the right-hand side variables as instruments in the IV model. The results from the Durbin–Wu–Hausman test did not indicate endogeneity in our data ($p > .10$), making the more efficient and hence more precise OLS estimates preferable to use (Wooldridge, 2012).

To address the serial correlation and heteroscedasticity that our tests have revealed, we used two common econometric approaches. First, to address serial correlation in the model error term, we followed a two-step approach (Neter et al., 1996). In the first step, we estimated the model and saved the estimated error term. Next, we ran two autoregressive models that predict persistence, i.e. serial correlation, by relating the estimated model error term to its first lag and second lag.⁶ We focused on the first lag and second lag, since the Cumby–Huizinga test showed serial correlation up to lag two (see above). In the second step, we re-estimated the model, including the fitted values (i.e., predicted error terms) of the two

⁶The autoregressive models we estimated are $\varepsilon_{it} = \beta\varepsilon_{it-1} + u_{it}$ and $\varepsilon_{it} = \beta\varepsilon_{it-2} + u_{it}$. Using the estimation results of the first (second) model, we can predict ε_{it} on the basis of its one (two) period lagged value and that prediction incorporates the level of first-order (second-order) serial correlation in the model error term. Therefore, to control for the serial correlation, we added the two predicted values for ε_{it} (i.e., predicted error terms) as additional regressors to our model specified in Eq. 1.

autoregressive models as additional regressors. The pattern of our results is unchanged when we alternatively included the two lags of the dependent variable as additional regressors. Lags of the dependent variable contain the corresponding lagged error terms as per Eq. 1. Second, to address heteroscedasticity, we used Newey–West standard errors, which are adjusted for heteroscedasticity, such that the standard errors we used for our significance tests (Table 4) are correct (Wooldridge, 2012).

5. Results and Discussion

5.1. Main results

To compare predictive performance, we estimated two versions of our model. Model 1 includes only main effects and Model 2 also contains the interaction terms. Table 4 shows the estimation results. The two models fit the data adequately ($F\text{-value} > 56; p < .01$). Model 2 explains the data systematically better than Model 1, on the basis of a set of fit indicators for model evaluation. In terms of in-sample prediction, Model 2 has a better R^2 value, adjusted R^2 value, and F -value. Furthermore, we assessed the out-of-sample prediction, using the k -fold cross validation technique with 10 folds. Specifically, we re-estimated the models ten times, using a random 90% of the sample for estimation and the remaining 10% for assessment of the estimates' predictive accuracy. Model 2 produces a higher pseudo- R^2 , smaller root mean square error (RMSE), and smaller mean absolute error (MAE). Therefore, we focus our discussion on Model 2.

Model 2 mean-centers variables used in the interaction terms. To allow for a comparison, we also report the results of Model 2', which uses the non-centered values (Echambadi & Hess, 2007).⁷ The estimation precision and the model fit are identical when the variables are mean-centered or not mean-centered. The maximum variance inflation factors of both models ($VIF_{\max} < 4.58$) are well below standard cut-off values (< 10), indicating that

⁷We thank an anonymous reviewer for this suggestion.

multicollinearity is not a particular problem in our regressions (Neter, 1996). Mean-centering does affect the direct effects of variables that form part of interaction terms. In a mean-centered model, these variables' effects are the effects when the other model variables are at their sample-mean values; in a non-centered model, they are the variables' effects when the other model variables are at a value of zero (Echambadi & Hess, 2007). The pattern of our results is generally robust to centering. Only the direct effect regarding a firm's quality focus differs, as we discuss below.

-- Insert Table 4 about here --

With regard to our conceptual model, we estimated a positive effect of B2B advertising spending on a firm's sales growth ($\beta = .512, p < .01$). This finding supports H1 and indicates that advertising spending pays off financially for B2B firms. This positive effect needs to be interpreted *ceteris paribus* and, therefore, it is in addition to any effects of a firm's quality focus and sales force spending. In other words, these results show that spending on B2B advertising is a viable tool in its own right for B2B firms to generate sales growth.

Our data also show positive moderating effects of B2B advertising. In particular, our estimates indicate that B2B advertising spending helps strengthen the effect of a firm's quality focus on sales growth ($\beta = .764, p < .05$). This result supports H2. Moreover, we estimated a similar positive effect of B2B advertising spending on the relationship between a firm's sales force spending and sales growth ($\beta = .134, p < .05$). This finding supports H3. Taken together, our findings suggest that B2B advertising spending—in addition to its independent positive effect on sales growth—helps unlock dormant potentials in the important classical approaches that B2B firms use to succeed in their markets. Figure 2 plots B2B advertising's synergy effects. Synergistic gains are particularly strong when firms with a quality focus increase their B2B ad spend. Gains are comparatively less strong when firms with high, versus low, sales force spending spend more on advertising. Nevertheless,

increasing advertising spending from low to high levels yields a 3% sales growth advantage for firms with high sales force spending compared to firms with low sales force spending. At our sample firms' average annual revenue level of \$2.7 billion, this advantage translates into \$81 million additional revenues from the advertising–sales force synergies alone.

-- Insert Figure 2 about here --

In terms of effects that are unrelated to our hypotheses, we estimated a significant positive sales growth effect from a firm's quality focus in the mean-centered Model 2 ($\beta = .040, p < .01$), which is insignificant in the non-centered Model 2' ($\beta = .014, p > .10$). These results suggest that sales growth cannot be achieved with a quality focus as a stand-alone investment, i.e. with advertising spending and sales force spending at zero levels. Yet, when firms spend at sample-average levels, a quality focus pays off. We also estimated a positive sales growth effect from a firm's sales force spending ($\beta = .380, p < .01$). Comparing effects with B2B advertising spending in statistical terms, the quality-focus effect is weaker (F-value = 24.32, $p < 0.01$), whereas the sales-force-spending effect is not (F-value = 1.58, $p > 0.10$). For patents, we estimated a significant negative effect ($\beta = -.005, p < .01$), which is, however, small in economic terms, similar to prior findings in the literature (e.g., Saboo et al., 2016). Customer-based concentration does neither decrease nor increase sales growth ($\beta = .000, p > .10$), while slack resources have a significant positive effect ($\beta = .010, p < .01$). The two predicted error terms have significant effects ($\beta_{\text{lagone}} = .968$ and $\beta_{\text{lagtwo}} = .588, p < .01$) and redress serial correlation in the model, as the insignificant ($p > .10$) Cumby–Huizinga tests on the lagged model residuals confirm. Our results are unchanged when we used the dependent variable's two lags instead of the predicted error terms.

Further, we expanded the model by adding the third possible interaction term between a firm's quality focus and its sales force spending. Since our conceptual model is focused on the effects of B2B advertising spending, we investigate this effect exploratively without a

hypothesis. A positive effect is conceivable, since sales employees may find it easier to sell a high-quality offer. However, we estimated a non-significant interaction term ($\beta = .030, p > .10$), indicating that the synergies between a firm's quality focus and its sales force spending are less systematic than intuitively thought. Nevertheless, a B2B firm that enhances the two variables would benefit from the positive (main) effects discussed above.

We note that while effects of additional, omitted variables on a firm's sales growth cannot be ruled out, those variables would not only need to be correlated with sales growth, but also with the main variables of interest in our model (i.e., B2B advertising spending) to affect our reported results (i.e., by creating endogeneity that leads to inconsistent estimates). The Durbin–Wu–Hausman test that we performed to develop our model indicated no significant endogeneity bias, suggesting that any particular omitted variables, if observable and included as an additional regressors in the model, are unlikely to change our reported results.

5.2. *Additional analyses*

5.2.1. *Heterogeneity between B2B industries*

We performed a multigroup analysis to investigate possible differences between B2B firms regarding the B2B advertising effects. We used the SIC industry groups to categorize firms, since a finer-grained grouping, for example using four-digit SIC codes, would result in an insufficient number of observations per group. Nevertheless, the number of observations in certain groups (e.g., agriculture, forestry, and fishing) is small and the corresponding estimated effects and significance levels should therefore be interpreted with caution (Table 5). The industry sectors with the largest number of observations and hence reliable estimates are manufacturing, services, and the wholesale trade.

-- Insert Table 5 about here --

We find positive B2B advertising effects in four of the nine SIC sectors. Several explanations for the non-significant effects are conceivable. First, non-significant effects

occur in industries whose products are difficult to differentiate through branding, for example, in the mining sector. Second, monopolistic market structures can make advertising unnecessary for sales success, for example, in the transportation, communications, electric, gas, and sanitary services sector. Third, a small number of observations reduces the significance level, for example, in the agriculture, forestry, and fishing sector. Fourth, non-significant advertising effects occur in industries with the smallest average advertising spending (< 2% of revenues). A minimum spending level may be necessary to create a meaningful sales response (Hanssens et al., 2001). Fifth, diversification across different industry sectors seems to impede a concerted advertising effort and positive pay offs, for example, in the unspecified/diversified sector.

B2B advertising spending creates positive synergies with firms' quality focus in the manufacturing sector and with firms' sales force spending in the construction sector and the manufacturing sector, respectively. We find significant negative interaction effects between B2B advertising spending and sales force spending in the transportation, communications, electric, gas, and sanitary services sector, as well as in the services sector. The negative interaction effects indicate that B2B advertising spending and sales force spending are substitutes in these sectors. Therefore, to generate a certain sales growth improvement, firms operating in these sectors should spend additional money either on B2B advertising or on the sales force, but not on both.

5.2.2. Nonlinear effects

We assessed whether B2B advertising has diminishing effects on sales growth. Specifically, we mean-centered the B2B advertising spending measure and added its squared term to our main model, i.e. Model 2 in Table 4. The term was non-significant. A possible explanation is that B2B firms spend too little on B2B advertising to reach saturation levels (Table 5). In contrast, B2B firms spend more money on the sales force, which many managers view as the

classical communication tool in B2B selling. We find a significant negative effect of sales force spending's squared term ($\beta = -.017, p < .10$), suggesting diminishing sales growth effects at high sales force spending levels. Since the available measure of a firm's quality focus is dichotomous (0/1), the linear term and squared term are equivalent, meaning that diminishing effects cannot be assessed for this variable.

