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HOW A FIRM'S COMPETITIVE ENVIRONMENT AND DIGITAL STRATEGIC POSTURE INFLUENCE DIGITAL BUSINESS STRATEGY[1]

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In this paper, we examine how the competitive industry environment shapes the way that digital strategic posture (defined as a focal firm's degree of engagement in a particular class of digital business practices relative to the industry norm) influences firms' realized digital business strategy. We focus on two forms of digital strategy: general IT investment and IT outsourcing investment. Drawing from prior literature on determinants of IT activity and competitive dynamics, we argue that three elements of the industry environment determine whether digital strategic posture has an increasingly convergent or divergent influence on digital business strategy. By divergent influence, we mean an influence that leads to spending substantially more or less on a particular strategic activity than industry norms. We predict that a digital strategic posture (difference from the industry mean) has an increasingly divergent effect on digital business strategy under higher industry turbulence, while having an increasingly convergent effect on digital business strategy under higher industry concentration and higher industry growth. The study uses archival data for 400 U.S.-based firms from 1999 to 2006. Our findings imply that digital business strategy is not solely a matter of optimizing firm operations internally or of responding to one or two focal competitors, but also arises strikingly from awareness and responsiveness to the digital business competitive environment. Collectively, the findings provide insights on how strategic posture and industry environment influence firms' digital business strategy.

Keywords: Digital business strategy, strategic posture, industry environment, industry turbulence, industry competition, industry growth, IT investments, IT strategy

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The appendix for this paper is located in the "Online Supplements" section of the *MIS Quarterly*'s website (http://www.misq.org).

Introduction

Increasing digitization of business processes, products, and services makes it imperative to develop a better understanding of digital business strategies. Digital strategies such as investments in general information technology and IT outsourcing are major elements of overall business strategy, sometimes allowing firms to differentiate from competitors and other times creating demands to conform with competitive norms (see, for instance, Barua and Mukhopadhyay 2000; Han and Mithas 2013; Kohli and Grover 2008; Kulatilaka and Venkatraman 2001; Mithas and Lucas 2010, 2014; Mithas et al. 2012b; Pavlou and El Sawy 2010; Rai et al. 2006; Sambamurthy et al. 2003; Saraf et al. 2007; Tafti et al. 2013). However, strategic management research and the IT strategy literature have only begun to investigate when firms focus on simply converging to competitive norms in their IT investments, and when they will view digital business strategies as opportunities to diverge from industry norms by spending substantially more or less than industry averages. In this paper, we develop the concept of a firm's strategic posture relative to the average in its industry. We argue that the degree to which firms choose to diverge from industry norms in their ongoing digital business strategies is influenced by the interaction of current digital strategic posture with three key aspects of the competitive environment: turbulence, concentration, and growth.

At the most general level, strategic posture is a firm's level of activity in a given strategic dimension relative to industry average. Research in strategic management argues that a firm's strategic posture relative to its competitors at any point in time influences ongoing choices about R&D, marketing, innovation, and other activities (Mol and Birkinshaw 2009; Porter 1979; Smith et al. 2001). Drawing from this research as well as the literature on the role of IT investment and IT infrastructure in corporate strategy, this paper focuses on digital strategic posture, which we define as the difference in a firm's engagement in a particular IT activity relative to the industry average of its competitors. Specifically, a firm with lower investment in IT outsourcing activities than its industry average has a low IT outsourcing digital strategic posture, while a firm with above-average investment in IT activities has a high IT digital strategic posture. A firm's digital strategic posture—that is, the degree to which it lags or leads industry investment patterns—can create either divergent or convergent pressures on its ongoing digital business strategy.

Digital business strategy is the extent to which a firm engages in any category of IT activity. Consider several examples. Amidst forecasts of economic recession in the early 2000s, American Airlines invested in software that enhanced fuel efficiency by tailoring routes, flight paths, and baggage loading. This investment was a strategic move to which other airlines would need to respond, whether by choosing to imitate or by differentiating (Lohr 2008). Likewise, Sprint's outsourcing of its IT services raised questions for other telecom providers in the United States on whether to imitate such a strategic move or to differentiate by keeping IT services in-house. These examples in the evolving digital business environment suggest that firms contend with a tension between the tendency to converge to industry norms in digital business strategy and the opportunity to diverge from industry norms.

We propose that differences in these opposing divergent and convergent tendencies in a firm's ongoing digital business strategies arise from interactions between its current digital strategic posture and variations in its industry environment. We predict that digital strategic posture (distance from the industry mean) has an increasingly divergent effect on digital business strategy under higher industry turbulence, while having an increasingly convergent effect on digital business strategy under higher industry concentration and higher industry growth. Thus, in contrast to approaches that focus on the dyad of focal and rival firms (e.g., Derfus et al. 2008), we consider normative forces in which managers respond not just to a single competitor but rather to the larger set of industry competitors.

This approach has particular salience in the case of digital business strategy for two reasons. First, managers often have better information on an industry norm for particular IT activities, such as general IT investment norms or outsourcing norms, than on the actions of a particular competitor. For example, while many research firms (e.g., Gartner, Forrester, and IDC) and business publications (e.g., *InformationWeek* and *Computerworld*) publish average industry investments on IT or allocations of IT budgets to outsourcing, they usually do not reveal details on the digital business practices of a specific competitor.

Second, managers typically have imperfect information and limited foresight on the optimal level of engagement in any digital strategy, due to the underlying complexities of digitally enabled business processes and inherent uncertainties regarding IT strategy. Under conditions of complexity and uncertainty, managers look to industry peers for frames of reference in determining firm strategy (Feigenbaum and Thomas 1994; Mol and Birkinshaw 2009). We examine how firms respond to the industry norms of digital business strategy by updating their own strategy in the subsequent year either toward or away from the norm, considering how industry turbulence, concentration, and growth shape firms' responsiveness to the industry norm.

This paper examines how the industry environment makes digital strategic posture a convergent or divergent force in shaping firms' digital business strategies. To our knowledge, this is the first study that establishes the links between competitive actions, industry environment, and digital business strategy. We extend prior work on competitive actions that has largely focused on visible, externally focused, frequent, and discrete (i.e., a firm either responds or does not respond to a competitive move) decisions such as pricing, capacity, geographic, marketing, and product introductions (Chen and Miller 1994; Derfus et al. 2008; Smith et al. 2001; Young et al. 1996). Smith et al. (2001, p. 340) note that prior competitive dynamics studies "excluded the firm's internal actions (such as using new information systems, …)." Understanding these decisions is critical to advancing our knowledge of digital business strategy.

The paper also considers specific aspects of the industry environment and examines its dynamic interaction with specific organizational factors. Instead of treating an environment as a single variable, we bring three environmental variables that are widely used in strategic management studies to the information technology strategy model, and examine their moderating effects on the main causal relationship. In addition, we use an extensive archival dataset of large U.S. firms to generate novel insights on the major issues related to IT investments and IT outsourcing, which are among the central artifacts in information systems research. Because IT investments and IT outsourcing have significant implications for competitive advantage, by understanding how digital strategic posture and industry environment *fuse* together to influence firms' strategic actions, we contribute to and extend the "fusion" view of digital business strategy (El Sawy et al. 2010; Mithas and Lucas 2010).

Theoretical Framework and Hypotheses

One of the central questions in the information systems literature and managerial press relates to the extent to which digital business activities are strategic. At the core, debates about the strategic nature of IT activities reflect the extent to which digital systems allow firms to differentiate their business processes and service offerings from competitors. The Schumpeterian framework suggests an approach to assessing digital business strategy by examining the extent to which firms respond to competitive moves and industry norms in their external environments (Barnett and McKendrick 2004).

In a Schumpeterian context, firms attain a favorable market position by means of competitive actions—such as a new product, a capital investment, an advertising campaign, or a pricing innovation. In the short term, at least, the firm attains an advantage in sales or reputation over its competitors. Because these competitive actions are often externally observable, competitors may try to match or exceed the actions, thereby destroying the advantage of the first-mover firms. Through this dynamic, firms create and destroy competitive advantages.

Applying these notions to digital business strategy, many IT activities are externally observable—especially when manifested as products, services, or consumer-facing channels (e.g., ATMs and web sites) that have high visibility (Dos Santos and Peffers 1995; Grover and Kohli 2013; Liang and Tanniru 2006-07). In addition, trade publications such as *InformationWeek* highlight technological advances in IT and conduct surveys that measure trends in digital strategies such as firms' industry-level IT investments and outsourcing practices. Hence, it is possible for firms to observe the industry norm in many aspects of digital business strategy and formulate strategies in terms of divergence from or convergence toward the industry norm. Because digital business strategy can help firms create competitive advantages or render old advantages obsolete, firms will attempt to take digital strategy decisions that shield themselves from the erosion of competitive advantage. Against this backdrop, we ask the following question: When does the industry environment make digital strategic posture a more convergent or divergent force in shaping realized digital business strategy?

Digital Business Strategy and Digital Strategic Posture

We define digital business strategy as the extent to which a firm engages in any category of IT activity. We identify key building blocks for how digital business strategy emerges as a result of interplay between a firm's digital strategic posture and industry environment. In contrast to the traditional view of IT as a "functional level strategy that must be aligned with the firm's business strategy" (Bharadwaj et al. 2010, p. 1), we take the view that firms should consider IT as essential to the framing of overall business strategy itself, that is, a *fusion* of IT and business strategy. Our view of digital business strategy implies a dynamic synchronization between business and IT to gain competitive advantage (Mithas 2012; Mithas et al. 2012a; Mithas and Lucas 2010; Prahalad and Krishnan 2002). This is in sharp contrast to the traditional view in which IT strategy is seen as needing to be aligned with business strategy, which presupposes the notion of separate IT and business strategies.

To that end, we focus on two strategic decisions that are likely to underlie any current conceptualization of digital business strategy: how much a firm invests in IT and what percentage of its IT budget it spends on outsourced services. While we recognize that digital business strategy has many dimensions, these two constructs are particularly useful to investigate the relationship between competitive environment and digital business strategy for three reasons. First, IT investment and IT outsourcing capture a broad range of many firms' IT activities, thus allowing us to empirically test whether this view of digital business strategy applies across such a broad spectrum of IT activities. Second, these constructs can be uniformly measured across multiple industries, allowing us to capture variations among industry characteristics and to better understand how digital business strategy is shaped by industry characteristics. Third, these particular constructs are measured repeatedly over various intervals of time, thus allowing us to study the dynamic updating of these firm-level strategic choices over time in response to changing industry characteristics.

