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# Managerial Entrenchment with Strategic Information Technology: A Dynamic Perspective

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**ABSTRACT:** Some economic and informational problems associated with organizational information technology (IT) spending may be attributed to managerial rent-seeking. Because of the unavoidable incompleteness of labor contracts, managers with misaligned incentives and budgetary discretion could entrench themselves through their non-value-maximizing adoption decisions. In order to boost their bargaining power in future contract renegotiation, they invest excessively in technologies they manage more effectively than their potential rivals. In addition, they tend to adopt technologies that can create large information asymmetries giving them significant knowledge advantage over their potential rivals *ex post*. We study the implications and effects of their rent-seeking behavior within the context of organizational IT adoption and management. The efficacies and the limitations of formal incentive contracting are discussed to underscore the need for additional governance mechanisms. While knowledge management may mitigate some of the agency problems associated with entrenchment, managerial self-policing issue remains a challenge. We further explore the incentive provision potential of relational labor contracts in combating entrenchment.

**KEY WORDS AND PHRASES:** agency problems, bargaining, contract renegotiation, entrenchment, incomplete contracts, information technology adoption, knowledge management, organizational decision making, relational contracts, rent-seeking.

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Managers of firms attempt to entrench themselves, increasing their bargaining power, e.g. *vis-à-vis* alternative management teams, and one of the ways that

they do this is to take actions which increase information asymmetries. Doing so effectively reduces competition in the market for management.

—Joseph E. Stiglitz, “Information and the Change in the Paradigm in Economics,” Lecture to the Memory of Alfred Nobel, December 8, 2001

IN TODAY’S DIGITAL ECONOMY WHERE INFORMATION TECHNOLOGY (IT) is evidently becoming the backbone, it is not uncommon for managers to emphasize the strategic importance of IT investments. However, they may never tell you that they can secure their jobs and reap significant personal benefits by strategically influencing their organizations’ IT spending. Absent effective monitoring and incentive alignment, they can entrench themselves and obtain managerial rents<sup>1</sup> by making opportunistic IT adoption decisions that erode corporate profitability and shareholder value.

Recent empirical evidence has demonstrated that undisciplined IT spending frequently destroys firms’ value and sometimes even leads to catastrophes in implementation [15, 52]. For example, Carr writes:

Some managers may worry that being stingy with IT dollars will damage their competitive positions. But studies of corporate IT spending consistently show that greater expenditures rarely translate into superior financial results. In fact, the opposite is usually true. [15, p. 49]

Using a resource-based perspective, Bharadwaj [12] suggests that merely spending in IT will not lead to competitively significant IT capabilities that enhance firm performance in a sustainable manner. The fact that IT spending on average does not generate sustainable higher profits should not surprise those researchers who are familiar with the competitive market equilibrium or the theories of competitive strategy. It is generally understandable that IT, once commoditized as a resource, will no longer confer a competitive advantage or be a source of competitive advantage [17, 74]. Even if a firm’s strategic IT investments lead to a competitive advantage, its financial performance will not be significantly enhanced when, as suggested in Coff [21], internal stakeholders instead of shareholders appropriate most rents from this competitive advantage. Some recent studies have highlighted the importance of better understanding managerial rent-seeking and opportunism in strategic IT investment decision making. For example, Hall and Liedtka [33] provide empirical evidence showing that large-scale IT outsourcing decisions are often taken to enhance top managers’ compensation. Bolton et al. [14] also point out that during late 1990s, many managers invested excessively in Internet and telecommunication technologies to increase their own payoffs from stock options and market timing.

Information systems (IS) researchers have long recognized the importance of studying decision-making processes in strategic IT adoption and applications (e.g., [63]), and several important issues frequently faced by decision makers have been addressed in the extant literature. These issues include the trade-off between preemptive investment and risk control [18, 43, 49], the investment timing strategy under declining technology costs [25], and the intangible costs and benefits associated with social

subsystems [62]. Nevertheless, some significant issues remain to be systematically studied. For example, a recent *Wall Street Journal* article highlights the pervasiveness of two problems in managing strategic IT investments [7]. First, in many companies there is a “glass wall” that separates IT managers from senior executives. Second, senior executives often have troubles quantifying IT investment payoffs. One direct consequence of the two problems is the lack of accountability from IT managers who make IT investment decisions. Because of the “glass wall” and the difficulties of qualifying IT investment returns, top executives often “sign off on IT spending without a clear understanding of its business value” [7, p. R4].

In a seminal paper, Simon calls on neoclassical economists to take a more serious look at the economic behavior that “takes place inside the skins of firms” [69, p. 25]. Gibbons [27] further points out the inevitability of the convergence between the new organizational economics literature and the noneconomic literature on organizational decision making. Deviating from the traditional economics models where organizations are simplified as unified value-maximizing nodes in a social network, the present study analyzes the internal inefficiencies associated with organizational IT investment decision making. More specifically, in an incomplete contract setting where contract renegotiation is considered, our analysis shows why managerial entrenchment within organizations can bring a value-destroying reputation to undisciplined organizational IT spending.

## Managerial Empire Building

One of the best-known manifestations of corporate agency problems is managerial empire building. With discretionary cash flow in hand, managers tend to invest excessively to build larger companies from which they can gain more private benefits and perquisites (e.g., [41]). Although this empire-building theory can be used as one explanation for the inefficiencies in corporate IT spending, it does not necessarily lead to IT overinvestment.<sup>2</sup> Furthermore, the empirically observed technology overinvestment or underinvestment could be at least partially explained by many other theories, including risk preference incongruity [30, 37], managerial career concerns [38, 39], herding [47, 64], managerial myopia [9], overconfidence [60], and so on.

Although these theories allow us to examine IT investment decision making from multiple perspectives, they make it challenging for researchers to select the most appropriate theory under different scenarios. As business researchers, we are more interested in the business and technological implications of these theories than in theory comparison and evaluation. We also believe that it will be far more productive for researchers to investigate how agency problems affect IT managers’ investment strategies than to argue whether firm or market-level IT overinvestment is empirically observed in different industries. Therefore, the present study does not focus on the controversy surrounding IT overspending. In order to provide more concrete and specific business insights, we follow Simon’s [69] call to take a closer look at the role played by IT managers in corporate investment decision making.

## Beyond Empire Building

Until recently most corporate governance studies (not including the theoretical literature on firms' internal hierarchies) have concentrated on the relationship between corporate top executives and outside shareholders. Some recent studies have suggested that many agency problems can be better understood if the relationship between corporate chief executive officers (CEOs) and divisional or departmental managers is also considered [11, 13, 65]. Most IT managers participate in corporate IT investment decision-making processes at the divisional or departmental level, and they generally have to get top executives' approval for significant IT spending (chief information officers [CIOs] might be an exception, but they usually also need to report to CEOs for final investment authorization). Because of their expertise and experience, IT managers are often key advisors who help top executives shape corporate IT spending strategies. However, they have less discretion and flexibility in IT spending than CEOs. For example, they sometimes have to make investment decisions under capital rationing, which makes it more difficult for them to engage in conspicuous IT overinvestment (e.g., empire building).

Nevertheless, it would be mistaken to assume that the agency problem of IT spending is much less severe at the departmental or divisional level than it is at the top executive level. One reason is that, unlike top corporate executives whose compensation packages usually include powerful incentives (e.g., significant amount of stock options), most mid-level IT managers do not own a lot of stocks or stock options. Even if they do, there is still a free-riding problem because usually their performance does not meaningfully influence their companies' stock performance [32]. More importantly, IT managers have much more discretion and flexibility in influencing the *form* of investment than they have in influencing the *level* of investment, which in many cases could exacerbate the managerial incentive problem in investment decision making. Given the strategic importance of technology selection<sup>3</sup> and IT spending prioritization, we believe that a thorough investigation of IT managers' potentially opportunistic behavior is well warranted. If appropriately conducted, such a study should not only contribute to the rich and ever-growing corporate governance literature that follows the work of Jensen and Meckling [42], but also yield new insights into organizational IT adoption and management.

We study the incentive for IT managers to entrench themselves by strategically allocating the IT budget under their control. It is well known that IT professionals' bargaining power vis-à-vis their employers significantly affects their compensation packages [1]. In a seminal paper, Milgrom and Roberts [53] discuss the economic implications of the "influence costs" within organizations. They argue that efficiency loss often occurs when employees try to influence their organizations' decisions to enhance their own power and bargaining positions. The essential objective for managerial entrenchment is to make the incumbent manager more difficult to be replaced, which will offer the incumbent more leverage and bargaining power in future compensation contract renegotiation. When information and knowledge, as described in our model, are strategically manipulated ex ante for exploitation ex post,

managerial entrenchment becomes an excellent example of the knowledge formation hazards conceptualized in Nickerson and Zenger [55]. Recent studies have recognized and emphasized the strategic role of IT human capital in enhancing organizational effectiveness [51, 59]. We believe that one major challenge in IT human resource management is what Holmström [38] describes as the “fundamental incongruity” between IT employees’ concern for their human capital returns and companies’ concern for their financial returns. Our analysis suggests that IT managers, instead of allocating more money to the IT with higher expected financial returns, have incentives to spend excessively in those technologies that they manage more effectively than their potential rivals. It further explains why IT managers can entrench themselves and extract significant rents by creating ex post knowledge superiority through their “strategic” budget allocation.

### Potential Remedies of IT Entrenchment

Although this paper does more to highlight managerial incentive problems in IT spending than to solve them, it does emphasize knowledge management and relational contracts as two potential tools in overcoming inefficient entrenchment. Undoubtedly, the optimal incentive contracting literature has greatly enhanced our understanding of the successes and limitations of contractual incentive provision in firms [58]. An interesting question is: What can knowledge management, as an alternative to incentive contracting, do to help mitigate managers’ propensity to entrenchment? So far, few economic studies have explicitly examined the role of knowledge management in overcoming agency problems.<sup>4</sup>

By exogenously incorporating the effects of effective knowledge management into our analysis, we show that it becomes more difficult for incumbent managers to maintain significant information or knowledge superiority over their potential rivals. As a result, IT managers’ incentives for engaging in inefficient IT investment entrenchment will diminish considerably. Of course, the efficacy of knowledge management in overcoming entrenchment depends on how well knowledge management systems are designed to discourage knowledge hoarding and to induce truth-telling in knowledge valuation. These important incentive issues associated with organizational knowledge management and governance are well elaborated in some recent studies [2, 3].

We believe that there is a fundamental incentive issue that could significantly lower the efficacy of knowledge management in disciplining managerial opportunism and rent-seeking. If those managers, who are the primary beneficiaries of existing information asymmetries and knowledge superiority, are delegated the decision-making authority in knowledge management, how can they behave benevolently and weaken their lucrative entrenchment voluntarily? This managerial self-policing issue and other difficulties with knowledge management underscore the need for other incentive provision mechanisms. Based on the recent development in the relational contract literature, we argue that self-enforcing relational contracts can play an interesting role in supplementing formal incentive contracts to combat entrenchment.

## Strategic Entrenchment and Contract Renegotiation

THE IMPORTANCE OF MANAGERIAL INCENTIVE ALIGNMENT in strategic investment has been repeatedly emphasized in prior economics literature. For example, Holmström and Costa remind us:

The need to harmonize preferences between superiors should be strongest in areas where ability plays a significant role. . . . Strategic investment decisions, which are likely to involve sizeable human capital risks and opportunities for the manager, need incentive alignment and control. [39, p. 857]

In addition to managerial ability, information plays a significant role in strategic IT adoption. Modern literature in decision making under uncertainty has provided us with a good understanding of the relationship between information availability and decision quality. However, the information structure in our model affects managerial decision making through another avenue. We show that information asymmetries, in many cases of strategic IT investments, are intentionally created and maintained by managers whose objective is to maximize their own human capital returns.

