



# The relationship between information technology capability, inventory efficiency, and shareholder wealth: A firm-level empirical analysis



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## ABSTRACT

Inventories represent an important strategic resource for firms, with implications for shareholder wealth. As such, firms expend considerable effort in managing their inventories efficiently. Among other factors, information technology (IT) capability can play an important role in enabling inventory efficiency and financial performance. However, insight into the chain-of-effects linking IT capability, inventory efficiency, and stock market returns and risk remains limited. In this paper, we provide a conceptual model outlining the relationships between these constructs. Next, we evaluate the model using secondary information on firms from multiple industries across the 10-year time period of 2000–2009. Our analysis confirms that firms' IT capability plays a significant role in enhancing their inventory efficiency, which, in turn, is observed to increase stock market returns. Our results also reveal that firms' IT capability directly reduces their stock market risk and enhances their stock market returns. Taken together, these findings, along with the conceptual model that we advance, have important research and managerial implications.

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## 1. Introduction

Given the importance of inventories as valuable strategic resources for firms (Cachon and Fisher, 2000), inventory management has been one of the central areas of inquiry in the operations management (OM) literature (e.g., Eroglu and Hofer, 2011; Fullerton et al., 2003; Moritz et al., 2013). The approach to inventory management that has garnered the most attention in recent decades is the lean inventory philosophy (Eroglu and Hofer, 2011; Womack et al., 1990), which views excess inventories as waste and focuses on fostering inventory efficiency in firms (e.g., Chen et al., 2005)<sup>3</sup>. To achieve higher inventory efficiency, firms can benefit greatly from the use of information technology (IT). A growing body of research has argued that IT resources, such as enterprise resource planning (ERP) and supply chain management (SCM)

systems, help streamline information flows among firms and their channel partners (Hendricks et al., 2007) and thus play an enabling role in their operations (e.g., Melville et al., 2004; Rabinovich et al., 2003; Shah and Shin, 2007).

It is not surprising, therefore, that firms invest billions of dollars in IT each year with world-wide IT spending forecast to reach \$ 3.8 trillion in 2012<sup>4</sup>. However, financial returns from investments in IT resources remain unclear (Kohli and Devaraj, 2003). The resource-based view (RBV) of the firm (Barney, 1991) suggests that because IT resources may be imitated and substituted by competitors, they often do not directly enhance firm performance (e.g., Wade and Hulland, 2004). Scholars have argued, instead, that it is the firms' IT capability, reflecting their superior ability to leverage IT infrastructure through a combination of superior IT human capital and IT-related intangibles, that is the source of sustainable value to firms (Bharadwaj, 2000). However, research into IT capability and operations management remains nascent (Boyer and Swink, 2008). Moreover, researchers have not investigated the role of IT capability in influencing the inventory efficiency of firms and the chain-of-effects linking both of these to shareholder wealth (see Appendices A and A.1). Because one of the primary mandates of publicly owned firms is to enhance shareholder wealth (e.g., Rappaport, 1986),

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<sup>3</sup> It is important to note that performance outcomes of inventory management may be reflected in various indicators, such as inventory turnover, inventory levels, inventory flexibility, service levels, inventory costs, inventory accuracy, inventory efficiency, etc. In this research, we focus on inventory efficiency.

<sup>4</sup> See Gartner (2012) at <http://www.gartner.com/it/page.jsp?id=1888514>.

scholars in OM (e.g., [Hendricks and Singhal, 2009](#)) and information systems (IS) (e.g., [Dewan and Ren, 2007](#)) have highlighted the importance of investigating factors affecting it.

Based on these observations, we take a step towards understanding the relationships between IT capability, inventory efficiency, and shareholder wealth of firms. We provide theoretical arguments that underscore the individual and synergetic role of the three dimensions of IT capability, i.e., IT infrastructure, IT human capital, and IT-related intangibles, in improving the inventory efficiency and shareholder wealth of firms. Further, we follow prescriptions from the finance literature to consider both firm's stock market returns and risk over time as measures of shareholder wealth (e.g., [Brealy et al., 2008](#)). Stock market returns indicate how investors value firms and reflect the net present value of firms' future expected cash flows (e.g., [Rappaport, 1986](#)). In addition to the level of stock market returns, their inherent risk (or volatility) is another critical element of stock market performance (e.g., [Ang et al., 2006](#); [Brealy et al., 2008](#)). Indeed, while focusing on factors that enhance stock market returns, managers must ensure that these do not concomitantly increase stock market risk (e.g., [Srinivasan and Hanssens, 2009](#)). This is because investing in riskier opportunities can put downward pressure on the overall shareholder wealth of firms, as witnessed in the recent 2008 financial crisis ([Bharadwaj et al., 2011](#)).

