



Benchmarking Retail Productivity Considering Retail Pricing and Format Strategy[☆]

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Abstract

With increased competitive pressures in the grocery retailing industry, managers have greater interest in measuring the productivity of the stores of their own chain relative to the other similar stores. In this paper, we measure and compare the inefficiencies of major grocery retailers across various formats and pricing strategies using stochastic frontier (SF) methodology. Using a unique dataset covering 2500 stores across 50 chains, we find that the average inefficiency was about 28.59 percent. Kroger and Wal-Mart are found to be the least inefficient chains with inefficiencies of 2.18 percent and 3.06 percent respectively. With respect to pricing strategy, EDLP and hybrid stores are found to do better than HiLo stores in generating weekly sales and with respect to format strategy, supercenters are found to do better than supermarkets and limited assortment stores. Using SF analysis, we also find that stores could potentially reduce the proportion of inputs such as selling area, number of checkout counters, number of employees and store features without threatening outcomes (i.e., by holding the output level constant).

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Introduction

According to Food Marketing Institute, there were more than 35,000 grocery selling stores¹ in the U.S. in 2009, generating \$557 billion in sales. A recent study conducted by the *Coca-Cola Center of Retailing Research Council (2006)*² find that with increased competitive pressures in the retailing industry, managers have greater interest in measuring the productivity of the stores of their own chain relative to the other stores in the similar space. Total weekly sales volume has been the primary

output unit of interest to the managers in measuring their performance (Kumar and Karande 2000; Reinartz and Kumar 1999, etc.). Since grocery stores operate in an industry that traditionally has low profit margins (Food Marketing Institute 2009), it is imperative for the chains to have a continued focus on improving their sales and profits relative to the competitors in the market. Successful companies such as Tesco and Whole Foods have a sustained focus on high performance (Clarke, Wildman, and Allen 2008). Multi-national corporations such as Chevron, Xerox and IBM also use the benchmarking concept to excel in their respective industries (Camp 1998).

Given the extensive interest of practitioners and the importance of benchmarking performance, managers and academicians clearly have a great deal of interest in understanding the factors that influence their effectiveness in generating sales volume (Bolton and Shankar 2003). This interest is certainly reflected in the literature as a significant volume of work exists in the area of measuring production efficiency. By estimating an 'efficient frontier', a variety of issues such as measuring retailing outlet productivity (Grewal et al. 1999; Ratchford and Brown 1985; Ratchford and Stoops 1988), market efficiency and consumer welfare loss (Donthu and Yoo 1998; Ratchford et al. 1996), sales force efficiency (Boles et al. 1995; Horsky

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¹ Stores with \$2 million or more in annual sales.

² "Getting to Great: Mapping Management Practices that Drive Great Store Performance", (Accessed: October 2012 <http://humetrics.com/wp-content/uploads/2011/04/GettingtoGreat.pdf>).

and Nelson 1996), channel productivity (Bultez and Parsons 1998), and resource allocation (Chebat et al. 1994; Donthu, Hershberger, and Osmonbekov 2005; Luo and Donthu 2005) can be studied.

While there exist a considerable literature on retail productivity, most of this is concerned with macro issues such as productivity changes in the sector, comparing ownership types and isolating contextual (external, environmental) variables that affect productivity (Ratchford 2011). In a recent survey of literature, Ratchford (2011) also notes that “*Relatively few studies have been aimed at comparing the productivity of individual stores as a means of benchmarking performance and developing marketing strategies.*” Only a few studies (Gauri, Pauler, and Trivedi 2009; Grewal et al. 1999, etc.) are concerned with exploring the productivity impact of strategic (“internal”) variables for which retail managers’ are responsible.

