Available online at www.sciencedirect.com
SCIENCE DIRECT®
Journal of Business Research 58 (2005) 28–36
JOURNAL OF BUSINESS RESEARCH

Assessing advertising media spending inefficiencies in generating sales

Xueming Luo[a], Naveen Donthu[b,*]

[a]State University of New York, Fredonia, NY, USA
[b]Marketing Department, Georgia State University, Atlanta, GA, 30303, USA

Received 15 November 2001; accepted 4 February 2003

Abstract

While it is widely believed that advertising media spending may not be optimal or efficient, it is not easy to measure the inefficiency, or the potential loss of sales due to inefficient ad spending. Advertising media spending efficiency needs to be measured and benchmarked. Here two approaches are presented and compared to evaluate top 100 advertisers' media spending inefficiency. The two methods are a nonparametric approach called Data Envelopment Analysis (DEA) and a parametric approach called Stochastic Frontier (SF). Results show that top 100 marketers' advertising spending in print, broadcast, and outdoor media are not efficient and could bring in 20% more sales. Results also show that the two methods may not always produce the same results. Therefore, it is suggested that both approaches be used in all applications.
© 2003 Elsevier Inc. All rights reserved.

Keywords: Advertising efficiency; Data envelopment analysis; Stochastic frontier analysis

1. Introduction

It has long been noted that advertising practice might not be as efficient as it has been theorized (e.g., Aaker and Carman, 1982; Bass, 1979; MacNiven, 1980; Simon and Arndt, 1980; Tull et al., 1986). The widely quoted statement by the first U.S. postmaster general John Wanamaker "I know half of my advertising is wasted, I just don't know which half" reflects the reality for many firms. Bass (1979) observed that advertising spending waste might be as high as 407% of the net income for some companies. High level of advertising inefficiency, defined here as the potential loss of sales due to inefficient ad spending, plagues businesses and frustrates managers (Aaker and Carman, 1982; Smith and Park, 1992) as inefficient media spending and misallocated resources contribute to lower profit margins and hurdle a company's ability to sustain a healthy growth (Danaher and Rust, 1994; Stankey, 1988). Given the critical importance of this practical issue, it is surprising that no study has empirically measured it, let alone compare and benchmark advertising inefficiency using multiple methodologies.

To fill in this void, this present study presents and compares two frontier or "best practice" methodologies that have been widely used to benchmark inefficiency. One is a nonparametric method called Data Envelopment Analysis (DEA), the other is a parametric technique called Stochastic Frontier (SF) method. DEA and SF have been extensively used to assess efficiency in various applications such as universities, banks, insurance companies, hospitals, salespeople, and countries (see Seiford, 1996, for a bibliography of more than 800 articles on DEA applications, and see Kumbhakar and Lovell, 2000, for an excellent review of the literature on SF models).

DEA is a nonparametric tool that can deal with multiple evaluating criteria when measuring media spending inefficiency. It estimates an efficient frontier by maximizing the weighted output/input ratio of each advertiser (Charnes et al., 1978). On the other hand, SF is a parametric approach and decomposes the error term into two parts, one reflecting advertising inefficiency and the other reflecting conventional statistical noise (Aigner et al., 1977). SF uses this decomposable error to estimate the overall media spending inefficiency in the industry and the inefficiency of each advertiser (Jondrow et al., 1982; Greene, 2000). Like DEA, the SF advertiser-specific inefficiency values are also the proportional difference between the individual marketer's actual sales output and the frontier' output (Kim and Kim, 1999; Haughton et al., 2000).

* Corresponding author. Tel.: +1-404-651-1043; fax: +1-630-604-7457.
E-mail address: ndonthu@gsu.edu (N. Donthu).

0148-2963/$ – see front matter © 2003 Elsevier Inc. All rights reserved.
doi:10.1016/S0148-2963(03)00076-6

The efficiency results given by DEA and SF techniques will provide valuable information to advertising practitioners in assessing the adequacy of their media spending. The most efficient advertisers can be the industry's role models. For each advertiser, inefficiency indicators will have a prescriptive role in establishing goals and budgets.

The present paper is exclusive in that it applies and compares DEA and SF to benchmark advertising spending inefficiency. To the best of our knowledge DEA and SF have not been jointly used in the context of measuring advertising efficiency. A joint application of both DEA and SF is desired since DEA and SF have their own strengths and weaknesses. Proponents of DEA stress its nonparametric nature and reliance on observed and realistic best practice, suggesting DEA as a manager-preferred method. In contrast, critics of DEA stress its nonstochastic nature and failure to differentiate managerial inefficiency from statistical noise or random error. The SF method has an advantage over DEA in that it can treat random noise and efficiency separately. However, SF is somewhat limited in the sense that more information is needed about the best way to model the error term (Bauer et al., 1998).