### The Model

We present a three-stage model with four dates ( $t = 0, 1, 2, 3$ ). At time 0, an IT manager is given a budget  $C$  for a firm's long-term strategic IT investment. The manager is supervised by the top executives acting in the interest of the firm's shareholders. The top executives know that the manager has an empire-building preference (he or she always spends all the money under his or her control), and thus impose a binding IT spending budget  $C$ . At time 1, the manager splits  $C$  between two types of technologies.<sup>5</sup> The manager spends  $C_1$  on the first type of technologies, those he or she manages better than his or her potential rival does, and he or she spends  $C_2 = C - C_1$  on the second type of technologies, those his or her potential rival manages as well as he or she does.<sup>6</sup> After time 1, the manager starts to manage the invested technologies. The manager has an opportunity to renegotiate his or her compensation contract with the top executives at time 2. The expectations that contracts will be renegotiated in the future, an essential feature of most incomplete contract models (e.g., [35, 36, 76]), provide managerial incentives for strategic entrenchment in our model. After the contract renegotiation, the manager continues to manage the invested technologies until time 3 when the terminal long-term investment payoffs are calculated. The sequence of events described above is depicted in Figure 1.

By adopting the Grossman–Hart–Moore incomplete contract approach, our model emphasizes that managerial entrenchment is not verifiable ex post (i.e., at time 3). This nonverifiability property makes it impossible or prohibitively costly to enforce contracts contingent on managerial entrenchment. While the manager can demand better compensation based on his or her superior expertise and knowledge about the invested technologies, his or her improved bargaining position at time 2 is not necessarily an indication of managerial entrenchment in IT capital allocation. A manager

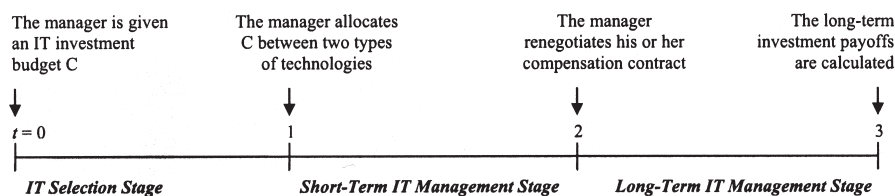


Figure 1. Sequence of Events in the Three-Stage Model

without self-serving incentives will also invest in technologies that better utilize his or her skills and knowledge as long as he or she genuinely believes those invested technologies maximize long-term payoffs for his or her firm.

The firm’s long-term IT investment payoffs under the incumbent manager and the potential rival are given as  $R_i = q(E_i, I_i)B_1(C_1) + qB_2(C_2)$  and  $R_r = q(E_r, I_r)B_1(C_1) + qB_2(C_2)$ , where  $B_1(C_1)$  and  $B_2(C_2)$  are the two types of technologies’ investment payoff per unit of managerial effectiveness, and  $q(E, I)$  is managerial effectiveness as a function of a manager’s expertise  $E$  and information quality  $I$ . We assume that  $B'_1(C_1) > 0$ ,  $B'_2(C_2) > 0$  and  $B''_1(C_1) < 0$ ,  $B''_2(C_2) < 0$ , which simply implies that, holding managerial effectiveness constant, the investment payoffs increase as more money is invested, but they increase at a decreasing rate. It is also reasonable to assume that managerial effectiveness increases in both  $E$  and  $I$ . As described above, for the second type of IT there is no difference between the incumbent and the rival in terms of their managerial effectiveness. So we use a constant  $q$  to express both managers’ effectiveness in managing this type of IT.

The incumbent’s initial salary is normalized to 0. He or she renegotiates his or her salary with the top executives at time 2, and his or her new salary at that time depends on how well he or she can manage the invested technologies vis-à-vis the potential rival in the long run. We assume that his or her new salary is  $S = \lambda(R_i - R_r)$ , where  $R_i - R_r$  measures the extra investment payoff the firm can get under the incumbent, and  $\lambda \in (0, 1)$  is the incumbent’s share of the extra payoff (it obviously depends on his or her bargaining power at time 2). The incumbent’s objective in the budget allocation is to maximize his or her long-term human capital return, given as  $\lambda(R_i - R_r) + \theta(R_i - C - \lambda(R_i - R_r))$ , where  $0 \leq \theta \ll 1$  is the incumbent’s very small share of firm ownership. So the first part of his or her return comes from his or her managerial rents and the second part comes from his or her stock ownership (note that  $R_i - C - \lambda(R_i - R_r)$  represents the firm’s net investment payoffs after sharing the surplus with the manager through salary renegotiation).

The sequence of events described in our model is similar to that in Shleifer and Vishny [66]. They analyze the investment strategy of a top executive (e.g., a CEO), who has much more discretion over the magnitude of capital investment than the IT manager has in our model. Consequently, their paper’s major insight is that managers’ entrenchment incentives tend to result in corporate overinvestment and excessive business expansion, and that corporate and division-level capital rationing can help to counter managerial entrenchment. Our analysis, however, shows that IT managers with capital

allocation discretion can engage in inefficient entrenchment even if they have a binding investment budget. This paper's concentration on the *form* of investment rather than the *level* of investment is particularly pertinent in the context of corporate IT adoption and management. Instead of joining the argument about whether consistent evidence of corporate-level IT overinvestment exists, this paper attempts to help practitioners and researchers to take a more serious look at the following questions: Are we observing overinvestment in some types of IT and underinvestment in some other types of IT? If yes, where does this investment distortion come from, and how can we deal with it?

### Make Your Expertise Pay: Buy More Manager-Specific IT

We first consider the impact of the incumbent manager's expertise on his or her IT investment strategy. The manager has the discretion to allocate  $C$  between two types of technologies. The first type of technology is manager specific, which means that the incumbent has more technology-specific expertise in managing them than the potential rival. We assume that the incumbent and his or her rival have access to the same information and their expertise does not change over time (this assumption will be relaxed later). So we can write their effectiveness in managing the first type of technologies as two constants with  $q_i > q_r$ .

To demonstrate the incumbent's preference for manager-specific technologies and the resultant investment inefficiencies, we first derive the firm's optimal IT budget allocation  $(C_1^*, C_2^*)$  that maximizes the firm's long-term investment returns. To make things interesting, we assume that  $(C_1^*, C_2^*)$  is an interior solution, which simply implies that  $C_1^* \in (0, C)$ . We then compare this efficient capital allocation to the incumbent's personal optimal budget allocation  $(C_1^{**}, C_2^{**})$  that maximizes his or her long-term human capital returns.