Prior research in Information Systems notes the strategic significance of these two decisions. Researchers have argued that investments in IT infrastructure and IT applications are necessary for firms to develop their operational, dynamic, and improvisational capabilities (El Sawy and Pavlou 2008) and for improved firm performance (Mithas et al. 2011; Mithas et al. 2012b; Tafti et al. 2013). Likewise, prior work argues that outsourcing can be an effective strategy to benefit from vendors' knowledge and production cost advantage (e.g., Ang and Straub 1998; Bardhan et al. 2006; Chang and Gurbaxani 2012; Han and Mithas 2013; Loh and Venkatraman 1992; Whitaker et al. 2011).

In turn, our theoretical perspective of digital business strategy, as a set of strategic responses to the collective choices of industry competitors that is shaped by industry conditions, motivates the construct of digital strategic posture. We define a firm's digital strategic posture as its current digital investments relative to the industry norm.[2] A firm's current digital strategic posture in any particular category of IT activities can create positive or negative incentives to undertake additional investments. The creation of such incentives is consistent with how Courtney et al. (1997) conceptualize strategic posture as "the intent relative to the current and future state of an industry" (p. 73). A firm's intent concerning digital strategic posture is a moving target due to the difficult-to-predict actions of a firm's peers. Thus, a reasonable baseline definition of strategic posture is the difference between prior period industry average and firm's prior period engagement in that activity. Firms then update their posture in the next period, such that the direction of updating with respect to the industry average can be inferred as a digital strategic move aimed at divergence from or convergence toward industry norm.[3]

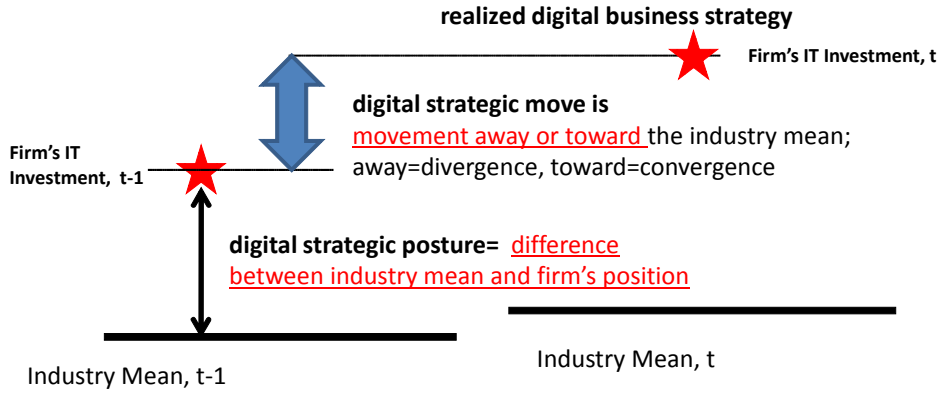
Figure 1 depicts how firms start with a digital strategic posture at time t-1, and then update that posture through their digital strategic moves to come close to their intended digital business strategy. This process results in their realized digital business strategy at time t.

To concretize these notions of digital business strategy and digital strategic posture, consider contrasting book retailing strategies by Amazon.com and the Borders Group. While Amazon pursued a digital strategy involving heavy investments in IT and online infrastructure in the book retailing industry, Borders pursued a very different strategy of investing in offline assets with little attention to online sales (Trachtenberg 2007). Indeed, Borders outsourced the operation of its online business to Amazon in 2001; Amazon kept the revenue generated from the Borders website in exchange for a commission to Borders. According to Trachtenberg (2007, p. B1),

> Greg Josefowicz, Borders' CEO at the time, said the decision 'helps us to focus on what we do best'—building more stores. Since then, Borders increased the number of its U.S. superstores to 499 today [2007] from more than 290 at the start of 2000, while increasing the number of overseas superstores to 73 today from 22 in 2001. [In 2011, Borders filed for bankruptcy and liquidated its assets.]

[2] Although the term *strategic posture* has been used in a general way to refer to "crucial strengths and weaknesses from a strategic standpoint" (Porter 1979, p. 143), the concept of digital strategic posture in our study focuses attention on a firm's stance with respect to digital activities of peers in its industry environment. As such, digital strategic posture complements other types of strategic posture in the strategic management, marketing, and entrepreneurship literatures, such as entrepreneurial posture, market orientation, consumer orientation, competitor orientation, innovation orientation, and technology orientation.

[3] As we discuss in more detail later in the paper, we begin with an assumption of exogeneity in a firm's strategic posture relative to its industry, including annual updating based on competitors' current positions, and then allow a degree of endogeneity in which we model decision makers' forecasts of their competitors' future investments.



Note: Firm (represented by star) starts with a digital strategic posture at time t-1 and updates that posture at time t by moving away or toward the industry mean (represented by the solid lines).

Figure 1. Digital Strategic Posture, Digital Strategic Moves, and Realized Digital Business Strategy

Arguably, the digital strategies of Amazon.com and Borders were informed by their digital strategic posture: while Amazon.com started with a digital strategic posture that reflected investments in IT assets higher than the industry mean, Borders started with a digital strategic posture that reflected investments in IT assets lower than the industry mean. Over time, Amazon.com and Borders further diverged from each other. While Amazon.com kept entrenching itself further in related markets by increasing the scale of its digital assets, Borders focused more on offline sources of growth and invested less than the industry mean.

The digital strategic moves of Amazon and Borders reflect how they approached digital strategy and how they viewed what they should do in-house versus what they should outsource. Amazon kept much of its website development in-house, while Borders outsourced that to its competitor. Another industry player, Barnes & Noble, tried to imitate Amazon by investing in IT assets and an online presence through BN.com. However, neither Borders nor Barnes & Noble could match Amazon's lead in capturing value from its digital assets. Eventually, Borders reversed course; it decided to terminate the outsourcing deal with Amazon, sell off some of its offline international bookstores, and close half of its Waldenbooks outlets in the United States (Trachtenberg 2007). In turn, these strategic choices had a major impact on the firms' subsequent performance.[4]

[4]Arguably, the outsourcing decisions by IBM that led to creation of the IBM PC in 1980 and by Kodak that led to the outsourcing of its IT function in 1989 also appear to have had significant impacts on their subsequent performance and evolution of the industries in which they participated.

While the above examples illustrate the relationship between digital posture and strategy, the bulk of firms' digital strategy consists of internal actions that are harder to perceive; most go unreported in the business press because they are not discrete, visible, or externally focused actions. Key examples include investments in internal IT systems and IT outsourcing. Nevertheless, such investments are driven by digital business strategy and, we argue, are also driven by how the firm chooses to engage its competitors through digital business strategy. While not all aspects of digital strategy may be externally visible as discrete actions, firms can often gauge the industry norms through aggregated survey results published in periodicals such as *InformationWeek*. We know little about the dynamics between industry factors and firm choices with respect to digital business strategy.

Digital Strategic Posture Influence: Convergent or Divergent?

Digital business strategy involves complex and interrelated factors that make it difficult for managers to foresee all investment outcomes or to determine the optimal levels of investments. Because managers have imperfect information and limited foresight regarding the optimal level of engagement in various digital business strategies, they look for signals from their competitive surroundings to ascertain the industry norm. The industry norm provides a frame of reference that managers can use to determine their subsequent strategic actions to either converge to or diverge from the norm. If managers respond to industry norms of digital business strategy, either moving away from or toward the norm,

this will suggest not only that the normative signals are present but also that a strategic element influences digital business strategy in relation to the industry environment. However, if managers do not respond to normative signals, this will suggest either that signals are weak or that firms' digital strategies are independent of strategic moves of competitors and, instead, largely arise from considerations of internal efficiency and effectiveness.

While the notion of digital business strategy suggests that firms respond to competitors' actions, prior theory provides conflicting arguments regarding whether the direction of response is toward or away from the norm. On one hand, because the underlying complexities of business processes make it difficult to determine the optimal levels of digitization, signals from industry peers can serve as a normalizing guidepost. Normative pressures can arise as key managers and CIOs participate in professional functions and conferences and relay information to one another regarding key firm investments (DiMaggio and Powell 1983; Lim et al. 2012). The inclination to follow industry trends dominates in the relative absence of clear guidelines regarding decision-making processes in which internal complexities are confounded with environmental uncertainty and volatility. Following the norm may be a consequence of risk-averse behavior among managers, who may believe that converging to the industry norms can make them less vulnerable to being singled out and held to blame should their investment decisions prove to be suboptimal. Further, digital business strategy often reflects competitive necessity as well as offering potential sources of competitive advantage. A firm may initially be disinclined to engage in a certain form of digital strategy such as offering a free online service, which can be costly. However, if other competitors are offering such a service, then following suit becomes a matter of survival.

On the other hand, firms may tend to diverge from the industry norm as a means of differentiating their competitive positions. Just as firms maintain their competitive positioning through differentiation in prices, quality, and/or services, firms may seek to further entrench themselves in unique competitive positions with respect to their digital business strategy. If industry peers provide a particular type of digital service to customers, a firm that lags in that area may choose to reallocate further resources toward establishing a niche in the offline substitute of that service. For example, when an airline finds itself lagging in advanced flight routing information systems or lower cost baggage delivery systems, it may instead choose to focus on premium services such as large leather seats and gourmet meals. On the other hand, when industry peers lag in some digital strategies compared to the focal firm, that firm may seize the opportunity to become a digital business leader so that it can provide unique products, services, or cost reductions that would give it a strategically sustainable niche in the industry environment.

Thus, it is not clear how a firm's existing digital strategic posture will affect its ongoing digital business strategy. To answer this question, we need to consider how competitive contingencies will shape the impact of digital strategic posture.

Three Key Elements of the Industry Environment

Research in industrial economics, strategic management, and information systems argues that industry environment has significant impact on a firm's strategic actions (Dess and Beard 1984; Keats and Hitt 1988; Milliken 1987; Scherer and Ross 1990; Smith et al. 2001). Prior research identifies multiple environmental factors, using multiple labels and operationalizations (Aldrich 1979; Dess and Beard 1984).

In the interest of parsimony, we focus on three key factors that arise in IS research: industry turbulence (Pavlou and El Sawy 2006; Wade and Hulland 2004), industry competition (Melville et al. 2007; Ray et al. 2009), and industry growth (Wade and Hulland 2004).[5] These three industry factors map to three salient industry dimensions: dynamism (reflecting industry turbulence in our study), competition (measured by industry concentration), and munificence (measured by industry growth). Several IS and strategy studies highlight the need to focus on this important subset of salient industry factors (e.g., Davis et al. 2009; Keats and Hitt 1988; King and Sabherwal 1992; Pavlou and El Sawy 2006; Ray et al. 2009).

