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An empirical study of the relationship between a self-service technology investment and firm financial performance

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ABSTRACT

More and more enterprises are taking advantage of self-service technologies (SSTs) in their customer-related operating activities, especially service firms. Although research on SSTs is prevalent, few studies have examined the impact of SSTs on firm financial performance. Given the growing importance of SSTs in the service industries in general and in the banking industry in particular, we therefore empirically examined the impacts of ATMs, one of the most widely accepted SSTs, on bank financial performance. Contrary to the existing literature, our results show ATMs have a positive relationship with profitability. However, we find no association between ATMs and growth performance.

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Introduction

For the last decades, firms have been investing in IT steadily and increasingly (Michael, 2007). Firms investing in information technology (IT) presumed that such investments would enhance operating efficiency and thus improve financial performance. From a strategic point of view, Porter and Millar (1985) suggest that IT is a business driver and thus can be used to reinforce competitive edge.

The great progress of IT capability as well as high labor costs is driving firms to reshape their service delivery systems. The technologies are adapted in order to allow customers to produce and consume services electronically, without direct contact with firm employees. These kinds of technological

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interfaces are referred to as self-service technologies (SSTs) (Meuter et al., 2000). SSTs have been increasingly prominent in the service industries in particular. For example, hotels utilize automated check-in systems and airports take advantage of check-in kiosks. Other examples of SSTs include automated ticketing machines, electronic retailing, automated phone systems, automated teller machines (ATMs), telephone banking and mobile banking.

Service providers who introduce SSTs may increase customer satisfaction, productivity and efficiency (Walker et al., 2002; Zeithaml and Gilly, 1987; Meuter et al., 2003). The introduction of SSTs does not automatically lead to their acceptance and usage. Hence, many researchers have studied customer acceptance from the viewpoints of technology readiness (Liljander et al., 2006; Lin and Hsieh, 2007), technology anxiety (Meuter et al., 2003), or e-commerce trust (e-trust) (Hwang and Kim, 2007). However, research examining the impact of SSTs on firm financial performance has been limited.

The banking industry is one of the pioneers of SSTs applications and today heavily depends on SSTs in reshaping its service delivery systems. Several SSTs have already been utilized for years by the banking industry. Since the first ATM was installed in the late 1960s, ATMs have been considered as the most well-known and classic example of SSTs application in the banking industry. Banks were eager to deploy ATMs and replace costly counter tellers in order to improve cost efficiency and thus financial performance (Hannan and McDowell, 1984; Banker et al., 1990). However, deploying each ATM machine now costs between \$15,000 and \$50,000. In addition, the maintenance and operation expenses range from \$12,000 to \$15,000 per ATM per year (Stavins, 2000). The tradeoff between the benefits and costs of deploying SSTs in general and ATMs in particular is an empirical issue to be examined.

Prior research which examined the effects of ATMs on cost reduction or efficiency improvement usually used a dummy variable to distinguish ATM investment versus non-ATM investment. This dummy variable approach cannot precisely measure the intensity of ATM investment and thus may lose the power of detecting the precise impact of ATMs. In this paper, we collect the actual financial and operating data in our empirical analysis. Specifically, we use the actual number of ATMs of each bank, rather than using a dummy variable, to measure the extent of ATM investment. Therefore, we can better estimate the financial impacts of ATMs, one of the most typical SSTs used by the banking industry.

In 2002, the banking industry ranked first in terms of IT investment (Kudyba and Diwan, 2002) with ATMs being one of the major investments. By studying the relationship between ATM investment and financial performance, we can provide more insights into the financial contributions of IT investment in general and one kind of SST investment (ATM) in particular. Our empirical results show that ATM investment has a significant and positive association with bank financial performance, but has no association with bank growth performance. Our findings provide evidence for the reasons behind the continual investment in ATMs, a well accepted SST, in the banking industry.

The “IT/SST Investments and Performance” section provides a review of the literature on IT and SST investments. The “Research Model and Methodology” section presents the research model and methodology. The sample and empirical results are discussed in “The Sample and Empirical Results” section. The final two sections present the sensitivity analysis and conclusions respectively.

IT/SST investments and performance

For the past half-century, firms have dramatically increased their investments in IT. The contributions of these IT investments and their effect on the efficiency of value chain activities have been research issues of many prior studies (Porter, 1980). Bakos (1987) claimed that IT had an impact on organizational structure and process, thereby affecting organizational performance. Furthermore, IT has led to changes in industry structure and competition and many firms have used IT to support the creation of new businesses. Firms that use IT effectively are expected to outperform their rivals (Porter and Millar, 1985) as IT could reduce the cost of coordination between activities and create value for the client (Bakos, 1991; Clemons and Row, 1991). Banker et al. (1990) studied the impact of IT investment on sales and order management in Hardees fast food stores, and found that IT improved cost efficiency by cutting down material costs.

SSTs, one form of IT, allow customers to perform transactions and complete services by themselves, reducing the need for tellers and thus saving the associated salary expense and cost of branch

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