*Proposition 1 (IT Investment Entrenchment: Manager-Specific Rents): The incumbent IT manager likes to invest excessively in those technologies that better utilize his or her specific managerial expertise. Consequently, his or her IT budget allocation in those technologies is always greater than the efficient allocation that maximizes the firm's long-term investment returns.*

(All technology investment discussed in the propositions are long-term strategic investments. All proofs are in the Appendix.)

Proposition 1 suggests that the manager has the incentive to overspend money in those technologies that he or she manages better than others, and consequently he or she spends less in other technologies that do not give him or her an edge over his or her potential competitors. As a result of the manager's discriminatory budget allocation, he or she fails to maximize the firm's long-term investment returns. This result may seem counterintuitive. How could it be less efficient for the manager to invest more money in technologies that better utilize his or her personal expertise? The answer to this question is that the efficiency loss actually comes from the manager's opportunistic overinvestment beyond the firm's optimal budget allocation that has *already* taken managerial expertise into consideration. The logic behind this type of

IT investment distortion is very clear: the incumbent manager can effectively entrench him- or herself and bargain for more compensation than justified by the management labor market (his or her rents) in future contract renegotiation.

It is well known in the transaction cost and the asset ownership literature that, because of opportunism and contract incompleteness, there is usually underinvestment in relationship-specific assets.<sup>7</sup> The reason our analysis suggests overinvestment rather than underinvestment in manager-specific technologies is simply that the manager is not spending his or her own money [66]. In one extreme case where the IT manager's ownership of the firm is zero ( $\theta = 0$ ), he or she will invest all the money under his or her control in manager-specific technologies ( $C_1^{**} = C$ ,  $C_2^{**} = 0$ ). In another extreme case where the manager is also the firm's sole owner ( $\theta = 1$ ), he or she has no incentive to deviate from the firm's optimal budget allocation ( $C_1^*$ ,  $C_2^*$ ). As discussed before, compared to top executives such as a CEO, most division or department-level IT managers have negligible firm ownerships, which unfortunately implies that they may be more prone to entrench themselves.

Excessively investing in manager-specific technologies is only one strategy used by managers to fortify their trenches and to extract rents. Many IT managers who have successfully entrenched themselves do not have any distinctive expertise that can give them an edge over their potential rivals. Their alternative entrenchment strategy, which will be demonstrated in a more general version of our model, is arguably more harmful to firm-level IT adoption and management.

### Make Your Knowledge Pay: Create Informational Superiority

We now drop the assumption that the manager and his or her rival have access to the same information and their expertise does not change over time. Recall that the manager's future salary depends on  $R_i - R_r$ , the extra IT investment payoff he or she can bring to the firm. So the incumbent, who wants to maximize his or her human capital return, will strategically allocate his or her IT investment budget to increase  $R_i - R_r$ . Because managerial effectiveness is a function of a manager's expertise  $E$  and information quality  $I$ ,  $R_i - R_r$  can be expressed as  $(q(E_i, I_i) - q(E_r, I_r))B_1(C_i)$ . This expression implies that there are two reasons why the incumbent manages the first type of technology better than does his or her potential rival. First, his or her personal expertise is more appropriate for this type of technology ( $E_i > E_r$ ). Second, the quality of his or her technology-related information is better than that of his or her rival's ( $I_i > I_r$ ). It is easy to see that Proposition 1's results are still applicable to this setting.

*Proposition 2 (IT Investment Entrenchment: Informational Rents): The incumbent IT manager will invest excessively in those technologies that offer him or her informational advantages over his or her potential rival. Consequently, his or her IT budget allocation in those technologies is always greater than the efficient allocation that maximizes the firm's long-term investment returns.*

Proposition 2 immediately leads to several important implications to IT investment decision making. Ceteris paribus, the incumbent manager favors IT investment with

uncertainty that can be more quickly resolved for him or her than for his or her potential rivals. These investments offer the incumbent significant informational advantages that materialize in future contract renegotiation. Interestingly, most long-term strategic IT investments create substantial uncertainty and noise that can sustain the incumbent's informational superiority over a significant time period. Moreover, the payoffs of most strategic IT investments are notoriously difficult to quantify in the short run, which provides managers with more flexibility in justifying their investment decisions *ex ante*. Therefore, it is understandable that IT managers with misaligned incentives prefer to spend excessively in long-term strategic IT.

It is worth noting that our model does not explicitly describe how the quality of technology-related information affects managerial effectiveness. In an insightful paper, Edlin and Stiglitz [26] analyze several mechanisms through which the incumbent manager can extract significant informational rents. In their model, risk-averse rivals, because of their informational disadvantage, make fewer efforts than the incumbent in managing invested projects. Consequently, their managerial effectiveness is reduced. In addition, they tend to ask for higher salaries to compensate for their perceived risks. Sometimes the problem of the winner's curse under information asymmetry further makes potential rivals more reluctant to compete for the incumbent manager's job.

There are two reasons why we do not directly model these mechanisms. First, deriving the incumbent manager's optimal budget allocation requires some stringent assumptions about these mechanisms, which unnecessarily limits the generalizing ability of our analytical results. Second, explicitly modeling these mechanisms excludes other interesting scenarios where the incumbent IT manager can create or worsen informational problems to extract rents. The analysis in Edlin and Stiglitz [26] focuses on the incumbent and his or her rivals' asymmetric information about the invested projects' prospects. This type of information asymmetry is not the only source from which the incumbent manager can extract rents in investment decision making. As discussed in Stiglitz [71], information asymmetries are a subset of the broader problem of knowledge imperfections. Nickerson and Zenger [55] explicitly point out that agents, with the intention to enhance their bargaining power in the future, possess incentives to strategically influence organizational knowledge development and accumulation. In the context of IT adoption decision making, we show that there are incentives for managers to invest excessively in any type of IT that makes them more knowledgeable than their potential rivals in the future. Clearly, knowledge plays a critical role here in our study of the strategic entrenchment in IT adoption. So it is important for us to connect our analysis to knowledge management whose primary function is to deal with organizational knowledge-related problems.