In evaluating the role of firm-level factors such as inventory efficiency and IT capability in influencing stock market returns and risk, extant research offers valuable guidance. Specifically, it suggests that both of these indicators of shareholder wealth have expected and unexpected components ([Srinivasan and Hanssens, 2009](#)). The expected component of stock market returns and risk are those that are explained by market-wide factors and remain largely beyond the direct control of managers ([Fama and French, 1996](#)). However, a portion of stock market returns, referred to as abnormal returns, and stock market risk, referred to as idiosyncratic risk, cannot be explained by market-wide factors and are instead primarily influenced by firm-specific characteristics ([Fama and French, 1996](#)). In seeking to understand the relationship between OM- and IS-related factors and shareholder wealth, these unexpected firm-specific portions of stock market returns and risk are of interest (e.g., [Dewan and Ren, 2007](#); [Modi and Mishra, 2011](#)). Thus, in our research, we focus on abnormal stock market returns and idiosyncratic risk of firms over time<sup>5</sup>.

To validate our model, we rely on information collected from multiple secondary sources. Our final sample consists of firms across multiple industries over the 10-year time period of 2000–2009. Our analysis reveals that the firms' IT capability plays a significant role in enhancing inventory efficiency. In addition, the inventory efficiency of firms is observed to increase stock market returns but to have no effect on stock market risk. Finally, IT capability is observed as directly increasing stock market returns and reducing stock market risk. Together, these results suggest that IT capability and inventory efficiency are important drivers of shareholder wealth. Our results showcase the chain-of-effects linking these constructs, providing important theoretical and empirical insights not available in the extant research (see [Appendices A and A.1](#)).

Moreover, our focus on both stock market returns and risk, as opposed to just one of these factors, allows us to provide insights on the metrics most relevant to managers and owners (i.e., shareholders) of publicly held firms. This approach contrasts with extant research in OM and IS, which has provided limited insight into stock market returns and risk in a unified model (see [Appendix A](#)) but

instead has typically utilized accounting-based measures of firm performance or relied on managerial perceptions of performance based on surveys. Accounting-based measures, such as return on assets (ROA) and return on sales (ROS), are backward-looking and do not account for the intangible value generated by firms (e.g., [Bharadwaj et al., 1999](#)). Managers' subjective assessments suffer from potential biases that are difficult to avoid in survey research ([Mithas et al., 2011](#)). Our conceptual model overcomes a number of these limitations.

## 2. Model development

Early work in IS and OM investigating the link between IT investments and firm performance revealed equivocal findings (e.g., [Barua et al., 1995](#); [Dehning et al., 2007](#); [Rabinovich et al., 2003](#)). To explain these mixed results, researchers have since built on RBV of the firm (e.g., [Barney, 1991](#)) to argue that IT resources themselves may be imitated by competitors and therefore it is more useful to focus on the performance impact of IT capability of firms (e.g., [Bharadwaj, 2000](#); [Santhanam and Hartono, 2003](#)). IT capability encompasses superior IT infrastructure, IT human resources, and IT-related intangibles and allows firms to achieve sustainable competitive advantage ([Bharadwaj, 2000](#)). Focusing on *how* the link between IT and firm performance is created (e.g., [Dehning and Richardson, 2002](#); [Devaraj and Kohli, 2003](#); [Tippins and Sohi, 2003](#)), the emerging consensus in the IS literature is that it is important to evaluate the role of IT capability in enabling critical organizational management strategies to improve firm financial performance ([Sambamurthy et al., 2003](#); [Wade and Hulland, 2004](#)).

One of the primary organizational strategies in which IT capability can play a central role is inventory management. Research has showcased the value of IT investments in fostering information flows between firms and their channel partners and among the various functions within firms in allowing for more effective inventory management (e.g., [Barua et al., 1995](#); [Dehning et al., 2007](#); [Mukhopadhyay et al., 1995](#); [Rabinovich et al., 2003](#); [Shah and Shin, 2007](#)). Although these studies have provided valuable insights, their emphasis on IT investments has resulted in a limited understanding of the role of IT capability. In particular, a conceptualization of how different dimensions of IT capability enable firm information flows and their resulting impact on inventory management is lacking (see [Appendices A and A.1](#)).

We therefore provide a theoretical model that builds on the existing research linking IT investments to inventory management and complements it with specific pathways relating the dimensions of IT capability to inventory efficiency of firms. In doing so, we further derive from studies that suggest IT capability is indicative of systems thinking in firms, which can help them understand interdependencies in business activities, and avoid the debilitating impact of functional and inter-organizational silos (e.g., [Feeny and Willcocks, 1998](#)). We draw on suggestions that the IT capability of firms enhances the reach and richness of their processes that enable them to acquire and utilize high quality information that is timely, current, accurate, complete, and relevant ([Sambamurthy et al., 2003](#)). Additionally, we utilize insights from the OM research underscoring the positive effect of information flows on firms' inventory management performance (e.g., [Cachon and Fisher, 2000](#); [Gavirneni, 2002](#); [Lee et al., 1997](#)).

In addition to the positive influence of IT capability on the inventory efficiency of firms, we theorize how inventory efficiency in turn affects firm stock market returns and risk. To formulate our arguments, we build on past OM research on the relationship between inventory management and firm financial performance (e.g., [Eroglu and Hofer, 2011](#); [Hendricks and Singhal, 2003](#); [Modi and Mishra, 2011](#)). Further, to complete our model, we evaluate the direct

<sup>5</sup> Hereafter, we refer to abnormal returns as stock market returns and to idiosyncratic risk as stock market risk.

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