MIS Quarterly

RESEARCH ARTICLE

CIO REPORTING STRUCTURE, STRATEGIC POSITIONING, AND FIRM PERFORMANCE[1]

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Almost 30 years after the introduction of the CIO position, the ideal CIO reporting structure (whether the CIO should report to the CEO or the CFO) is yet to be identified. There is an intuitive assumption among some proponents of IT that the CIO should always report to the CEO to promote the importance of IT and the CIO's clout in the firm, while some adversaries of IT call for a CIO–CFO reporting structure to keep a tab on IT spending. However, we challenge these two ad hoc prescriptions by arguing that neither CIO reporting structure is necessarily optimal, and that the CIO reporting structure should not be used to gauge the strategic role of IT in the firm.

First, extending the strategy–structure paradigm, we propose that a firm's strategic positioning (differentiation or cost leadership) should be a primary determinant of its CIO reporting structure. We hypothesize that differentiators are more likely to have their CIO report to the CEO in order to pursue IT initiatives that help the firm's differentiation strategy. We also hypothesize that cost leaders are more likely to have their CIO report to the CFO to lead IT initiatives to facilitate the firm's cost leadership strategy. Second, extending the alignment–fit view, we propose that firms that align their CIO reporting structure with their strategic positioning (specifically, differentiation with a CIO–CEO reporting structure and cost leadership with a CIO–CFO reporting structure) will have superior future performance.

Longitudinal data from two periods (1990–1993 and 2006) support the proposed hypotheses, validating the relationship between a firm's strategic positioning and its CIO reporting structure, and also the positive impact of their alignment on firm performance. These results challenge the ad hoc prescriptions about the CIO reporting structure, demonstrating that a CIO–CEO reporting structure is only superior for differentiators and a CIO–CFO reporting structure is superior only for cost leaders. The CIO reporting structure must, therefore, be designed to align with the firm's strategic positioning, independent of whether IT plays a key strategic role in the firm.

Keywords: Chief information officer (CIO), CIO reporting structure, strategic positioning, Porter's generic strategies, product/service differentiation, cost leadership, firm performance, abnormal stock returns, cash flows from operations, chief executive officer (CEO), chief financial officer (CFO)

[1]Elena Karahanna was the accepting senior editor for this paper. Vern Richardson served as the associate editor.

Introduction

The CIO position emerged in the early 1980s in response to the pervasive use of information technology in firms and the emergence of the information economy (e.g., Benjamin et al. 1985; Rockart et al. 1982). The CIO position gradually became more influential as IT increasingly played a more central role in business processes and overall strategy (Applegate and Elam 1992; Jarvenpaa and Ives 1991; Raghunathan and Raghunathan 1989). Today, CIOs are often members of the firm's C-level executive team and assume many influential roles in addition to overseeing the IT function, such as managing the firm's information resources, offering vision for the role of IT in the firm, promoting IT as an agent of business change, redesigning firm strategy, and ultimately creating business value.

This study focuses on the CIO reporting structure, which influences both the CIO's role and the firm's IT structure and strategic IT initiatives (e.g., Raghunathan and Raghunathan 1989, 1993). While the CIO reporting structure is one of many decisions that a firm must make, since it involves the firm's highest IT executive, it is likely to have implications for firm performance, consistent with Hambrick and Mason's (1984) "upper echelon" theory that a firm's top management team (TMT) can affect performance. Czaszar and Clemons (2006) explain that the IT structure and IT reporting relationships can have a profound effect on firm performance. While the CIO can have formal and informal interactions and develop a shared vision with all TMT members (Preston and Karahanna 2009), a direct reporting relationship facilitates easier access and stronger lines of communication with the focal C-level executive. The direct reporting relationship enables the CIO to promote a vision for IT, exchange ideas about IT initiatives, and assure proposals are heard by the appropriate executive, thus facilitating the CIO's role. In contrast, Kaarst-Brown (2005) shows that an incorrect CIO reporting structure impedes the role of the CIO. Nonetheless, empirical evidence on the ideal CIO reporting structure (whether the CIO should report to the CEO, the CFO, or other executive) has not yet been identified. While the reporting structure of other mainstream C-level executives has been established (such as the CFO and COO reporting to the CEO), the CIO reporting structure is still unclear, and the pursuit of the ideal CIO reporting structure remains an unresolved issue both in the academic and also the practitioner IS literature (e.g., Parry 2004; Talbot 2008; Wilson 2007). Besides the CEO and CFO, there are other entities to whom the CIO reports. This study focuses on the CIO–CEO and CIO–CFO that are the most common CIO reporting relationships, especially for firms where IT plays a strategic role. Watson (1990, p. 228) states: "The fact that the IS manager is distant from the CEO is an indication that the organization does not place a high value on IS and IS planning." Raghunathan and Raghunathan (1989) did test this proposition and found that the impact of the CIO declines substantially when the CIO is more than two levels below the CEO.