The three dimensions reflect competitive opportunities and pressures. Industry turbulence refers to the unpredictable change in an industry (Lu and Ramamurthy 2004; Melville et al. 2007). Industry turbulence is the rate at which firms enter and exit an industry normalized by the number of firms in the industry, with higher ratios indicating greater industry turbulence (Griliches and Regev 1995; Thomas and D'Aveni 2004). Industry concentration, which is often measured with the Herfindahl-Hirschman Index (HHI), refers to the extent of

[5]Although these environmental factors might have some empirical overlap, they are conceptually distinct. We find support for their distinction in the low correlations among these dimensions, which we discuss later. We thank the AE for suggesting that we focus on this three-pronged conceptualization of industry environment.

competitive rivalry in an industry (Scherer and Ross 1990; Waring 1996). Industry growth refers to the growth in demand for an industry's output, or access to resources to capitalize on opportunities for growth (Dess and Beard 1984). Although higher industry growth may imply comparatively less competition (Wade and Hulland 2004) and less strategic aggressiveness (Ferrier and Lee 2000; Smith et al. 2001), industry growth relates to opportunities on the demand side while industry competition refers to industry structure on the supply side.

Hypotheses: How the Industry Environment Moderates the Relationship between Digital Strategic Posture and Digital Business Strategy

Although the three factors in the industry environment (turbulence, concentration, and growth) may have direct effects on digital business strategy (e.g., King and Sabherwal 1992), our focus is on how they moderate the relationship between digital strategic posture and digital business strategy because this reveals greater insight into the mechanisms underlying that relationship. We hypothesize that the environmental factors will moderate the degree to which digital strategic posture leads to greater convergence toward or divergence from industry norms in digital strategy. Figure 2 shows the conceptual model; Table 1 summarizes the arguments and mechanisms that underlie the three hypotheses that we develop in this section.

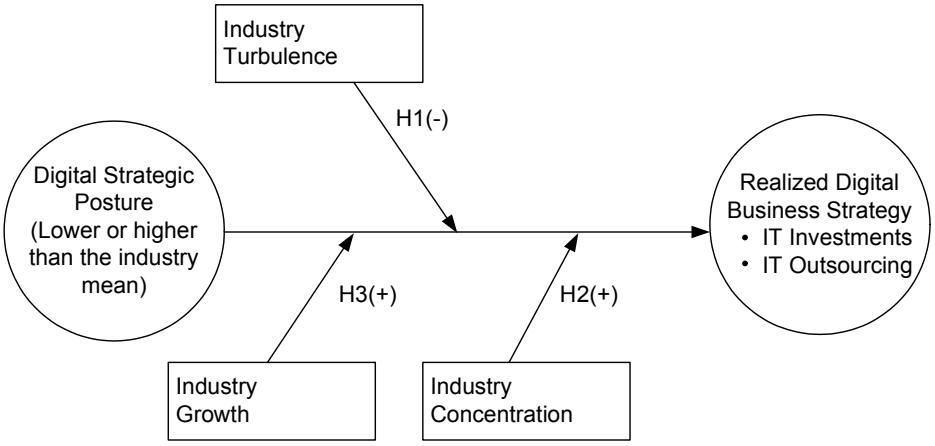
Industry Turbulence: Turbulent industries are characterized by competitive opportunities arising from an ongoing stream of innovations and competitive actions by industry players (D'Aveni 1994; Eisenhardt and Sull 2001). In a highly turbulent industry, the dominant position of incumbents may be destroyed by rivals or new entrants who own superior knowledge about the market and/or firm resource configuration (Sambamurthy et al. 2003). Socioeconomic or technological shifts may also uncover new market opportunities, bringing new players with new advantages to replace old ones (Thomas and D'Aveni 2004). Turbulent industries are characterized by frequent entries, exits, and structural instability, which should encourage firms to act more independently and to diverge from the industry norm. This is because the industry norm may be perceived as a less reliable guide for future success. Under such conditions of instability and uncertainty, convergent influences may be muted.

In our research context, industry norms are industry average IT inputs, which can be observed in aggregate industry reports. In theory, a firm can adjust its IT inputs to reflect the industry norm even if the industry average is dynamic. However, because of higher industry turbulence, firms are unlikely to consider the noisy industry norm worth emulating because of competition coming from different industries (e.g., Kodak facing competition from HP; music distributors facing competition from Apple; Barnes & Noble facing competition from Google Play and Apple iBooks), changing identity of players in the industry, and more frequent entry and exits. Firms deviate from the dynamic industry mean in a highly turbulent industry context because the industry norm has low credibility as a recipe for success, not just because it is difficult to ascertain what the industry norm may be. In contrast, a more stable industry environment may afford firms greater confidence in the signal represented by the industry norm as a collective of rational choices made by the firm's peers, as well as greater clarity in discerning that norm. Hence, firms in a stable industry environment are more likely to be influenced by industry norms, to the extent that such norms imply stability and success. Therefore, we posit that under higher industry turbulence, firms are more likely to diverge from the industry norm in digital business strategy.

Hypothesis 1: The greater the industry turbulence, the greater the divergent effect of digital strategic posture on realized digital business strategy.

Industry Concentration: The economic industrial organization literature suggests that dominant firms in more concentrated industries face competitive pressure to acknowledge their interdependence and tacitly coordinate with each other to leverage oligopoly rents (Scherer and Ross 1990). In addition, due to greater mutual awareness in a less crowded market, firm actions in less competitive industries are more likely to be noticed and mimicked by rival firms (Bain 1951). Hence, normative signals will have greater visibility and strength in industries that are more concentrated. Since it is easy to learn and anticipate the consequences of actions in more concentrated industries, firms are more likely to imitate actions taken by competitors and are more likely to converge to the industry norm (Derfus et al. 2008). The more visible a strategic move is to competitors, the more likely it is to be detected and imitated (Chen and Miller 1994). In contrast, when industry concentration is lower (i.e., there are more firms), firms can act in distinct and unique ways with less danger of being noticed and, hence, they can avoid a quick retaliatory or imitative response by competitors. Consequently, firms are inclined to converge to the industry norm under high industry concentration, and more inclined to diverge from the industry norm under low industry concentration.

Hypothesis 2: The greater the industry concentration, the greater the convergent effect of digital strategic posture on realized digital business strategy.



Note: Control variables are omitted for clarity.

Figure 2. Conceptual Model

Table 1. Mechanisms Underlying the Influence of Three Focal Industry Factors on Convergence and Divergence with Respect to Digital Strategies

Industry Factor	Definition	Key Mechanisms
Industry Turbulence H1: Turbulence → Divergence	Unpredictable change in an industry (Lu and Ramamurthy 2004; Melville et al. 2007), including the rate at which firms enter and exit an industry normalized by the number of firms in the industry, with higher ratios indicating greater industry turbulence (Griliches and Regev 1995).	**Mechanism: Dynamic norms.** Unstable norms generate differentiated strategies. Turbulent industries are characterized by frequent entries, exits, and structural instability. This environment makes it difficult for firms to clearly determine the optimal levels of IT investment based on industry norms because "norms" are less informative of future success.
Industry Concentration H2: Concentration → Convergence	Extent of industry concentration (fewer firms dominating an industry), often measured with the Herfindahl-Hirschman Index (HHI), where higher HHI implies less competition (Scherer and Ross 1990; Waring 1996) but greater strategic visibility.	**Mechanism: Strategic visibility.** More recognition by rivals generates similar strategies. When industry concentration is higher (i.e., fewer players), firm actions are more likely to be noticed and imitated by rivals (Bain 1951).
Industry Growth H3: Growth → Convergence	Growth in demand for an industry's output, with higher growth implying less competition and less strategic aggressiveness (Ferrier and Lee 2000; Smith et al. 2001).	**Mechanism: Less competition for profit opportunities.** Less need for differentiation generates common strategies. In rapidly growing industries (controlling for any effects of turbulence and competition that may arise during industry growth), competitive repertoires are simpler and there are fewer motivations to carry out a sequence of competitive actions of significant duration (Smith et al. 2001). Hence, facing high industry growth, firms are less likely to differentiate from the industry norm.

Industry Growth: When industry growth or environmental munificence (Castrogiovanni 1991; Staw and Szwajkowski 1975) is high, competition among incumbents tends to be less intense and profitability is often higher (Smith et al. 1992). In turn, growth and environmental munificence helps incumbents maintain superior performance even though entrants take some market share (McDougall et al. 1994). Some perspectives, such as population ecology theory (Hannan et al. 1995), argue that environmental munificence encourages more entrants into an industry and enables diverse types of organizations to develop differentiating strategies. However, other research findings suggest that in rapidly growing industries, competitive repertoires are simpler, patterns of competitive actions are more predictable, and there are fewer motivations to carry out a sequence of distinguishing actions of significant duration (Smith et al. 2001).

Following Smith et al. (2001) we posit that, separate from any effects of concentration and turbulence that may arise, firms facing high industry growth are less likely to diverge from the industry norm for at least three reasons. First, under conditions of environmental munificence, firms are less likely to be protective of core technologies than they would be under conditions of environmental scarcity (Yasai-Ardekani 1989). As a result, they may invest in innovations that are more likely to diffuse in the competitive environment, leading to a normative influence of digital strategic posture. By contrast, conditions of environmental scarcity lead to a hostile competitive environment (Dess and Beard 1984), in which firms are more likely to pursue only investments in technology innovations that are difficult to replicate. Under conditions of environmental munificence, firms are less likely to be deterred from investments that can be replicated, and thus digital strategic posture in high growth industries is more likely to have a convergent influence. Second, under conditions of environmental scarcity, firms experience greater duress and thus have greater incentive to take risks associated with differentiation in digital business strategy (Castrogiovanni 1991). By contrast, firms are more likely to follow the lead of industry peers in digital business strategy if such peers are doing well in overall performance, whereas it might not be a rational strategy to follow industry peers that are doing poorly. Third, under conditions of environmental munificence, firms have a greater incentive to maintain harmony and stability of the industry environment. Not only will the normative influence of strategic posture be greater, but firms will explicitly avoid actions that disrupt the condition of environmental munificence. As Dess and Beard (1984) argue, growth and stability leads to slack resources that firms can use to further maintain and reinforce such beneficial conditions. For example, firms can engage in coalitions that "serve as a means of conflict resolution" (Dess and Beard 1984, p. 55) and that further strengthen the normative influence of digital strategic posture. Therefore, we posit

Hypothesis 3: The greater the industry growth, the greater the convergent effect of digital strategic posture on realized digital business strategy.

Before moving to the empirical setting, it is useful to recognize that, even though the predictions do not distinguish between the two forms of digital strategy, industry environment and digital strategic posture may have different impacts on IT investments and IT outsourcing. In particular, IT outsourcing is more vulnerable than IT investment to floor and ceiling effects—that is, minimum and maximum feasible levels of investment. Because of floor and ceiling effects, there may be little room for divergence from the industry norm for IT outsourcing. Because of the promise of cost savings through outsourcing, for example, firms are unlikely to diverge by under-investing in outsourcing. At the same time, firms have more limited room for divergence by over-investing in outsourcing because of sensitivity about job losses that may entail public-relations risks, particularly if outsourcing vendors also engage in offshoring. Floor and ceiling effects do not apply as much to IT investments because higher investments in IT commonly contribute to productivity and profitability gains (Brynjolfsson and Hitt 1996; Mithas et al. 2012b), while lower investments in IT may be consistent with cost leadership strategy and can be a successful strategy if firms are adept at managing IT. Thus, we may find more support for H1 (turbulence) for IT investment than for outsourcing.

On the other hand, we may find stronger support for H2 (concentration) for outsourcing than for IT investments. This is because, with higher industry concentration, externally oriented actions of industry players such as outsourcing choices are more visible. Visibility makes actions easier to observe and imitate. However, when firms use internally oriented IT investments as a differentiating strategy, their individual methods of using IT may not be as easy to observe and imitate.

A complementary way of differentiating between IT investments and IT outsourcing is to think about the types of strategic degrees of freedom that IT investments and IT outsourcing enable. IT investments can enable firms to grow revenues, reduce costs, or do both at the same time (Mithas and Rust 2012). In contrast, IT outsourcing has predominantly been used to reduce costs. Because of these extra degrees of freedom, IT investments may allow greater room for divergence in more rapidly growing industry environments (H3).

Methods

Measures for Digital Strategic Posture and Digital Business Strategy

As we noted earlier, we defined digital business strategy as the extent to which a firm engages in any category of IT activity and digital strategic posture as the industry norm of any digital business strategy relative to the focal firm. Therefore, in creating measures for digital strategic posture and digital business strategy, we need to identify common sets of IT activities.

We present the following criteria in identifying suitable measures. First, the digital business practices must be applicable across the population of firms, so that there is a basis to compare their levels of engagement. It is also important that the measures have both economic and strategic significance. Second, digital business activities are externally observable with regard to their industry norms, such as through publication of annual survey results that post summary statistics by industry. It is important that industry peers have the means to observe industry norms for such practices. Third, firms regularly update their digital practices; hence, the availability of multi-year data is critical. Based on these criteria, we identified two suitable measures for digital business strategy: general IT investments and the portion of the IT budget allocated to outsourcing activities.

Investments in general IT and outsourcing activities are relevant measures for digital business strategies because differing levels of these investments can significantly expand or constrain a firm's strategic choice sets. We earlier described the example in which the digital strategies of Amazon and Borders reflected how they approached IT investment and how they viewed what they should do in-house versus what they should outsource. Other examples reinforce the importance of these elements of digital strategy. Netflix invested in a digital infrastructure that allowed it to leapfrog Blockbuster's massive offline assets (Antioco 2011). These examples from the book retailing and movie rental industries provide face validity for treating IT investments and outsourcing as appropriate examples of digital strategies.

Data

The data for this study come from two sources. First, we obtained the data related to IT investment from *InformationWeek* surveys from 1999 to 2006. Prior academic studies have used *InformationWeek* surveys as a reliable source of IT investments (Bharadwaj et al. 1999; Mithas et al. 2005; Rai et al. 1997). Respondents include chief information officers, chief technology officers, and other senior-level IT executives in the firm; these executives have the most knowledge of firm IT investments and practices. The IT investment figures include technology hardware, software, and systems, as well as salaries and recruitment of IT professionals, IT-related services, and training. The data provide a comprehensive measure of a firm's IT-related expenses and, in turn, assess the overall information intensity of a firm's operations. Although the *InformationWeek* sample adds and drops firms in each report, a given firm is present for an average of three years out of the 1999–2006 period. This set of survey data includes the percentage of the IT budget that is allocated to outsourcing activities.

Second, we retrieved firm- and industry-level variables from the Compustat North America database. This source provides data for calculations of industry-environment variables, including industry turbulence, the HHI, and industry growth. The final sample included 400 firms and 1,225 firm-year observations in the unbalanced panel of firms present in at least one of the *InformationWeek* surveys from 1999 to 2006.[6] The firms operate in 55 different three-digit NAICS industries (the results are robust to industry classification at one-digit and two-digit NAICS levels).

Variable Definitions

IT Investment (IT): We measure general IT investment intensity as a ratio of sales revenue, which is available in a set of *InformationWeek* surveys from 1999 through 2006. Annual IT investment represents the sum of all expenses reported for information systems activities, including capital and operating expenses for infrastructure (telecom, networking, hardware, applications maintenance, applications development, and packaged applications); Internet-based costs; salaries and recruitment; IT services and outsourcing; and training.

Outsourcing Investment (Outsourcing Allocation Pct): We measure percentage of overall IT investment projected to be allocated to outsourcing for the current year, which is available in a set of *InformationWeek* surveys from 1999 through 2006. IT investments have enabled the outsourcing of business processes through codification, standardization, and modularizability of tasks (Han and Mithas 2013; Mithas and Whitaker 2007; Whitaker et al. 2011). The extent to which firms allocate IT investment to outsourcing activities

[6]Annual cases: 1999 (89); 2000 (139); 2001 (150); 2002 (177); 2003 (228); 2004 (191); 2005 (150); 2006 (101).

is an increasingly important aspect of digital business strategy. During the sample period of 1998–2006 when business process outsourcing was expanding rapidly, some firms that initially hesitated to engage in outsourcing because of uncertain vendor reputations or concern about customer perceptions may have been influenced to finally engage in it when observing their industry peers. Like general IT investment, the direction of peer influence will depend on industry conditions.

General IT Strategic Posture (IT_STRATPOSTURE): We measure the difference between the prior-year average industry-level IT intensity at the three-digit NAICS level and prior-year firm-level IT investment intensity. When calculating this difference for a firm, we excluded the focal firm's IT investments in that industry in our calculation of prior year industry average. A higher positive value of IT_STRATPOSTURE means that a firm has undertaken low IT investments relative to its industry rivals. A larger negative value of IT_STRATPOSTURE means that a firm has undertaken high IT investments relative to its industry rivals. To our knowledge this is the first study that investigates strategic actions involving continuous measures such as IT expenditures. Drnevich and Kriauciunas (2011) use a similar type of measure for capability heterogeneity. While our measure is consistent with the concept of digital strategic posture, future research could explore alternative conceptualizations and operationalization.

Outsourcing Strategic Posture (OS_STRATPOSTURE): We defined outsourcing strategic posture as the strategic posture in allocation of IT investments to outsourcing activities. We measure the difference between the average industry-level outsourcing allocation (at the three-digit NAICS level) and firm-level outsourcing allocation. When calculating this difference for a firm, we excluded the focal firm's outsourcing allocation in its industry in our calculation of prior year industry average.

Industry Turbulence (INDTURB): We measure industry turbulence based on the prior conceptualization of gross churning and market turbulence (Griliches and Regev 1995; Segarra and Callejon 2002; Thomas and D'Aveni 2004).We calculate INDTURB = (*entrance* + *exit*)/*inddens*, where *entrance* denotes the number of firms that enter a three-digit NAICS segment in a given year, *exit* denotes the number of firms that exit a three-digit NAICS segment in a given year, and *inddens* denotes the total number of firms in a three-digit NAICS segment at the end of the prior year.

Herfindahl-Hirschman Index (HHI): HHI measures industry concentration, following Hou and Robinson (2006). The HHI for some industry j is measured by using data on all firms available in Compustat, which includes almost major firms in most industries, in each 3-digit NAICS industry as follows:

$$\text{HHI} = \sum_i S_{ij}^2$$

where s_{ij} is the market share of firm i in industry j.

Industry Growth (INDGROWTH): Industry growth equals three-year growth in the sum of total sales among all firms in each three-digit NAICS industry: $\text{INDGROWTH} = (MS_t - MS_{t-3}) / (0.5 \times MS_t + 0.5 \times MS_{t-3})$, where MS is market size.

We created five control variables: competitive uncertainty, firm size, free cash flow, market share and related diversification. We also control for year and industry effects.

Competitive Uncertainty (COMPUNC): We measure competitive uncertainty by adapting a prior measure of relative firm-specific variation (Beckman et al. 2004; Durnev et al. 2004; Morck et al. 2000) that draws from Schumpeter's ideas of creative destruction. This measure captures the variation in market-value returns that industry and market factors do not explain. To calculate this measure, we first specified the following regression equation:

$$r_{firm} = \text{Const} + \beta\, r_{industry} + (\text{Year1-Year10 dummies}) + \text{Industry dummies}$$

where r_{firm} is three-year growth in market value at the firm level, and $r_{industry}$ is marketshare-weighted average market value growth at the industry level calculated as $r_{industry} = (MV_t - MV_{t-3}) / (0.5 \times MV_t + 0.5 \times MV_{t-3})$. From this regression, we obtained the firm-specific residual for each firm $\varepsilon_i = y_i - \hat{y}$ and the systematic deviation $\varepsilon_s = \hat{y} - y_{avg}$, where $\hat{y}$ is the predicted firm-level return, y_i is the observed return, and y_{avg} is the sample mean return. We computed firm-specific variation σ_i^2 as the square of the firm-specific residual, and systematic variation σ_s^2 as the square of the systematic deviation. We define relative firm-specific variation, in a manner analogous to Chun et al. (2008), as $\ln(\sigma_i^2) - \ln(\sigma_s^2)$. We obtain the mean of this figure at the industry-year level. This is a measure of heterogeneity in firm performance in an industry. Because competitive uncertainty can also moderate the effect of strategic posture on digital strategy, we account for this influence in our empirical models.

Firm Size: Firm size records the natural log of the number of employees. Larger firms have more slack resources for IT investment, are more likely to achieve economies of scale (Mithas et al. 2013), and are more capable of bearing the risk associated with IT investment.

Free Cash Flow: Free cash flow is the sum of Income before Extraordinary items (#18) and Depreciation and Amortization (#14), using data from Compustat. Agency theory (Jensen and Meckling 1976) suggests that managers have incentives to invest free cash flow on resources under their control rather than pay out the free cash flow to shareholders, even if the investments are not cost effective. This variable serves as a proxy for resource endowments (or financial distress) of a firm.

Market Share: The ratio of firm revenues over the total revenues generated by all firms in the same three-digit NAICS industry, market share controls for the relative influence that a firm might have within its industry attributed to its share of industry revenue.