## Potential Remedies for Managerial Entrenchment

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THERE ARE AT LEAST TWO REASONS WHY WE ARGUE that researchers should pay more attention to the interplay between the literature on corporate governance and the literature on organizational knowledge management. First, the problems of managerial entrenchment and rent-seeking, as Stiglitz [70] points out, "may be particularly

acute" in knowledge-based enterprises and the knowledge-driven economy in general. This judgment is also consistent with the major empirical insight given by Coff [22]. Second, there are interesting interactive dynamics between corporate governance and knowledge management. For example, as our analysis suggests, many managerial incentive problems arise because of knowledge-related issues that are frequently addressed in knowledge management studies. At the same time, there are various kinds of incentive alignment issues in acquiring and in managing organizational knowledge and knowledge management systems [2, 3]. Before we examine the interactive dynamics between knowledge management and corporate governance, we discuss the role of some traditional methods in combating managers' IT investment entrenchment.

### Active Monitoring and Contractual Remedies

One major condition under which the IT manager in our model can engage in inefficient entrenchment is that the firm's top management cannot differentiate his or her normal investment behavior from rent-seeking entrenchment. There are many reasons why this condition exists for long-term strategic IT investment. For example, the long-term payoffs of strategic IT investments are extremely difficult to quantify in the short run. In addition, many IT projects that can strongly entrench the incumbent manager are also profitable, at least in terms of the precompensation investment returns [26, 66]. Undoubtedly, the firm's top management can be more proactive in monitoring the IT manager's investment behavior, which may help to stop some blatant cases of entrenchment. Top management may further reduce the manager's budgetary discretion to avoid the extreme situation where certain types of IT investment are not funded at all because of managerial biases [61]. However, active monitoring and supervision are usually costly and in some cases may result in efficiency loss because of budgetary inflexibility. They remain, at best, a partial solution to managerial entrenchment as long as the fundamental knowledge-related problems exist in an organization. For example, to avoid managerial opportunism, many firms are moving toward nonidiosyncratic technologies. This strategy certainly minimizes the likelihood of investing in manager-specific technologies. However, this strategy may also result in efficiency loss. By adopting this strategy, a firm has to adopt some nonidiosyncratic technology even in situations where a manager-specific technology could maximize expected investment payoffs. This type of efficiency loss is similar to the capital budgeting distortion described in Stole and Zwiebel [72, 73]. Their papers demonstrate why investment distortions (relative to neoclassical firms) occur because of the possibility of intrafirm wage renegotiation.

The traditional wisdom from the optimal incentive contracting literature suggests that, if a frontal attack on the inherent organizational informational problems is infeasible or too costly, providing managers with incentives not to behave opportunistically might be a reasonably good solution. In the context of managerial entrenchment, Edlin and Stiglitz [26] argue that contractual restriction of salary bargaining or incentive provision through stock ownership could mitigate managers' propensity to entrenchment. We formalize their argument in the next two propositions.

*Proposition 3 (Incentive Provision Through Stock Ownership): Providing the IT manager with initial higher stock ownership moves his or her personal optimal IT budget allocation closer to the firm's efficient budget allocation.*

*Proposition 4 (Contractual Restriction of Salary Bargaining): Contractual restriction of the manager's salary bargaining power reduces his or her rents associated with IT investment entrenchment, which moves his or her personal optimal IT budget allocation closer to the firm's efficient budget allocation.*

Although the two approaches seem to have potential in combating managerial entrenchment, their efficacy in the real business organization is considerably attenuated by several factors. First, as discussed above, it is very uncommon and often impractical for a mid-level IT manager to own a significant share of the firm in which he or she works. Even if the decision maker is a top executive, the efficiency loss resulting from granting him or her significant stock ownership may significantly outweigh the benefits of curbing managerial entrenchment [8, 32]. Furthermore, contractual restriction of salary bargaining, such as the prevention of contract renegotiation or rent-sharing, has serious problems in its implementation.<sup>8</sup> In a dynamic setting, the firm's commitment not to engage in future contract renegotiation or rent-sharing will not impact managers' entrenchment incentives unless it is deemed credible. Even if the firm finds some mechanisms to make a binding commitment at a reasonable cost, restricting contract renegotiation in a competitive management labor market often has some undesirable consequences on efficiency. For example, without contract renegotiation and rent-sharing, a firm may continue to lose the ablest managers to the job market because of its compensation rigidity.

## Knowledge Management Versus Managerial Entrenchment

To search for fresh insights into how to overcome entrenchment, we need to go beyond the traditional economics literature that often views a firm as a nexus of contracts. By viewing a firm as an institute of knowledge integration, the knowledge management literature, in our opinion, could shed new light on IT investment entrenchment caused by various knowledge-related problems. Our previous discussion argues that targeting information asymmetries and knowledge imperfections could have direct effects on managerial incentives for entrenchment. We formalize this argument in the next two propositions.

*Proposition 5 (The Effect of Expertise Disparity on Entrenchment): Other things being equal, the smaller the incumbent IT manager's expertise advantage over his or her potential rival at the time of contract renegotiation, the closer the incumbent's personal optimal IT budget allocation is to the firm's efficient budget allocation.*

*Proposition 6 (The Effect of Information Disparity on Entrenchment): Other things being equal, the smaller the incumbent IT manager's informational advantage over his or her potential rival at the time of contract renegotiation, the closer*

*the incumbent's personal optimal IT budget allocation is to the firm's efficient budget allocation.*

It is obvious that companies should not reduce the incumbent manager's expertise or lower the quality of his or her technology-related information. They instead should concentrate on making the rival more knowledgeable after he or she is hired to replace the incumbent. To effectively combat managerial entrenchment in IT spending, Propositions 5 and 6 suggest that the firm should try to reduce the knowledge gap between the incumbent manager and his or her potential replacement. The key to implementation lies in the firm's learning of its employees like the incumbent manager, which, as argued by Simon [67, 68], is one of the two ways in which organization learning can be achieved. In the real business world, there are many examples where firms retain its key employees' knowledge through different methods of learning. For example, firms sometimes assign assistants to work with key employees who are expected to leave in the near future. By doing that, they try to retain knowledge and minimize the disruption that might be caused by key employees' departure.<sup>9</sup> In fact, one motive for capturing employee expertise in automated systems, as pointed out by Simon, is that "it makes organizational memory less vulnerable to personnel turnover" [68, p. 129].