6. Implications

This study is the first comprehensive examination of the performance benefits related to advertising spending in business markets—which is an understudied research area (Table 1).

A recent meta-analysis of advertising's sales response effects, for instance, notes:

. . . our meta-analysis excludes . . . business-to-business (B2B) advertising . . . studies that provide advertising elasticities in the B2B context are few and, in general, pertain to journal advertising to physicians (Sethuraman et al., 2011, p. 458).

Our study makes several important contributions to the literature. First, we develop conceptual rationales regarding why B2B advertising spending should have an independent positive sales performance impact. These rationales are not self-evident, since B2B firms have a long tradition of using non-advertising means, such as a focus on quality and the sales force, to succeed in their markets. Against this backdrop, the conceptual rationales that we develop make a case for B2B advertising spending's positive impact *above and beyond* the effects of a firm's quality focus and sales force spending by identifying B2B advertising's exclusive effects that classical means cannot match. Future studies in the emerging research stream on B2B advertising can use the rationales developed in this study as a basis for their conceptual arguments. Our theoretical reasoning also emphasizes that, in most cases, logic from the B2C literature cannot simply be transferred to the B2B context, which requires contextualization that considers the distinct characteristics of business markets, such as the nature of buying decisions, the sales force's role, etc.

Second, by empirically testing our conceptual model, we contribute to research that investigates the success factors in business markets (e.g., Russo et al., 2016; Worm et al., 2017). Importantly, our empirical results demonstrate that B2B advertising, which is currently underutilized in business markets, can be a key driver of B2B firms' sales growth. Thus, conceptual models of success factors in business markets should add B2B advertising as an important success driver. However, success factor models should consider the industry context, which matters, as we show.

Third, we contribute to the literature on product and service quality. While, for consumer markets, the current literature provides a well-grounded case for a distinction between (objective) quality and perceived quality (e.g., Mitra & Golder, 2006), the literature has not made a similar case for business markets. In particular, scholars have described business purchase decisions as highly rational processes in which buyers conduct extant research on all options available in the market, suggesting that objective quality is central to these purchases. In contrast to this view, our study shows that for firms with a quality focus B2B advertising spending can enhance customer demand, as reflected in a firm's sales growth. This finding provides indirect evidence that decision-making in business markets may be less rational than sometimes assumed in the literature.

Fourth, our study contributes to the sales literature. On a *strategic* level, this literature has made a strong case for integrating the sales and marketing functions in organizations to improve business outcomes (e.g., Homburg et al., 2008). We add to this research stream by investigating the business outcomes from synergies that are generated by harmonizing sales and marketing spending at the *tactical* level. In particular, our results reveal that, for many firms, simultaneous investments in sales (i.e., the sales force) *and* marketing (i.e., B2B advertising) create a positive effect on a B2B firm's sales growth that goes beyond the effects that isolated spending on either one of the two communication tools alone would generate.

This synergistic interaction effect, as well as the interaction between B2B advertising and quality discussed above, advances a contingency view on the apparently highly interrelated performance effects of success drivers in business markets.

Fifth, our study contributes to literature on signaling theory pertaining to the outcomes of simultaneous signals (Akdeniz et al., 2014; Basuroy et al., 2006; Kirmani & Rao, 2000). The theory predicts that similar signals substitute each other in their impact. To assess signal similarity, researchers usually refer to signal costs' default-independence versus default-dependence, i.e. whether a firm incurs the costs independently or dependently of a possible quality shortfall (Basuroy et al., 2006; Kirmani & Rao, 2000). For our set of variables, all of which are default-dependent signals, we find that advertising spending indeed substitutes sales force spending effects in some industry groups. However, in other groups the relationship is synergistic. The results across the complete sample also show synergistic effects. Thus, our findings indicate that the default-dependence/default-independence dichotomy to categorize substitutive signals can have limitations in certain contexts. A behavioral perspective that considers differences regarding signals' specific impact in the marketplace tends to yield more accurate predictions for many firms.

For managers of B2B firms, our results demonstrate the market-success benefits of investing in B2B advertising. The firms in our sample, on average, only spent three cents per dollar of revenues on B2B advertising. This finding is much in line with anecdotes that in the opinion of many managers B2B advertising and the brand it creates “does not really figure very much in the final decision of the customer, especially in B2B marketing, where the purchasing agents are professional and well-informed” and that B2B advertising “costs too much” (Keller & Kotler, 2012, p. 209). In contrast to these views, we find that the sales benefits of B2B advertising can be substantial. Specifically, for a 50% increase in B2B ad spending from the current three cents per dollar figure, our estimation results predict a .77%

sales growth increase. At the currently low spending level, we do not find any diminishing effect. Moreover, firms can benefit from an additional sales growth increase of 1.15% by combining advertising with a strong quality focus. The synergistic effect with the sales force is comparatively lower and yields a .002% sales growth increase for every cent per dollar of revenues spent on the sales force. At the sales force spending level that we observe on average in our sample, the synergistic effect with advertising results in a sales growth increase of .09%, which can be economically substantial in dollar terms for firms with medium-sized and large sales revenues.