Related Diversification: We used the entropy measure from Bharadwaj et al. (1999), basing the industry classification scheme on NAICS:

$$E_r = E_t - E_u = \sum P_t \log\left(1/P_t\right) - \sum P_u \log\left(1/P_u\right)$$

where E_r is related component of entropy, E_t is entropy as defined at the four-digit NAICS level, E_u is entropy as defined at the two-digit NAICS level, P_t is percentage of sales in each four-digit NAICS industry, and P_u is percentage of sales in each two-digit NAICS category. Diversification influences IT investments because it increases the need for new internal coordination requirements associated with resource sharing across multiple lines of business or organizational units, and consequently increases the demand for information processing and IT (Dewan et al. 1998; Hitt 1999). Firms expanding into multiple businesses have to develop resources such as flexible IT infrastructure and IT skills to manage the business heterogeneity (Zhu and Kraemer 2005).

Table 2 provides descriptive statistics and zero-order correlations among variables. The HHI measure of industry concentration has moderate negative correlation with industry turbulence (r = -0.13). Firm size (employees) has moderate positive correlation with free cash flow (r = 0.47) and the Herfindahl-Hirschman Index (r = 0.20). Firm- and industry-level IT investment are moderately correlated (r = 0.24). Industry turbulence has a moderate positive correlation with industry growth (r = 0.16), firm-level IT investment (r = 0.10), and industry-level IT investment (0.13). The two strategic posture variables are largely uncorrelated (r = -0.04) with each other, while having negative correlation with each relevant form of investment ($r_{IT,STRATPOSTURE}$ = -0.50; $r_{Outsourcing\ allocation,\ OS\_STRATPOSTURE}$ = -0.62). The three focal industry environment variables show relatively low correlations among each other (-0.07 to 0.16) suggesting that they are conceptually and empirically distinct. Overall, there is substantial independence among the independent variables.

Figures 3 and 4 report trends in industry-level IT investments and firm-level strategic posture. Figure 3 shows that industries vary substantially in trends and year-to-year fluctuations of IT investments. Figure 4 shows that firms vary substantially in trends and year-to-year fluctuations in their strategic posture. To assess whether the outsourcing percentage may be influenced by the general level of IT investment, we checked the correlation between IT investments and outsourcing allocation and found it to be 0.05 (see Table 2). Because of this low correlation, we did not include IT investments in our outsourcing models.

Empirical Models and Econometric Choices

Our approach starts with the assumption that the current status of digital strategic posture (SP0) influences subsequent digital business strategy. Of course, once firms undertake their investments, strategic posture will change; hence, a firm's position relative to the industry norm is a moving target. Nonetheless, it is reasonable to treat digital business strategy decisions based on an exogenously determined SP0, because the current strategic posture arises from past decisions. In this decision process, a firm decides whether it wants to engage more or less in a specific digital business strategy. Then, depending on industry environment, we want to know how firms update their digital business strategy in the next time period. Because we define strategic posture as a difference between the norm (say A) and the desired state of the firm (say B), we are agnostic to how the quantities involved in the difference (A or B) themselves change; what matters is the difference (A – B). Of course, we assume that firms will differ with respect to their strategic posture both in sign and magnitude.

In an extension to the analysis, we then allow the decision makers a degree of foresight, in which they estimate what strategic posture will be next year (SP1), based on likely investments that firms in the industry will make this year. Then, rather than estimating digital business strategy based on current strategic posture (SP0), we will examine whether feasible estimates of future digital strategic posture in the prior year drive current digital business strategy. This approach allows a degree of endogenous equilibration in the decision process. In addition to accounting for the potential presence of endogeneity, this approach allows us to examine whether competitive factors may induce a different response for anticipated future-year strategic posture as compared to the current strategic posture.

Table 2. Correlations and Descriptive Statistics

		1	2	3	4	5	6	7	8	9	10	11	12	13
1	IT (year t)	1.000												
2	IT_STRATPOSTURE (year t-1)	-0.499*	1.000											
3	Outsourcing allocation pct.	0.054	-0.059	1.000										
4	OS_STRATPOSTURE (year t -1)	0.041	-0.042	-0.622*	1.000									
5	Industry Turbulence	0.102*	-0.012	0.110	-0.018	1.000								
6	Herfindahl-Hirschman Index (HHI)	-0.026	-0.008	-0.098	0.003	-0.129*	1.000							
7	Industry Growth	-0.027	-0.022	0.019	-0.040	0.164*	-0.068	1.000						
8	Industry Avg. IT	0.240*	0.271*	0.011	-0.010	0.126*	-0.042	-0.043	1.000					
9	Employees	0.024	0.013	0.028	-0.041	0.063	0.195*	-0.056	0.022	1.000				
10	Related Diversification	-0.024	-0.010	0.141*	-0.082	-0.024	-0.006	-0.039	-0.097*	0.133*	1.000			
11	Free Cash Flow	0.030	0.008	0.148*	-0.081	0.169*	-0.031	0.012	0.034	0.470*	0.006	1.000		
12	Market share	-0.089*	0.045	0.051	-0.096	0.003	0.487*	-0.002	-0.063	0.42*	-0.043	0.268*	1.000	
13	Competitive Uncertainty	0.089*	-0.016	-0.106	0.016	-0.047	-0.075*	-0.04	0.141*	0.05	0.01	0.03	-0.181*	1.000
	Observations	1225	1225	406	709	1225	1225	1225	1225	1225	1225	1,225	1225	1225
	Mean	0.028	0.000	13.7	0.323	0.062	0.061	0.149	0.032	35.8	0.181	1,042	0.035	1.515
	Std. Dev.	0.030	0.042	12.7	15.05	0.029	0.047	0.192	0.024	54.0	0.376	2,429	0.051	2.944
	Min	0.000	-0.709	0	-69.73	0.000	0.011	-0.472	0.000	0.088	-0.819	-12,300	0.000	-6.561
	Max	0.400	0.260	83	55.00	0.184	0.408	0.785	0.353	475.0	2.075	29,824	0.506	12.417

$p < 0.01$

Notes: IT, STRATPOSTURE, and INDTURB are ratios. Outsourcing allocation pct. and OS_STRATPOSTURE are percentages. The HHI is the square of a ratio. Employees are in thousands. Free Cash Flow is in millions of dollars. Competitive uncertainty is a unit-less measure.

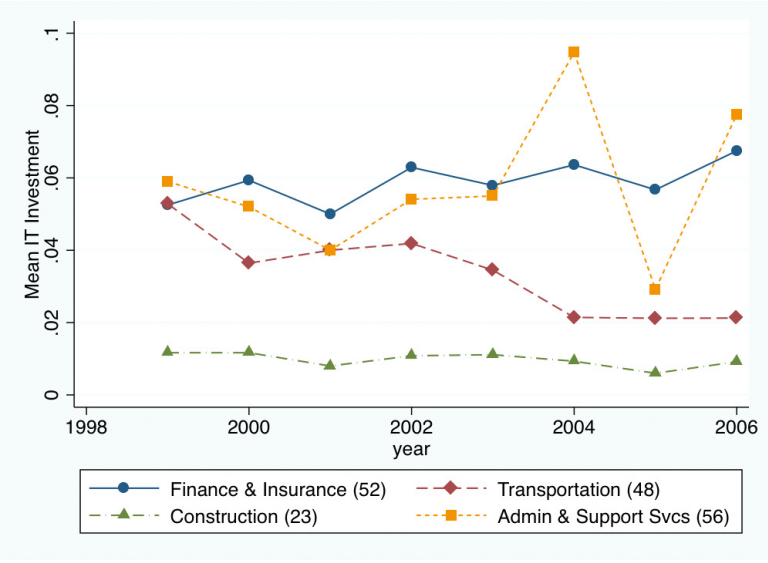


Figure 3. Trends in Annual IT Investments in Selected Industries

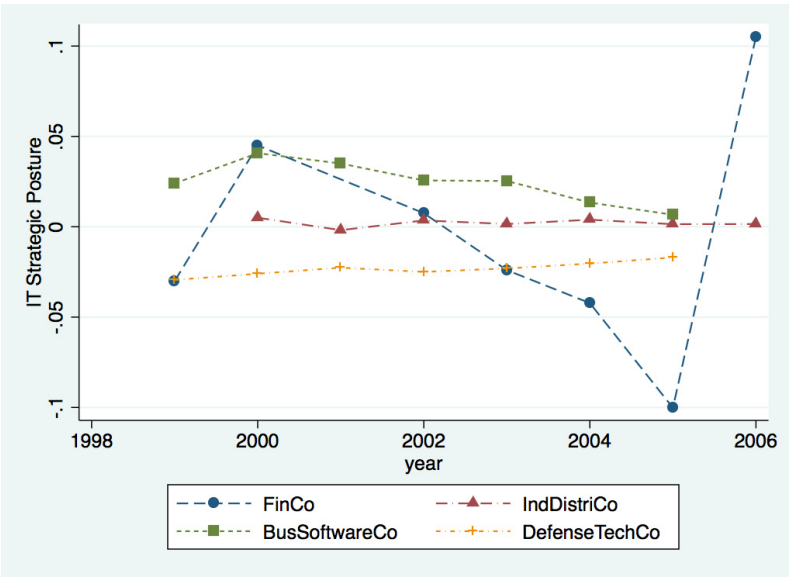


Figure 4. Trends in Annual IT Strategic Posture of Selected Firms

Notes: IT strategic posture is operationalized as the difference between the mean IT investments in an industry (as a ratio of sales) and a firm's IT investments. Positive values mean that a firm's IT investments are less than the mean IT investments in that industry while negative values mean that a firm spends more on IT than the mean IT investments in that industry. These charts show that (1) IndDistriCo stays at the mean of industry IT investments, (2) FinCo chases the mean of industry IT investments, (3) BusSoftwareCo remains at slightly below the mean of IT investments, and (4) DefenseTechCo hovers just above the mean of industry IT investments.

Our theory and hypotheses describe a set of conditions that influence a firm's *desired* levels of engagement in digital business strategies: Strategic posture (i.e., where the firm wants to be with respect to the industry norm), industry turbulence, industry competitiveness, and industry growth. In developing the empirical model, we consider a firm's *actual* digital business strategy level in response to the industry environment as a movement or adjustment toward the desired level. Due to inertia in a firm's culture, high costs of adjustment, and rigidities in technological infrastructure, we expect that a firm's actual adjustments in digital business strategy will represent only a fraction of the adjustments that the firm desires to make in response to the industry environment. We model this scenario using a partial-adjustment econometric framework (Feigenbaum and Thomas 1994).

