

Investing in Information Systems: On the Behavioral and Institutional Search Mechanisms Underpinning Hospitals' IS Investment Decisions

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Abstract

Integrating tenets of behavioral and institutional theories, we identify four recurring technological search processes that prompt senior managers to allocate organizational resources to information systems (IS). We suggest that senior managers' IS investment decisions are influenced by perceived shortfalls in organizational performance (*problemistic search*), abundant organizational resources (*slack search*), prior IS investment decisions in their own organization (*institutionalized search*), and IS investment patterns of other comparable organizations (*mimetic search*). Further, we hypothesize that senior managers will be more risk averse in their IS investment decisions when their organization lacks sufficient regulatory legitimacy.

Based on the analysis of panel data from all public non-specialist hospital organizations in England, our findings suggest that senior managers' IS investment decisions are indeed driven not only by the desire to improve organizational performance, but also by the need to achieve continuity in resource allocation and to signal compliance with external norms and expectations. The objective of making adequate use of uncommitted resources, however, was found to be salient as a trigger of IS investment only among organizations with low regulatory legitimacy. Our study thus highlights that instrumental and ceremonial motives shape - and constrain - senior managers' IS investment decisions. These insights into the pre-investment stage are also of practical relevance, as they will enable IS managers to more effectively make the case for IS investment.

Keywords: *Information Systems; Business Value; Decision-Making; Technological Search; Behavioral Theory of the Firm; Institutional Theory; Legitimacy*

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INTRODUCTION

Information systems (IS) have played a pivotal role in the radical transformation of industries and the rapid emergence of new business models especially in the sphere of services (Barrett et al. 2008; Bryson et al. 2004). With global annual IS expenditures surpassing the \$3 trillion threshold (Gartner 2011), IS has become a key strategic resource – a fact that is reflected in the vast body of research on the business value of IS (Barua et al. 1995; Hitt and Brynjolfsson 1996; Kohli and Devaraj 2003; Kohli and Grover 2008; Melville et al. 2004). Although the resulting evidence base is far from unequivocal, this literature has contributed much to untangling the causal chain through which IS investments enhance organizational performance. Studies in this research stream, however, tend to treat IS investment as a ‘given.’ The primary emphasis is hence placed on evaluating the consequences of IS investments, with few exceptions where researchers have examined how IS investment decisions are made in the first place (Kobelsky et al. 2008; Xue et al. 2008). As a result, much less is known about what determines the amount of financial resources that senior managers – CEOs, executive directors and business division heads – are willing to allocate to the IS function in the face of competing priorities. Understanding the triggers of senior managers’ IS investment decisions, however, is critical for both IS scholarship and IS practice. As for the former, insights into senior managers’ various motives for IS investment are much needed, if the total business value of IS is to be assessed appropriately. As for the latter, the IS function crucially relies on senior management for funding IS initiatives yet often suffers from a profound credibility problem (Feldman 2012). Hence, it is all the more important for IS managers to better understand – and appeal to – the key motives that trigger senior managers to allocate scarce financial resources to the IS function.

Such insights are particularly needed in healthcare, a field that not only ranks among the largest sectors in many developed economies, but also places considerable hope on IS as an effective means of quality improvement and cost containment (Agarwal et al. 2010; Fichman et al. 2011). Despite some notable exceptions (Angst et al. 2010), however, the process of digitization has proceeded less rapidly and

less smoothly in healthcare than in most other service sectors (Menachemi et al. 2006; Venkatesh et al. 2011). The slow uptake of novel IS solutions in the clinical and administrative domain has been attributed in particular to insufficient resource allocations to IS (Jha et al. 2009). The scope of this relative underinvestment in IS is substantial as reflected in mean annual IS expenditures per employee of US \$ 3,000 among US healthcare organizations compared to US \$15,000 in banking (Porter and Teisberg 2006 p. 213) and an overall cross-industry average of \$8,000 (McAfee and Brynjolfsson 2008).¹ Healthcare managers' hesitancy to embrace health IT (HIT) might be due – at least in part – to uncertain payoff expectations resulting from the difficulty to appropriately assess the overall value contribution of IS investments encountered by IS professionals and scholars alike (Agarwal et al. 2010; Jha et al. 2009). Deeper insights into senior managers' IS resource allocation decisions and their underpinning motives for IS investment are thus needed, if IS research is to contribute to overcoming the barriers to both widespread HIT adoption and appropriate payoff assessment.

It is against this backdrop that our study seeks to identify some of the recurring triggering mechanisms that affect the aggregate IS investment intensity among hospitals. Inspired by recent IS research employing multiple theoretical perspectives to examine a phenomenon (Lapointe and Rivard 2007), we integrate insights from the behavioral theory of the firm (Argote and Greve 2007; Cyert and March 1963) and neo-institutional theory (DiMaggio and Powell 1983; Scott 1995). It is precisely by exploiting the well-established complementary nature of both theories (Gavetti et al. 2012; March 1994), that we hope to provide a more complete and realistic account of the multiple mechanisms underpinning hospital managers' IS investment decisions. As has been previously noted “alternatives to the current set of activities do not suddenly appear on the decision maker's desk, they have to be generated through a process of searching” (Greve 2003a p. 14).

Similarly, effective IS solutions are not immediately available, but must be searched for – a process that is fueled by hospital managers' decision to allocate additional organizational resources to the

¹ The IS expenditure figures for healthcare and banking in the U.S. were reported by the National Business Group on Health in 2004, while the overall average for the U.S. economy stems from the U.S. Bureau of Economic Analysis and refer to the year 2005.

IS function (Cyert and March 1963; Greve 2003b). Building on this understanding of IS investment as a form of organizational search, we argue that at least four recurring search mechanisms are at play when it comes to deciding on the total amount of resources hospital managers allocate to IS. Further, we account for the consequential role of regulatory authorities in healthcare (Ruef and Scott 1998; Scott et al. 2000) and examine the extent to which inter-organizational differences in regulative legitimacy will affect the relative salience of each of the four search mechanisms (Desai 2008).

To empirically examine our model, we draw on panel data from all 153 non-specialist public hospital organizations in England. Findings from dynamic panel data analyses suggest that hospital managers' IS investment decisions are driven not only by the desire to improve organizational performance (*problemistic search*), but also by the need to achieve predictability in resource allocation (*institutionalized search*) and to signal compliance with external norms and expectations (*mimetic search*). The objective of making adequate use of uncommitted resources (*slack search*), however, was found to be salient as a trigger of IS investment only among hospital organizations with low regulative legitimacy. Our study thus provides new insight into the mechanisms that trigger – or constrain – senior managers' IS investment decisions. In doing so, we move beyond the dominant economic-rationalistic paradigm in IS investment research (Fichman 2004; Orlikowski and Barley 2001) and highlight that the process of allocating resources to the IS function is simultaneously shaped by human agency, bounded rationality and external constraints. These insights also meaningfully complement prior research focusing on structural factors at the level of the environment, the organization and the technology as determinants of organizations' IS investment intensity (e.g. Dewan et al. 1998; Harris and Katz 1991; Kobelsky et al. 2008).

Below, we present the theoretical background and develop our hypotheses. Following the methods section, we describe our results. We then discuss implications for HIT research and practice as well as the generalizability of our theoretical arguments to the wider context of regulated industries and

possibly beyond (Johns 2006; Lee and Baskerville 2012). We conclude by highlighting the limitations of our study and sketching possible avenues for future research.

THEORETICAL BACKGROUND

IS Investment

IS investment and the complex process whereby such investments are translated into superior performance have long been themes at the very heart of IS research (Kohli and Devaraj 2003; Kohli and Grover 2008; Melville et al. 2004). As part of this important endeavor, scholars in general IS and health IT have focused much of their attention on examining three sequential stages of the IS investment process (See Table 1), which we label as adoption, usage and appropriation (Soh and Markus 1995).

The IS *adoption* stage pertains to the process of converting financial resources allocated to the IS function into actual IS assets (Huff and Munro 1985). This involves identifying, acquiring and implementing suitable IS solutions in a way that is consistent with the broader IS and business strategy of the adopting organization (Henderson and Venkatraman 1999; Weill and Ross 2004). IS adoption research in healthcare has identified inadequate financial resources, uncertain payoff expectations and high maintenance costs as barriers contributing to HIT adoption rates that are low overall, but exhibit high inter-hospital variation (Agarwal et al. 2010; Jha et al. 2009).

The IS *usage* stage encompasses the set of activities whereby adopted IS assets become an integral part of regular work practices (DeLone and McLean 1992; Venkatesh et al. 2008). This entails establishing broad user acceptance (Venkatesh et al. 2003) and implementing complementary assets to enhance the value creation potential of a novel IS solution (Melville et al. 2004). HIT research equally emphasizes the critical importance of actual IS usage (Devaraj and Kohli 2003), but reports low usage levels especially of clinical IS solutions (DesRoches et al. 2008; Venkatesh et al. 2011), which were found to be frequently subject to initial resistance or later avoidance by physicians (Kane and Labianca 2011; Lapointe and Rivard 2005).

The value *appropriation* stage, finally, comprises those activities that enable the focal organization to translate the routine use of appropriate IS into improved operational or financial outcomes within the focal organization. This requires aligning novel technologies and existing work routines (Barley 1986) as well as capturing the resulting value even when competitive dynamics might favor rent appropriation by competitors, suppliers or customers (Hitt and Brynjolfsson 1996). Consistent with such arguments, extant HIT research highlights the need for IS solutions and work routines to be reconfigured and co-evolved over time (Davidson and Chismar 2007; Goh et al. 2011). This has to be done in a way that does adequate justice to the idiosyncratic practices of the multiple occupational groups involved in increasingly multidisciplinary clinical care (Oborn et al. 2011).

This literature provides important insights into the process steps that have to be completed if the financial resources allocated to the IS function are to generate superior outcomes. As such, it has also contributed much to establishing the current consensus about the value creation potential of IS (Kohli and Grover 2008) and more specifically of HIT (Buntin et al. 2011). As we mentioned previously, however, this literature tends to treat the availability of financial resources for IS as a ‘given.’ Little is hence known about the initial *allocation* stage during which senior managers decide how and how much of the firm’s scarce financial resources should be allocated to the IS function (Xue et al. 2008), a decision that is likely to be affected by senior managers’ foci of attention and causal attributions. Extant research on the determinants of IS investment is limited in this regard, in that it is located in settings other than healthcare and focuses on structural correlates of IS investment intensity rather than on specific mechanisms triggering the allocation of scarce financial resources to the IS function (Dewan et al. 1998; Harris and Katz 1991; Kobelsky et al. 2008). Understanding these triggers is crucial as they constitute the starting point for IS value creation and determine IS managers² subsequent scope for action as well as senior managers’ payoff expectations. In many ways, the IS investment ‘die is cast’ at the allocation stage, with subsequent stages then focusing on how best to extract value.

² IS managers include IS directors, networks managers and analysts, among others.

