

USING SUPPLY CHAIN EFFICIENCY IN PORTFOLIO SELECTION

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ABSTRACT

Supply chain management is increasingly viewed as the primary value-generating and cost-cutting process by business organizations. More recently, however, companies with successful supply chain management have observed that it is a major shareholder value driver and helps them in creating competitive differentiation. Latest research studies have shown that the financial markets accept this argument and react favorably to the announcements about firms' adoption of new methods, tools, or processes to increase their supply chain efficiency [Hendricks and Singhal (2003)].

The purpose of this paper is to establish a linkage between supply chain efficiency of firms and their stock prices. It is shown that identifying the most efficient supply chains can be of paramount importance to portfolio managers for the purpose of stock selection, and data envelopment analysis (DEA) can be a valuable tool for them.

Introduction

A supply chain which consists of all parties involved in providing goods and services to meet end users' request aims to maximize the overall value generated (supply chain surplus). In other words, the generated value in a supply chain is the difference between what the final products and services worth to the end users and the costs the supply chain incurs to fulfill the end users' demand. Therefore, the efficiency and the profitability of the supply chain can be an indicative of its success in the market. That is, the higher the supply chain efficiency and profitability, the more successful that chain is, and thus, the higher could be the value of firms' stocks along the chain. The possibility of the existence of a positive relationship between firm's stock price and its supply chain efficiency and profitability is obviously of paramount importance to portfolio managers and individual investors. While many authors in the past had speculated about strong correlation between excellence in SCM and shareholder value (Edward et al., 1996; Raman, 1998; Tyndall et al., 1998; Quinn, 1999; Chopra and Meindl, 2001; Mentzer, 2001), more recent research articles have provided support for this speculation. Hendricks and Singhal (2003), for example have used regression analysis to show the negative impact of supply chain glitches on shareholder wealth. Hendricks, Singhal, and Zhang (2009) also show the relationship between firms' supply chain performance and the stock market reaction. However, their research showed

that firms' design and operation of their supply chains can mitigate the negative impact of supply chain disruptions.

Linking and measuring supply chain efficiency to company value could be a challenge. Malhotra, Malhotra, and Russl (2010) used data envelopment analysis (DEA) to rate corporate bonds. Frontier analysis, also called (DEA) has been used extensively in the latest supply chain research. It was first introduced in 1978 by Charnes, Cooper, and Rhodes to measure the relative efficiency of decision-making units (DMU's) in organizations. Using DEA and mathematical programming, performance of peer units can be evaluated. DEA examines the resources used by the DMU's (inputs) and their outputs. It helps to reveal the weaknesses and strength of the DMU's, prepares the DMU's to meet their customers' needs, and pinpoints the opportunities to improve the existing operations and to create new product, services and processes. It is a non-parametric and as such, has the advantage of not assuming any particular shape or form for the frontier function. Most recent applications of DEA deal with measuring the efficiency and profitability of supply chains.

The purpose of this research is to establish a linkage between supply chain efficiency of firms and their stock prices. First, efficiencies of 341 companies in eight industries are measured. Next, a portfolio of the most efficient companies is created for each industry. The performances of these portfolios are then compared to the industry averages. This paper will therefore show (1) the valuable contribution of DEA in creating portfolios that are superior, and (2) the impact and importance of supply chain management practices on company valuation.

RESEARCH METHODOLOGY

Eight of eleven industries (Audio & Video Equipment, Coal, Metal Mining, Auto & Truck Manufacturers, Auto & Truck Parts, Computer Networks, Oil & Gas Operations, and Rental & Leasing) which were identified by "Clearstation.com" as the highest return industries in December 2009 were selected and the metrics for them were collected from Morningstar US Institutional Database. . To ensure that the results are meaningful, the criteria specified by Charnes and Cooper (1990), i.e., the number of DMUs must be greater than or equal to 3 times the total number of inputs and outputs, was used to eliminate three industries (Photography, Jewelry & Silverware, and Mobile Homes) from considerations. Following Zhu (2003), the inputs for the DEA included the average equity, the average assets, and the total number of employees. The three outputs consisted of total revenue, gross profit, and net income. Data for a total of 314 companies were collected and analyzed.