We first specify the *desired* digital business strategy as

$$y_{i,t}^{*} = \gamma_0 + (\gamma_1 \text{INDTURB}_t + \gamma_2 \text{HHI}_t + \gamma_3 \text{INDGROWTH}_t) \times (\text{STRATPOSTURE}_{i,t}) + \gamma_4 \text{STRATPOSTURE}_{i,t} + \gamma_5 \text{INDTURB}_t + \gamma_6 \text{HHI}_t + \gamma_7 \text{INDGROWTH}_t + X_C \gamma_C + u_i + \varepsilon_{i,t} \quad (1)$$

where STRATPOSTURE represents the industry mean for the level of engagement in the digital business practice minus the focal firm's level of engagement, INDTURB measures industry turbulence, HHI measures industry concentration (inverse of competitiveness), and INDGROWTH represents industry growth. The vector γ_C represents the coefficients for the covariates including free cash flow, related diversification, firm size, year dummies, and industry indicator variables at the level of two-digit NAICS codes. The desired level of digital business strategy by firm i at time t is represented by $y_{i\,t}^{*}$; the firm-specific component of error is u_i.

In the partial-adjustment model, the firm's actual adjustment in digital business strategy is some fraction (δ) of its desired adjustment. Formally,

$$y_{i,t} - y_{i,t-1} = \delta(y_{i,t}^{*} - y_{i,,t-1}) + \varepsilon_{i,t}^{0} \quad (2)$$

Combining and rearranging equations (1) and (2), we have

$$y_{i,t} = (1-\delta)\, y_{i,t-1} + \delta \times \gamma_0 + (\gamma_1 \delta \text{INDTURB}_t + \gamma_2 \delta \text{HHI}_t + \gamma_3 \delta \text{INDGROWTH}_t) \times (\text{STRATPOSTURE}_{i,t}) + \gamma_5 \delta \text{STRATPOSTURE}_{i,t} + \gamma_6 \delta \text{INDTURB}_t + \gamma_7 \delta \text{HHI}_t + \gamma_9 \delta \text{INDGROWTH}_t + \delta X_C \gamma_C + \delta u_i + \delta \varepsilon_{i,t} + \varepsilon_{i,t}^{0}$$

Consolidating the coefficient terms, we can rewrite the above equation as an equivalent empirical estimation model:

$$y_{i,t} = \beta_0 + \alpha\, y_{i,t-1} + \beta_1\, INDTURB_t \times STRATPOSTURE_{i,t} + \beta_2\, HHI_t \times STRATPOSTURE_{i,t} + \beta_3\, INDGROWTH_t \times STRATPOSTURE_{i,t} + \beta_4\, STRATPOSTURE_{i,t} + \beta_5\, INDTURB_t + \beta_6\, HHI_t + \beta_7\, INDGROWTH_t + X_C\, \beta_C + v_i + w_{i,t} \quad (3)$$

The resulting model allows us to test our hypotheses: β_1, β_2, and β_3 test H1, H2, and H3, respectively.

Several diagnostic checks suggest that the results are stable. We confirmed that all empirical results are robust to heteroskedastic error distributions. We tested for multicollinearity by computing variance inflation factors. The highest variance inflation factor in our models was well below 9.0, indicating that multicollinearity is not a serious concern. Although some multicollinearity exists among the industry indicator variables, they do not affect the consistency of estimates and only somewhat reduce the efficiency of the estimates. Since the industry indicator variables reduce the possibility of specification errors by controlling for additional systematic differences among industries, we retained both time and industry indicator variables in the model.

Results

Table 3 reports the results when using IT investment as a measure of digital strategy. Column 1 of the table reports the control variable effects. IT investment increases with industry turbulence, the HHI, growth, and lag investment. Strategic posture, competitive uncertainty, size, diversification, and free cash flow do not have significant effects. The model also controls for year and industry.

The results in column 2, which include the hypothesized predictor variables, support hypotheses 1 and 3 for IT investments. We interpret the coefficients for IT_STRATPOSTURE and the interactions as follows. A positive coefficient estimate of the main effect of IT_STRATPOSTURE indicates that firms, on average, tend to converge toward their industry peers in IT investment. A convergence tendency implies that if a firm's IT investment level is lower than the average of its industry peers in year *t*, it is likely to increase its level of IT investment in the following year ($t + 1$) towards the industry mean, while if the firm has greater IT investment levels than the average of its industry peers, then it is likely to decrease its IT investment level in the following year away from the industry mean. By contrast, a divergence tendency (negative coefficient) would imply the reverse in either situation. In turn, the interaction effects have the following interpretation. A positive interaction effect (an industry factor multiplied by IT_STRATPOSTURE) suggests that the factor makes the effect of IT_STRATPOSTURE on IT investment increasingly positive (i.e., that the industry factor creates a convergent effect). A negative interaction effect suggests the reverse (i.e., that the industry factor creates a divergent effect).

Hypothesis 1 predicted that firms are likely to diverge from the industry norm under higher industry turbulence but converge toward the norm under lower industry turbulence. The results support this hypothesis because the coefficient estimate for INDTURB×IT_STRATPOSTURE is negative and statistically significant (coefficient = -5.291, $p < .01$), implying that higher industry turbulence creates a divergent effect while lower industry turbulence creates a convergent effect. The negative coefficient estimate for this interaction effect implies that industry turbulence makes the divergent effect of IT_STRATPOSTURE on IT investment stronger.

Hypothesis 2 predicted that firms are likely to converge toward the industry norm under higher industry concentration but diverge from the industry norm under lower industry concentration. This prediction means that firms would converge toward industry norm in industries characterized by a higher HHI but diverge from their peers in industries characterized by a lower HHI. The results have the expected positive sign but do not support the hypothesis because the coefficient estimate for HHI×IT_STRATPOSTURE is statistically insignificant (coefficient = 0.443, n.s.), implying that industry concentration is unrelated to the convergent or divergent effect. We return to this null result later, when we compare the results for general IT and outsourcing investments.

Hypothesis 3 predicted that firms are likely to converge toward the industry norm under higher industry growth but diverge from the industry norm under lower industry growth. The results support this hypothesis because the coefficient estimate for INDGROWTH×IT_STRATPOSTURE is positive and statistically significant (coefficient = 4.546, $p < .01$), implying a convergent effect under higher industry growth and divergent effect under lower industry growth.

Among the other results, we discuss how strategic posture and competitive factors affect IT investments at the mean values of other variables. Several of the main effects of the variables from Model 1 increase in significance with the addition of the interactions in Model 2. We find that, at the mean value of industry factors in the competitive environment, firms imitate the industry norm in IT investments because the coefficient on IT_STRATPOSTURE is positive (coefficient = 0.111, $p < .05$). Among the industry factors, at the mean level of strategic posture, firms have higher IT investments under higher industry turbulence (coefficient = 0.0478, $p < .10$), lower competition (higher HHI; coefficient = 0.195, $p < .01$), and higher industry growth (coefficient = 0.0812, $p < .05$). Competitive uncertainty had no significant effect on IT investments at the mean level of strategic posture.

Table 3. How Strategic Posture and Competitive Environment Influence IT Investments

	1. IT Investments (SP0)	2. IT Investments (SP0)	3. IT Investments (expected SP1)
	Fixed Effects	**Fixed Effects**	**Fixed Effects**
IT_STRATPOSTURE (Industry Norm Minus Firm's IT Investments in Prior Period)	-0.0137	0.111**	0.185**
	(0.0508)	(0.0498)	(0.0897)
β_1: IT_STRATPOSTURE × INDTURB (H1 -)		-5.291***	-9.961***
		(0.601)	(1.166)
β_2: IT_STRATPOSTURE × HHI (H2 +)		0.443	1.135
		(0.623)	(1.212)
β_3: IT_STRATPOSTURE × INDGROWTH (H3 +)		4.546***	9.359***
		(1.203)	(2.347)
IT_STRATPOSTURE × COMPUNC		-5.618***	-11.10***
		(0.757)	(1.468)
Industry Turbulence (INDTURB)	0.0547*	0.0478*	0.0432
	(0.0284)	(0.0263)	(0.0264)
Herfindahl-Hirschman Index (HHI)	0.227***	0.195***	0.202***
	(0.0745)	(0.0692)	(0.0693)
Industry Growth (INDGROWTH)	0.0826*	0.0812**	0.0834**
	(0.0445)	(0.0413)	(0.0413)
Competitive Uncertainty (COMPUNC)	2.85e-05	-0.00242	-0.00281
	(0.0260)	(0.0242)	(0.0242)
Lag Investment (IT)	0.606***	0.567***	0.554***
	(0.0634)	(0.0605)	(0.0565)
Firm size: Log(Employees)	0.00146	0.00121	0.00124
	(0.00309)	(0.00288)	(0.00289)
Related Diversification	-23.97	-27.39	-29.08
	(68.83)	(64.00)	(64.04)
Free Cash Flow	-0.00178	-0.00324	-0.00342
	(0.00569)	(0.00529)	(0.00530)
Market share	-0.108*	-0.0935	-0.0955
	(0.0648)	(0.0604)	(0.0605)
R-squared	0.440	0.521	0.520
F-statistic	45.53***	48.84***	48.65***
Number of firms	400	400	400
Number of observations	1,225	1,225	1,225

***p < 0.01, **p < 0.05, *p < 0.10; standard errors in parentheses

Notes: Dependent variable is IT investment. Positive coefficient on IT_STRATPOSTURE suggests convergence, negative coefficient suggests divergence; positive interaction effects suggest stronger convergence due to environmental factors; and negative interactions suggest stronger divergence due to environmental factors.

The estimated models include an intercept, and indicator variables for year and industry. Variables in interaction terms are mean centered. We rescaled several variables to produce meaningful coefficient decimal places: Competitive uncertainty (× 100), industry growth (× 10), free cash flow (× 10,000), related diversification (× 10,000). The first stage model that predicts expected IT_STRATPOSTURE for Model (3) is statistically significant and highly linear (overall F = 172.2, prob > F = 0.000, R^2 = 0.49).