Table 1: Stages of the IS Investment Process

	Stage 1 Allocation	Stage 2 Adoption	Stage 3 Usage	Stage 4 Appropriation
Primary Link	Financial resources --> IS investment	IS investment --> IS assets	IS assets --> IS use	IS use --> IS impacts
Main Question	How and how much to invest in IS?	What IS to adopt?	How to put IS into use?	How to reap the benefits of IS?
Focal Actors	Board of Directors Senior management	IS management Line management	IS management Line management	Line management IS management
Selected Contingencies	Managers' attention Managers' attributions	IS governance IS - strategy alignment	IS acceptance Complementary assets	IS - structure alignment Competitive dynamics
Illustrative Example	Top management decides to allocate more financial resources to IS	IS and line management identify, acquire and implement specific IS	IS and line management seek broad acceptance of new IS	Line management adjusts work routines to fully capture IS benefits
Selected IS References	Dewan and Michael 1998 Harris and Katz 1991 Kobelsky et al. 2008	Henderson and Venkatraman 1999 Weil and Ross 2004	DeLone and McLean 1992 Venkatesh et al. 2008	Barley 1986 Hitt and Brynjolfsson 1996
Selected HIT References		Agarwal et al. 2010 Jha et al. 2009 DesRoches et al. 2008	Devaraj and Kohli 2003 Kane and Labianca 2011 Venkatesh et al. 2011	Davidson and Chismar 2007 Goh et al. 2011 Oborn et al. 2011

Notes. The boxed area indicates the research gap addressed in this paper.

In Table 1 we summarize the four stages of the IS investment process described above and emphasize our explicit focus on the resource allocation stage. In the following section, we develop and test an integrated theoretical model of the multifaceted search mechanisms underpinning senior managers' IS investment decisions. Although we develop our arguments with particular emphasis on the hospital context of our study, the theoretical ideas advanced below are likely to be also valuable in explaining IS investment decisions in other regulated industries.

IS Investment Decisions and Organizational Search

Allocating scarce organizational resources across competing investment priorities constitutes one of senior managers' primary tasks (March and Simon 1958). Decisions on the overall amount of resources to be allocated to the IS function are thus likely to fall equally under the remit of senior management (Kobelsky et al. 2008; Weill and Ross 2004), with various other actors seeking to exert their influence at the allocation stage (Xue et al. 2008). Senior managers in hospitals and elsewhere, however, are limited with regards to their attentional capacity as well as their information-gathering and -processing abilities

(Ocasio 1997; Simon 1947). Given the realities of bounded rationality and incomplete information, senior managers are often unaware of all possible choice alternatives and their respective values. Gavetti et al. (2012) propose “Different from what the rational-agent model posits, information or choice alternatives do not naturally flow to them. They need to be searched” (pg. 5). This holds in particular for senior managers’ IS investment decisions which can be more challenging than many other decisions given the informational uncertainty related to the technical and economic value of IS (Powell 1992). Therefore, it is meaningful to conceptualize IS investment decisions as emerging from a process of goal-directed organizational search defined as a set of “routine activities directed toward examining alternative modes of organizing and assessing their effectiveness” (Mezias and Lant 1994 p. 182).

Given the expected multitude of coexisting objectives and mechanisms of search, an integrated theoretical approach to IS investment as a form of organizational search is warranted. As Allison and Zellikow’s (1999) seminal analysis of the Cuban missile crisis and Lapointe and Rivard’s (2007) insightful study of hospitals’ IS implementation demonstrate, the use of multiple complementary theories often yields more comprehensive and realistic accounts of complex decision making processes. In a similar vein, March (1994) contends that decision making is best understood when the analysis is informed by two complementary logics – a ‘logic of consequence’ and a ‘logic of appropriateness.’ The former is rooted in contemporary economics and psychology and views decision making as the boundedly rational process of identifying and selecting choice alternatives with expected consequences evaluated as satisfying decision makers’ preferences. The latter, in contrast, is rooted in contemporary sociology and anthropology and views decision making as the socially embedded process of identifying and selecting courses of action deemed appropriate according to some socially accepted norms and rules. Although proponents of each logic claim that one encompasses the other, both logics are indeed complementary. As March (1994 p. 102) states “empirical observations provide ample examples of behaviors that are hard to understand without attention to both perspectives, and neither [...] explains enough of the phenomenon to claim exclusive rights to truth.”

Recognizing the complementarity of both theoretical perspectives, we draw on the behavioral theory of the firm to account for the ‘logic of consequence’ (Argote and Greve 2007; Cyert and March 1963) and on neo-institutional theory to reflect the ‘logic of appropriateness’ (DiMaggio and Powell 1983; Scott 1995). Given the complementary nature of both theories and the character of the behavioral theory as an ‘open system’ that thrives on incorporating tenets from alternate theories, calls for such an integrated approach have been mounting (Gavetti et al. 2012; Shipilov et al. 2011). Clearly, the behavioral theory of the firm constitutes a highly valuable micro-level perspective designed to illuminate decision making processes by individual actors who are constrained by their own bounded rationality but otherwise enjoy considerable latitude in allocating resources and scoping search activities (Cyert and March 1963; Greve 2003b). Aware of the institutional constraints decision makers are often exposed to, however, Gavetti et al. (2012 p. 24) highlight the potential of the behavioral theory of the firm to “grow by paying greater attention to the effects of the institutional environment.” Neo-institutional theory, which enjoys growing popularity in the IS (Weerakkody et al. 2009) and HIT literature (Currie and Guah 2007), appears best positioned to fulfill this function in that it offers a highly complementary macro-level perspective focusing on the broader institutional field and the way in which expectations emanating from it tend to shape micro-level decision making.

It is hence by integrating tenets from the behavioral theory of the firm and neo-institutional theory that we hope to provide a richer explanation of organizational search in general and hospital managers’ IS investment decisions in particular. As we will describe in greater detail below, this integrated theoretical approach suggests that four recurring search mechanisms, labeled *problemistic search*, *slack search*, *institutionalized search* and *mimetic search*, underpin hospital managers’ IS investment decisions. The relative salience of each of these four search mechanisms is expected to be influenced by the extent to which organizational autonomy and survival are threatened (Miller and Chen 2004). In healthcare and other highly regulated industries (Desai 2008; Holburn and Bergh 2008), this is likely to be the case when regulatory authorities cease to endorse an organization or its activities and start to impose sanctions -

disciplinary actions that were shown to contribute to the death of healthcare organizations (Ruef and Scott 1998; Scott et al. 2000). We thus also explore below the potential moderating role of regulative legitimacy, that is, of “the generalized perception or assumption [of a regulatory authority] that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” (Suchman 1995 p. 574). In particular, we will argue that the withdrawal of regulative legitimacy threatens a hospital’s very license to operate and is hence likely to affect hospital managers’ strategic priorities and the subsequent salience of the four search mechanisms underpinning their IS investment decisions.

HYPOTHESES

IS Investment as Problemistic Search

According to the behavioral theory of the firm, senior managers will search for alternatives to the current set of activities whenever they consider the performance of their organization to be unsatisfactory (Greve 2003a; Jordan and Audia 2012). This first search mechanism, that is, “search that is stimulated by a problem [...] and is directed toward finding a solution to that problem” (Cyert and March 1963 p. 121), is commonly known as *problemistic search*.

As problemistic search is triggered by negative performance feedback, the process whereby senior managers evaluate the performance of their organization takes center stage. This evaluation process requires senior managers to define goal variables for their organization and to set aspiration levels for each. As March (1994 p. 28) states, “decision makers set aspiration levels for important dimensions – firms for sales and profits, museums for contributions and attendance, colleges for enrollments and placements.” Such aspiration levels can be understood as the lowest level of goal attainment senior managers deem satisfactory. They are typically based on an organization’s own prior performance level (i.e. *historical* aspirations) or the performance level of an organization’s reference group (i.e. *social* aspirations) (Baum et al. 2005; Greve 1998). Hospital managers, for instance, might aspire to reach at least the mean clinical performance level of their respective hospital category (e.g. teaching hospitals).

Once aspiration levels have been set, senior managers regularly monitor key goal variables by comparing actual performance levels against their aspirations. This performance evaluation process constitutes an important feedback mechanism to assess the appropriateness of organizational routines and resources (Cyert and March 1963). A decline in performance relative to aspirations thus signals to senior managers that existing routines are failing to deliver the intended outcomes and must be renewed (Greve 2003a).

Performance shortfalls hence trigger problemistic search activities, as part of which senior managers seek to identify adequate solutions to the performance problem at hand. Problemistic search can come in multiple shapes (Cyert and March 1963), such as greater risk taking (Miller and Chen 2004), higher investments in R&D (Greve 2003b) and increased external advice seeking (McDonald and Westphal 2003). Importantly, prior research has established that problemistic search tends to occur locally, as senior managers hope to identify suitable solutions in vicinity of the identified problem area (Gavetti et al. 2012; Stuart and Podolny 1996). The extent to which problemistic search involves increases in IS investment is likely to be a function of both senior managers' causal attributions and their perceptions of the general problem-solving potential of IS. In particular, the role of IS for problemistic search will hinge on the extent to which senior managers perceive IS as a suitable solution to the performance problem at hand.

The IS payoff literature suggests that the expected benefits of IS, if implemented appropriately, are likely to outweigh its costs (Kohli and Devaraj 2003; Kohli and Grover 2008). This makes IS a pivotal instrument with considerable potential to enhance organizational performance in the long-term, although the introduction of novel IS solutions might lead to a short-term performance downturn due to the temporary disruption of existing routines (Barnett and Freeman 2001). In healthcare, negative side-effects of IS implementation have been reported in some studies (e.g. Koppel et al. 2005). Recent meta-analyses (Buntin et al. 2011) and large-scale studies (Angst et al. 2011), however, provide robust evidence that IS can indeed assist in the effective redesign of administrative and clinical processes and hence improve

hospital performance as measured by patient mortality (Devaraj and Kohli 2003; Piontek et al. 2010), medication errors (Aron et al. 2011) and profitability (Devaraj and Kohli 2000).

In light of this evidence and the growing emphasis that policy makers place on the cost-containment and quality-improving effects of HIT (Agarwal et al. 2010), we expect hospital managers to consider the allocation of additional resources to IS as a solution especially to those problems that call for a radical process redesign or enhanced information needs. Kohli and Kettinger (2004) provide supporting evidence and describe how the threat of financial losses triggered the management of a community hospital to allocate additional funds to establish an information system to track physician-driven cost and quality outcomes. We therefore anticipate hospital managers' problemistic search efforts to materialize in increased IS investment. Hence:

***Hypothesis 1.** A decline in a hospital's performance relative to aspirations will be associated with a subsequent increase in its IS investment intensity.*

IS Investment as Slack Search

In addition to organizational performance, senior managers routinely evaluate the level of uncommitted resources in their organization (Cyert and March 1963). When resources are viewed as being in surplus, so the behavioral argument goes, senior managers will seek to identify promising investment opportunities - a process commonly known as *slack search* (Iyer and Miller 2008). Slack search "stems from extra time and resources that allow for experimentation" (Jordan and Audia 2012 p. 211). As March (1994 p. 32) describes, "slack search differs in character, as well as timing, from search under adversity. It is less tightly tied to key objectives and less likely to be careful. It involves experiments that [...] allow for serendipity, foolishness and variation." Financial slack in particular acts as an important safety net that buffers the organization from the downside risks associated with search activities. As such, it increases senior managers' room to maneuver and provides them with greater flexibility when it comes to deciding upon discretionary investments (Nohria and Gulati 1996).

Consistent with such arguments, prior research has revealed that financial slack increases risk-taking (Bromiley 1991), intensifies investment in R&D (Chen and Miller 2007) and facilitates innovation adoption (Damanpour 1991). Slack therefore seems to relax organizational controls and increase senior managers' propensity to sponsor - and allocate resources to - discretionary activities with uncertain and often relatively distant returns that might not have been approved in times of austerity (Cyert and March 1963). This is also likely to apply to IS investments, which are typically regarded as discretionary and risky in that a positive payoff occurs neither immediately nor automatically (Kohli and Grover 2008). As such, IS investments are expected to be particularly reliant on the availability of slack resources. Moreover, agency theorists suggest that senior managers will have an incentive to convert free cash flow into resources under their control in an effort to increase the set of options they can exercise when faced with the need to improve performance in the future (Jensen 1986). Empirical evidence suggests that this tendency might also be at play when senior managers substantially increase their IS investments in the face of financial slack (Dewan et al. 1998). Similarly, Kobelsky et al. (2008) found aggregate IS budget levels to increase following declines in organizations' debt ratio, because it eased the pressure on senior managers to delay, scale back or even abandon IS expenditures.

