ABSTRACT

This paper examines the correlation between the relative financial strength of public firms and their stock price performance. By using financial information obtained from the firms’ publicly available financial statements as inputs and outputs in Data Envelopment Analysis (CCR model), a relative financial strength of a firm is determined relative to other competing firms operating in the same market segment. The aim here is to verify if such a strength index can be strongly (positively) correlated with the stock market returns, and to develop statistical tests that are necessary to establish the significance of that correlation. We present preliminary computational testing of the strength index with stocks from various industries and report the correlation analyses to support the validity of the approach. Based on the correlation, a well-informed assessment can be made for stock selection in investment portfolios.

Keywords: Data Envelopment Analysis, Financial Statements Analysis, Public Firms, Relative Financial Strength, Stock Price Performance

INTRODUCTION

Portfolio design is typically encountered in the management of mutual funds, retirement and pension funds, bank and insurance portfolio management. Such problems involve, first, identifying market sectors and individual firms that are expected to display strong performance in a competitive market; second, it also requires a risk analysis on how best to allocate funds among a subset of the chosen firms to manage the risk-level of the portfolio within acceptable limits, given various regulatory and policy parameters. This paper aims to provide a significant contribution to the former function.

A firm’s business (economic) strength can be evaluated by factors that are internal as well as external to the firm. From the perspective of internal factors, a publicly traded firm is in the business of producing marketable outputs, which are products and services, using an input supply of raw materials, labor, and other resources. Such a business is typified, in microeconomics, by a production process...
that transforms or converts inputs into outputs, and a productivity or efficiency metric can be associated with such a transformation process. A firm’s internal business strength is directly related to its productivity or efficiency in the conversion of inputs to outputs. For example, if a firm increases its productivity, it is likely that this firm can produce products with lower production cost, thus, resulting in higher profits. Then, such productivity gain will be reflected in the financial statements data revealed by the firm.

On the other hand, from the perspective of external factors, a firm’s business success often depends on whether the firm produces to growth or matured markets and also on market factors such as product competition, substitution effects, and market supply/demand imbalance, for instance. Therefore, it is the relative business strength of a firm, relative to competition with other firms in a similar business segment, that influences the firm’s overall financial success. Consequently, in this paper, the basic underlying concept is that the stock price performance of a firm is dictated by both the internal productivity/efficiency considerations as well as external relative valuations in the presence of other firms. In the absence of strong competition, the lack of internal productivity may not significantly affect the financial well-being of the firm, and thus, the stock returns. However, in the presence of strong market participants, productivity loss can lead to severe internal financial ill-health, and thus, diminished stock market performance for the firm.

In general, financial statements provide the basic data that reflects both internal and external influences on a firm’s financial performance. Consequently, analysis of financial statements is a common approach for gauging a firm’s business strength. For instance, many accounting models, such as the free cash flow model and the residual income valuation model have been developed to determine a firm’s intrinsic value, based on information (or forecasts thereof) obtained from the financial statements of the firm. Such an intrinsic value can then be compared with the firm’s current market value with the hope of finding investments where the intrinsic value exceeds the market value. The notable drawback of approach is that such an intrinsic value has only implicitly accounted for business strength of other competing firms. This lack of explicit relative valuation makes it difficult for fund managers to allocate portfolio dollars to firms with similar value/price ratios. In this paper, we propose a new methodology called “Data Envelopment Analysis (DEA)” to determine strength metric for the firm that provides an explicit reference to the operation of other firms in the same business segment. Then, the resulting financial strength metric for the firm is computed relative to other firms, instead of computing a firm-specific absolute intrinsic value.

DEA is a ranking technique, which estimates a firm’s efficiency by comparing the firm to many other firms operating under a similar environment. The original DEA model was the CCR model, named after Charnes, Cooper, and Rhodes (1978). There are certain extensions of the CCR model, most notably the BCC model of Banker et al. (1984) and the additive model of Charnes et al. (1985). DEA models have been widely applied in performance appraisal in both financial and non-financial areas. In the non-financial DEA applications, Ali and Nakosteen (2005) ranked the economic performance of different industries. Barua and Brockett et al. (2004) compared the performance between internet dot com companies that produce only physical products and those that produce only digital products. Banker (1984) examined the performance of 117 North Carolina hospitals. Moreover, Carrico and Hogan et al (1997) developed a decision-making process for university selection, and Miliotis (1992) measured the efficiency for 45 electricity distribution districts in Greek. In the financial applications of DEA methodology, data from financial statements can be used as inputs and outputs for a DEA model. For example, Yeh (1996) evaluated performance of banks by incorporating financial ratios as inputs and outputs in the DEA model. Bowlin (2004) compared the importance of United States Department of Defense’s Civil Reserve
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