There is a widely held, implicit assumption among IS academics (e.g., Applegate and Elam 1992; Benjamin et al. 1985; Raghunathan and Raghunathan 1989) and practitioners (e.g., Luftman and Kempaiah 2007; Ross and Feeny 2000; Slofstra 2001) that the CIO is better off reporting to the highest level executive. The CIO reporting to the CEO has been viewed as an indication of the CIO's power in the firm (e.g., Applegate and Elam 1992; Luftman and Kempaiah 2008; Talbot 2008), and that IT success is more likely if the CIO is closer to the CEO (e.g., Armstrong and Sambamurthy 1999). Raghunathan and Raghunathan (1989, 1993) argued that only a CIO–CEO reporting structure made much difference to the IS planning effort and only CIOs who report to CEOs had expanded roles. Watson (1990) found that CIOs who report to the CEO have a better understanding of the firm's objectives and direction and have no difficulty engaging in business planning. Even incoming CIOs often demand to report to the CEO (Evans 2007). Thus, to enhance the CIO's role, the IS literature has prescribed several means, such as creating value (e.g., Earl and Feeny 1994), having a solid business background and good communication skills (e.g., Reich and Nelson 2003), rational persuasion, personal appeal, and good working relationships with peers (e.g., Enns et al. 2003; Preston and Karahanna 2005, 2009), and frequent communication with the CEO (Watson 1990).

While many prior studies have prescribed a CIO–CEO reporting structure, is this indeed always the best reporting structure for all firms? We propose that no CIO reporting structure is optimal for *all* firms. We argue that the CIO reporting structure should *not* be viewed as a means to enhance the CIO's power or to be determined by the strategic role of IT in the firm, but rather seen as a means to create business value by allowing the CIO to work under the most appropriate C-level executive. We draw upon Porter's (1980) generic strategies (*product/service differentiation*, *cost leadership*)[2] by which firms can achieve an advantage. To prescribe the ideal CIO reporting structure relative to its strategic positioning and its impact on firm performance, we address two research questions:

[2]For brevity, we shall refer to *differentiation* to construe product and/or service differentiation.

1. **How does a firm's strategic positioning (differentiation or cost leadership) influence its CIO reporting structure (CIO reporting to the CEO versus to the CFO)?**

2. **Is there an alignment or "fit" between the CIO reporting structure and the firm's strategic positioning that is associated with higher firm performance?**

Extending Chandler's (1962) strategy–structure theory, we propose that a firm's strategic position influences its choice of CIO reporting structure. Second, extending the alignment–fit paradigm (Mintzberg 1990), we propose that the CIO reporting structure must align with the firm's strategic positioning to enhance its performance by allowing the CIO to work with the right C-level executive to focus IT on supporting the firm's strategy. The results from secondary data from two distinct time periods show that differentiators tend to have their CIO report to the CEO, while cost leaders tend to have a CIO–CFO reporting structure. Also, differentiators with a CIO–CEO reporting structure and cost leaders with a CIO–CFO reporting structure outperform firms with misaligned configurations (either differentiators with a CIO–CFO reporting structure, or cost leaders with a CIO–CEO reporting structure). No significant performance differences between the two aligned configurations are found, implying that either a CIO–CEO or a CIO–CFO reporting structure may have equifinal performance. Besides, there are no significant performance differences between the two misaligned configurations. Therefore, the CIO–CEO reporting structure is *not* always superior, and the CIO reporting structure must align with the firm's strategic positioning in order to improve firm performance.

Literature Review

CIO Reporting Structure

The *CIO* is defined as the highest level IT executive or manager in a firm or business unit, even if the term CIO may not always be used. According to the 2008 "State of the CIO" survey (**www.cio.com/article/147950/**), 60 percent of the heads of IT carry the CIO title, while other titles include director of IT (18 percent), vice president of IT (11 percent), and chief technology officer (CTO) (4 percent). Other titles are also emerging that eliminate the terms *technology* or *information*, such as vice president of services. Still, the CIO title is the most widely accepted for the firm's top IT executive.