In healthcare, financial slack was found to increase the level and persistence of hospitals' largely discretionary R&D activities (Salge 2011, 2012). With regards to hospitals' IS investments, Kimberly and Evanisko (1981) revealed that senior managers in larger hospitals, which arguably possess greater resources, are more inclined to adopt electronic data processing technologies than their counterparts in smaller hospitals. Similarly, Angst et al. (2010) developed a social influence model of HIT diffusion amongst hospitals and found that larger hospitals with more slack resources are better positioned to adopt electronic medical records. In light of the theoretical arguments and extant empirical evidence, we expect the availability of slack resources to enhance hospital managers' ability and willingness to allocate additional resources to IS. Thus:

Hypothesis 2. *An increase in a hospital's level of financial slack will be associated with a subsequent increase in its IS investment intensity.*

IS Investment as Institutionalized Search

Over time, senior managers are expected to contribute to the institutionalization of organizational search (Chen and Miller 2007). As part of this process, specific search patterns gradually become engrained in organizational structures, resources and capabilities leading to greater temporal stability in organizations' search activities. As March (1994 p. 30) describes, organizations "may create "search departments" both to solve problems [...] and to find them [...]. This search tends to be orderly, standardized, and somewhat independent of success or failure" and is commonly known as *institutionalized search* (Greve 2003a).

Institutionalized search appears desirable for senior managers not least because of the greater efficiency and predictability it entails. In particular, it lowers the burden of seeking to anticipate distant futures and configure organizational search processes accordingly – activities that are most challenging in times of high uncertainty and imperfect information (Gavetti et al. 2012). Further, it reduces the need for repeated internal negotiations and lengthy issue selling (Dutton and Ashford 1993), hence economizing on senior managers' limited time and attention. As such, institutionalized search constitutes an effective coping mechanism that reduces the complexity of senior managers' resource allocation decisions (Greve 2003a). At the same time, it increases the predictability of managerial decision making, which allows IS and other functional managers not only to develop dedicated structures and specific competencies but also to maintain them over time. By issuing an ongoing mandate for search and establishing visible structural representations thereof, senior managers also show conformity with external expectations and signal their progressiveness of operation (Tolbert and Zucker 1983). Such behavior increases the likelihood of an organization and its actions being considered as acceptable to external entities, which in turn enhances organizations' legitimacy and survival prospects (Meyer and Rowan 1977).

A growing body of empirical evidence supports these theoretical arguments. Several scholars have detected, for instance, high temporal persistence in the innovative search efforts of organizations in

general (e.g. Chen and Miller 2007; Helfat 1994) and hospitals in particular (Salge 2012). This institutionalization is fueled not least by senior managers' increasing willingness to establish a dedicated R&D infrastructure and to commit a stable minimum share of annual revenues to R&D – an activity that is often perceived as indicating technological excellence and product leadership (Greve 2003a). A similar pattern of institutionalization can be observed with regards to IS. In most industries - including healthcare - establishing dedicated IS departments, IS budgets and IS leadership roles is seen as a strategic necessity rather than an optional luxury (Clemons and Row 1991). In particular, sufficiently high levels of IS investment, assets and usage are now widely considered a vital precondition for - and signal of - effectiveness and efficiency in business operations (Kohli and Grover 2008). Senior managers in healthcare and elsewhere are therefore exposed to growing pressures emanating from the institutional environment to pursue a sustained IS investment program (Kobelsky et al. 2008). This often implies dedicating a set minimum percentage of annual revenues to the IS function, thereby facilitating the development of long-term IS strategies and contributing to high temporal stability in organizations' IS investment patterns (Hu and Quan 2006). Hence:

Hypothesis 3. *A hospital will exhibit high levels of temporal persistence in its IS investment intensity.*

IS Investment as Mimetic Search

In addition to fostering temporal persistence, strong institutional pressures increase senior managers' propensity to imitate the behavior of other organizations in their reference group (DiMaggio and Powell 1983). Such mimetic behavior is less motivated by the perceived technical value of a specific structure or practice than by senior managers' need to establish and maintain the legitimacy of their organization as granted by external stakeholders (Meyer and Rowan 1977; Zucker 1987). For this purpose, senior managers engage in a process of *mimetic search*, as part of which they “search for information about what organizational characteristics are legitimated in their environmental niche” (Mezias and Lant 1994 p. 182).

Since “practices, forms, and rules become more legitimate as more decision makers use them” (March 1994 p. 100), mimetic search involves the close observation of decision making patterns prevailing within a well-defined institutional field (Barreto and Baden-Fuller 2006). Mimetic search is facilitated not least by professional associations, consulting firms, educational institutions and publishing houses, all of which actively promote the inter-organizational diffusion of apparent best practices (Abrahamson 1996). By mimicking widely adopted structures and practices, senior managers reduce the likelihood that their organization will be perceived as violating prevalent expectations and institutional models of organizing (DiMaggio and Powell 1983; Meyer and Rowan 1977). Conformity, i.e. alignment with what is considered ‘normal’ behavior in an institutional field, is therefore seen as an effective means to maintain organizational legitimacy and reduce an organization’s “vulnerability to negative assessments of its conduct, products, or services” (Oliver 1991 p. 153). Consistent with these conceptual ideas, prior research has revealed that senior managers mimic reference group behavior with regards to choices of organizational form (Lee and Pennings 2002), market entry (Haveman 1993), market position (Greve 1998), strategy abandonment (Greve 1995), branch location (Barreto and Baden-Fuller 2006), acquisition activity (Haunschild 1993) and R&D investment (Chen and Miller 2007). In line with theoretical predictions, mimetic isomorphism was found to be notably more effective in enhancing organizational legitimacy (Deephouse 1996) than in improving organizational performance (Barreto and Baden-Fuller 2006).

Mimicry is particularly salient with regards to those structures and practices that are observable and strategically relevant, but suffer from uncertainty with regards to their performance benefits (Greve 1998). As DiMaggio and Powell (1983 p. 154) summarize, “the more uncertain the relationship between means and ends the greater the extent to which an organization will model itself after organizations it perceives to be successful.” Under such conditions, imitation of peer behavior constitutes a simple and cost-effective solution to the informational problem senior managers face (Lieberman and Asaba 2006). They will hence be more inclined to rely on the visible choices of comparable organizations to inform

their own decisions (Cyert and March 1963). Given the high visibility, strategic relevance and uncertain payoff of many IS solutions, mimetic isomorphism is expected to be particularly salient in shaping IS investment decisions (Tingling and Parent 2002). It is therefore not surprising that the observation and imitation of reference group behavior were found to be important triggers of senior managers' decisions to adopt and use information technologies as diverse as electronic data interchange (EDI) (Teo et al. 2003), electronic B2B marketplaces (Son and Benbasat 2007), inter-organizational business process standards (Bala and Venkatesh 2007) and enterprise resource planning (ERP) (Liang et al. 2007). Although little is known about the role of mimetic forces in the first stage of the IS investment process, it is plausible that such forces will also be at play when it comes to determining the aggregate amount of financial resources to be allocated to the IS function (Kobelsky et al. 2008).³ How else could the fact be explained that most organizations - largely irrespective of their financial solvency - dedicate between three and five percent of their annual revenues to the IS function (Hu and Quan 2006)?

Among hospitals, mimetic pressures are particularly pronounced given the high level of goal ambiguity, the marked dominance of a single organizational model and the vital reliance on regulatory endorsement (DiMaggio and Powell 1983; Scott et al. 2000). As a result, hospital managers were found not only to invoke mimetic pressures to justify organizational change (Arndt and Bigelow 2000), but also to mimic peer behavior when adopting total quality management (TQM) techniques – a strategy that led to higher organizational legitimacy but lower efficiency (Westphal et al. 1997). Similarly, Angst et al. (2010) uncovered hospital managers' decision to adopt electronic medical records (EMR) to be influenced by prior adoption decisions of hospitals that were either socially and spatially proximal or enjoyed 'celebrity' status. In light of the theoretical arguments and empirical evidence presented, we expect hospital managers to conform to prevailing IS investment patterns in the organizational reference group, when deciding on the aggregate amount of resources to be allocated to the IS function. Therefore:

³ In contrast, other types of external pressures - in particular coercive and normative pressures - are expected to be notably less salient at the allocation stage, as organizations' aggregate IS investment intensity is typically neither of direct interest to powerful external actors (i.e. *coercive* pressures) nor subject to professional norms and standards (i.e. *normative* pressures).

Hypothesis 4. *An increase in the mean IS investment intensity of a hospital's reference group will be associated with a subsequent increase in its own IS investment intensity.*

In Table 2 we summarize the four search mechanisms put forth above.

Table 2: Search Mechanisms Underpinning IS Investment Decisions

	Behavioral Search Mechanisms		Institutional Search Mechanisms	
	Mechanism 1 Problemistic Search	Mechanism 2 Slack Search	Mechanism 3 Institutionalized Search	Mechanism 4 Mimetic Search
Foundations	March and Simon 1958 Cyert and March 1963	March and Simon 1958 Cyert and March 1963	Meyer and Rowan 1977 DiMaggio and Powell 1983	Meyer and Rowan 1977 DiMaggio and Powell 1983
Trigger	Performance problems	Slack resources	Own investment history	Peer investment decisions
Primary Motive	Identifying solutions to perceived problems in organizational performance	Identifying opportunities to make the best possible use of uncommitted resources	Achieving continuity and predicatability in IS resource commitments	Signaling conformity with prevailing IS investment patterns in the organizational reference group
Illustrative Example	Hospital managers fail to achieve organizational performance targets and decide to allocate additional resources to IS to support planned process improvements	Hospital managers detect availability of uncommitted liquidity and decide to allocate additional resources to IS to boost an ongoing technology modernization initiative	Hospital managers seek to simplify the IS resource allocation process and decide to commit at least three percent of annual revenues to IS over the next 5 years	Hospital managers notice that their competitors invest notably more in IS and decide to allocate additional resources to IS to close this investment gap
Related IS insights	Broad consensus on general value creation potential of IS (e.g. Kohli and Grover 2008)	Negative link between organizations' debt ratio and their IS budgets (e.g. Kobelsky et al. 2008)	Prevalence of ongoing mandates and stable structures for IS (e.g. Clemons and Row 1991)	Salience of mimetic isomorphism at IS adoption and usage stage (e.g. Angst et al. 2010)
Selected References from Org. Theory	Desai 2008 Greve 2003a Jordan and Audia 2012 Miller and Chen 2004	Bromiley 1991 Greve 2003a Iyer and Miller 2008 Nohria and Gulati 1996	Chen and Miller 2007 Greve 2003b Helfat 1994 Tolbert and Zucker 1983	Chen and Miller 2007 Greve 1998 Haveman 1993 Oliver 1991

These four search mechanisms underpinning hospitals' IS investment decisions differ notably with regards to the benefits they promise and the risks they involve. Problemistic search strives for tangible performance improvements, while mimetic search seeks to enhance external endorsement. Slack search allows for "safe" experiments with high, yet uncertain returns, while institutionalized search provides predictability and efficiency in resource allocation. Considering the unique value proposition of each type, senior managers are expected to tailor their configuration of search mechanisms to their prevalent strategic priorities. In one situation, senior managers may place a premium on organizational

legitimacy and risk avoidance, while they may give preference to organizational performance and risk taking in another (March and Shapira 1987).