Thus, in terms of when to start investing, the best time for managers to begin ramping up B2B advertising budgets may be now. Advertising is a relatively underutilized tool in business markets compared with consumer markets. This can give investing firms a high share of voice, such that advertising messages face limited rivalry from competing messages and the target audience is less likely to experience fatigue from advertising clutter, increasing the expected effectiveness of and thus benefits from B2B advertising. In contrast, the firms in our sample invested much more money into their sales force, and at high spending levels our results show diminishing sales growth effects of this spending.

Finally, with regard to industry-specific effects, our findings particularly confirm B2B advertising spending's positive effects for the industry groups construction, manufacturing, finance, insurance, and real estate, as well as services. However, we cannot rule out that the spending levels in other industries are currently just too low to yield a significant sales growth effect, since a minimum spending level may be necessary for a sales response to occur.

7. Limitations and directions for further research

Our dataset has several limitations that create opportunities for further research. First, while we used observations from many different firms, industries, and years that contribute to our

findings' generalizability, the firms in our dataset are U.S.-based firms with publicly traded stocks or debt, since the data required for our examination are comprehensively available only for these firms. Further research could assess the effects for privately owned firms or in other national contexts, which may differ in terms of cultural characteristics that shape organizational decision-making and inter-organizational ties. Second, we used secondary data for our investigation and, while these data are objective, they are non-experimental, such that alternative explanations for the effects observed in the data can never be ruled out completely (Rossi, 2014). Although econometric tests indicate that unobserved effects are unlikely to alter our results substantially, i.e. a possible endogeneity bias is limited, interviews with managers of B2B firms and market experts are nevertheless useful to triangulate our findings and can help explore the mechanisms underlying the observed effects. These interviews could also help understand the reasons for the substitutive effects that we find for advertising spending with sales force spending in some industry groups. Third, for a few industry groups only a small number of observations was available and advertising spending levels were low (Table 5). Future survey research could specifically target firms in those industry groups.

We propose the following additional avenues for further research. First, B2B firms can advertise in different channels, but data availability reasons precluded us from examining effects at this disaggregation level. Specifically, B2B firms can advertise in traditional channels, such as trade magazines, or through non-traditional channels, such as social media. While the latter channel received attention in recent studies (e.g., Swani et al., 2014; Swani et al., 2017), researchers have not yet assessed the channel's effectiveness and the investigation has been in isolation from other channels. Thus, while our results show that B2B advertising is beneficial on average, the question about the relative effectiveness of and potential synergies between different advertising channels in business markets is an interesting follow-up question from our research. In this regard, a 2019 survey of U.S.-based CMOs shows that

B2B firms' digital social media spending is low at only 10% of the budget. Does this number reflect an efficiency disadvantage of the channel or a mistake by B2B managers who are inert to switch to new advertising channels?

Second, we found a synergistic effect between B2B advertising spending and a firm's quality focus. Our theoretical discussion provided different explanations for this synergy. For instance, a possible explanation is that B2B advertising creates awareness about the quality that would be less known in the marketplace without its communication through advertising. Another explanation is that B2B advertising allows building an image for quality that creates buyer trust and increases tolerance toward isolated performance incidents. While the first explanation attributes advertising's sales effect to enhanced information, the second explanation describes a profound change in buyer behavior. Which mechanism is more relevant to explain the synergy that we observed in our data?

Third, for many firms in our sample, we found a synergistic effect between a firm's B2B advertising spending and its sales force spending, indicating that advertising increases the productivity of sales investments. We argued that this synergy can occur in various stages of the selling process. However, for which stage does B2B advertising add more or less value? Moreover, how does advertising's impact on supporting the sales process compare with B2B advertising's other effects on the sales force, such as creating a shared vision? We could not disentangle those effects for data availability reasons. Further research that provides this detailed investigation would add to our understanding of exactly how sales and marketing interact—with positive business outcomes—at a *tactical* level. Managers could use those insights to further optimize the amount and timing of their investments in B2B advertising and the sales force.

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Table 1
Prior B2B advertising research.