The CIO position is becoming more important as IT is increasingly playing a greater role in the firm's strategy. The CIO has many roles, such as business leadership (Applegate and Elam 1992) and relationship builder (Earl and Feeny 1994). The CIO's clout has increased in magnitude, not only because the CIO manages a larger IT budget, but because the CIO shapes the firm's strategy (e.g., Benjamin et al. 1985; Luftman and Kempaiah 2007; Preston and Karahanna 2005). In fact, market announcements of new CIO positions help spawn positive reactions in the marketplace (Chatterjee et al. 2001). CIOs have also become attractive candidates for the CEO position (Synott 1987). Broadbent and Kitzis (2005) argue that the CIO's role is to lead the entire firm, suggesting that CIO should mean "chief influencing officer." Karahanna and Chen (2006) argue that CIOs help create value by increasing the strategic foresight of the TMT, and find that firms with effective CIOs consistently outperform industry competitors on several success measures.

The firm's reporting structure defines how power and control is allocated throughout the firm, and it has been closely tied to strategy and performance (Chandler 1962). Specific to IT structure, a key element of a firm's reporting structure is the *CIO reporting structure*, and there are two key entities to whom CIOs tend to report (Armstrong and Sambamurthy 1999): the highest-level executive (e.g., CEO, chairman, president), or the highest-rank *finance* executive (e.g., CFO, vice chairman of finance).

Following this classification, we parsimoniously categorize the CIO reporting structure to either the CEO or to the CFO. This binary classification is not exhaustive of all CIO reporting structures, and CIOs may report to C-level executives other than the CEO and the CFO, such as the COO (Stephens et al. 1992). However, CIOs who report to the COO are not very common. In our sample, for example, less than 5 percent of CIOs report to the COO. Our parsimonious classification captures the vast majority of the CIO reporting structures found in practice, and our basic distinction is between reporting to a C-level executive who focuses on financial risk, planning, and reporting versus reporting to the top executive who focuses on the firm's overall strategy and management.

The CIO reporting structure has a reciprocal relationship with the firm's IT orientation, which can be either *strategic* or *operational* (Cash et al. 1992). In a *strategic* IT orientation, the CIO is a member of the TMT and is involved in the firm's strategic planning (Reich and Nelson 2003). However, in an *operational* IT orientation, the CIO is only responsible for leading the IT function, offering IT support, and managing less risky IT projects (Ives and Olson 1981). Firms whose CIO reports to C-level executives (CEO or CFO) tend to have a strategic IT orientation; firms whose CIO reports to managers two or more levels below the CEO often have an operational

IT orientation (Raghunathan and Raghunathan 1993). Since IT in firms with an operational IT orientation is less likely to affect firm performance (Armstrong and Sambamurthy 1999), we focus on CEO or CFO reporting.

Strategic Positioning

Porter's (1980, 1996) typology of strategic positioning is widely accepted in the literature, and it is still relevant in today's environments (e.g., Kald 2003), including Internet business strategy (Porter 2001). Porter argues that there are two generic strategies: *differentiation* and *cost leadership*.

Differentiation: Differentiators offer products and services with unique features that customers find valuable. These features can be superior designs, innovative research and development, superior engineering, customer intimacy, and brand image (Porter 1980, 1996). Differentiation is achieved by leading scientific research, advanced R&D and product development, and superior customer service (Hambrick and Mason 1984). A differentiation strategy allows firms to command high margins by creating customer value (Kald 2003; Kim et al. 2004). For instance, Cadillac is an example of differentiation strategy associated with high-end prices due to high product quality and marketing.

Cost Leadership: Cost leaders strive to have the lowest average unit costs in the industry by achieving economies of scale, cost efficiencies, and operational excellence throughout the firm. Chevrolet was an example of cost leadership with tight cost control, efficiency, and low prices. Cost leadership implies operating the same activities and achieving the same outcomes more efficiently than rivals (Porter 1996). Cost leaders gain a strategic advantage by reducing costs (Hambrick and Mason 1984) and achieving "efficient scale facilities, cost reductions through experience, tight cost and overhead control, and cost minimization in R&D, advertising, sales" (Porter 1980, p. 35).

Porter's (1980) generic strategies are the extremes of a continuum, and firms compete across the entire spectrum. In fact, prior research has shown that cost leaders do differentiate their products, and differentiators focus on cost reduction (Miller and Friesen 1986). Since firms that pursue one strategy do not totally ignore the other (Porter 1996), there is a simultaneous pursuit of differentiation and cost reduction. Thus, it is not trivial to distinguish between differentiators and cost leaders. Still, it is possible to identify attributes associated more with each strategy. Also, while there are attempts to pursue differentiation and cost leadership within an industry (Kald 2003), some industries are more focused on differentiation (e.g., high-end apparel) and others on cost leadership (e.g., commodities).