The Moderating Role of Regulative Legitimacy

The relative importance senior managers assign to these competing priorities was found to be influenced, above all, by the extent to which organizational survival is threatened (March and Shapira 1992; Miller and Chen 2004). In healthcare and other highly regulated industries (Agarwal et al. 2010; García-Canal and Guillén 2008), this tends to be the case when regulatory authorities cease to endorse an organization or some of its activities (Deephouse and Suchman 2008; Johnson et al. 2006). In these settings, regulators play a vital role given their explicit rule-setting, monitoring, rewarding and sanctioning powers (Ruef and Scott 1998; Scott et al. 2000). The withdrawal of regulative legitimacy puts organizational autonomy at risk as it triggers regulatory interventions that may involve financial penalties, executive replacement and even the (partial) closure of facilities (Deephouse and Carter 2005; Johnson et al. 2006). Ultimately, a loss of regulative legitimacy threatens the ‘going concern’ status and very survival of a hospital who sees its license to operate, i.e. the “right to exist and to pursue its affairs in its chosen manner” (Knoke 1985 p. 222), being removed. It is hence not surprising that organizational exit rates were found to be notably higher for home health agencies that had their license suspended (Scott et al. 2000) and for hospitals that lacked endorsement by accreditation agencies (Ruef and Scott 1998). When confronted with a lack of regulative legitimacy, senior managers’ in hospitals and other highly regulated industries must focus their attention on restoring the endorsement of key regulatory authorities, if they are to achieve the most basic of objectives, namely organizational survival (Meyer and Rowan 1977). When focusing on safeguarding organizational survival, senior managers tend to be risk averse in their decision making and search activities – a phenomenon known as the threat-rigidity hypothesis (Staw et al. 1981). In such a situation, hospital managers are hence also expected to be conservative in their IS investment decisions and favor those search mechanisms that are perceived as low risk and legitimacy-enhancing.

Below, we describe how these managerial preferences are likely to enhance the salience of both slack search and mimetic search in times of low regulative legitimacy.

Given its risk-buffering effect, *slack search* is expected to be most valued by senior managers who have seen the regulative legitimacy of their hospital being withdrawn raising fundamental concerns about its survival prospects (Salge 2011). As Tan and Peng (2003 p. 1250) state, “especially during turbulent, rainy days, slack enables the firm to hang in there” – an observation corroborated by the fact that slack was found to enhance the survival rate of hospitals (Ruef and Scott 1998) and firms in general (Hambrick and D’Aveni 1988). In particular, financial slack reduces a hospital’s vulnerability to the downside risks often associated with organizational search in general (Greve 2003b) and IS investments in healthcare (Heeks 2006; Jaana et al. 2006) and beyond (Keil 1995; Lyytinen and Hirschheim 1987) in particular.⁴ This cushioning function of slack is vital when threats to hospital autonomy and survival require senior managers to minimize any unhedged and potentially fatal risks emanating from novel IS investments (Nohria and Gulati 1996). Hence, it is in times of fundamental legitimacy threats that hospital managers will be especially reliant on financial slack to fuel additional IS investments, should they be willing to sponsor them at all. In times of high regulative legitimacy, in contrast, risk tolerance increases which is expected to weaken the association between a hospital’s level of financial slack and its subsequent IS investments. Therefore:

Hypothesis 5a. *The lower a hospital’s level of regulative legitimacy, the higher will be its reliance on slack search for IS investment.*

Given its legitimacy-enhancing effect, *mimetic search* is equally expected to gain in salience when hospital managers are confronted with survival threats due to regulative legitimacy challenges. In such a situation, senior managers will focus not only on eliminating any unwarranted risks, but also on restoring regulative legitimacy (Benner and Ranganathan 2012; Suchman 1995). In institutional fields

⁴ The initial failure (Beynon-Davies 1995) and later turnaround (2005) of the London Ambulance Computer Aided Dispatch System is a well-known case in point. A substantial IS investment project undertaken to automate emergency call processing and ambulance dispatching in London, it was affected by substantial implementation problems which resulted not only in substantial financial losses but also in unacceptably long emergency response times, a public inquiry and the replacement of the chief executive.

characterized by high informational uncertainty and causal ambiguity such as healthcare, senior managers will often find it easiest to adopt a conformist approach which signals their allegiance to prevailing institutional models (Deepphouse 1996; Oliver 1991). Simply mimicking the IS investment decisions of other hospitals in the same reference group and following apparent best practices might thus be the fastest way for hospital managers to repair legitimacy. Indeed, institutional theory points to mimetic isomorphism as a primary means for (re)establishing organizational legitimacy (DiMaggio and Powell 1983; Meyer and Rowan 1977). Consistent with this theoretical proposition, hospital managers' decision to mimic peer behavior with regards to the adoption of total quality management (TQM) practices was found to be motivated by the desire to enhance not only economic performance but also organizational legitimacy (Kennedy and Fiss 2009). Hospital managers who focus their attention on restoring regulative legitimacy as a means to increase survival chances are thus expected to rely more strongly on mimetic search. Conversely, senior managers of hospitals with high regulative legitimacy will focus on performance improvement instead of legitimacy enhancement (March and Shapira 1987; Miller and Chen 2004). Despite limited prior empirical evidence, this pattern is also expected to characterize hospitals' IS investment decisions, such that hospitals managers' tendency to imitate peer IS investment behavior will increase with lower levels of regulative legitimacy. Hence:

Hypothesis 5b. *The lower a hospital's level of regulative legitimacy, the higher will be its reliance on mimetic search for IS investment.*

When regulative legitimacy is considered adequate, in contrast, senior managers will shift their focus of attention from survival towards aspiration levels (March and Shapira 1987; Ocasio 1997). When being concerned with improving performance instead of repairing legitimacy, hospital managers will be more risk tolerant in their search activities and less conservative in their IS investment decisions. They will hence give preference to those search mechanisms that they perceive as performance- and predictability-enhancing even if they are risky. As we explain below, this is likely to entail a stronger reliance of hospital managers on both problemistic search and institutionalized search in times of high regulative legitimacy.

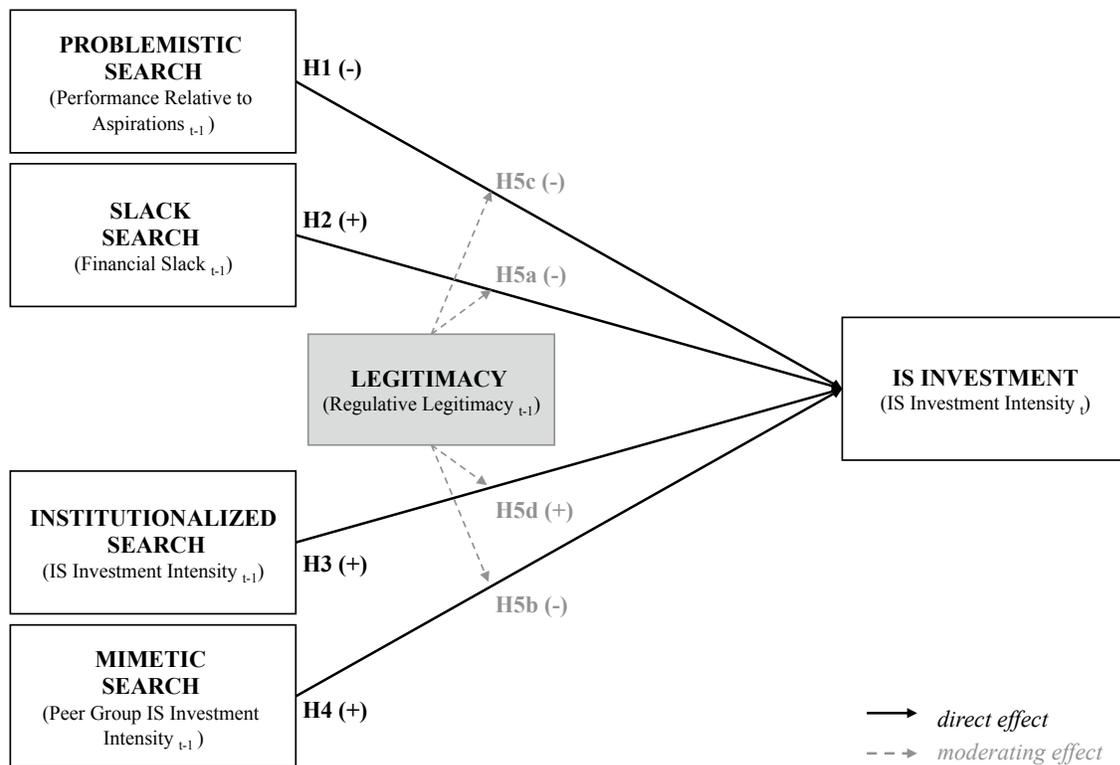
Given its performance-enhancing effect, *problemistic search* is expected to gain in salience as regulative legitimacy increases, thereby liberating senior managers from immediate threats to hospital survival. In such a situation, hospital managers will strive to attain set aspiration levels and will seek solutions that promise to narrow any gap that may exist between actual and desired performance levels (Cyert and March 1963). To this end, they are willing to take calculated risks typically associated with search activities that are not hedged by slack resources (Miller and Chen 2004). All else being equal, hospital managers will hence invest more strongly in IS as a possible solution to the performance problems they face when regulative legitimacy is high. In line with this proposition, senior managers of railroad companies (Desai 2008) and public hospitals (Salge 2011) were found to respond to performance shortfalls by making substantial investments in capacity expansion and R&D activity, respectively, only when organizational legitimacy is not under threat. Conversely, when legitimacy is inadequate and the threat of painful sanctions imminent, hospital managers will be risk averse and reluctant to engage in search activities with uncertain and distant payoffs which characterize most IS investments (Kobelsky et al. 2008). Given the theoretical arguments and empirical evidence available, the link between perceived performance shortfalls and subsequent IS investments is expected to become stronger with higher levels of regulative legitimacy. Therefore:

Hypothesis 5c. *The higher a hospital's level of regulative legitimacy, the higher will be its reliance on problemistic search for IS investment.*

Given its predictability-enhancing effect, *institutionalized search* is equally expected to become more salient as regulative legitimacy increases. It is precisely the absence of immediate threats to organizational autonomy and survival that allows senior managers in hospitals and elsewhere to adopt a longer-term perspective towards organizational search (Miller and Chen 2004). Managers are then more inclined to make continued resource commitments to largely discretionary search activities such as IS, thereby trading managerial discretion and flexibility against predictability and efficiency in resource allocation (Chen and Miller 2007). Sustained sponsorship and the reduced uncertainty this entails are likely to enhance the efficiency and effectiveness of organizational search in general and IS investment

decisions in particular, as dedicated structures and specific competencies can be developed and maintained over time (Greve 2003a). Once established, these structures will act as a powerful inertial force that further fortifies persistence in resource allocation and remains unchallenged in times of continuity (Hannan and Freeman 1984). It then requires a major crisis such as the withdrawal of regulative legitimacy for hospital managers to reassess their institutionalized search activities (Huff et al. 1992). In this case, senior managers will have to review their resource allocation priorities and are likely to place a premium on latitude in resource allocation (Staw et al. 1981).