Comparative studies of these two popular frontier analyses methods are needed because DEA and SF inefficiency results may differ as a consequence of the deterministic vs. stochastic structure of the two approaches. Also, it is generally recognized that DEA and SF results are each sensitive to various underlying assumptions and the data used to operationalize them. For example, DEA findings may be sensitive to extreme data points or outliers, whereas SF estimates are expected to vary by the specific distributional assumption imposed on the error term.

Previous studies applying frontier methodologies have investigated retailing outlets productivity (Donthu and Yoo, 1998; Kamakura et al., 1996; Ratchford and Brown, 1985; Ratchford and Stoops, 1988; Thomas et al., 1998); market efficiency and consumer welfare loss (Kamakura et al., 1988; Ratchford et al., 1996); short-run banks' inefficiency (Kaparakis et al., 1994); sales force efficiency (Boles et al., 1995; Horsky and Nelson, 1996; Mahajan, 1991); channel productivity (Bultez and Parsons, 1998); operating efficiencies in real estate (Anderson et al., 2000); hospital efficiency (Chirikos and Sear, 2000); first-mover market share advantages (Murthi et al., 1996)' Chinese economic reforms (Cooper et al., 1995); public schools efficiency (Ruggiero and Vitaliano, 1999); resources allocation (Bhargava et al., 1994; Chebat et al., 1994); and efficiency of travel management departments (Anderson et al., 1999) to name a few.

Among studies that used both DEA and SF, Ruggiero and Vitaliano (1999) found that DEA and SF results were different. But Anderson et al. (1999) found similar results with DEA and SF. Chirikos and Sear (2000) and Cooper et al. (1995) also found that DEA and SF results are correlated. In a Monte Carlo simulation study, Banker et al. (1993) found that DEA produced more reliable results than SF. However, Gong and Sickles (1992) found the complete opposite results. In spite of such inconclusive findings, most applications seem to just pick one of the two methods in assessing efficiency of decision-making units. Here, we employ both methods and also compare their results with traditional regression analysis.

Next, we will employ DEA and SF methodologies to assess the advertising efficiency for a sample of marketers selected from top 100 advertisers. The results of DEA and SF analyses are then reported along with those of traditional regression analysis. Implications for advertisers will be drawn based on these results as to how inefficient their media spending is and how to identify role models for optimal media spending. Implications will be drawn for marketing and advertising researchers as to how to model and estimate inefficiency and which method to use.

2. Model specifications

Past advertising response research on the shape of the response function (e.g., Stewart, 1989; Aaker and Carman, 1982; Simon and Arndt, 1980; Mesak, 1999; Wittink, 1977) and dynamics of advertising effects (e.g., Simon, 1982) has established the relationship between media spending and sales volume. Following this stream of research, this study benchmarks the top 100 advertisers' ad spending efficiency. Particularly, the amount spent in different media such as broadcasting, print, and outdoor are the three inputs, while the sales revenue is the output in the following DEA and SF models.

Both DEA model and SF function admits input or output orientation in constructing the frontier advertisers. Both orientations will produce the same frontier or best practice of media spending (Charnes et al., 1994). An input orientation of model focuses on maximal movement toward the frontier through proportional reduction of inputs such as media spending, whereas an output-oriented model focuses on the maximal movement via proportional augmentation of outputs such as sales. To keep the results consistent and comparable, we choose the output-orientation version of both DEA and SF models (e.g., Reinhard et al., 2000).

2.1. Data envelopment analysis model

The DEA approach to measure inefficiency, based upon Farrell's (1957) seminal article, was first developed by Charnes et al. (1978). Later it was modified into various models (Banker et al., 1984; Cooper et al., 1999; Kim et al., 1999; Thanassoulis and Allen, 1998). In marketing literature, Charnes et al. (1985) conceptually discussed potential applications of DEA in retailing and sales management research.

DEA is a linear programming formulation developed by the management scientists based upon economic principles. It defines a nonparametric relationship between multiple

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
✓ امکان دانلود نسخه ترجمه شده مقالات
✓ پذیرش سفارش ترجمه تخصصی
✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
✓ دانلود فوری مقاله پس از پرداخت آنلاین
✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات