Spring 4-1-2015

IT Investments and Myopic Behavior in Firms

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IT Investment Types and Shareholder Investment Horizons

1. Introduction

A significant body of work has examined the organizational performance impacts of information technology (IT) investments (for reviews of this literature, see Brynjolfsson & Yang, 2004; Dedrick et al. 2003; Melville et al. 2004). Using myriad approaches to empirically study this relationship, researchers have examined both the magnitude of the impact as well as the mechanisms by which value from IT is derived. Market based measures have been particularly useful to understand how a firm's shareholders react and respond to overall IT investments. Although these studies have confirmed the value relevance of IT investments to shareholders they are all based on analyses of the *total* financial market returns to the *overall* levels of IT investments. To the best of our knowledge, none have taken into account two critical factors that potentially impact how shareholders value IT investments. First, IT investments are *not monolithic* and can differ greatly in objectives, scope and timing of benefits. Second, the investor community is *not homogeneous* and can differ in their preference for different types of IT investments based on the goals, risks, and investment time horizon of these investments. In this paper, we close these two critical gaps in the IT and business value literature, by examining the financial impact of a firm's short and long term IT investments from a contingency perspective that focuses on the heterogeneity of a firm's investor community.

A key decision that firms make with their IT investment budget is the *portfolio decision,* or the proportion of the IT budget spent on achieving goals related to operational efficiency such as maintaining or integrating existing applications, versus the proportion of the IT budget spent on new IT development projects (Gregory et. al. 2015). A common and practical manifestation of this tradeoff occurs when firms choose to continue spending on maintaining and improving current IT systems rather than innovating with new IT projects. Industry analysts agree that the majority share of IT budgets go toward managing existing systems rather than developing new IT capabilities. If indeed firms are underinvesting in IT targeted toward building strategic capabilities in favor of maintenance and integration spending that emphasizes operational advantages, it is worthwhile to examine how the shareholders respond to this behavior. While

the value relevance of IT investments to shareholders has been established in the main, the question of whether the investor community is able to differentiate the value potential of these two fundamentally different types of IT investments remains unexplored.

To explore this question, we call for a focus on a *firm's investor base* and contend that the market reaction to IT investments is a function of the nature of the investor base of the firm. Specifically, we examine if the market returns to IT investments are moderated by the *investor time horizon*, such that investors with shorter time horizons are more likely to reward firms that choose to invest their IT dollars on short-term (operational) projects rather than on long-term (strategic) projects.

2. Theory

2.1 Operational versus Strategic IT Investments

Over the last two decades, numerous studies have documented the substantial effect of IT investment on various firm-level performance measures. However, by using the total annual IT budget (or IT spend in $) as a proxy for overall IT investments, these studies have made the critical assumption that all the IT related expenditures go toward creating new long term IT capabilities. According to a recent survey published in Zdnet, American companies spend on average about two-thirds (67%) of their annual IT budget on maintenance and mandatory spending such as on projects designed to maintain existing service levels and for complying with regulatory or legal systems. Only the remaining one-third of the total budget is allocated for projects aimed at innovation and new business opportunities[1].

Clearly these two categories of IT spending are distinct not only with respect to their underlying objectives, but also in regards to their corresponding risks and payoffs. The strategic grid framework (Nolan and McFarlan 2005) recognizes this dichotomy and classifies firms based on the nature of their IT spending as having either a *defensive* or an *offensive* posture. Defensive IT is about operational reliability and the bulk of the firm's IT spending goes toward keeping existing systems up and running. On the other hand, firms with an offensive posture tend to be more ambitious and adventurous with their technology investments as they try to leverage IT for strategic purposes and to rise to a position of industry leadership.

[1] **http://www.zdnet.com/article/heres-what-your-tech-budget-is-being-spent-on/**

2.2. Institutional Investors and investment time horizons

Financial institutions (defined under SEC rule 13-F) such as banks, insurance companies, mutual and pension funds that exercise investment discretion (i.e., buy or sell securities) over $100 million or more on behalf of their principals are categorized as institutional investors. In contrast to individual investors, institutional investors are more sophisticated and utilize a variety of valuation strategies (Bushee 1998; 2001). They also tend to differ in their investment time horizons due to the heterogeneity in the maturity dates of their liabilities. Institutional investors with a longer-term investment horizon generally tend to invest in fewer firms but have significant holdings in each of them. They trade infrequently and follow a buy and hold strategy, while placing a great deal of importance in future cash flows and longer-term dividend income or capital appreciation (Bushee 2001). In contrast, shorter-term investors have smaller holdings but in many firms and because these are often subject to large short-term redemptions by their fiduciary clients, these investors tend to have shorter-term investment horizon. They focus on performance measures such as current earnings which are easily quantifiable, and tend to underweight the long-term earnings component.

The preceding discussion suggests the possibility of an interaction effect of IT investment types and institutional investor horizons. Short term IT investments, as noted earlier, are meant to scaffold or incrementally improve existing systems and are designed to maintain current operations in the most cost effective manner, potentially achieving greater cost savings from year to year. Such investments seldom represent ambitious goals for turnaround or transformation of the company and tend to align well with the goals of short term investors. Therefore, we hypothesize:

H1: *The interaction effect between the proportion of short-term institutional investor ownership of a firm's stock and the proportion of its IT budget spent on operational IT investments on the firm's market value will be positive.*

Institutional investors with a long term mindset tend to be more patient investors who are willing to buy and hold a stock for longer durations, thereby giving managers the time and resources needed to develop and execute long range strategic plans. Therefore,

H2: *The interaction effect between the proportion of long-term institutional investor ownership of a firm's stock and the proportion of its IT budget spent on strategic IT investments on the firm's market value will be positive.*

3. Empirical Analysis & Results

We build our dataset based on *Information Week* survey data (1999-2006), a leading and widely circulated IS publication, and on complementary archival data from COMPUSTAT. The detailed information includes data on the IT department and operations, budgets, and projections, along with data on major IT initiatives. Table 1 describes the variables used in this study. Table 2 provides descriptive statistics and correlations for the model variables. To assess the impact of short and long-term IT spending in the condition of increasing ownership by short-term oriented institutional investors on Tobin's q , we specify the following model:

$$\text{Tobin's } q_{i,t} = \beta_0 + \beta_1 \text{Tobin's } q_{i,(t-1)} + \beta_2 \text{Short IT}_{i,t} + \beta_3 \text{Long IT}_{i,t} + \beta_4 \text{INV}_{i,t} + \beta_5 \text{Short IT}_{i,t} \times \text{INV}_{i,t} + \beta_6 \text{Long IT}_{i,t} \times \text{INV}_{i,t} + \beta_7 \text{ROA}_{i,t} + \beta_8 \text{SIZE}_{i,t} + \beta_9 \text{ADVG}_{i,t} + \beta_{10} \text{RND}_{i,t+} u_i + e_{i,t}$$

where Tobin's $q_{i,t-1}$ = the lagged dependent variable,

$\text{Short IT}_{i,t}$ = expected short-term IT spending for firm *i* at time *t*,

$\text{Lont IT}_{i,t}$ = expected long-term IT spending for firm *i* at time *t*,

$\text{INV}_{i,t}$ = institutional ownership (either short or long-term) for firm *i* at time *t*,

$\text{AD}_{i,t}$ = advertising spending scaled by sales for firm *i* at time *t*,

$\text{RND}_{i,t}$ = research and development spending scaled by sales for firm *i* in year *t*,

$\text{SIZE}_{i,t}$ = size of firm *i* at time *t*, measured as the log of total assets, and

$\text{ROA}_{i,t}$ = return on assets of firm *i* at time *t*.

The results shown in Table 3 are found to be robust to concerns of endogeneity. Consistent with Hypothesis 1, our results show that firms that focus on operational IT projects and have an increasing proportional ownership by short-term institutional investors seem to benefit (β_5 = .3379, $p < .01$) in terms of increasing financial performance (Tobin's Q). In contrast, when firms engage in building new applications and making investments in more long-term infrastructure and applications, we observe a diminishing (β_6 = -.0001, $p < .10$) performance in terms of Tobin's Q, thus providing support for H1. When firms have an

increasing proportion of *long-term* institutional investors, we observe the opposite results: investments in operational IT projects contribute to a lower firm performance, whereas strategic IT investment is associated with a *higher* Tobin's Q ratio (β_6 = .0001, p < .05), thereby supporting H2.

4. Conclusion

Our study contributes to the extant literature on IT and business value but builds on the findings in important ways. While the prior literature has examined and confirmed the value relevance of IT investments to shareholders, to the best of our knowledge none of the studies have taken into account two critical factors that impact how the financial market values IT investments. First, IT investments are not monolithic and can differ greatly in objectives, scope and timing of benefits. Second, the investor community is not a homogeneous entity and can differ in their preference for different types of IT investments based on the goals, risks, and investment time horizon of these investments. In this paper, we close these two critical gaps by examining the financial impact of a firm's short and long term IT investments from a contingency perspective that focuses on the moderating role of the firm's investor base. In doing so, our results indicate the possibility of significantly differential returns to the two types of IT expenditures based on the nature of the investor's timing horizon.

Table 1 : Variable Descriptions

Variable Name	Description	Data Source
Advertising Intensity	Yearly advertising spending in thousands of USD, scaled by total revenue.	COMPUSTAT
R&D Intensity	Yearly R&D spending in thousands of USD, scaled by total revenue.	COMPUSTAT
Tobins' Q	Ratio of the sum of the market value of equity, preferred stock, and debt, to the book value of total assets.	COMPUSTAT
Long IT	Long-term oriented IT investments spending (% of IT budget spent on new projects/applications).	InformationWeek
Short IT	Short-term oriented IT investments spending (% of IT budget spent on maintaining/integrating existing applications).	InformationWeek
Short-Term Institutional Investors	Percentage short-term institutional investors' ownership in sample firms.	B. Bushee's website / COMPUSTAT
Long-Term Institutional Investors	Percentage long-term institutional investors' ownership in sample firms.	B. Bushee's website / COMPUSTAT
Return on Assets	Return on assets ratio.	COMPUSTAT
Firm Size	Total firm assets in thousands of USD, logged.	COMPUSTAT

Table 2: Correlations Table

	Mean (St. Dev)	TOBIN'S Q	MKT VALUE	ST Investors	LT Investors	SHORT IT	LONG IT	ADVG	R&D	SIZE	ROA
Tobin's Q [1]	1.36 (.98)	1.000									
Market Value	1.21 (1.14)	.847***	1.000								
Short-Term Investors	29.00 (7.84)	-.089**	-.084**	1.000							
Long-Term Investors	70.99 (7.84)	.108***	.083***	-1.000***	1.000						
Short IT	.02 (.03)	.134***	.101***	.063*	-.061**	1.000					
Long IT	.01 (.02)	.130***	.099***	.015	-. 031	.646***	1.000				
Advertising Intensity	.01 (.04)	.229***	.195***	-.006	.015	.056	.083**	1.000			
R&D Intensity	.02 (.04)	.251***	.307***	.048	- .028	.039	-.064*	-.047	1.000		
Size	8.51 (1.11)	.072*	.099***	-.253***	.244***	-.104***	-.112***	-.025	-.080**	1.000	
Return on Assets	-.54 (2.76)	.049	.076**	.016	-.013	.018	.023	.014	.070*	-.009	1.000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. [1] Note: Tobin's q, Short-Term Investors, Short and Long IT, Advertising and R&D intensities, and ROA are measured as percentages; Market Value and Size are measured as logged values.

Table 3: Long and Short Term IT Investments & Institutional Investor Ownership: Effect on Tobin's Q, Arellano-Bond GMM Models

		Short-Term Investors		*Long-Term Investors*	
Dependent Variable $_{(t-1)}$	.3627***	.3653***	.3334***	.3398***	.3372***
Short-Term IT	.6742	.6181	-.1905	-1.3400	-2.2907
Long-Term IT	-.0001	-.0001	-.0004	6.2315*	6.0745*
Investor ownership		-.0345	-.0122	.0085	.0129
Short Term IT × Investor Ownership			**.3379*** **		**-.4198*** **
Long Term IT × Investor Ownership			**-.0001***		**.0001** **
Controls					
Return on Assets	-.0003	-.0053	-.0043	.0001	-.0013
Firm Size	-.1119	-.1111	-.0674	-.0826	-.0661
Advertising Intensity	.6356***	.5221**	.5587**	.5899**	.6226**
R&D Intensity	-1.1384**	-1.0678**	-1.0340**	-.6479*	-.6659*
Number of Observations	449	421	421	421	421

Note: *** p < .01, ** p < .05, * p < .10. Significance levels of the main effects are based on two-tailed tests, and those of the interaction effects are based on directional one-tailed tests.

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