Authors	Study focus	B2B ad-related issues examined				Generalizability criteria				Key finding(s) with regard to B2B advertising
		ASp	FP	Comp	Syn	Ind	Fir	Obs	TS	
Abrahams et al. (2012)	Content of print ads targeted at entrepreneurs	No	No	No	No	7	778	5,288	No	B2B ads do not address the most important success factors for entrepreneurs as identified by the Small Business Success Index. Industries differ regarding the position and size of ads in the magazines, the typical months of ad placement, the contact details provided, the use of repetitions, and comparative ads.
Anaza et al. (2019)	Narrative transportation in B2B ads on C-suite decision makers	No	No	No	No	23	< 100 ^a	229	No	B2B ads with narrative transportation increase decision makers' trust, feeling of a personal connection, and propensity to advocate for the supplier. Effects are stronger for C-suite than non-C-suite deciders.
Baack et al. (2016)	Creativity in B2B ads	No	No	No	No	n/a	n/a	166	No	For business managers, creative B2B ads generate stronger shifts in attitudes toward the ad and brand, as well as behavioral intentions.
Erevelles et al. (2008)	Co-branding	. ^b	. ^b	. ^b	. ^b	n/a	n/a	n/a	No	On the basis of a mathematical model, B2B ads can make co-branding more effective.
Ferguson and Mohan (2019b)	Celebrity persons in B2B ads	No	No	No	No	n/a	n/a	54	No	For B2B ads with celebrities, managers pay more attention, but with more negative hedonic attitudes, reduced utilitarian attitudes, and lower brand recall.
Fischer and Albers (2010)	Patient- versus physician-directed marketing	Yes	Yes	Yes	No	1	n/a	2,831	Yes	Pharmaceutical companies spend little on physician-directed journal (B2B) ads compared to other spending categories (e.g., detailing activities). B2B ads only have a small sales effect, although effects can be higher for individual brands and certain product categories (e.g., chronic care).
Giakoumaki et al. (2016)	B2B ingredient advertising in consumer ads	No	No	No	No	n/a	n/a	320	No	By advertising B2B ingredients, consumer brands benefit in terms of more positive attitude and purchase intention. The benefits are higher, the greater the importance of the advertised ingredient for the host product.
Gupta and Di Benedetto (2007)	Optimal pricing and advertising of a new B2B product	. ^b	. ^b	. ^b	. ^b	n/a	n/a	n/a	No	On the basis of a mathematical model, the optimal B2B advertisement expense depends on the price charged, the industry competition, and the effects on the industry's total demand.

Authors	Study focus	B2B ad-related issues examined				Generalizability criteria				Key finding(s) with regard to B2B advertising
		ASp	FP	Comp	Syn	Ind	Fir	Obs	TS	
Jensen and Jepsen (2007)	Low attention processing B2B ads	No	No	No	No	1	n/a	48	No	Despite likely benefits for low attention processing, emotional brand appeals and intuitively understandable messages are rarely used in B2B ads for low attention products.
Lohtia et al. (2003)	Banner advertising click-through rates	No	No	No	No	n/a	n/a	8,725	No	For B2B banner ads, incentives, emotions, animations, and interactivity lower the click-through rate. Medium levels of colour are better than low and high levels. B2B banner ads have higher click-through rates than B2C banner ads.
Spotts and Weinberger (2010)	Corporate reputation effects of ad spending and publicity	Yes	No	No	No	n/a	32	97	No	For firm reputation, B2B ad spending has the lowest importance of all examined factors (publicity volume and valence, and B2C and B2B ad spending). For brand equity, B2B ad spending has no effect.
Swani and Iyer (2017)	Effects of the global financial crisis on print ads of B2B service firms	No	No	No	No	n/a	n/a	759	No	Compared to B2C ads, B2B ads make greater use of functional appeals, first-person voice, tangibilization through physical representation and documentation. B2B ads make comparatively less use of positive emotions, website URLs, phone numbers, and tangibilization through visualization. The global financial crisis reduced B2B ads' use of positive emotional appeals and tangibilization through physical representation.
This study	B2B ad spending as an underutilized success factor	Yes	Yes	Yes	Yes	173	2,270	12,701	Yes	B2B ad spending contributes to sales growth in its own right and, in addition, creates synergies together with a B2B firm's quality focus and sales force spending. B2B ad spending contributes to sales growth more strongly than a quality focus and equally strongly as sales force spending.

Notes: ASp = B2B advertising spending level considered; FP = financial performance impact examined; Comp = comparison with other B2B sales growth drivers provided; Syn = synergistic effects with other B2B sales growth drivers examined; Ind = number of industries in sample; Fir = number of firms; Obs = number of observations; TS = time-series data and analysis used; n/a = the information is not provided in the study

^aExact number is not reported.

^bThe study is not empirical.

Table 2

Independent and control variable operationalization.

Variable	Source	Definition/operationalization
Sales growth	COMPUSTAT North America	Sales revenue _t / sales revenue _{t-1}
B2B advertising spending	COMPUSTAT North America	Advertising expense _t / sales revenue _{t-1}
Quality focus	SEC filings	Indicator for an ISO 9001 certification
Sales force spending	COMPUSTAT North America	(SG&A expense _t – advertising expense _t) / sales revenue _{t-1}
Patents	Bureau van Dijk Orbis	Number of patents (log)
Customer-base concentration	COMPUSTAT Segment Files	Customer-base concentration index = $\sum_{j=1}^J \left(\frac{\text{Sales revenue with major customer } j_t}{\text{Sales revenue}_t} \right)^2$
Slack resources	COMPUSTAT North America	Current ratio = current assets _t / current liabilities _t (log)
Industries	COMPUSTAT	Indicator variables for the industries (minus one) in our sample (four-digit SIC code)
Years	COMPUSTAT	Indicator variables for each of the years (minus one) from 1990–2015

Table 3
Descriptive statistics and correlations.