Table 4. How Firms Adjust Their IT Investments Depending on Their Strategic Posture and Competitive Environment (Summary of Results in Table 3)

		Competitive Environment			
		Low Industry Turbulence	*High Industry Turbulence*	*Low Industry Growth*	*High Industry Growth*
Strategic Posture with Respect to IT Investments	*More IT Investments than Industry Norm*	Decrease in IT Investments in Year *t* + 1	Increase in IT Investments in Year *t* + 1	Increase in IT Investments in Year *t* + 1	Decrease in IT Investments in Year *t* + 1
	Less IT Investments than Industry Norm	Increase in IT Investments in Year *t* + 1	Decrease in IT Investments in Year *t* + 1	Decrease in IT Investments in Year *t* + 1	Increase in IT Investments in Year *t* + 1
		Convergence toward the industry norm	Divergence from the industry norm	Divergence from the Industry Norm	Convergence toward the Industry Norm

Column 3 provides a sensitivity analysis based on predicted strategic posture (estimated SP1), rather than current strategic posture (SP0). We estimated predicted SP1 using prior year values of eight explanatory variables in a first-stage model.

$$\text{PREDICTED\_STRATPOS}_{t+1} = \text{Constant} + b_1\text{INDTURB}_t + b_2\text{HHI}_t + b_3\text{INDGROWTH}_t + b_4\text{IT}_t + b_5\text{COMPUNC}_t + b_6\text{Ind.Avg.IT}_t + b_7\ln(\text{Employees}_t) + b_8\text{Free Cash Flow}_t + \varepsilon_{i,t} \quad (4)$$

As we noted earlier, the SP1 approach incorporates foresight by the executives who make IT investment decisions. The SP1 model (equation 4) is significant based on the overall F-statistic (160.4). The results in Model 3 (using predicted SP1 in place of current SP0) are similar to those in Model 2 (using current SP0). Thus, the results are robust to differing behavioral assumptions about current versus future decision-making frontiers.

Table 4 summarizes the results. The column headings delineate industry environment as low or high for relevant industry factors in year *t*. The row headings delineate the level of strategic posture with respect to IT investment (IT_STRATPOSTURE) in year *t*. The entries of each cell indicate whether IT investment is predicted to increase or decrease in year *t* + 1, given the combination of IT_STRATPOSTURE state and industry environment. The combination of responses under each column of the table suggests whether each focal industry competitive factor contributes to a convergent or divergent tendency.

We next examine the extent to which strategic posture with respect to outsourcing and industry environment influence firms' investments in outsourcing activities. Table 5a reports the focal results for outsourcing allocations, using the same control variables as in Table 3.

In the analyses of outsourcing allocations, the results showed strong support for one hypothesis and weak support for a second hypothesis concerning interactions with industry conditions. The results did not exhibit the predicted patterns for outsourcing investments in H1, concerning industry turbulence. By contrast, the outsourcing analyses supported H2 ($p < 0.10$; one-tail) and H3 ($p < 0.01$) concerning industry concentration and industry growth. Firms tend to weakly follow their industry peers in outsourcing allocation when the industry is less crowded with competitors, likely due to higher visibility of competitor strategies. Moreover, firms tend to follow their industry peers in outsourcing allocation under conditions of high industry growth. Table 6 summarizes the results.

Column 2 of Table 5 uses expected outsourcing strategic posture (SP1) rather than current strategic posture (SP0). The first-stage model for predicting outsourcing strategic posture is similar to equation 4, except that previous-year outsourcing and previous-year industry average of outsourcing are also included in the first-stage model. Most results for SP0 and SP1 are similar, and the results for H2 and H3 are stronger in the SP1 model. Thus, as in the IT-investment models, these results are robust to differing behavioral assumptions about current or future decision-making frontiers.

The results suggest that, as we predicted, environmental factors condition the impact of strategic posture on both general IT and outsourcing investments. We find both differences and similarities across the two sets of analysis. The discussion section will address possible causes of these differences.

We conducted additional robustness checks. First, we calculated industry mean of IT investments and IT outsourcing at one-digit and two-digit NAICS level and obtained broadly similar results for our main models. This analysis provides

Table 5. OLS Regression Analysis with Strategic Posture of Outsourcing		
	1. Outsourcing allocation Pct. (year = *t* + 1)	**2. Outsourcing allocation Pct. (year = *t* + 1)**
	SP0 (current)	SP1 (expected)
OS_STRATPOSTURE (Outsourcing Strategic Posture)	-0.0706	-0.127
	(0.0567)	(0.0943)
β_1: OS_STRATPOSTURE × INDTURB (H1 -)	1.782	2.460
	(1.307)	(1.748)
β_2: OS_STRATPOSTURE × HHI (H2 +)	0.665#	1.159*
	(0.459)	(0.652)
β_3: OS_STRATPOSTURE × INDGROWTH (H3+)	4.550***	7.014***
	(1.571)	(2.173)
OS_STRATPOSTURE × COMPUNC	1.229	1.927
	(1.228)	(1.645)
Industry Turbulence (INDTURB)	20.79	20.20
	(17.30)	(17.37)
Herfindahl-Hirschman Index (HHI)	-24.87**	-24.47**
	(10.81)	(10.73)
Industry Growth (INDGROWTH)	-38.70*	-40.83*
	(23.25)	(23.12)
Competitive Uncertainty (COMPUNC)	-8.710	-11.91
	(16.74)	(16.75)
Lag Investment (Outsourcing)	0.662***	0.637***
	(0.0629)	(0.0766)
Firm size: Log(Employees)	0.0710	0.0374
	(0.431)	(0.428)
Related Diversification	21,877*	21,128*
	(11,766)	(11,743)
Free Cash Flow	3.757	3.963
	(2.982)	(2.979)
Market share	12.16	12.46
	(11.08)	(11.04)
Observations	406	406
R-squared	0.609	0.613
F-statistic	24.75***	25.11***

***p < 0.01, **p < 0.05, *p < 0.10, #p < 0.10 (1-tailed test); standard errors in parentheses

Notes: Dependent variable is one year-forward Outsourcing Allocation investment. Positive coefficient on OS_STRATPOSTURE suggests convergence; negative coefficient suggests divergence; positive interaction effects suggest stronger convergence due to environmental factors; and negative interactions suggest stronger divergence due to environmental factors.

The analyses in Table 5 include an intercept, and year and industry indicator variables. We rescaled several variables to produce meaningful decimal places: Uncertainty (× 100), industry growth (× 10), free cash flow (× 10,000), related diversification (× 10,000). The first stage model that predicts expected OS_STRATPOSTURE for Model (2) is statistically significant and highly linear (overall F = 48.2, Prob > F = 0.000 , R^2 = 0.52).

Table 6. How Firms Adjust Their Outsourcing Allocation of IT Investments to Outsourcing Depending on Their Strategic Posture and Competitive Environment (Summary of Results in Table 5)

		Competitive Environment			
		Low Industry Concentration	*High Industry Concentration*	*Low Industry Growth*	*High Industry Growth*
Strategic Posture with Respect to Allocation of IT Investments to Outsourcing	*More Percentage Allocation to Outsourcing than the Industry Norm*	Increase in Outsourcing Allocation in Year $t + 1$	Decrease in Outsourcing Allocation in Year $t + 1$	Increase in Outsourcing Allocation in Year $t + 1$	Decrease in Outsourcing Allocation in Year $t + 1$
	Less Percentage Allocation to Outsourcing than the Industry Norm	Decrease in Outsourcing Allocation in Year $t + 1$	Increase in Outsourcing Allocation in Year $t + 1$	Decrease in Outsourcing Allocation in Year $t + 1$	Increase in Outsourcing Allocation in Year $t + 1$
		Divergence from the Industry Norm	Convergence toward the Industry Norm	Divergence from the Industry Norm	Convergence toward the Industry Norm

confidence in main results which are based on industry classification at three-digit NAICS level at which there may be relatively fewer firms in each industry on average. In addition, we have conducted a series of Kolmogorov-Smirnov sample selection tests at the three-digit and two-digit NAICS levels, comparing the firm-level variables of firms in our sample with those in the overall population of firms in Compustat that report over $1 million in annual sales. Even in industries with the fewest number of observations in our sample, such as conglomerates (two-digit NAICS = 99) and mining (two-digit NAICS = 21), the Kolmogorov-Smirnov tests showed no significant difference between firms in the sample and firms not in the sample. This is because these industries also have very few members in the overall population of publicly listed firms, and thus our sample is proportionately representative of the sparsely populated as well as densely populated industry segments. Likewise, the Kolmogorov-Smirnov tests showed broad similar results in all other industry segments covered in our data sample.

Second, to assess the strategic significance of strategic posture for competitive advantage, we estimated firm performance models using Tobin's q for IT investments and IT outsourcing.[7] Table A1 shows that current-year IT investments have a positive association with Tobin's q at the mean value of industry variables. We also find that the relationship between IT and Tobin's q is attenuated in more turbulent industries but amplified in high-growth industries. Note that while general IT strategic posture influences IT investments (as reflected in substantive and statistical significance of coefficients involving general IT strategic posture variable in Table 3), its influence on firm performance occurs indirectly through its effect on IT investments. This is because the coefficient of general IT strategic posture variable is statistically insignificant in firm performance models while that of IT investments variable is statistically significant as discussed above.

Table A2 shows that prior-year outsourcing strategic posture has a positive association with current year IT investments. In other words, firms that allocated less to IT outsourcing compared to their peers in the prior period have higher IT investments in the next period. Since we showed earlier that current-year IT investments have a positive association with Tobin's q (Table A1), outsourcing strategic posture influences Tobin's q through its influence on IT investments. Together, these additional analyses show the strategic significance of general IT and outsourcing strategic posture because they eventually influence firm performance.

Third, we estimated the models using seemingly unrelated regression (SUR) to allow correlation among the error terms of the IT investments and IT outsourcing models (Table A3). We obtained broadly similar results despite a drop in sample size. Fourth, we assessed the robustness of our results by controlling for a firm's participation across industries by including diversification (related and total diversification) and number of segments measures in our main models. Since 138 out of 400 firms in our sample are single-business firms, we expected and confirmed that the results are generally equivalent with these additional controls (see Table A4). Fifth, we assessed the stability of results by adding controls for

[7]Tobin's q provides a forward-looking measure of expected firm value which is less vulnerable than accounting-based measures either to idiosyncrasies of accounting practices or to historical profitability that may not continue into the future (e.g., Bharadwaj et al. 1999; Mithas and Rust 2010; Tafti et al. 2013).

current- and prior-year firm performance, finding results similar to the main models reported in Table 3 (see Table A5).

Finally, we assessed stability of results by using a two-year rolling average of strategic posture (average values of STRATPOSTURE (year t - 1) and STRATPOSTURE (year t - 2)), instead of one-year lagged values, and obtained broadly similar results (see Table A6).

Discussion

Main Findings

This study set out to investigate how digital strategic posture influences a firm's digital business strategy and to demonstrate that key elements of the industry environment shape the impact of strategic posture. The analysis, which uses both general IT investments and outsourcing allocations as measures of digital strategy, provides two sets of core results. First, strategic posture has a convergent effect for general IT investment and a divergent effect for IT outsourcing investment at the mean value of industry factors. That is, at the mean value of industry factors, firms converge toward the industry norm in their general IT investments while diverging in terms of outsourcing investments. The difference may reflect the dynamic nature of outsourcing trends during the study period, in which firms were experimenting with different outsourcing strategies.