The software of choice for this analysis was the DEA Xcel Solver developed by Zhu (2003). It provides the detail analysis of the only two available basic DEA models: CCR (Charnes, Cooper, and Rhodes (1978)) and BCC (Banker, Charnes, and Cooper (1984)). However, there are many variations of DEA models depending on the nature of the production-technology. The model used in this research is a basic model assuming CCR (Constant Return to Scale).

One important advantage of DEA over the typical statistical approaches that compare DMUs to an "average" DMU is that it compares each DMU with the "best" DMU, given the amount of inputs and outputs for each DMU. It can also pinpoint specific inefficiencies of each DMU. However, this paper uses DEA for the sole purpose of identifying the most efficient

company/companies in each industry, and there is no need of analyzing efficiency of inefficient firms.

Once the most efficient company/companies in each industry is/are identified, a portfolio of their stocks can be created and the returns for this portfolio can then be compared to the average returns for each industry. For the purpose of comparison, the end of the third quarter of 2010 was chosen.

RESEARCH RESULTS

Table 1 summarizes the overall results of DEA and identifies the most efficient companies in each industry. In some industries up to 9 companies were identified as being efficient. However, we have included only the most efficient ones in Table 1. The 13-week rate of return versus the industry average at the end of the third quarter of 2010 is also included. Based on these findings, a portfolio consisting of the stocks of these 20 companies, which are the most efficient companies in each industry, can generate 27.728% higher return compared to the average return for the listed eight industries.

These results indicate that as indicated by supply chain practitioners and substantiated by more recent research, supply chain efficiency plays an important part in firms’ market value. Also, the results show that DEA can be a valuable tool for portfolio managers in their attempt to select the stocks with highest returns.

Table 1: Most Efficient Companies and their Returns Compared to Industry Returns

Industry	The Most Efficient Companies	13-Week Company Rate of Return Versus the Industry Average
Audio & Video Equipment 21	NIPNY, HAR	4.86%, 3.62%
Coal 26	PCX, MEE	26.6%, 27.05%
Metal Mining 27	PAL, MCP, URRE	30.4%, 33.35%, 126.26%
Auto & Truck Manufacturers 28	WBC	11.03%
Auto & Truck Parts 44	PKOH, SRI, BWA, PRTS	37.89%, 15.48%, 14.35%, 10.21%
Computer Network 34	SYKE, CERN, RDWR	18.16%, 17.58%, 3.45%
Oil & Gas Operations 111	AREX, TGA, CVI	61.06%, 39.77%, 55.35%
Rental & Leasing 23	RCII, HTZ	15.25%, 2.84%

CONCLUSIONS

Since today’s marketplace is extremely competitive and globalization and fast technological changes add more to its complexity, companies are looking to find ways to enhance their values and profitability. They are turning their attention into the ways their companies are functioning and interacting with others. More specifically, companies are realizing that the possibilities for advancement are laid within their supply chain, and they are experimenting with all sorts of alignment mechanisms and organizational forms to define and integrate all their activities within their established supply chain. For that reason, companies, today, try to maximize their supply chain surplus (efficiency and profitability) for enhancing the company value. That is, the efficiency and the profitability of the supply chain of a company can be an indicative of that

company's success in the market. This paper explores the use of "data envelopment analysis" (DEA) to measure and rate some selected companies within 8 different industries. It establishes a linkage between supply chain efficiency of firms and their stock prices. The 13-week companies' rate of return versus their industry average, in Table 1, suggest a strong relationship between supply chain efficiency and firms' market value. In other word, it is essential for the portfolio managers to identify the companies with the best and most efficient supply chains due to the fact that these companies are valued by the market. Also, a tool such as DEA can be of great importance because of its ability to identify companies with most efficient supply chains.

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