Variables	M	SD	1	2	3	4	5	6
1. Sales growth	1.17	.48	1					
2. Advertising spending	.03	.08	.43	1				
3. Quality focus	.09	.28	-.01	-.06	1			
4. Sales force spending	.45	.66	.60	.58	-.02	1		
5. Patents	1.33	2.14	-.07	-.07	.15	-.06	1	
6. Customer-base concentration	.07	.19	-.04	-.05	.06	-.05	.19	1
7. Slack	2.29	2.11	.03	-.02	.05	-.02	.03	.01

Notes: Correlations with an absolute value greater than .02 are significant at the $p < .05$ level. Variance inflation factors (VIF) are well below standard cut-off values, indicating that multicollinearity is not a particular problem. A Durbin–Wu–Hausman test confirmed no significant endogeneity bias, such that additional omitted drivers of a firm’s sales growth are unlikely to change our reported results if they could be observed (i.e., for many variables data are unlikely to be available) and were to be included as additional regressors in the model.

Table 4
B2B advertising spending's effect on sales growth.

	Dependent variable: Sales growth					
	Model 1		Model 2 (mean-centered)		Model 2' (non-centered)	
	b	t	b	t	b	t
<i>Main effects</i>						
Advertising spending	.655	6.37 ***	.512	5.25 ***	.385	3.76 ***
Quality focus	.028	2.44 **	.040	2.84 ***	.014	1.21
Sales force spending	.398	23.38 ***	.380	18.57 ***	.376	17.35 ***
<i>Interaction effects</i>						
Quality focus x advertising spending			.764	2.10 **	.764	2.10 **
Sales force spending x advertising spending			.134	2.57 **	.134	2.57 **
<i>Controls</i>						
Patents	-.005	-3.31 ***	-.005	-3.45 ***	-.005	-3.45 ***
Customer-base concentration	.001	.07	.000	.00	.000	.00
Slack resources	.010	6.75 ***	.010	6.50 ***	.010	6.50 ***
Pred. error term (using lag one)	.966	12.20 ***	.968	12.04 ***	.968	12.04 ***
Pred. error term (using lag two)	.580	3.96 ***	.588	3.84 ***	.588	3.84 ***
Intercept	1.168	19.17 ***	1.369	22.70 ***	1.180	14.82 ***
Industries	Included		Included		Included	
Years	Included		Included		Included	
<i>Model descriptive statistics and prediction</i>						
Observations	12,701		12,701		12,701	
Firms	2,270		2,270		2,270	
R ²	0.4387		0.4391		0.4391	
Adj. R ²	0.4295		0.4298		0.4298	
F-value	56.27 ***		56.31 ***		56.29 ***	
10-fold pseudo R ²	0.3937		0.3972		0.3988	
10-fold RMSE	0.3757		0.3758		0.3755	
10-fold MAE	0.2240		0.2237		0.2236	

Notes: For expositional reasons, the effects of individual industries and years are not reported, since the number of effects is very large (e.g., 172 industry effects). The significance of the t-statistics is on the basis of a two-tailed test and indicated as: * $p \leq .10$, ** $p \leq .05$, and *** $p \leq .01$.

Table 5

Contextual effects: Heterogeneity between B2B industries.

Industry group (SIC)	N	Advertising spending	Quality focus	Sales force spending	Quality focus x advertising spending	Sales force spending x advertising spending	Mean advertising spending	Mean quality focus	Mean sales force spending
Agriculture, forestry, and fishing	41	1.46	.20	.42	-9.27	15.54	.024	.049	.403
Mining	246	.08	-.31	.51***	.65	.03	.015	.024	.394
Construction	82	3.76***	.00***	.81***	.00	12.07***	.020	.000	.209
Manufacturing	6,692	.32***	.04***	.28***	.89***	.43***	.023	.140	.394
Transportation, communications, electric, gas, and sanitary services	409	.52	.06	.35***	4.78	-.67***	.017	.037	.264
Wholesale trade	1,000	.88	.11	.49***	4.18	.06	.017	.042	.281
Finance, insurance, and real estate	560	1.05***	.00	.49***	.00	.02	.043	.000	.443
Services	3,419	.31*	.00	.50***	-1.81	-.10***	.061	.026	.644
Unspecified/diversified	252	-3.24	-.66	.39***	-41.67	-.05	.065	.028	.670

Notes: The significance of the t-statistics is on the basis of a two-tailed test and indicated as: * $p \leq .10$, ** $p \leq .05$, and *** $p \leq .01$.