While many retail chains maximize their distribution coverage across regions, individual stores vary tremendously in terms of their physical characteristics such as the selling area, number of employees, in-store services provided, products offered (Gauri, Pauler, and Trivedi 2009). In addition, the external environment in which the stores operate can vary significantly and could influence the performance of individual stores depending on the market and trade area characteristics. Research dealing with such store-specific performance issues is somewhat scarce (Gauri, Pauler, and Trivedi 2009; Grewal et al. 1999; Ratchford 2011). Using the frequent shopper data at a more disaggregate (block group) level, Gauri, Pauler, and Trivedi (2009) perform a detailed analysis of factors affecting demand at the block group level and develop benchmark measures of expected demand at each store. Even though they compare their model estimates with a stochastic frontier model, they use data of stores from a single chain and hence are not able to comment on anything related to differences in performance of stores across multiple chains. Our study attempts to fill this gap in the literature by using data from multiple chains.

It has also been well known that grocery selling stores follow a combination of format and pricing strategies to serve the needs of various consumer segments. The predominant formats are supermarkets, supercenters, and limited assortment stores, and the main pricing strategies observed are EDLP, Hi-Lo and hybrid³ (Bhatnagar and Ratchford 2004; Gauri, Trivedi, and Grewal 2008; Hoch, Drèze, and Purk 1994). Most major retailers use a variety of combinations of pricing and format strategy combinations to occupy several niche markets in various geographical regions. For example, Food Lion, Supervalu and Wal-Mart all adopt a multi-banner strategy⁴ in different markets (Gauri, Trivedi, and Grewal 2008). In our study, we consider both the pricing and format strategies of the store.

³ A combination of EDLP and Hi-Lo pricing strategy is known as Hybrid Pricing Strategy.

⁴ When the company operates under multiple names of chain, often following a different combination of pricing and format strategy under different names or banners.

The contributions of this study are as follows. First, we develop a benchmarking model that includes the impact of both internal (discretionary) and exogenous (non-discretionary) inputs on influencing sales volume as the output. We consider the impact of pricing and format strategy (separately as well as jointly) followed by stores belonging to multiple chains. Second, using a panel level stochastic frontier method, our research identifies the impact of each input on enhancing the sales volume and offers an effective way to compare the best performers, thus presenting a way to benchmark performance. The scope of our data covering a wide range of retailers (about 2500 stores belonging to 50 different chains) located in the north-eastern part of United States also lends credence to the generalizability of our results to a greater geographic area.

In the next section, we discuss the relevant frontier model based on research work that we draw upon for our empirical model. Subsequent sections deal with the empirical illustration with a description of data and variables and empirical results. Finally, we conclude with managerial implications and a general discussion of the model, its contributions and limitations.

Relevant literature on productivity measurement

As mentioned earlier, a significant volume of work exists in the area of measuring the productivity of a decision making unit (DMU). Two broad techniques that have been at the forefront in benchmarking research studies are the stochastic frontier (SF) and data envelopment analysis (DEA) methods. DEA is a linear programming procedure for evaluating the ratio of outputs to inputs of a DMU relative to other units. SF is a regression procedure for evaluating the output of a DMU relative to a frontier describing the maximum attainable output for a given set of inputs. Both these methods produce a frontier consisting of the set of most efficient performers, thus allowing a comparison to the best performers rather than one to the average performer (as in regression based models). While regression produces an average line across all units, frontier based methods produces an efficient frontier that encompasses the best performers. Units above the regression line, while performing better than average may not perform as well as the units on the efficient frontier (Donthu, Hershberger, and Osmonbekov 2005).

DEA is a linear programming formulation developed by management scientists based upon economic principles. It defines a non-parametric relationship between multiple spending inputs and outputs by building an efficient frontier as defined by the most efficient unit. DEA converts multiple inputs and outputs of a DMU into a single measure of performance, generally referred to as relative efficiency (Donthu and Yoo 1998). In DEA, productivity of a retail outlet is estimated by comparing its inputs and outputs with the corresponding values of other outlets in consideration. Within marketing, the DEA model has been used in various contexts – to gain insights into efficiency of marketing efforts (Charnes et al. 1985), and to evaluate relative performance of salespeople (Boles et al. 1995). Kamakura and Ratchford (1996) evaluated multiple retail stores for their efficiency using DEA and translog cost function estimation. A key advantage of the DEA model is that it is non-parametric and

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