



Chapter XV

Assessing the Value of Information Technology Investment to Firm Performance

Qing Hu

Florida Atlantic University, USA

Robert T. Plant

University of Miami, USA

The promise of increased competitive advantage has been the driving force behind the large-scale investment in information technology (IT) over the last three decades. There is a continuing debate among executives and academics as to the measurable benefits of this investment. The return on investment (ROI) and other performance measures reported in the academic literature indicate conflicting empirical findings. Many previous studies have based their conclusions on the statistical correlation between IT capital investment and firm performance data of the same time period. In this study we argue that the causal relationship between IT investment and firm performance could not be reliably established through concurrent IT and performance data. We further submit that it would be more convincing to infer causality if the IT investments in the preceding years are significantly correlated with the performance of a firm in the subsequent year. Using the Granger causality models and three samples of firm-level financial data, we found no statistical evidence that IT investments have caused the improvement of financial performance of the firms in the samples. On the contrary, the causal models suggest that improved financial performance over consecutive years may have contributed to the increase of IT investment in the subsequent year. Implications of these findings as well as directions for future studies are discussed.

This chapter appears in the book, *Advanced Topics in Information Resources Management* by Mehdi Khosrow-Pour.
Copyright © 2002, Idea Group Publishing.

INTRODUCTION

The so-called “productivity paradox” has created an increasing awareness of the issues that surround the question: What value does information technology add to an organization? The paradox is described as that “[the] delivered computing power in the U.S. economy has increased by more than two orders of magnitude since 1970, yet productivity, especially in the service sector, seems to have stagnated” (Brynjolfsson, 1993, p. 67). Here management is faced with the dilemma: Does it pay to invest in information technology (IT) provided that there are other investment opportunities?

The case literature of the 1980s and 90s attempted to show that IT provided competitive advantages to firms by adding value across all aspects of the value chain, improving operational performance, reducing costs, increasing decision quality, and enhancing service innovation and differentiation (Applegate, McFarlan & McKenney, 1996; Porter & Millar, 1985), etc. More recent literature suggests that sustained competitive advantages can be achieved through building and leveraging key IT assets such as human resources, reusable technology and partnership between IT and business management (Ross, Beath, & Goodhue, 1996). The underlying theory is that these operational and strategic improvements as a result of effective use of IT should lead to corresponding improvements in productivity, revenue, and profits for those firms that consistently make higher investment in IT than their competitors. In the case of high-tech companies, IT often is the product or service that directly contributes to revenue and profit.

There are several empirical studies that support such arguments. Brynjolfsson and Hitt (1996) estimated that the net marginal product of IT staff is about \$1.62, and that of IT capital is about 48% or better, which are at least as large as these of other types of capital investment. Mitra and Chaya (1996) showed that the firms that spent more on IT achieved lower cost of production and lower total operating cost when compared with their peers in the same industry, indicating that IT investment indeed improves operational efficiency.

However, not all studies of industry- and firm-level financial data have shown a positive causal relationship between IT investment and improved firm performance. Morrison and Berndt (1990) found that in the manufacturing sector, every dollar spent on IT only delivered on average about \$0.80 of value on margin, an indication of overspending in IT. Loveman’s study (1994) of 60 business units found that IT investment has a negative output elasticity, indicating that the marginal dollar would have been better spent on other categories of capital investment. Even though such a negative impact of IT on a firm’s output seems unlikely and counterintuitive, it is consistent with the findings of Hitt and Brynjolfsson (1996). Their study of 370 firms showed that IT stock has negative impacts on firm performance measures, such as return on assets, return on equity, and total return, though the magnitude of such impact is quite small.

Closer examinations of these studies, however, revealed a flaw in the methodologies: the impact of IT on firm performance was tested using the IT capital data

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/assessing-value-information-technology-investment/4589

Related Content

Distributed Cooperative Localization

Stefano Panzieri, Federica Pascucci, Lorenzo Sciacviccoand Roberto Setola (2013). *Journal of Information Technology Research* (pp. 49-67).

www.irma-international.org/article/distributed-cooperative-localization/97628

Incentives and Knowledge Mismatch

Parthasarathi Banerjee (2002). *Annals of Cases on Information Technology: Volume 4* (pp. 297-315).

www.irma-international.org/chapter/incentives-knowledge-mismatch/44514

Technologies in Support of Knowledge Management Systems

Murray E. Jennex (2010). *Information Resources Management: Concepts, Methodologies, Tools and Applications* (pp. 784-796).

www.irma-international.org/chapter/technologies-support-knowledge-management-systems/54516

Beyond Knowledge Management: Introducing Learning Management Systems

Audrey Graceand Tom Butler (2005). *Journal of Cases on Information Technology* (pp. 53-70).

www.irma-international.org/article/beyond-knowledge-management/3139

Self-Aware Contextual Behavior Analysis for Service Quality Assurance Over Social Networks

Deepanshiand Adwitiya Sinha (2022). *Journal of Cases on Information Technology* (pp. 1-23).

www.irma-international.org/article/self-aware-contextual-behavior-analysis-for-service-quality-assurance-over-social-networks/281229