Theory Development

Strategic Positioning and CIO Reporting Structure

Many studies have made the implicit or explicit assumption that a CIO–CEO reporting structure is associated with a strategic role of IT in the firm while a CIO–CFO reporting structure is associated with a diminished role of IT. We challenge this assumption that the strategic role of IT determines the CIO reporting structure, and we propose that it is the firm's strategic positioning that influences the CIO reporting structure. This is based on Chandler's (1962) strategy–structure paradigm, which has been extended to IT structure (Floyd and Wooldridge 1990). As the leader of the IT function, the CIO directs the firm's IT initiatives to support its strategy, and the CIO reporting structure is an important element of the firm's IT structure that is influenced by the firm's strategic positioning.

Our logic is based on the IS literature that argued that, for IT initiatives to succeed, an effective relationship between the CIO and other C-level executives must be established (e.g., Jarvenpaa and Ives 1991; Karimi et al. 1996; Raghunathan 1992). Thus, our proposition is that firms should have their CIO report to the appropriate C-level executive (CEO or CFO) whose primary focus—overall strategy and firm management (CEO) versus financial planning and risk (CFO)— will enable the CIO to lead IT initiatives that support the firm's strategic positioning (differentiation or cost leadership).

While both differentiators and cost leaders do invest in IT initiatives to pursue their strategies, we propose that IT initiatives for differentiators are better served by a CIO–CEO reporting structure, while IT initiatives for cost leaders are better served by a CIO–CFO reporting structure. While often equally innovative, as the goal of IT initiatives is different for differentiators and cost leaders, a CIO who works either closer with the CEO or with the CFO is better positioned to promote these IT initiatives.

First, for differentiators that focus on innovation and customer intimacy, the role of IT initiatives is mainly to enhance new product development and customer intimacy. For example, IT initiatives in product development, such as collaborative tools, focus on enabling cost-functional integration among marketing, R&D, and engineering to develop original products

(Pavlou and El Sawy 2006). IT initiatives in the supply chain, such real-time intelligence and global visibility systems, focus on customer intimacy by dynamically adjusting to changes in customer needs (Rai et al. 2009). Also, IT initiatives in the apparel industry, such as data mining tools for market intelligence, can be used to personalize marketing efforts and identify products that meet seasonal changes in customer needs (Farrell et al. 2003). We argue that the CIO is in a better position to become aware of and contribute to differentiating strategies with the aid of such IT initiatives by being closer to the CEO who has a broader cross-functional view of the firm and its needs for customer intimacy and original products.

In contrast, for cost leaders that focus on reducing costs across the firm through scale economies, efficiencies, and frequent financial reporting (Hambrick and Mason 1984; Porter 1980), the role of IT initiatives is to promote lean operations, tight cost management, close supervision of labor, automated processes, cost-effective asset utilization, reduced cycle time, efficient manufacturing, distribution, and supply chain business processes, operational excellence, and incentives based on quantitative targets. IT initiatives in product development, such as new mobile tools, allow people to work remotely, thus reducing the need for travel (Porter 2001). In the supply chain, IT initiatives can cut costs by automating data transfers, supporting common standards, correcting errors, and embedding rules in the supply chain (Rai et al. 2009). In the apparel industry, IT initiatives, such as neural networks and transaction risk models, which mine customer data, can reduce excess stock through optimal discounting (Feeny et al. 1992). Therefore, we argue that CIOs of cost leaders are better positioned under the CFO to enable them to work together to scrutinize the firm's cost patterns to identify inefficiencies and pursue IT initiatives for cost cutting to enhance the firm's bottom line.

It is crucial to clarify that a cost leadership strategy does not necessarily imply reduced IT costs, and both differentiators and cost leaders invest in new IT initiatives to pursue their strategies without viewing IT costs as their main concern. However, since the objective of cost leaders is to reduce costs throughout the firm, reducing IT costs is more likely to be a primary objective for cost leaders. Thus, the CIO reporting structure of cost leaders is still better positioned under the CFO to allow the CIO to support the firm's overall cost leadership strategy with the aid of IT initiatives while simultaneously reducing IT costs. Nonetheless, a cost leadership strategy may still require increased IT investments if they offer more than commensurate reduction in other costs throughout the firm.