Nevertheless, many companies in today's knowledge-driven economy still exhibit some features of the "organized anarchy" described in Cohen et al.'s [24] garbage can model, which often makes it difficult for them to manage organizational knowledge effectively. Moreover, there is one fundamental incentive problem associated with knowledge management system adoption and implementation. It is imperative to point out that it is corporate managers (in many cases, IT managers) who make decisions on what knowledge management systems to adopt and on how to implement the adopted systems. Unfortunately, those managers happen to be the major beneficiaries of managerial entrenchment created and sustained by various knowledge-related problems that knowledge management intends to solve. Because of this inherent incentive conflict, managers are very likely to take advantage of their authorities by minimizing the effects of knowledge management systems on their personal lucrative entrenchment. Consequently, it is a myth that, without successful incentive alignment, corporate managers will behave benevolently and play a self-policing role in knowledge management decision making. In addition to this self-policing issue, there are other strategic issues that may significantly limit the potential of knowledge management in weakening managerial incentives for entrenchment. For example, many firms may not want to codify their managers' knowledge and expertise into systems, because they fear that their knowledge resource may become more imitable and transferable so rival firms can apply it [23, 51]. Therefore, we believe that knowledge management, like formal contracting and monitoring, has its inherent limitations in overcoming entrenchment.

## Relational Governance

Effectively mitigating entrenchment problems in today's knowledge-driven economy, in our opinion, entails the employment of other channels of incentive provision, and

relational incentive provision is certainly among these channels. Recent development in the organizational economics literature demonstrates the potential of relational contracts in overcoming opportunism both between and within firms (e.g., [28, 46]). The essential trade-off emphasized in this literature is between the short-term gains from opportunistic behavior and the long-term losses from damaged relationships. In our model, the incumbent manager's incentive for entrenchment will be significantly weakened if his or her decision quality is somewhat linked to his or her long-term human capital returns. Because of the causally ambiguous nature of IT investments, firms often assess the quality of managers' IT adoption decisions subjectively, which underscores the importance of relational governance. Baker et al. [4] demonstrate why efficiency can be improved by simultaneously using formal contracts based on objective performance and relational contracts based on subjective assessments. Poppo and Zenger [56] provide empirical evidence substantiating the argument that there are valuable complementarities between formal contracting and relational incentive provision.

In the incomplete contract environment described in our model, relational contracting is attractive because it does not require ex post verifiability. For example, the firm can offer the incumbent a long-term bonus contract based on its subjective evaluation of long-term investment performance (this type of relational contract is discussed in [28]). Note that this bonus contract does not require the firm to verify whether entrenchment occurs or not. Nevertheless, the incumbent will have fewer incentives to entrench him- or herself because repeated suboptimal capital allocation will inevitably lead to weak long-term investment performance. Therefore, the incumbent is unlikely to engage in entrenchment if the bonus offered is sufficient. The only problem left is whether the firm may renege on this relational contract. Because of the subjective nature of performance evaluation, this bonus contract cannot be enforced by a court and thus must be self-enforced. In addition to building a solid employer reputation, solving this problem entails the establishment of a corporate culture that embraces mutual trust, honesty, and accountability.

## Discussions and Conclusion

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COULD MANAGERIAL OPPORTUNISM WEAKEN strategic IT investment's contribution to corporate profitability? How can an IT manager with a binding IT budget, by strategically overspending in certain types of IT, establish information and knowledge advantages over his or her potential rivals in the future? What is the role of compensation contract renegotiation in facilitating managerial rent-seeking? What are the effects of managerial entrenchment on corporate IT adoption and management? Our study attempts to provide researchers with a theoretical perspective from which these questions can be formally studied. By looking through the corporate veil behind which most IT investment decisions are made, our analysis sheds fresh light on the inefficiency of organizational strategic IT spending. Specifically, it shows that forward-looking IT managers, in order to gain leverage in future contract renegotiations, have incentives to entrench themselves in investment decision making. With managerial discretions

in IT budget allocation, they tend to invest excessively in those technologies that they can more effectively manage in the long run vis-à-vis their potential rivals.

Unlike most agency-theoretic models that assume exogenous information asymmetries, our model recognizes the incumbent IT manager's ability to create informational problems that he or she can exploit ex post. This recognition is important in the context of strategic IT investment where opportunities for informational rent-seeking abound. Its significance is even more noticeable when we analyze the IT manager's incentive for creating knowledge superiority over his or her potential rivals.

In both economics and management information systems (MIS) literature, the dominant application of incomplete contract theory is interfirm negotiation and bargaining. In fact, influential MIS papers using the incomplete contract theory almost exclusively focused on interfirm transactions (e.g., [6, 19, 20, 34]). As thoroughly discussed in Malcomson [50], labor contracts in most American firms are inherently incomplete and are thus subject to various forms of renegotiations. In a seminal paper, Milgrom and Roberts [53] discuss the economic implications of the "influence costs" within organizations. As the first MIS study that develops an incomplete contract framework focusing on intrafirm bargaining, this paper contributes to the extant MIS literature by examining managerial entrenchment as a special form of "influence costs" through the lens of incomplete contract theory.

Our study concentrates on the entrenchment problem associated with investments in manager-specific technologies. Following the seminal work in Becker [10], there is a great deal of theory around firm-specific human capital. Before we discuss the IT investment scenarios involving firm specificity, we want to emphasize the difference between technology-specific human capital and firm-specific human capital. Shleifer and Vishny [66] use "manager-specific investment" to stress the fact that a manager may possess specific human capital that can be better utilized in some invested technologies. Gibbons and Waldman propose the term "task-specific human capital" to conceptualize the similar idea that some of the human capital is "specific to the tasks being performed, as opposed to being specific to the firm" [29, p. 203]. They demonstrate how the concept of task specificity can be applied to better explain the well-documented cohort effects studied in Baker et al. [5]. In addition, Gibbons and Waldman argue that this new human capital concept can be used in some business strategy studies where the issue of firm specificity has been well understood.

