

## Analysts' forecasts and investments in information technology

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Received 15 June 2005; received in revised form 1 July 2006; accepted 2 July 2006

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### Abstract

Previous research has shown that investments in intangible assets, especially research and development, can increase the difficulty in forecasting a company's earnings. This information risk translates into a lower market value for the firm. Because IT investments have many intangible characteristics similar to research and development expenditures, information technology investments may also increase information risk. Tests using IT spending data for over 1000 firms show that IT spending does increase earnings forecast dispersion and error. Increased dispersion and error might affect the market value of the firm. Using a residual income valuation model, results show that as IT spending increases, residual income is capitalized into market value at a decreasing amount, controlling for diminishing marginal returns to IT spending. This research highlights the importance for IT-intensive companies to find ways to decrease information risk through other forms of communication with market participants.

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*Keywords:* Information technology; Analyst forecasts; Market value; Information risk

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### 1. Introduction

While investments in information technology (IT) are generally expected to increase the value of the firm (Bharadwaj et al., 1999; Brynjolfsson and Yang, 1999), the nature of IT investments may contribute to increased uncertainty about future earnings. As IT intensity increases, the

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benefits of IT investment go from clearly definable benefits to softer benefits that are difficult to evaluate in advance (Dehning et al., 2003). As the level of IT expenditures increases, predicting future earnings may become more difficult. Because investors may have difficulty translating the soft or less tangible benefits of IT into future earnings when a firm invests in IT, current earnings and other publicly available information will be less reliable for making predictions. This source of increased uncertainty about the benefits of IT is referred to as information risk.

When information about the firm's capital investments is more difficult to obtain or interpret, the risk of investing in that firm increases. As the risk of investing increases, the firm faces a higher cost of capital. This might cause the market value of future earnings and capital expenditures to diminish due to the higher implicit cost of capital.

In response to increased uncertainty, investors are likely to engage in private information production. As the reliance on this private information increases, disagreement about the firm's future prospects will likely also increase. This will be reflected in higher dispersion and error in analyst forecasts of earnings. In this study the relationship between the level of IT spending, characteristics of analysts' earnings forecasts, and firm value is examined. This study hypothesizes that, as the level of IT expenditures increases, the level of error in financial analysts' earnings forecasts will also increase, reflecting increased uncertainty about the effects of IT on expected future earnings. Additionally, due to increased information risk, investors and analysts place a greater reliance on private information, which is reflected by an increase in the amount of dispersion among analysts' earnings forecasts. Finally, as the level of IT investment increases, the difficulty of interpreting the impact of IT on future earnings will likely increase the firm's cost of capital, resulting in a decreased capitalization rate for future earnings.

These conjectures are tested using IT spending, security analysts' earnings forecasts, and the market values of more than 1000 firm-years of data (*InformationWeek* 500 companies, 1992–1997). Consistent with the hypotheses, the results show that the magnitude of *ex post* forecast error and the level of *ex ante* forecast dispersion increase with the relative level of IT spending. This increase in forecast error and dispersion as IT spending increases is consistent with an increased level of information risk. The evidence is consistent with a positive relationship between the level of IT spending and the firm's cost of equity capital. The increase in the implicit cost of capital is also consistent with higher information risk.

These findings should be important for the managers of companies that invest heavily in IT. In order to maximize the value of the firm, managers must account for the role that information risk plays in determining the firm's cost of capital. Understanding the cost of capital is also important to make correct capital budgeting decisions and capital allocation within the firm.

The following section develops hypotheses about the relationship between IT spending and the properties of analysts' earnings forecasts. A residual income valuation model is employed to develop hypotheses about the relationship between IT spending, earnings expectations, and firm value. The Section 3 discusses sample and data definitions. Section 4 presents the results, and Section 5 discusses the implications of these results and concludes the paper.

## 2. Research hypotheses

Information risk refers to the extent to which investors lack adequate and reliable information on which to base investment decisions. Information risk is costly. To compensate for this risk, investors will demand higher rates of return on investments and will likely spend more resources on the production of private information, either on their own account, or by acquiring the services of financial analysts. The extent to which reported information about a firm is correlated with the

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