Second, the three focal dimensions of the industry environment have substantial and varied moderating influences on the impact of the two types of strategic posture. Greater industry turbulence increases the degree to which general strategic posture has a divergent impact on general IT investment, but has little or no moderating influence on outsourcing investment. Greater industry concentration (higher HHI) has a weakly convergent effect on outsourcing strategic posture, but does not moderate the effect of general IT strategic posture. Greater industry growth generates a convergent moderating effect in both forms of strategic posture, likely because firms are less inclined to diverge in their digital strategies when demand is growing rapidly.

In interpreting the results, it is helpful to recognize how variations in the competitive environment explain the difference in how digital strategic posture manifests itself between the two forms of digital business strategy that we examined. We find that industry concentration (strategic visibility) and industry growth have similar impact on both forms of digital strategy, while industry turbulence differs in its impact on general IT and outsourcing investment. Because outsourcing was an emergent and rapidly evolving phenomenon during the sample period, firms may have been less motivated to diverge in their outsourcing strategy in industries characterized by higher turbulence. The divergent impulses of turbulence may have been outweighed by concerns regarding unknown international vendors or changing customer perceptions regarding outsourcing.

Research Implications

This study has several research implications. First, the industry environment of a firm influences the extent to which digital strategic posture has a convergent or divergent effect on digital strategy. Although prior studies have argued that industry environment matters (Chiasson and Davidson 2005; Melville et al. 2004; Wade and Hulland 2004) and some studies have empirically examined one or two dimensions of the industry environment in firm performance models (Chiasson and Davidson 2005; Lu and Ramamurthy 2004; Melville et al. 2007), this study is the first we know of that provides a comprehensive examination of how three salient features of the industry environment influence the tendency to converge toward or diverge from industry norms. Our research tests the importance of these industry factors as argued in prior work in IS and competitive dynamics literature.

Second, related to the above, although at the mean value of industry factors we find support for convergence in IT investments implying support for a "fashion" or mimetic explanation, a more nuanced picture emerges when we take into consideration the effect of varying industry environments. In other words, our research suggests the need to extend "IT fashion" studies (Wang 2010) by considering the contingent effect of industry environments. The contingent effect may reflect more than just a desire to imitate from a fashion sense; it also can reflect firms' responsiveness to advances in IT that can render some products or services obsolete while generating new ones, transforming the competitive environment and compelling firms to evolve with their competitors in order to survive.

Third, the differences in the results for competition and turbulence extend the theoretical predictions across the two sets of analysis, contributing to our understanding of the underlying causal mechanisms. The fact that industry concentration had no significant impact on the relationship between digital strategic posture and IT investments but did affect outsourcing identifies boundary conditions for the impact of strategic visibility. General trends in IT investments were relatively well known during the study period. By contrast,

outsourcing was a newer strategy in which firms' choices were dynamic and often unknown to their rivals. In parallel, the fact that turbulence had a moderating influence for general IT investments but not for outsourcing suggests that the causal mechanism—dynamic norms—has a stronger effect in more well-established types of IT activities (i.e., general IT trends versus outsourcing trends).

These findings help demonstrate how firms integrate IT into the broader notion of strategic posture and competitive environment. Digital business advances do not just strengthen individual components of firm capability, but can also act as architectural innovations that transform the structure of industries and markets (Henderson and Clark 1990). Thus, IT is essential to the framing of business strategy itself, rather than simply being a functional area that aligns itself with firm strategy. This idea fits with the perspective of digital ecodynamics, described by El Sawy et al. (2010) as a three-way interaction between capabilities, environment, and information systems. Specifically, the firm and its competitors make investments in information systems and capabilities that simultaneously determine the strategic posture of each firm with respect to its competitors. The subsequent tendency of firms to update their strategic posture for either greater convergence to or divergence from the industry norm depends on the competitive environment. As firms respond to their strategic posture over time, the cumulative history of those responses define the competitive environment. Essentially, firms' responsiveness to their peers may reflect not just a desire to imitate but also a heightened awareness that "the 'ground' is in motion" (Emery and Trist 1965 p. 26). Investments in IT by a firm's peers signal how the competitive environment is evolving and may lead to a response by the focal firm, which in turn contributes to the changing competitive environment. Thus, digital ecodynamics becomes particularly relevant as a lens for understanding the continuously evolving configuration of firm capabilities with the competitive environment, and further research that takes this perspective into account will help enrich our understanding of digital business strategy. The current study offers a framework for future IT strategy research.

Managerial Implications

Managerially, our results suggest that normative signals of IT investment exist and shape different elements of firms' digital strategies in nuanced ways. We provide evidence for how managers view IT as a platform for undertaking strategic actions in response to actions of industry peers. In turn, the results can help managers understand how competitors are likely to respond to their actions in different industry contexts. Many digital business initiatives fail not because the IT department has failed in planning, implementation, or execution, but instead because executives do not anticipate the likely reaction of industry competitors given the industry conditions. For example, the ultimate failure of Borders was partly due to its inability to respond more aggressively to Amazon's digital business initiatives by developing similar capabilities. A convergence response in its IT investment that focused more on over-coming its historical tendencies may have served Borders better than a divergence response in this particular case; in general, it is important for firms to avoid path dependence when their historical strategies do not synchronize with the competitive environment.

Our exploratory analyses linking general IT and outsourcing strategic posture with Tobin's q suggest that general IT strategic posture and outsourcing strategic posture influence financial performance through their influence on IT investments. The effect of IT investment is attenuated in more dynamic industries but amplified in high-growth industries. To the extent that industry factors influence the effect of strategic posture on IT investments, our study demonstrates how digital strategic posture and industry environment jointly influence firm performance. Notably, while the strategic posture of a firm influences IT investments, it does not by itself affect firm performance. This finding underscores the importance of IT investments as a strategic lever that more directly influences firm performance. Therefore, firms need to be aware of the role of the industry environment in influencing IT investment levels, and consider whether their IT investment levels are driven by a coherent strategy or by a tendency to simply react piecemeal to the industry environment.

The finding that the relationship between IT and Tobin's q is amplified in high-growth industries and attenuated in turbulent industries suggests that while IT can provide greater flexibility to cope with the environment in turbulent environments (such as through improved time-to-market and efficiencies in new product development (Pavlou and El Sawy 2006)), such increased flexibility may not translate to superior firm performance. Although previous research has not studied the moderating effect of industry turbulence on the relationship between IT investments and Tobin's q, findings in prior work appear to suggest that IT investments may not always be more beneficial in more dynamic environments. For example, Lu and Ramamurthy (2004) use *Information Week* 1991–1994 data on IT leaders and followers to find that firms with higher IT capability had a significant performance advantage over firms with lower IT capability only with low environmental dynamism. Likewise, in a more recent examination of the impact of IT across competitive regimes using 1987–1994 data from CII database, Melville et al. (2007)

report that industry dynamism did not have a statistically significant moderating impact on the relationship between IT capital and firm productivity. On the whole, while IT can provide greater flexibility, industry turbulence may make any gains through use of IT short-lived. Thus, managers need to continuously monitor their IT investments and make suitable adjustments in light of emerging opportunities and threats. While this point may seem obvious, it is all too easy for executives to let historical paths shape their current strategies, even if the environment has changed drastically.

Hence, the study provides a framework for developing a more proactive and less reactive digital business strategy. Having a better understanding of how competitive factors affect the tendency to converge toward or diverge from industry peers can empower firms to better evaluate alternative courses of digital business strategy based on business objectives.

Limitations and Extensions

This study has limitations that future research can address. First, although our longitudinal data and panel models generate robust results, further studies can investigate other strategic actions related to IT such as engagement in social media and social networks. Second, while this study undertaken in the U.S. context shows that industry environment matters in determining discretionary investments, the extent to which this finding generalizes across other national contexts such as in emerging economies requires further investigation. Third, due to data limitations, we are unable to fully account for a firm's participation in strategic groups that reflect particular competitive sets and focus instead on the primary industry of a firm. Nonetheless, the findings are robust to variations in the multiplicity or degree of diversification of firm activities across multiple industries. We recognize that IT-enabled transformations are blurring some industry boundaries, particularly in the case of firms such as Apple, IBM, Amazon.com, Google, Netflix, and Comcast. However, such firms are still a minority in the overall economy. For most firms (particularly of the type included in our dataset), conventional industry classifications are appropriate as a starting point for strategy formulation. Future research with longer time series and covering fewer industries may be more appropriate for analysis at a strategic group level, although measurement and theoretical validity of strategic groups has often been an issue (for a discussion, see Thomas and Venkatraman 1988).

Several other promising areas for further research will contribute to both the IS and competitive dynamics literature. First, it will be useful to study the effect of IT resources and capabilities on the number of competitive actions and the complexity of action repertoire leading to financial performance of firms. Researchers can use or build on conceptualizations of IT resources and capabilities (Bharadwaj et al. 2002; Mithas et al. 2011; Rai et al. 2006) and competitive actions (Smith et al. 2001) to undertake such studies.

Second, this study focused on strategic decisions related to IT investments that are relatively less visible, internal to a firm, and more continuous in nature. IT and outsourcing investments relative to industry average are important aspects of strategic posture of a firm, but firms can also have strategic posture with respect to other aspects of IT strategy. For instance, a firm's choice in allocating the IT investment between IT capital and IT labor may be an important feature of its IT strategic posture because higher allocations to IT labor may indicate a firm's desire to tailor its IT systems to create uniqueness or differentiation. There is a need to study these aspects of strategic posture.

Third, while we use annual data on IT investments to infer how firms adjust these investments as they become aware of the industry norm, future research can study announcements related to specific IT investments (such as those related to customer relationship management or other enterprise systems), how focal firms' IT announcements are matched by competitors, and, in turn, how such competitive reactions affect focal firms' performance; see Derfus et al. (2008) for an example. Such studies will complement prior IS studies that use event study methodologies to assess the impact of a focal firm's IT investment announcements on its own performance (Chatterjee et al. 2002; Dos Santos et al. 1993; Im et al. 2001). Such studies will also further our understanding of action-response dynamics among specific firms considering their market commonality and resource similarity as suggested in prior research (Chen 1996).

To conclude, this study enriches our understanding of how strategic posture and industry environment shape a firm's digital strategies. We find that strategic posture has a substantial and nuanced impact on two forms of digital strategy—general IT investment and outsourcing investment—with influences that arise both directly and in combination with three key elements of the industry environment, including turbulence, concentration, and growth. The study provides a base from which to continue the investigation of strategic posture and digital business strategy and how they influence competitive advantage.

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