Figure 1: A Search Model of IS Investment



Notes. 't' denotes the current year and 't-1' the previous year.

They may hence seek to scale back largely discretionary, institutionalized search activities in an attempt to increase their flexibility to shift scarce financial resources to those areas that are believed to have the highest legitimacy- and survival-enhancing effect (Benner and Ranganathan 2012). Such reallocation decisions tend to increase the volatility of IS investments. We hence expect the level of

temporal stability in IS investment intensity, i.e. the reliance on institutionalized search, to be higher among hospitals with high regulative legitimacy than among hospitals with low regulative legitimacy.

Thus:

***Hypothesis 5d.** The higher a hospital's level of regulative legitimacy, the higher will be its reliance on institutionalized search for IS investment.*

Figure 1 depicts our proposed model of IS investment as a form of organizational search with annotations of our hypotheses.

METHODS

Setting and Data

To empirically test our proposed conceptual model, we locate our study in the context of public hospital services in England provided by the National Health Service (NHS).⁵ Founded in 1948, the NHS is the world's largest public health service accounting for nearly 90 percent of national health expenditures and 7.9 percent of the English gross domestic product (GDP). We draw on panel data from the entire population of non-specialist, public hospital organizations in the English NHS. This population is composed of 153 Acute Trusts (similar to health systems in the USA), each of which manages an average of 2.35 hospitals and 40.86 clinical wards. Our balanced panel dataset contains five years of observations (April 2002 to March 2007) for each Trust for a total of 765 data points.⁶ These hospital organizations provide the vast majority of all general acute care services in England. In 2006-07, for instance, they admitted a total of 12.2 million patients for hospital care using 120,000 beds while employing more than 580,000 staff members (in full-time equivalents). In the same year, IS expenditures of these 153 organizations amounted to nearly 630 million British pounds (US \$1.18 billion)⁷, a mean of nearly US \$7.8 million per organization or US \$2,031 per hospital employee (full-time equivalent), which

⁵ Predominantly public health systems can be found in numerous countries around the world including Italy, Spain, Portugal, Canada, Australia and New Zealand.

⁶ Since all explanatory variables have been lagged by one year, 153 observations of the first year are unusable. Our analysis thus fully utilizes 612 observations.

⁷ To convert the value into US dollars, we used the average interbank exchange rate for the financial year from April 2006 to March 2007.

is below the figure of US \$ 3,000 reported for US healthcare organizations (Porter and Teisberg 2006 p. 213).

Given their vital importance for human well-being and their sustained reliance on public funding, hospitals in numerous countries are subject to strong regulatory oversight (Scott et al. 2000). Hence, hospitals provide an ideal setting to examine behavioral and institutional search mechanisms as well as their interplay with regulative legitimacy (Ruef and Scott 1998; Zucker 1987). In England, the Care Quality Commission (CQC)⁸ - formerly known as the Health Care Commission (HCC) - closely audits, monitors and regulates all public hospital organizations and thus constitutes a key legitimating agent (Mueller et al. 2003). Given the power of direct intervention of regulative bodies, hospitals require their endorsement, if they are to continue to operate autonomously, access financial and human resources, and secure future patient referrals (Scott et al. 2000). Our focus on English non-specialist hospital organizations as a relatively homogeneous population of organizations also allows us to draw on context-informed measures of such constructs as relative performance or regulative legitimacy and to control for systematic heterogeneity that might otherwise have confounded key relationships of interest (Chiasson and Davidson 2005).

To construct our panel dataset, we integrated archival data from a variety of sources including the Department of Health (DH), the National Health Service (NHS) and the Care Quality Commission (CQC). These three bodies are responsible for funding, dispensing and regulating the delivery of healthcare in England. In the few occasions when central records were incomplete, we consulted official documents such as annual reports or directly contacted the individual hospital organizations to collect the missing information. This procedure resulted in data completeness for all variables.⁹

⁸ In the U.S., The Joint Commission, formerly the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), fulfils a similar, though less powerful, legitimating function as the CQC in England and has the authority to grant and withdraw accreditation based on compliance with administrative and clinical standards (Scott et al. 2000).

⁹ Only the indicator of IS investment intensity was affected by some missing data. This problem, however, only pertained to five hospital organizations, for which IS data remained unavailable for up to three of the five years. The few remaining data points could thus be imputed using both the data available for the respective organization and mean IS expenditure growth rates. Omitting these imputed data points from our analyses yielded qualitatively identical results.

Measures

IS Investment Intensity. Our dependent variable in all models is hospitals' aggregate 'IS investment intensity'.¹⁰ In line with recent research on IS investment (Aral and Weill 2007; Ho et al. 2011; Kobelsky et al. 2008) and other partly discretionary investments such as R&D (Chen and Miller 2007; Greve 2003b), we measured IS investment intensity as hospitals' total IS expenditures in percent of total revenues.

Problemistic Search. To model problemistic search,¹¹ we calculate the difference between hospitals' actual performance and their social aspiration level to capture their 'performance relative to aspirations' (Greve 2003b). As public hospital organizations' primary mission is to cure patients rather than to generate financial returns (West et al. 2006), we depart from previous behavioral research by employing service quality rather than profitability as the key organizational goal variable. More specifically, we measure hospitals' *actual performance level* as hospitals' risk-adjusted patient survival rate – an indicator regularly used in England to compute hospital league tables, which are freely accessible by patients and the general public. This indicator allows for comparisons between hospitals, as it explicitly accounts for differences in hospitals' patient mix pertaining to patients' gender, age, method of admission, socio-economic status, primary diagnosis and co-morbidities (Jarman et al. 1999). To determine the *social aspiration level* of each hospital, we follow prior behavioral studies (e.g. Chen and Miller 2007; Desai 2008; Greve 2003b) that propose that senior managers adopt a conservative strategy and seek to achieve at the very least patient survival rates that are not below the mean of their respective peer group (Hu et al. 2011). Such reference groups are typically defined on the basis of strategic or structural similarity (Fiegenbaum and Thomas 1995). In highly regulated settings such as healthcare, regulators will often contribute to the formation of reference groups, as they tend to categorize members of a population into

¹⁰ Such an emphasis on hospitals' aggregate IS investment is warranted given our focus on the allocation stage of the IS investment process, where senior managers decide on the total amount of resources to be allocated to IS. The decision on how to precisely spend these resources will typically be made by IS and line managers in the subsequent adoption stage. An analysis by IS investment category is hence less appropriate for our study. That said, we also report separate results for investments in IS equipment, IS labor and IS services as part of our post-hoc analyses.

¹¹ Consistent with common practice in the search literature (e.g. Chen and Miller 2007; Desai 2008; Greve 2003b), we measure the extent to which the trigger for each search mechanism is present, but not the intensity of the search mechanism itself. This emerges as the strength of the association between the trigger and the IS investment intensity.

sub-groups to compare and benchmark organizations against their group standards (Barreto and Baden-Fuller 2006). This is also the case for English public hospital organizations, where the CQC as the main regulator establishes hospitals among one of five groups determined as a function of their size, teaching status and service specialization. These groupings are well established and are of practical relevance for English public hospitals because CQC publishes quality and safety outcomes by these groupings. These are labeled (1) Small Acute Trusts, (2) Medium Acute Trusts, (3) Large Acute Trusts, (4) Acute Specialist Trusts¹² and (5) Acute Teaching Trusts. We hence compute the social aspiration level of each hospital as the mean risk-adjusted survival rate of its respective reference group. As search activities in response to performance shortfalls are likely to be triggered with a certain delay, we follow extant behavioral research in lagging ‘performance relative to aspirations’ by one year (Chen and Miller 2007).

Slack Search. To model slack search, we capture hospitals’ lagged level of ‘financial slack’, measured as the ratio between quick assets (cash and marketable securities) and liabilities. This indicator of liquidity is the slack measure used most frequently in behavioral studies (Desai 2008; Greve 2003b). It is also meaningful in the context of public hospital care, as confirmed by a senior finance manager in the NHS, whom we interviewed for this study.¹³

Institutionalized Search. To examine institutionalized search, i.e. temporal stability or persistence in hospitals’ IS investment intensity, we follow prior empirical research on persistence in organizational performance (Roberts and Dowling 2002; Roberts 1999) and other discretionary investments (Helfat 1994; Salge 2012) in that we model persistence by including hospitals’ ‘IS investment intensity’ as a lagged dependent variable. The coefficient estimate for lagged IS investment intensity - the persistence parameter - typically ranges from 0 to 1. Values approaching 1 indicate high levels of temporal persistence in IS investment, that is, strong salience of institutionalized search as a mechanism underpinning hospitals’ IS investments (Roberts and Dowling 2002).

¹² Group 4 (Acute Specialist Trusts) is not populated in this study given our focus on non-specialist hospitals.

¹³ Head of Financial Planning at a leading NHS Acute Trust.

Mimetic Search. Consistent with Chen and Miller (2007), our approach to modeling mimetic search focuses on trait-based imitation (Haunschild and Miner 1997). We therefore infer inter-organizational imitation to be stimulated primarily by the observable practices of other organizations with certain features.¹⁴ In particular, we expect senior managers to mimic above all the behavior exhibited by organizations in the same reference group given their strategic and structural similarity with the focal organization (Fiegenbaum and Thomas 1995) - an assumption supported by a growing body of literature (e.g. Barreto and Baden-Fuller 2006; Garcia-Pont and Nohria 2002; Greve 1995). Baum et al. (2000 p. 775) therefore suggest that senior managers in need of role models “monitor the behavior of a reference group of comparable organizations in similar situations, and their opinions and actions evolve toward those in their reference group.” Angst et al. (2010) reveal that similar processes are at play with regards to health IT, as hospital managers were found particularly likely to adopt electronic medical records when other, socially proximal hospitals had done so previously. To demonstrate that hospital managers also mimic the IS investment behavior of their reference group, three conditions must be satisfied (Haunschild 1993). First, reference group hospitals need to exhibit a certain level of IS investment at one point in time. Second, senior managers of the focal hospital need to have the opportunity to observe this IS investment level either directly or indirectly. Third, the focal hospital needs to demonstrate an adjustment in IS investment in line with the observed reference group behavior at some later time. Adopting this approach, we construct the variable ‘reference group IS investment intensity’, computed as the lagged mean IS investment intensity of each of the five hospital groups distinguished by the CQC and listed above (condition 1). This one-year lag provides the time needed for senior managers to observe and subsequently imitate reference group IS investment behavior (condition 2). Finally, a positive and statistically significant association between the reference group IS investment intensity at time $t-1$ and

¹⁴ Haunschild and Miner (1997) introduced *frequency-based imitation* (mimicry of widely accepted practices) and *outcome-based imitation* (mimicry of apparently effective practices) as two alternative modes of imitation. While frequency-based imitation is likely to shape the adoption of individual HITs rather than aggregate IS expenditures, outcome-based imitation may equally be at play. Instead of mimicking the IS investment behavior of their entire reference group, hospital managers would rather copy the IS investment behavior of top performers assuming that their superior performance can at least in part be attributed to their prior IS investment decisions (Williamson and Cable 2003). We therefore equally examined the possibility of outcome-based imitation and report our findings in the ‘post-hoc analyses’ section.

hospitals' own IS investment intensity in time t is needed to suggest that the expected trait-based imitation has indeed occurred (condition 3).

Regulative Legitimacy. Consistent with previous research in banking (Deeppure 1996) and hospital care (Westphal et al. 1997), we draw on regulatory ratings to measure our moderating variable 'regulative legitimacy'. More specifically, we draw on the overall rating score that the CQC assigns to each hospital as part of its annual 'health check.' Calculated in a similar way as the Joint Commission rating for U.S. hospitals (Westphal et al. 1997), the CQC rating captures hospitals' compliance with more than 60 standards and targets. These pertain to clinical areas such as waiting times, patient choice, cleanliness, infection control or staff training as well as to administrative areas such as financial reporting, financial management or internal control. The final score for regulative legitimacy is lagged by one year, ranges from 1 ("weak") to 4 ("excellent") and indicates varying levels of "conformity of organizational action to regulative standards" (Deeppure and Carter 2005, 337). In case of a low rating score, the probability of regulatory intervention, executive replacement or suspension of services increases notably.

Control Variables. Conceivably, hospitals' IS investment intensity can be affected by several contextual variables other than those that are at the core of our study. We therefore control for a number of organizational and environmental factors that might potentially confound the relationships of interest. With regards to organizational factors, we first control for hospital 'size' measured as the logarithm of the total number of hospital beds, a standard indicator of organizational size in hospital studies. Second, we account for inter-hospital differences in 'R&D intensity' operationalized as a hospital's total annual research grant income in percent of its total revenues. Third, we control for hospital's severity-based 'case mix', measured as the percentage of admitted patients expected to decrease during their hospital stay – an indicator comparable to 'expected mortality rate' among US hospitals. In particular, it appears plausible to surmise that hospitals seeking to cure the most severely ill or injured patient require even more intense IT support. Fourth, hospitals' 'case load', defined as the total number of annual inpatient admissions per full-time equivalent employee, is accounted for, as the need for sophisticated IT infrastructure might

increase with higher patient volumes - and hence information demands. Fifth, we capture whether a hospital has achieved ‘foundation trust status’, a standing that provides it with greater financial flexibility and autonomy from government – two aspects that might affect IS investment.

As for environmental factors, we first account for ‘regional overcapacity’ measured as the percentage of unoccupied hospital beds available within each hospital’s local market. Second, the ‘population health status’ is assessed by means of the age-standardized mortality ratio in each regional market. Third, we control for the degree of ‘rurality’ of the hospital location measured on a scale from 0 to 100 as evaluated by the English government’s Department for Environment, Food and Rural Affairs (DEFRA). These three factors capture essential elements of the regional environment of the hospital organization and might affect IS investment priorities. Finally, we include a set of ‘time dummy’ variables to account for possible temporal effects.

Analysis

Our reliance on quantitative data with a cross-sectional and a temporal dimension calls for appropriate panel data techniques such as random effects estimation (Halaby 2004). It is important to note, however, that all our models are autoregressive in that they include a lagged dependent variable to assess the strength of institutionalized search as a search mechanism underpinning hospitals’ IS investment intensity. Such an autoregressive model specification possesses several desirable properties, which include its reduced exposure to the threats of spuriousness and reverse causation (Allison 1990). That said, autoregressive specifications have special requirements for model estimation. In particular, the endogeneity of the lagged dependent variable causes conventional random effects panel estimates to be subject to a possible bias, especially if the time series dimension is short (Arellano 2003). As a result, random effects estimators are likely to overestimate the degree of persistence in IS investment intensity, i.e. the importance of institutionalized search. We therefore employ the standard random effects estimator with robust standard errors, in addition to a system of General Method of Moments (GMM) estimator with heteroscedasticity and autocorrelation consistent standard errors (Blundell and Bond 1998). This

estimator was explicitly developed for estimating autoregressive models based on panel data with many cross-sectional units (n = 153 in this study), but few temporal observations (t = 5 in this study). Most importantly, it addresses the issue of endogeneity by using lagged levels and differences of the regressors as instruments, instead of relying on external instrumental variables. Moreover, the GMM estimator reduces the risk of spurious estimates in that it accounts for time-invariant, unobserved organization-specific heterogeneity. Given these distinct advantages, system GMM is now widely used to estimate autoregressive models as illustrated by recent studies on both search (Vissa et al. 2010) and legitimacy (Benner and Ranganathan 2012).

RESULTS

Descriptive Results

In Table 3 we present descriptive statistics and pairwise correlations. The mean annual IS expenditure per hospital amounts to 1.8 percent of revenues during our study period from April 2003 to March 2007.¹⁵ Given a notable upward trend in IS investment, this corresponds to US \$7.8 million per hospital organization in 2006-07.

Table 3: Descriptive Statistics and Pairwise Correlations

Variable	Mean	SD	Min	Max	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. IS investment intensity	1.8	0.6	0.0	4.0											
2. Performance relative to aspirations	0.0	10.8	-38.2	27.5	-0.04										
3. Financial slack	0.1	0.4	0.0	7.4	0.02	0.00									
4. Regulative legitimacy	2.7	0.9	1.0	4.0	-0.16 *	0.01	0.13 *								
5. Size	824.7	391.6	72.0	2662.0	-0.31 *	-0.10	-0.03	0.04							
6. R&D intensity	1.0	2.2	0.0	14.2	-0.21 *	0.11 *	0.04	0.13 *	0.23 *						
7. Case mix	6.0	1.2	2.0	9.7	0.20 *	0.09	-0.06	-0.05	-0.17	-0.29 *					
8. Case load	20.7	3.8	0.4	31.0	0.14 *	-0.10	0.00	-0.09	-0.23 *	-0.42 *	-0.09				
9. Foundation trust status	0.2	0.4	0.0	1.0	-0.11 *	0.05	0.49 *	0.32 *	0.02	0.08	-0.18 *	0.00			
10. Regional overcapacity	15.3	2.4	11.0	21.1	-0.02	0.09	0.09	0.04	0.15 *	-0.08	-0.05	0.03	0.20 *		
11. Population health status	107.8	13.1	59.4	147.4	-0.15 *	-0.20 *	-0.07	0.25 *	0.33 *	-0.05	0.02	-0.18 *	-0.06	0.09	
12. Rurality	19.4	27.4	0.0	100.0	0.16 *	0.14 *	-0.04	-0.17 *	-0.33 *	-0.23 *	0.07	0.22 *	-0.11 *	0.00	-0.40 *

Notes: N = 616 (154 organizations over four years - April 2003 to March 2007).

* p < 0.01.

There is considerable variation in hospitals' IS investment intensity with top IS spenders

¹⁵ This is notably below the mean annual IS budget of 2.2 percent of revenues reported by Kobelsky et al. (2008) for their *InformationWeek* sample covering U.S. firms during the period from 1991 to 1997.

investing more than twice as much per British pound of revenue as the average hospital. Moreover, descriptive statistics in Table 3 reveal notable inter-hospital differences in performance relative to aspirations, with some organizations performing as much as 38.2 percentage points below the mean patient survival level of their reference group. Similarly, considerable variation can be observed for financial slack, regulative legitimacy and all control variables.

Regression Results

Table 4 contains our panel regression estimates. IS investment intensity is the dependent variable in all four models. Models 1 and 2 were estimated using standard random effects, while models 3 and 4 were performed using the system GMM dynamic panel data estimator. We also computed several specification tests to assure the validity of our GMM model specification. The results of these tests are also reported in Table 4 along with the regression estimates. A comparison between model 1 and model 2 reveals that our main effects, i.e. regulative legitimacy and the four search variables indeed make a significant contribution in explaining hospitals' IS investment intensity. More specifically, inclusion of our main effects increases the explained share of the total variance (R-squared) in IS investment intensity from 16.4 percent in model 1 to 50.0 percent in model 2.¹⁶

When comparing models 2 and 3, it is apparent that random effects and GMM analyses yield largely consistent estimates. As expected, model 2 (random effects) overestimates the strength of the lagged dependent variable 'IS investment intensity' relative to model 3 (GMM), pointing to the advantages of the latter for the purposes of our study. We therefore focus upon the results from GMM models 3 and 4.

¹⁶ The lagged dependent variable accounts for a large portion of the change in R-squared. Omitting the lagged dependent variable, however, still leads to an increase in R-squared from 16.4 in model 1 to 18.3 in model 2 (+11.6%) highlighting the explanatory value of the problematic, slack and mimetic search variables.

Table 4: Panel regression analyses for IS investment intensity

	<i>Model 1</i> <i>Random Effects</i>		<i>Model 2</i> <i>Random Effects</i>		<i>Model 3</i> <i>GMM^a</i>		<i>Model 4</i> <i>GMM^a</i>	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Control Variables								
Intercept	-0.062	(0.094)	-0.039	(0.063)	-0.056	(0.067)	-0.034	(0.062)
Size (log)	-0.431	(0.086) ***	-0.078	(0.072)	-0.111	(0.066) *	-0.083	(0.062)
R&D intensity	-0.069	(0.061)	0.045	(0.042)	0.015	(0.058)	0.020	(0.051)
Case mix	0.145	(0.082) *	0.095	(0.050) *	0.097	(0.067)	0.080	(0.061)
Case load	0.021	(0.057)	-0.017	(0.045)	-0.045	(0.059)	-0.032	(0.055)
Foundation trust status	-0.198	(0.102) *	-0.010	(0.090)	-0.025	(0.095)	0.016	(0.091)
Regional overcapacity	0.042	(0.066)	-0.017	(0.065)	0.054	(0.070)	0.016	(0.074)
Population health status	-0.007	(0.081)	-0.026	(0.044)	-0.055	(0.045)	-0.038	(0.038)
Rurality	0.026	(0.075)	0.003	(0.037)	0.012	(0.041)	-0.005	(0.038)
Time dummies		Yes *		Yes		Yes		Yes
Main Effects								
Regulative legitimacy _{t-1}			-0.075	(0.033) **	-0.027	(0.038)	-0.113	(0.036) ***
Performance relative to aspirations _{t-1}	H1 (-)		-0.063	(0.028) **	-0.121	(0.059) **	-0.048	(0.041)
Financial slack _{t-1}	H2 (+)		0.049	(0.059)	0.031	(0.075)	0.095	(0.047) **
IS investment intensity _{t-1}	H3 (+)		0.609	(0.061) ***	0.530	(0.100) ***	0.629	(0.085) ***
Reference group IS investment intensity _{t-1}	H4 (+)		0.101	(0.057) *	0.106	(0.051) **	0.097	(0.055) *
Interaction Effects								
Financial slack _{t-1} x regulative legitimacy _{t-1}	H5a (-)						-0.113	(0.034) ***
Reference group IS investment intensity _{t-1} x regulative legitimacy _{t-1}	H5b (-)						-0.057	(0.033) *
Performance relative to aspirations _{t-1} x regulative legitimacy _{t-1}	H5c (-)						0.018	(0.030)
IS investment intensity _{t-1} x regulative legitimacy _{t-1}	H5d (+)						0.107	(0.063) *
Arellano-Bond Test for AR(1)					-3.820	***	-3.800 ***	
Arellano-Bond Test for AR(2)					-1.180		-1.150	
Hansen J Test					53.350		34.250	
Organizations		153		153		153		153
Years		4		4		4		4
Number of Observations		612		612		612		612
Wald chi-square (F-statistic for model 3)		85.180 ***		509.600 ***		18.780 ***		36.720 ***
R-squared		0.164		0.501				
Change in R-squared				0.336 ***				

Notes: IS investment intensity is the dependent variable. Standardized coefficient estimates reported. Robust standard errors in parentheses. Regulative legitimacy and the four search variables were mean-centred prior to calculating the interaction terms.

^a All General Method of Moments (GMM) models were estimated using the system GMM estimator implemented via the Stata command xtabond2 and passed the Arellano-Bond test for AR(2) errors as well as the Hansen J test for instrument exogeneity.

