Available online at www.sciencedirect.com
SCIENCE DIRECT®
Information & Management 42 (2005) 989–1008
INFORMATION & MANAGEMENT
www.elsevier.com/locate/dsw

Information technology investments and firm value

Bruce Dehning[a,*], Vernon J. Richardson[b], Theophanis Stratopoulos[c]

[a]*Chapman University, Argyros School of Business and Economics, Orange, CA 92866, USA*
[b]*University of Kansas, USA*
[c]*University of New Hampshire, USA*

Received 25 June 2004; received in revised form 12 November 2004; accepted 16 November 2004
Available online 1 January 2005

Abstract

Our objective in this paper is to develop a firm value model to assist IT managers and researchers in understanding the multiple effects that IT investments have on firm value. This firm value approach adds to the process-oriented approach through simultaneous evaluation of all of the factors that affect firm value. It is crucial for IT professionals to recognize the complex and diverse implications of IT investments on firm value. The implications of the firm value approach include forcing IT managers to think in terms of both industry and company-specific effects of IT investments, to consider both the magnitude and duration of competitive advantage due to IT investments, and the implications of the effect that IT investments have on risk and its relation to firm value. We demonstrate an application of the firm value framework by evaluating a major stream of research in MIS—event studies of IT investment announcements. Appendices to this paper can be found at http://www.itandfirmvalue.com.

Keywords: Information technology; IT investments; Market value; Residual income; Competitive advantage; Event studies

1. Introduction

The context for making IT investment decisions has been altered dramatically in the last few years. This change is primarily due to three factors. First, IT is no longer primarily confined to backroom operations. As Bob Martin, CEO of Wal-Mart's International Division says, ''At Wal-Mart and at many other companies, technology has become integrated with every aspect of the business'' [53, p. 37]. Second, the role of CIO has been elevated from the back office to the board room [85] and companies now emphasize the ability of CIOs to contribute beyond IT functionality [48]. In the words of Jonathan Newcomb, CEO of Simon and Schuster, ''I expect my CIO to have a rock solid business view of technology'' [53, p. 43]. Third, the use and misuse of IT has become fertile ground for an ever increasing number of opportunities to either gain a competitive advantage or fall into a position of competitive disadvantage [11,13,21,22,64]. In light of these developments, it is apparent that managers involved in IT investment decisions must recognize

* Corresponding author. Tel.: +1 714 628 2702; fax: +1 714 532 6081.
E-mail address: bdehning@chapman.edu (B. Dehning).

0378-7206/$ – see front matter © 2004 Elsevier B.V. All rights reserved.
doi:10.1016/j.im.2004.11.003

the complex and diverse implications and trade-offs of IT investments.

Our objective in this paper is to develop a model that can be used by managers and researchers to understand the interrelated effects that IT investments have on firm value. A firm value framework (FVF) is important because management's first priority should be to maximize value for shareholders [15]. The firm value approach builds on the process-oriented approach. The latter was used during the 'Productivity Paradox' era to analyze the contribution of IT investments to firm performance through its impact on business processes [4,5,12,33]. The firm value approach adds to the process-oriented approach through simultaneous evaluation of the factors that affect firm value. As this study shows, there are some interesting implications of the firm value approach. These implications include forcing IT managers to think in terms of both the industry and company-specific effects of IT investments, the duration of competitive advantage due to IT investments, and the effect of IT investment on risk and its effect on firm value.

Hence, the FVF fills a very important gap in the IT researcher's and CIO's toolbox. We support and reinforce this observation in the following pages. We introduce the model in part 2 and in part 3 we discuss the implications of the model for managers. In part 4 we demonstrate the potential contribution of the FVF as a research tool by using it as the underlying business model to explain the interrelated effects of IT investments on firm value in the context of several recent event studies. We close the paper with our concluding remarks.

2. The firm value framework

If a firm is faced with a competitive environment where the opportunity set consists entirely of projects with a net present value of zero, then the value of a firm will be equal to its book value.

$$V_0 = \mathrm{BV}_0 \tag{1}$$

where V = firm value; BV = book value of the firm.

However, if the opportunity set includes positive net present value projects, market value will exceed book value. We will assume that managers avoid negative net present value projects, and therefore MV $\geq$ BV. The residual income stock price valuation model, also known as the Edwards–Bell–Ohlson Model [46,75,49] shows that a company's value will be equal to its book value unless it can produce residual income. Residual income is a better measure of the true operating performance of a company than accounting income because it includes a charge for the capital employed in the business in addition to materials and labor. As shown in Eq. (2), the residual income model denotes firm value as current book value, plus the discounted sum of all future residual income,[1] which we will refer to as abnormal earnings.[2]

$$V_0 = \mathrm{BV}_0 + \frac{I_1 - (r_e \times \mathrm{BV}_0)}{1 + r_e} + \frac{I_2 - (r_e \times \mathrm{BV}_1)}{(1 + r_e)^2} + \frac{I_3 - (r_e \times \mathrm{BV}_2)}{(1 + r_e)^3} + \cdots \tag{2}$$

This can be re-written as

$$V_0 = \mathrm{BV}_0 + \sum_{t=1}^{\infty} (1 + r_e)^{-t} [I_t - (r_e \mathrm{BV}_{t-1})] \tag{3}$$

where V = current firm value; BV = book value of the firm; r_e = the cost of equity capital; I = net income; $I_t - r_e \mathrm{BV}_{t-1}$ = abnormal earnings.

One of the most enduring debates in the management literature is the one regarding the determinants of firm performance (variation in abnormal earnings). The earliest views, stemming from economic theory, stress the importance of industry factors, while more recent theories from the field of strategic management stress the importance of firm-specific resources and capabilities. Researchers have responded to this debate with empirical studies probing the relation between industry and firm-specific factors and firm performance [91,52,86,54]. An emerging consensus is that firm performance is driven primarily by firm-specific factors and secondarily by industry or market factors. The residual income model is useful from a strategic perspective because it can be modified to

[1] It is important to stress that value today is based on expectations of future performance, which may or may not be realized. Past performance only matters to the extent that what has happened in the past affects the current book value of net assets.

[2] The residual income model assumes "clean surplus accounting", which basically means that all gains or losses flow through the income statement. This is akin to comprehensive income in US Generally Accepted Accounting Principles (GAAP).