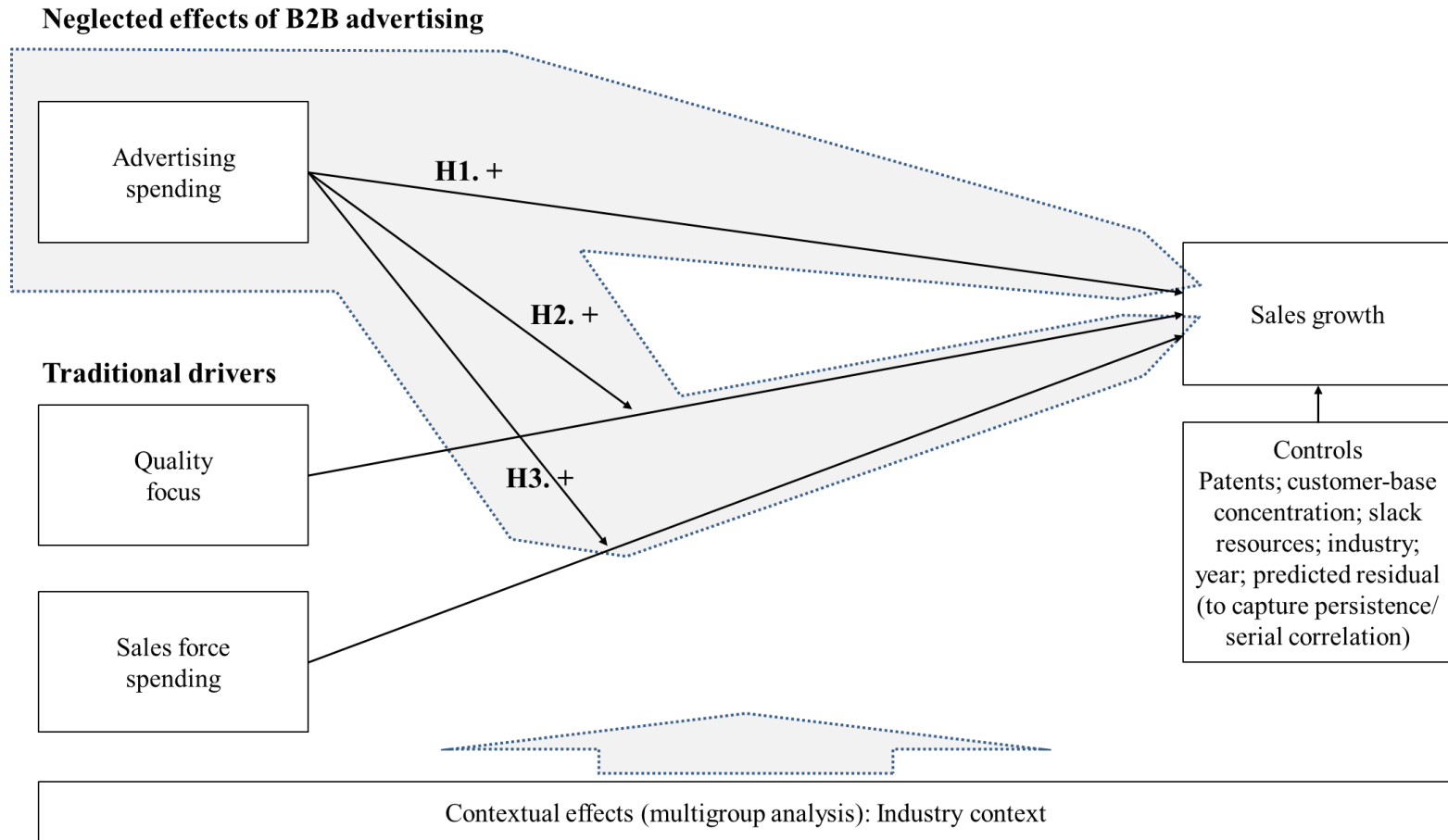
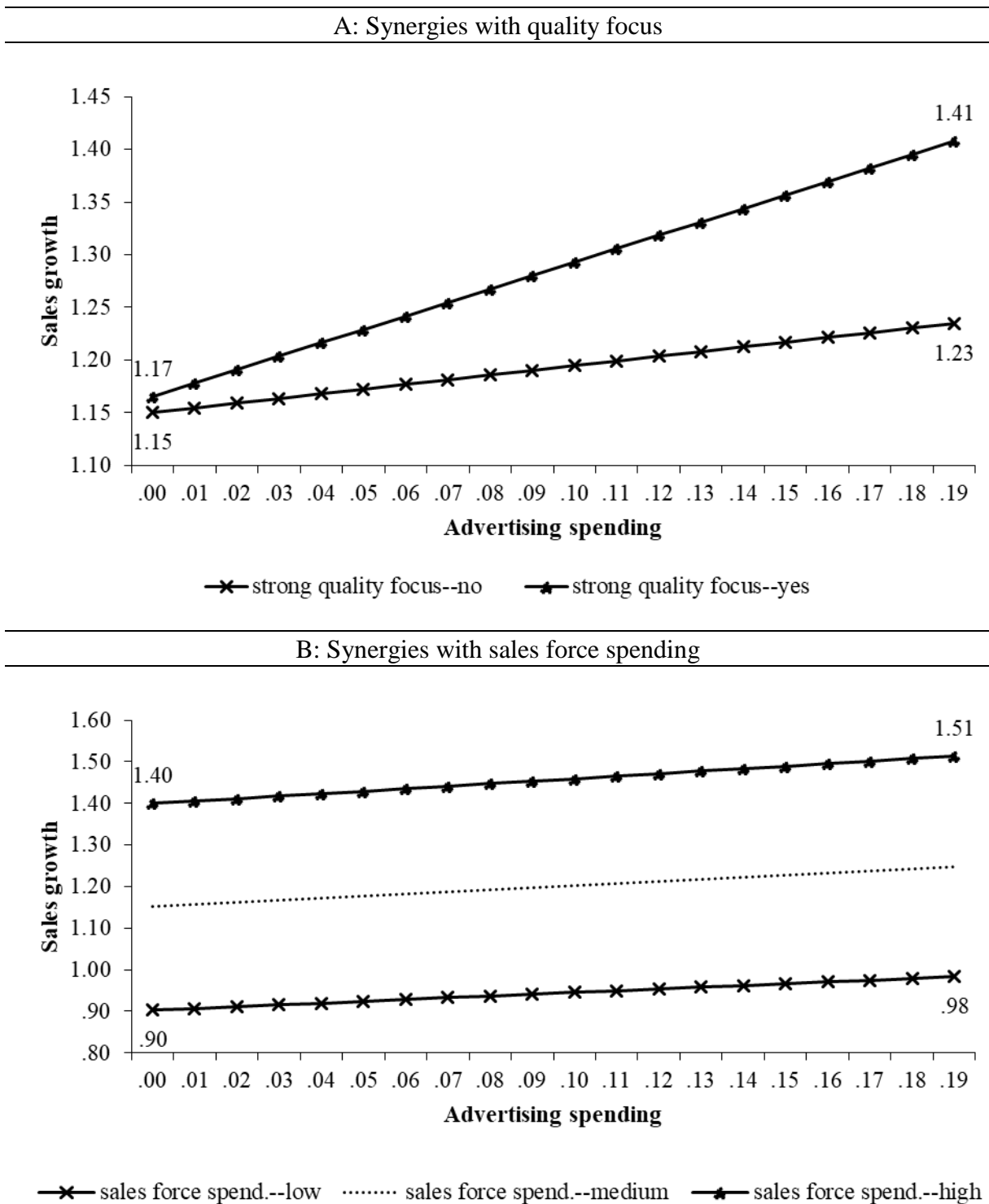
Fig. 1 Conceptual framework.