* p < 0.10; ** p < 0.05; *** p < 0.01.

Problemistic Search. Hypothesis 1 proposed that senior managers tend to increase the IS investment intensity of their hospital when its performance relative to aspiration declines. Thus, we expected the coefficient estimate of ‘performance relative to aspirations’ in model 3 to be negative and statistically

significant. Consistent with behavioral arguments for IS investment as a form of problemistic search, our estimates indicate that a relative performance decline of one standard deviation will tend to translate into a 0.121 standard deviation increase in a hospital's IS investment intensity. *Hypothesis 1 is thus supported.*

Slack Search. Following hypothesis 2, we expected financial slack to have a positive and significant effect on hospitals' IS investment intensity. Although it demonstrates the expected positive algebraic sign, the coefficient estimate for 'financial slack' in model 3 fails to achieve statistical significance. *Hypothesis 2 is thus not supported.*

Institutionalized Search. According to hypothesis 3, we expected the coefficient of the lagged dependent variable 'IS investment intensity' in model 3 to be between 0 and 1 and statistically significant. In line with our theoretical arguments for institutionalized search, our analyses yield a highly significant coefficient estimate of 0.530 indicating moderately high levels of temporal persistence in hospitals' IS investments. *Hypothesis 3 is thus supported.*

Mimetic Search. Hypothesis 4 proposed that hospitals will tend to adjust their IS investment intensity following changes among their peers. To support our notion of IS investment as mimetic search, the coefficient estimate for lagged 'reference group IS investment intensity' in model 3 needed to be positive and significant. The standardized coefficient estimate meets these conditions and suggests that on average a one standard deviation increase in mean reference group IS investment intensity is associated with a subsequent 0.106 standard deviation increase in the focal hospital's IS investment intensity. Given this evidence for IS investment as mimetic search, *hypothesis 4 is supported.*

Regulative Legitimacy as Moderator. Model 4 provides formal tests for our hypotheses pertaining to the moderating role of regulative legitimacy. In particular, we expected slack search ('financial slack') and mimetic search ('reference group IS investment intensity') to gain in salience with lower levels of regulative legitimacy (hypotheses 5a and 5b). Conversely, problemistic search ('performance relative to aspirations') and institutionalized search ('IS investment intensity') were expected to become more salient with higher levels of regulative legitimacy (hypotheses 5c and 5d). Coefficient estimates for the

interaction terms in model 4 provide partial support for the moderating role of regulative legitimacy.¹⁷ Consistent with our theoretical arguments, we find slack search (hypothesis 5a) and mimetic search (hypothesis 5b) to be more pronounced when regulative legitimacy is low, while institutionalized search (hypothesis 5d) becomes more salient when regulative legitimacy increases. Only problemistic search (hypothesis 5c) remains unaffected by the level of regulative legitimacy. *Hypotheses 5a, 5b and 5d are thus supported, whereas hypothesis 5c is not supported.*

The main findings described above are summarized in table 5.

Table 5: Summary of Results

Hypothesis	Result	Conclusion
H1 Problemistic Search	supported	Hospitals tend to increase their IS investment intensity following a prior decline in relative performance
H2 Slack Search	not supported	Hospitals' IS investment intensity tends to be largely independent of prior changes in financial slack
H3 Institutionalized Search	supported	Hospitals tend to demonstrate moderately high levels of temporal persistence in their IS investment intensity
H4 Mimetic Search	supported	Hospitals tend to increase their IS investment intensity following a prior increase in the mean IS investment intensity of their reference group
H5a Slack Search x Regulative Legitimacy	supported	The lower the level of regulative legitimacy, the more hospitals tend to rely on slack search for IS investment
H5b Mimetic Search x Regulative Legitimacy	supported	The lower the level of regulative legitimacy, the more hospitals tend to rely on mimetic search for IS investment
H5c Problemistic Search x Regulative Legitimacy	not supported	Hospitals' reliance on problemistic search for IS investment tends to be largely independent of their level of regulative legitimacy
H5d Institutionalized Search x Regulative Legitimacy	supported	The higher the level of regulative legitimacy, the more hospitals tend to rely on institutionalized search for IS investment

Notes. All conclusions are based on the average effects observed in our study of English public hospital organizations.

Post-Hoc Analyses

We also conducted a number of post-hoc analyses for additional robustness checks and further exploration of our findings. These analyses are valuable in that they can provide novel insights into the appropriateness of our assumptions, the reliability of our empirical results and the complexity of the

¹⁷ Testing the moderating role of regulative legitimacy by means of an alternative modeling approach based on sample-splitting rather than interaction terms yielded qualitatively identical results.

relationships of interest. In a first step, we modified key assumptions underpinning our measurement and estimation approach to examine the sensitivity of our results to changes in model specification.

As for *problemistic search*, qualitatively comparable results emerged when we redefined hospitals' reference groups on the basis of geographic proximity rather than regulative classification (Baum and Mezas 1992) and when we employed historical aspirations, computed as a hospital's performance in the preceding year, instead of social aspirations (Chen and Miller 2007). Moreover, we followed Hu et al.'s (2011) methodology to distinguish three strategies for setting senior managers' aspiration levels.¹⁸ These are known as the conservative strategy (aspiration level set at mean performance of reference group), the ambitious strategy (aspiration level set at top ten percent performance of reference group) and the stepwise strategy (aspiration level set as a function of own current performance allowing for adaptation over time).¹⁹ We reexamined our problemistic search hypothesis using all three competing aspiration levels and found models with conservative aspirations to be more efficient than alternative models with ambitious or stepwise aspirations, which demonstrated the same coefficient sign but higher standard errors. These additional analyses point to the prevalence of the conservative strategy adopted in this study following prior behavioral research (e.g. Chen and Miller 2007; Greve 2003b). In line with the GMM specifications used in previous research (e.g. Uotila et al. 2009), we treated time dummies and external control variables as exogenous, the lagged dependent variable as endogenous and all other variables including performance relative to aspirations as predetermined. Modeling performance relative to aspirations as endogenous yields qualitatively identical results. In addition, Davidson-MacKinnon test of exogeneity following a Two-Stage Least Square (2SLS) regression using regional population health as an instrument for performance relative to aspirations (relative patient survival rates) remains insignificant (F-test statistic = 0.03, $p = 0.86$). Hence, any endogeneity bias, if present at all, is likely not to have deleterious effects on our estimates of problemistic search. Similarly, Granger causality tests provide no evidence of simultaneous causality as performance relative to aspirations is found to

¹⁸ We would like to thank one of the anonymous reviewers and the associate editor for offering this suggestion.

¹⁹ Senior managers in a hospital with average performance, for instance, might aspire to achieve a performance level within the top quartile of the reference group performance distribution.

‘Granger cause’ IS investment intensity, but not vice versa. When we used hospitals’ return on assets (ROA) as an alternative goal variable, we found no evidence of hospitals engaging in problemistic search. This supports our assumption that hospital managers tend to employ IS as a means to achieve improvements in clinical quality rather than in economic efficiency.

With regards to *institutionalized search*, we departed from the standard approach of modeling persistence in IS investment adopted in our study (e.g. Roberts and Dowling 2002; Roberts 1999) and extended the time lag between the lagged dependent variable and the dependent variable from one to two years. The persistence parameter of such an alternative model is also positive and statistically significant, yet smaller than in the original model with a one-year time lag. This indicates that hospitals’ IS investment intensity exhibits moderate persistence over periods longer than one year.

As for *mimetic search*, we also modeled outcome-based imitation to complement the trait-based imitation models used in our main analyses following prior research on mimicry of organizational search activities (Chen and Miller 2007). For this purpose, we assumed hospital managers to imitate the IS investment behavior exhibited by admired and respected peers rather than their entire reference group (Haunschild and Miner 1997; Williamson and Cable 2003). This plausible alternative assumption is consistent with the neo-institutional argument that legitimate and successful actors are particularly likely to serve as role models within their institutional field (DiMaggio and Powell 1983). It has also received empirical support in the HIT context as illustrated by the recent finding that ‘celebrity’ hospitals characterized by superior survival rates and patient safety are more likely to be imitated with regards to their electronic medical record adoption behavior than ‘non-celebrity’ hospitals (Angst et al. 2010). Our additional analyses provide strong evidence for such outcome-based imitation, in that prior increases in the IS investment intensity of top-performing hospitals (i.e. the ten percent of hospitals with the best patient survival rates) were found to have a more significant effect on subsequent increases in the IS investment intensity of the focal hospital than prior increases in the mean reference group IS investment intensity. Comparable results emerged when we examined the influence of legitimate hospitals holding

the highest regulatory rating, which points to patient survival and regulatory ratings as two salient observable signals that may guide hospital managers in their decision of whom to emulate. These findings suggest that both trait- and outcome-based imitation are at play when it comes to determining hospitals' IS investment intensity.

In a second step, we conducted a number of supplementary analyses to shed additional light on the subtle nature of the relationships identified. As part of this effort, we decomposed hospitals' aggregate IS investment into sub-categories of IS equipment, IS labor and IS services. We then explored the relative salience of the four search mechanisms. Overall, parameter estimates were consistent with those for hospitals' aggregate IS investment, but generally less efficient. This supports our assumption that hospital managers tend to allocate scarce financial resources to IS as a whole rather than to specific sub-categories.²⁰ Moreover, we tested for complementarities among the four search mechanisms and identified a number of notable interaction effects achieving statistical significance at the five- or even one-percent level. Our preliminary analyses suggest that hospital managers who make continuous resource commitments to IS (institutionalized search) also tend to invest more in IS when confronted with performance shortfalls (problemistic search) or surplus resources (slack search). In contrast, hospital managers who imitate the IS investment behavior of their peers (mimetic search) tend to invest significantly less in IS as a possible means to respond to performance shortfalls (problemistic search) and to make use of surplus resources (slack search). These search patterns might indicate that some hospital managers consider IS an important strategic asset to achieve their business objectives, while others adopt a less strategic stance to IS investment and invest in IS primarily to conform to external expectations and norms.

²⁰ A few differences are worth reporting though. First, institutionalized search pertained primarily to IS labor expenses, followed by IS services and IS equipment. Moreover, problemistic search was found to involve investments in additional IS services and IS equipment, rather than investments in further IS staff.

DISCUSSION

This study sought to expand scholarly understanding of the IS investment process by focusing on the initial resource allocation stage as an emerging area for IS research. To this end, we integrated arguments from behavioral and neoinstitutional theories and examined the key search mechanisms that trigger senior managers to dedicate scarce financial resources to IS. Drawing on extensive panel data from all public, non-specialist hospital organizations in England, our analyses revealed that hospital managers invest in IS not only to find solutions to performance shortfalls (*problemistic search*), but also to achieve continuity and predictability in resource allocation (*institutionalized search*), signal conformity with external norms and expectations (*mimetic search*), and - to a lesser extent - make adequate use of excess financial resources (*slack search*). We also uncovered the relative salience of three of the four search mechanisms to be contingent upon a hospital's level of regulative legitimacy, a withdrawal of which would constitute a fundamental threat to its very autonomy and survival. The theoretical framework and the supporting empirical evidence presented in this study have potentially important implications for HIT research and practice as well as for IS research and theory more generally, which we discuss below.

Implications for HIT Research and Practice

Much prior HIT research has focused on issues of HIT adoption, HIT usage and its clinical and economic payoff (Agarwal et al. 2010). Notwithstanding the valuable contributions of this research, our study alerts HIT scholars to the usefulness of extending their focus beyond the IS adoption, usage and appropriation stages. In particular, greater attention needs to be dedicated to the hitherto underexplored resource allocation stage if researchers are to understand those motives that trigger – or constrain – hospital managers' decisions to allocate scarce organizational resources to HIT – insights that will also be vital for appropriately assessing the business value of HIT.

