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Impact of Accounting for Logical and Physical Processes on Market Capitalization Measures

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Abstract

This paper puts forth a framework for classifying organizations according to the relative importance of logical processes associated with their knowledge infrastructures. Drawing on financial and accounting valuation methods, differences in market-to-book value of equity are hypothesized due to under-valuation of logical processes per accounting conventions. This paper has implications for finance and accounting valuation of logical processes and hence knowledge-intensive processes.

Introduction

There is growing consensus that knowledge has become the primary source of wealth creation and sustainable competitive advantage. Accordingly, scholars in different fields have increased their interest in knowledge management and its impact on organizations. An important aspect of knowledge management is the attempt to measure the benefits associated with investments in knowledge infrastructure (Cohen, 1998). This would include investments in information technology (IT), training of knowledge workers, the development of knowledge processes that collectively bring about the benefits, etc. Unfortunately, these benefits are very difficult to directly measure, while the knowledge infrastructure costs are readily apparent (Dzinkowski, 1999; Teece, 1998). For these reasons it is often difficult for champions of knowledge infrastructure projects to justify their inclusion in organizations' capital budgets. This under-allocation of organizational resources to knowledge infrastructure may result in critical lost opportunities that may be of great strategic value to the organization.

Accounting practices reinforce the problem by both over reporting expenses and under reporting assets (Aboody and Lev, 2000; Lev, 2000; Baruch Lev in Webber and Maxwell, 2000). Since the future benefits are hard to measure and associate with future revenues, matching and conservatism, both accounting conventions, require that many knowledge infrastructure expenditures be expensed as opposed to being capitalized as intangible assets. Further, the real value of these intangible assets may be even higher than their expenditures due to the synergistic benefits associated with enhanced knowledge infrastructure. This accounting treatment is in direct contrast to the treatment accorded traditional expenditures

on plant and equipment, or in physical processes, which get capitalized as assets, and are expensed over the estimated useful lives of these tangibles. These and other outdated accounting practices have greatly constrained companies' attempts to adapt to today's technological capabilities and the globally competitive environment and has led to many problems (Kaplan, 1991; Lev, 2000).

Another undesirable consequence of these outdated accounting practices is the apparent skyrocketing equity valuation relative to book value for those companies with few physical assets, such as Internet companies, although they may have a huge amount of intellectual assets (Bary, 2000; Helyar, 1999; Warner, 1999; Laderman and Smith, 1998). Financial analysts and mutual fund managers are troubled by such apparently high relative equity valuations of these companies, and many times miss investment opportunities in these huge growth companies, only to see later that their valuations have risen even higher (Helyar, 1999; Warner, 1999; Laderman and Smith, 1998).

We contend these differences in market-to-book values of companies can, in part, be explained, by examining the capitalization or expensing of expenditures related to their logical versus physical processes. Below we provide a theoretical framework for our research and describe our proposed methodology.

Theoretical Framework

An example of a physical process is the manufacturing of an automobile. An expenditure related to this process may be the acquisition of robotic equipment, which is capitalized under accounting rules. The output of this process is an assembled automobile. An example of a logical process is knowledge acquisition, storage, and production in a business consulting firm. The expenditures related to these knowledge processes are expensed under accounting rules. The manufacturer's book value of equity will increase whereas the software company's book value of equity will decrease as a result of the respective expenditure (Lev and Sougiannis, 1999).

Financial theory suggests that financial markets determine equity valuation based on all publicly available information. If it does so efficiently, we can expect the market value of equity to reflect all economic assets, not just those that are recorded for accounting purposes, which are primarily physical assets associated with physical processes. Assuming that the market capitalizes

the manufacturing and consulting firm expenditures in a similar manner, the market-to-book value of equity of the business consulting company will exceed that of the manufacturer (Lev and Sougiannis, 1999; Keloharju and Kulp, 1995). It should be noted that there are other determinants of market capitalization, including, the size and risk of the company.

Since accounting practices do not capture the full value of certain expenditures, especially those related to intangibles, associated with the logical processes, we expect the market-to-book value of equity (M/B) to be, *ceteris paribus*, higher for those firms emphasizing logical processes relative to those emphasizing physical processes. Organizations with a higher proportion of logical processes will primarily show the values of their physical assets, while organizations with a higher proportion of physical assets will have better-reflected book values of equity. In other words, we expect the differences in M/B to be due to book value differences.

Consistent with the foregoing, we put forth a model: $M/B = f(P/L \text{ class, risk, and size})$ where P/L represents a classification of the relative emphasis of a firm's physical to logical processes and risk and size are control variables. Under the null hypothesis, we expect no M/B differences. Under the alternative hypothesis, we expect M/B of "logical" firms to be greater than that of "physical" firms.

Methodology

Datamation has published for many years a list of Global 100 IT companies. Each of these companies' primary business is in the information technology industry. We expect these companies to have a higher proportion of logical processes relative to physical processes. To contrast these companies, we plan to select companies on the opposite end of the spectrum, those having a higher proportion of physical processes relative to logical processes. These companies will be selected from SIC code Division D: Manufacturers, with SIC two-digit codes in the thirties. Financial data for both categories will be obtained from Standard & Poor's Research Insight database (formerly, COMPUSTAT).

As indicated in the previous section, holding everything else equal is implausible when there are known reasons for M/B to vary across firms. One such reason is firm risk difference, and another is the persistence of size effects. Therefore, controls for both factors need to be established before other differences can be examined. We will compare these two groups on their M/B, using risk and size as control variables. We will use a paired t-test as the data analytic method to test for the M/B differences, pairing on risk and size.

Conclusions

We have developed a framework for categorizing companies based on their emphasis on physical versus logical processes. We have hypothesized that, due to accounting rules, those companies emphasizing logical processes will have a higher M/B value than those emphasizing physical processes. Since, knowledge-intensive companies emphasize logical processes, this research will provide insight into their financial valuation.

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