Fig. 2 Synergies of advertising spending with quality focus and sales force spending.



Notes: Strong quality focus yes (no) means that a firm has (does not have) an ISO 9001 certification. High (low) sales force spending means that a firm spends one standard deviation above (below) the average spending level (Table 3). While synergies with sales force spending are limited, they can nevertheless be economically significant. Firms with high sales force spending can generate 3% higher sales growth from increasing advertising spending from low to high levels (1.51–1.40 = .11) compared to firms with low sales force spending (.98–.90 = .08).

Appendix

Industries in the sample.

SIC industry group	Corresponding four-digit SIC codes	Obs.	Firms	Revenue (in \$million)	Assets (in \$million)	Employees (in thousand)	Age (in years)
Agriculture, forestry, and fishing	200, 700, 800	41	11	305.07	229.89	0.83	11.73
Mining	1000, 1040, 1090, 1220, 1311, 1381, 1382, 1389, 1400	246	60	8,371.02	10,754.58	8.34	12.08
Construction	1520, 1540, 1600, 1623, 1700	82	25	358.44	305.68	1.14	8.78
Manufacturing	2421, 2531, 2631, 2650, 2731, 2790, 2800, 2810, 2820, 2821, 2835, 2860, 2870, 2911, 2990, 3250, 3290, 3310, 3312, 3320, 3330, 3334, 3341, 3350, 3357, 3360, 3390, 3440, 3444, 3448, 3460, 3480, 3490, 3510, 3523, 3530, 3531, 3533, 3537, 3540, 3541, 3550, 3555, 3559, 3560, 3562, 3564, 3567, 3569, 3575, 3579, 3580, 3590, 3613, 3620, 3621, 3672, 3674, 3677, 3711, 3713, 3714, 3715, 3721, 3724, 3728, 3743, 3760, 3790, 3812, 3821, 3822, 3823, 3824, 3825, 3826, 3827, 3829, 3841, 3842, 3843, 3844, 3845, 3851	6,692	1,049	3,220.86	4,208.28	8.15	14.98
Transportation, communications, electric, gas, and sanitary services	4011, 4213, 4512, 4513, 4581, 4731, 4950, 4953, 4955, 4991	409	75	7,139.79	7,799.56	28.43	14.88
Wholesale trade	5000, 5010, 5013, 5030, 5031, 5040, 5045, 5047, 5051, 5063, 5064, 5065, 5070, 5072, 5080, 5082, 5084, 5090, 5094, 5099, 5110, 5122, 5130, 5150, 5172, 5190	1,000	168	1,872.80	1,677.57	3.57	14.35
Finance, insurance, and real estate	6153, 6159, 6163, 6172, 6200, 6211, 6331, 6351, 6399, 6512, 6519, 6552, 6794	560	107	431.97	2,479.78	1.54	13.55
Services	7310, 7311, 7323, 7330, 7331, 7370, 7371, 7373, 7374, 7377, 7380, 7381, 7384, 7385, 7389, 8071, 8700, 8711, 8731, 8734, 8741, 8742	3,419	707	1,461.98	2,010.74	6.30	9.85
Unspecified/diversified	9995	252	68	377.32	326.46	4.25	9.40