Despite the difference between firm specificity and manager specificity, most results of our study can be extended to address the potential entrenchment problem caused by firm specificity. It is commonly observed that firms often invest in customization when there are more cost-effective off-the-shelf products that better serve their needs. Here the customized products may not be manager specific, but they are generally firm specific, which, because of learning by doing, offers incumbents an edge over their external rivals in the long run. Of course, in terms of entrenchment, firm-specific investments may not be as effective as manager-specific investments. The reason is that firm-specific investments do not protect incumbent managers from the competition of internal rivals. Moreover, managers' firm-specific human capital tends to depreciate upon their leaving the firm, which not only limits their labor mobility, but also reduces

their bargaining powers in contract renegotiation. On the other hand, human capital specific to tasks or technologies, as argued in Gibbons and Waldman [29], is more likely to be reasonably valued in the labor market.

Although managers may have stronger incentives to accumulate human capital specific to their expertise than that specific to their companies, they often face a lower hurdle in justifying firm-specific investments than manager-specific investments. Because most insiders can somewhat benefit from firm-specific investments, the link between entrenchment and firm specificity is presumably stronger in situations where a group of insiders make investment decisions. It is often argued from the resource-based perspective that managerial expertise is the only attribute of IT that can generate sustainable competitive advantage [51]. By relating our study to both technology-specific and firm-specific human capital, organizational strategy researchers could further investigate the core rigidity associated with IT human capital [45]. In our opinion, incorporating firm specificity in the study of entrenchment in organizational IT adoption could also shed fresh light on the relationship between IT and firm boundaries. It is well understood that IT, if properly deployed, can improve incentive structure and consequently facilitate more efficient organizational design [54]. However, there is still an ongoing debate between researchers about the joint effects of technological advance and asset specificity on firm boundary choices (e.g., [56, 57]). By highlighting the entrenchment problem in organizational IT adoption, our study suggests that, because of both IT capabilities and rigidities, the complicated role played by IT in the theory of firm warrants more theoretical and empirical investigations.

Our analysis suggests that effective knowledge management, by limiting the incumbent manager's information and knowledge superiority over his or her potential rival, has the potential to overcome managerial entrenchment in IT spending. Consequently, we argue that this may be a reasonable corporate governance justification for allocating more resources to information retention and knowledge storage.

Among those incentive issues in knowledge management, the difficulty of managerial self-policing is emphasized as a major impediment to the successful adoption and implementation of knowledge management systems. We question the plausibility of assuming that entrenched managers will voluntarily destroy their lucrative entrenchment by effectively implementing organizational knowledge management initiatives. Therefore, one interesting extension of our study is to endogenize the delegation of knowledge management authority in a more general model. In such a model, we will be able to better study the economic effects and organizational implications of different knowledge management governance structures. For example, we may analyze the efficiency improvement of giving the knowledge management authority to a top executive (e.g., a chief knowledge officer directly supervised by the board) who is less entrenched or more easily controlled through incentive contracting.

Our discussion highlights the promising potential of relational incentive contracts in combating managerial entrenchment. Unlike formal incentive contracts that require ex post verifiability for court enforcement, relational contracts are self-enforced through corporate culture, mutual trust, or exchange norms. In many strategic IT investment situations, informal relational contracts could be used as an inexpensive and effec-

tive tool to restrain moral hazards and managerial opportunism. To better understand relational governance's impact on managerial entrenchment incentives, future studies are needed to extend our model to some repeated exchange setting where the optimal relational contract can be formally characterized.

Our research, as one of the first papers focusing on proposing a research framework of managerial entrenchment in corporate IT spending, needs to be followed by future empirical studies developing operationalized models within the theoretical framework proposed in this study. For example, we feel that the management entrenchment problem is likely to emerge when IT managers evaluate proprietary technologies against open source technologies. For seasoned IT managers who have used/managed technologies from proprietary vendors (e.g., Microsoft, Oracle) for years, they may have strong incentives to resist open source technologies. For less-experienced managers who have not entrenched themselves with proprietary technologies, they may have fewer incentives to resist new open source technologies. Other IT investment scenarios where managerial entrenchment problems might arise include IT infrastructure upgrade or reconfiguration, IT investments supporting IT outsourcing, strategic investment in information assurance and network security, IT investments facilitating cross-training of non-IT employees, etc. We believe that empirically refutable implications will emerge after our framework is operationalized in some very specific IT investment context, which is clearly an important direction for future studies.

We examine the dark side of organizational IT investment decision making in a managerial entrenchment study where "discipline-based property rights" [77, p. 25] are nowhere to be found. It is our belief that many exciting research opportunities in this area are awaiting researchers who can think beyond disciplinary boundaries.

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## NOTES

1. The term "rent" is widely used by economists as the financial payment that cannot be justified by competitive market mechanisms. It has become almost axiomatic in the related literature that rent-seeking, as a market distortional behavior, usually leads to significant welfare losses (e.g., [8, 65]).

2. Some theoretical studies dynamically model the disciplinary role of corporate debt, and their results generally suggest that managers' empire-building preference will not necessarily result in ex post overinvestment [35, 36, 78].

3. Using a real options model, Kauffman and Li [43] analyze the strategic options embedded in technology selection under scenarios where incompatible technologies compete and uncertainties abound. Li [48] studies how cheap talk affects emerging technologies' diffusion in technology markets subject to network externalities.

4. Some economists have long ago suggested the incentive justification for organizational information gathering and storage (e.g., [40]). In the organizational literature on the theories

of the firm, we have recently seen some interesting discussions of the relationship between knowledge and opportunism [22, 58].

5. We here use the term “technology” in a very broad sense. Generally, IT managers have significantly less discretion in selecting strategic IT projects than in selecting technologies for approved projects.

6. A more general assumption is that the potential rival manages the second type of projects *at least* as well as the incumbent. Such a scenario would not change the insights of this paper. It actually strengthens our core argument, because such a manager would have stronger incentives to prioritize type-1 projects over type-2 ones. The presence of a symbolic management rival in the labor market (or an emblematic corporate raider in the capital market) has been extensively discussed in the corporate governance literature as a managerial disciplinary mechanism [16, 26, 66, 75]. The potential rival described in our model is some individual who might step into the incumbent manager’s job either through internal promotion or external hiring. In the real world, the incumbent perhaps only knows the probability distribution of his or her potential rival’s expertise and information. To increase the firm’s costs to replace him or her, he or she wants to statistically minimize the probability for the firm to find a suitable replacement.