Our study makes a first important step in this regard in that it uncovers four salient search mechanisms underpinning hospital managers' IS investment decisions. More specifically, our study revealed that several distinct motives are at play including not only the ambition to improve clinical

performance (*problemistic search*), but also the desire to use uncommitted resources for ‘safe’ experiments (*slack search*), to achieve predictability in resource allocation (*institutionalized search*) and to signal conformity with external norms and expectations (*mimetic search*). Intended performance improvements are hence just one of several reasons why hospital managers invest in HIT. This multifaceted set of motives at work during the allocation stage points to the need for broadening the HIT research agenda. As a case in point, research on the impact of HIT has to go beyond examining possible effects on clinical and economic performance. In particular, scholars need to explore how HIT investments can enhance organizational legitimacy and other social goals such as reputation and status (Angst et al. 2010; Bitektine 2011), which are so vital for achieving the most basic of objectives, that is, organizational survival (Ruef and Scott 1998). When researchers examine the benefits of HIT across a wider array of motives, more robust conclusions about its full value creating potential can be drawn. Otherwise, our understanding of the total HIT payoff will remain partial at best and will tend to be biased downwards leading to a systematic underappreciation of the value of HIT.

These insights into hospital managers’ motives for IS investment are also likely to be of interest to health policy makers and IS professionals. As for health policy, our study acknowledges the considerable path dependence in hospitals’ IS spending (*institutionalized search*), but also highlights three additional search mechanisms that policy makers could activate or incorporate into their policy development in an attempt to boost HIT investment levels. As a case in point, policy makers could further enhance the availability, reliability and comparability of hospital performance data to draw managerial attention to social comparison and trigger *problemistic search* (Cyert and March 1963). Similarly, policy makers could seek to increase hospitals’ reliance on HIT in response to perceived performance shortfalls by providing practical advice and robust evidence on the clinical and economic value of HIT – support that is much needed to reduce the substantial informational uncertainties that still appear to prevent hospital managers from embracing HIT (Jha et al. 2009). Moreover, policy makers could incentivize and promote *slack search* by providing adequate funding for HIT investment especially for hospitals with

lower legitimacy, which were found to rely most strongly on uncommitted liquidity for HIT investment. Last but not least, policy makers could seek to capitalize on the predilection of organizations to imitate others as a way of raising HIT investment levels (Angst et al. 2010). Our finding that *mimetic search* is both trait- and outcome-based in that hospitals tend to emulate most closely the IS investment behavior of successful and legitimate peers seems especially relevant in this regard (Haunschild and Miner 1997). Policy makers could rely on this insight to support HIT investment and adoption in clinical centers of excellence, which are not only best positioned to cope with the implementation challenges and downside risks of HIT, but may also serve as important role models for HIT investment and adoption especially amongst hospitals of lower status (Angst et al. 2010).

Our insights into hospital managers' IS investment decisions are also potentially useful for IS professionals, who crucially rely on top management for resources to support IS adoption activities (Xue et al. 2008). Better knowledge of the motives underpinning IS resource allocation decisions is hence vital, if IS professionals are to strengthen their business case for IS investment (Heracleous and Barrett 2001; Salge and Barrett 2011). For this purpose, IS professionals may draw on our typology that distinguishes between problemistic, slack, institutionalized and mimetic IS investments when seeking to influence hospital managers' allocation decisions (Weill and Ross 2004). In particular, IS professionals could craft their rhetorical strategies for additional IS investment such that they appeal to the prevailing motives and preferred investment types of their hospital's senior management (Suddaby and Greenwood 2005).

Implications for IS Research and Theory

The fact that our study examines senior managers' IS investment decisions in the specific setting of hospital care allows for local theorizing and contextualizing of our measures and findings (Chiasson and Davidson 2005). This has notable benefits for the internal validity of our study, yet constrains its external validity, i.e. the generalizability of our knowledge claims (Seddon and Scheepers 2012). Clearly, our empirical findings hold first and foremost for our target population of English public hospital organizations (Lee and Baskerville 2003). In particular, the relative salience of each of the four search

mechanisms might well be affected by contextual differences (Johns 2006) pertaining not least to industry IT strategic role (Dehning et al. 2003) or environmental munificence (Wade and Hulland 2004). Any claim for statistical generalizability to populations that differ from the one we studied requires either direct empirical testing or important judgment calls (Lee and Baskerville 2012). Such judgment calls might appear justifiable when generalizing to other healthcare or structurally similar regulated settings for which our sample can be considered “representative” with regards to key variables (Seddon and Scheepers 2012), but will become more speculative the greater the contextual differences.

That said, we believe that our theoretical arguments will be of relevance for IS research and theory more generally. To make a viable case for analytical rather than statistical generalizability, we need to justify – with the appropriate caveats – why we expect that causal drivers similar to those that triggered the behavior we observed among English hospital organizations will be at play in other settings (Seddon and Scheepers 2012). Our reliance on behavioral and neoinstitutional theory is helpful in this regard because both offer highly complementary insights into the broader phenomenon of managerial decision making, of which HIT investment is only one possible instantiation (March 1994). As such, the motives driving our four search mechanisms are not unique to hospital managers, but can be expected to characterize decision makers more generally (Cyert and March 1963). Empirical evidence corroborates this expectation as similar search mechanisms were found to underpin decision making across a range of investment types, industries, geographies and time periods (Argote and Greve 2007; Gavetti et al. 2012). These include for instance R&D investments of Japanese ship-builders, 1971-1996, (Greve 2003b) and US manufacturing firms, 1980-2001, (Chen and Miller 2007), capacity investments of US railroad companies, 1978-2003, (Desai 2008) or retail location investments of Spanish banks, 1988-1996, (Barreto and Baden-Fuller 2006).

This provides some indication of the considerable value our theoretical model might have for IS investment more generally, though future studies are needed to validate this assertion. While the four search mechanisms are expected to be at play in most industries, boundary conditions need to be

stipulated regarding the expected moderating role of regulative legitimacy (Gregor 2006). In particular, we expect regulative legitimacy to affect organizational search primarily in settings characterized by strong regulatory oversight such as healthcare, banking, education, transportation and energy (Holburn and Bergh 2008). Senior managers in less regulated industries, however, are likely to see themselves confronted with additional threats to organizational survival, among which not only the withdrawal of normative and cognitive legitimacy, reputation or status (Bitektine 2011; Deephouse and Suchman 2008), but also proximity to bankruptcy (Miller and Chen 2004) - a further complexity that needs to be accounted for in research across these settings.

We also argue that our insights into senior managers' motives for IS investment can inform IS payoff research beyond the healthcare context (Kohli and Grover 2008; Melville et al. 2004). In particular, our theory-driven typology of IS investment is valuable in that it highlights systematic differences in expected benefits, incurred risks and underpinning motives across our four IS investment types. These insights have potentially far-reaching implications for IS payoff research in that they challenge the taken-for-granted assumption that IS investments are predominantly motivated by intended improvements in operational or financial performance. Our study thus calls for a more subtle evaluation of IS payoff, as part of which each of the four IS investment types identified in our study is assessed against its primary objective. Mimetic IS investments, for instance, need to be evaluated on the basis of their legitimacy-enhancing effect rather than their efficiency-increasing effect. Indeed, such a refined approach might be essential if the evidence base on IS payoff is to become more consistent.

Finally, our study illustrates the value of integrating tenets from behavioral and neoinstitutional theory to develop more comprehensive explanations of managerial decision making (March 1994). Although such a theoretical integration has been advocated (Gavetti et al. 2012), few studies have attempted to do so. Our approach to integrate the two theoretical perspectives is particularly meaningful for IS investment research in that it allows us to conceptualize IS decision making as an activity that is simultaneously shaped by human agency, bounded rationality and external constraints. As such, our study

provides important theoretical foundations for moving IS investment research beyond the dominant economic-rationalistic paradigm (Fichman 2004), while showcasing the potential for IS research and organizational theory to inform each other (Orlikowski and Barley 2001).

CONCLUSIONS

This study makes two key contributions to IS research. First, it offers theoretical and empirical insights into the hitherto underexplored, yet critical initial allocation stage of the IS investment process. Second, it identifies four salient search mechanisms that underpin senior managers' IS investment decisions and form the basis for a novel typology distinguishing IS investments as a function of the primary motive they seek to satisfy. Despite these contributions, our study has several theoretical and empirical limitations, which in turn offer meaningful opportunities for future research.

First, the theoretical model we developed to explain senior managers' IS investment decisions can be extended in several useful ways. In particular, our model does not fully account for the possibility of what might be called forward-looking or anticipatory search – a limitation our study shares with much prior behavioral research (Gavetti et al. 2012). It appears plausible, however, that senior managers' IS investment decisions can also be triggered by the desire to take advantage of opportunities that are expected to emerge at some time in the future (Barreto forthcoming; Gavetti and Levinthal 2000). Moreover, systematic theory development regarding possible interaction effects among – and configurations of – the four search mechanisms is needed. For instance, future research may seek to explain when certain search mechanisms are likely to co-occur or why they may act as complements or substitutes. Such attempts could be informed by the initial results reported in our post-hoc analyses. Similarly, the interaction between IS and other semi-discretionary expenditures such as R&D or advertising that compete for resources at the allocation stage merits greater attention. This will shed light on the conditions under which senior managers give preference to one type of expenditure over the other. Scholars could also extend our theoretical model by considering additional moderating factors. The internal legitimacy of the IS function might be a suitable candidate, given that search mechanisms such as

problemistic or slack search are expected to become more prevalent when the general value-creation potential of IS is taken-for-granted rather than contested by senior managers – a state that is likely to be influenced by organizations’ IS strategy (Sabherwal and Chan 2001) as well as senior managers’ own IS competence and experience (Bassellier et al. 2003).

Our study can also be extended empirically in a number of important ways. Perhaps most importantly, replication studies are needed to establish the generalizability of our theoretical model to settings outside the context of English public hospital care (Lee and Baskerville 2003). Such research could adopt comparative, cross-industry or cross-country designs to learn more about the boundary conditions of our proposed model. Moreover, most of the constructs employed in this study - including performance, legitimacy and slack - are inherently multidimensional. Although the dimensions examined as part of our main and post-hoc analyses are highly salient in the specific context of public hospital services, further studies are needed to shed light on alternative dimensions of these variables. The construct of legitimacy is a case in point. In this study, we focused on organizational legitimacy as assessed by the key regulative authority. Future research could thus explore whether legitimacy as assigned by other legitimating agents, such as the general media or public interest groups (Deephouse 1996; Desai 2008), has a similar moderating effect on the four search mechanisms. Furthermore, our quantitative research design allowed us to identify senior managers’ motives for IS investment only indirectly by examining observable IS investment patterns. This approach has its strengths and enjoys considerable popularity in the search literature. That said, it needs to be complemented by in-depth qualitative accounts of IS resource allocation decisions informed by rich longitudinal data from business cases for IS investment, interviews with senior managers or the observation of board meetings. Ideally, future studies will adopt suitable mixed methods designs that combine the strengths of quantitative and qualitative methods to yield a more holistic and subtle understanding of the complex interplay among the various motives for IS investment (Venkatesh et al. forthcoming). Pursuing any of the above

opportunities, we believe, will be valuable in providing further insights into the search mechanisms underpinning senior managers' IS investment decisions at the IS allocation stage.

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