7. Early influential studies in this area include Klein et al. [44] and Williamson [77]. Grossman and Hart [31] present a more formal treatment of contract incompleteness and asset ownership.

8. For example, some companies specify detailed executive compensation schemes in their corporate bylaws to leave very limited room for contract renegotiation. Some organizations have a “no counteroffer” policy to discourage salary bargaining. See section 3 in Hart and Moore [35] for an in-depth discussion of the difficulties associated with committing not to renegotiate a contract.

9. Thanks to Gordon Davis for offering this example based on his own experience. He worked as a consultant before joining academia, and an assistant was assigned to work with him shortly after his firm learned his intention to leave.

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## Appendix

### Proof of Proposition 1

THE FIRM'S OPTIMAL IT BUDGET ALLOCATION  $(C_1^*, C_2^*)$  that maximizes its long-term investment returns is determined by solving

$$\max_{C_1, C_2} q_i B_1(C_1) + q B_2(C_2) - C \quad \text{such that } C_1 + C_2 = C.$$

Because this objective function's second derivative is always negative, its interior maximum  $(C_1^*, C_2^*)$  is given by  $q_i B_1'(C_1^*) - q B_2'(C_2^*) = 0$ . However, the incumbent manager's objective in IT investment is to maximize his or her long-term human capital returns by solving

$$\max_{C_1, C_2} \lambda(R_i - R_r) + \theta(R_i - C - \lambda(R_i - R_r)) \quad \text{such that } C_1 + C_2 = C.$$

This objective function can be simplified as  $(1 - \theta)\lambda(R_i - R_r) + \theta(R_i - C)$ , and its second derivative is  $(1 - \theta)\lambda(q_i - q_r)B_1''(C_1) + \theta q_i B_1''(C_1) + \theta q B_2''(C_2) < 0$ . So any non-boundary maximum  $(C_1^{**}, C_2^{**})$  should satisfy  $(1 - \theta)\lambda(q_i - q_r)B_1'(C_1^{**}) + \theta(q_i B_1'(C_1^{**}) - q B_2'(C_2^{**})) = 0$ . Rearranging the equation, we have  $q_i B_1'(C_1^{**}) - q B_2'(C_2^{**}) = (1 - 1/\theta)\lambda(q_i - q_r)B_1'(C_1^{**}) < 0$ . Because  $q_i B_1'(C_1) - q B_2'(C - C_1)$  monotonically decreases with

$C_1$ , it is easy to see that  $C_1^{**} > C_1^*$  and  $C_2^{**} < C_2^*$ . If we also consider the possibility that  $C_1^{**} > C$ , the manager's personal optimal IT budget allocation is  $\min(C_1^{**}, C) > C_1^*$ . Q.E.D.

### Proof of Proposition 2

The proof is similar to that of Proposition 1, and it is omitted here.

### Proof of Propositions 3 and 4

In our model, any nonboundary maximum  $(C_1^{**}, C_2^{**})$  should satisfy  $(1 - \theta)\lambda(q(E_r, I_i) - q(E_r, I_r))B'_1(C_1^{**}) + \theta(q(E_r, I_i)B'_1(C_1^{**}) - qB'_2(C_2^{**})) = 0$ . Rearranging the equation, we have  $[(1/\theta - 1)\lambda(q(E_r, I_i) - q(E_r, I_r)) + q(E_r, I_i)]B'_1(C_1^{**}) = qB'_2(C_2^{**})$ . It is easy to see that  $C_1^{**} = C_1^*$  when either  $\theta = 1$  or  $\lambda = 0$ .

Defining  $f(\theta, \lambda) = (1/\theta - 1)\lambda[q(E_r, I_i) - q(E_r, I_r)] + q(E_r, I_i)$ , we have  $\partial f(\theta, \lambda)/\partial \theta < 0$  and  $\partial f(\theta, \lambda)/\partial \lambda > 0$ . It is also easy to see that  $\partial B'_1(C_1)/\partial C_1 < 0$  and  $\partial B'_2(C_2)/\partial C_2 > 0$ . Hence, we have  $\partial C_1^{**}/\partial \theta < 0$  and  $\partial C_1^{**}/\partial \lambda > 0$ . Of course, in the case of the boundary solution, small changes in  $\theta$  or  $\lambda$  do not affect the IT manager's personal optimal budget allocation. Q.E.D.

### Proof of Propositions 5 and 6

In our model, any nonboundary maximum  $(C_1^{**}, C_2^{**})$  should satisfy  $(1 - \theta)\lambda(q(E_r, I_i) - q(E_r, I_r))B'_1(C_1^{**}) + \theta(q(E_r, I_i)B'_1(C_1^{**}) - qB'_2(C_2^{**})) = 0$ . Differentiating the equation totally with respect to  $E_r$ , we get

$$\begin{aligned} & \left[ (1 - \theta)\lambda(q(E_i, I_i) - q(E_r, I_r))B''_1(C_1^{**}) + \theta q(E_i, I_i)B''_1(C_1^{**}) + \theta qB''_2(C_2^{**}) \right] \frac{\partial C_1^{**}}{\partial E_r} \\ & = (1 - \theta)\lambda B'_1(C_1^{**}) \frac{\partial q}{\partial E_r}. \end{aligned}$$

Since  $B'_1(C_1) > 0$ ,  $B'_2(C_2) > 0$ ,  $B''_1(C_1) < 0$ ,  $B''_2(C_2) < 0$  and  $(\partial q/\partial E_r) > 0$ , we know that  $(\partial C_1^{**}/\partial E_r) < 0$ . Because of the symmetry between  $E_r$  and  $I_r$ , we immediately have  $(\partial C_1^{**}/\partial I_r) < 0$ .

We know from Proposition 1 that  $C_1^{**} > C_1^*$ , which completes the proof of Propositions 5 and 6 for all nonboundary maximum  $(C_1^{**}, C_2^{**})$ . Of course, in the case of the boundary solution, small changes in  $E_r$  or  $I_r$  do not affect the IT manager's personal optimal budget allocation. Q.E.D.

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