In addition, differentiators focus on more subjective and less quantifiable success measures (e.g., product innovation, customer intimacy), while cost leaders focus on less subjective and more quantifiable targets (e.g., cost, time, efficiency, and error reduction). Thus, since IT initiatives for differentiation are more difficult to quantify, a CIO who reports to the CFO may have a hard time promoting differentiating IT initiatives that do not produce clearly quantifiable results (Koch 2006). In fact, for the differentiating CIO, the CFO is often seen as an adversary due to the difficulty in clearly documenting financial returns on IT (Power 2002; Slater 2002), thus creating a source of tension between the CIO and CFO. In contrast, since the CEO is responsible for the firm's entire value proposition that often goes beyond cost reduction, a CIO who reports directly to the CEO is in a better position to convince the CEO to assume the risk of IT initiatives for differentiation. Applegate and Elam (1992) show that CIOs who are closer to the CEO have a greater success in promoting novel IT initiatives by convincing the CEO to accept the risks of uncertain IT payoffs. Therefore, differentiators are more likely to have their CIO report to the CEO. On the other hand, since IT initiatives to support a cost leadership strategy are associated with more objective and more quantifiable IT payoffs, the CIO is better positioned to work with the CFO who is in charge of controlling the firm's finances to promote such IT initiatives to meet the quantifiable cost targets imposed by the CFO. Therefore, cost leaders are more likely to have their CIO report to the CFO. Summarizing these arguments, we propose

H1: Differentiators are more likely to have their CIO report to the CEO.

H2: Cost leaders are more likely to have their CIO report to the CFO.

Identifying the Ideal CIO Reporting Structure

Following the alignment–fit view (Mintzberg 1990), the importance of aligning firm strategy with structure has been widely established (e.g., Govindarajan 1989; Hambrick and Mason 1984). Extending the alignment view, our basic premise is that the alignment between the CIO reporting structure with the firm's strategic positioning will enhance firm performance. This is because a suitable CIO reporting structure gives the best opportunity for the CIO to pursue appropriate IT initiatives that align with the firm's strategic positioning, thereby achieving IT–business alignment and facilitating firm performance. While novel IT initiatives can be used to support both a differentiation and a cost leadership strategy, CIOs whose reporting structure aligns with the firm's strategic positioning are more likely to lead appropriate IT initiatives under the guidance of the most knowledgeable C-level executive to support the firm's strategic positioning.

Table 1. Configurations Between a CIO Reporting Structure and Strategic Positioning

		Strategic Positioning	
		Product Differentiation	**Cost Leadership**
CIO Reporting Structure	**CEO**	CIO–CEO with Differentiation	CIO–CEO with Cost Leadership
	CFO	CIO–CFO with Differentiation	CIO–CFO with Cost Leadership

In this study, we consider two CIO reporting relationships that correspond to a firm's strategy: (1) direct reporting to the CEO, enabling the CIO to use IT to support a differentiating strategy, or (2) direct reporting to the CFO, enabling the CIO to use IT to support a cost leadership strategy. Accordingly, we propose four (2 × 2) potential configurations—two *aligned* and two *misaligned*—strategic positioning and its CIO reporting structure (Table 1).

In terms of the alignment between a CIO–CEO reporting structure and differentiation, the basic idea is that the CIO is in a better reporting relationship that enables working closely with the CEO who has a broader, cross-functional view of the firm, thus enabling the CIO to become aware of the firm's strategic needs and therefore pursue a broader set of IT initiatives for differentiation. Besides, since IT initiatives for differentiation are generally more difficult to quantify, a CIO who has direct access and a good working relationship with the CEO would be in a good position to convince the CEO to approve risky IT initiatives for differentiation by obtaining initial approval, securing continued funding, and obtaining support to ensure their completion and success. Thus, the CIO–CEO reporting structure facilitates the success of IT initiatives for differentiation. In contrast, the CIO may have a hard time convincing the CFO to fund risky IT initiatives that do not offer measurable returns (Slater 2002), and a CIO–CFO reporting structure may hurt the performance of differentiating firms by preventing differentiating IT initiatives. A differentiation strategy thus aligns with a CIO–CEO reporting structure to facilitate performance by achieving strategic IS alignment.

A CIO–CFO reporting structure is also proposed to support a cost leadership strategy to enhance firm performance. Since a cost leadership strategy strives for cost control, the CIO must focus the firm's IT initiatives on contributing to the firm's cost cutting needs. A CIO–CFO reporting structure allows the CIO to work in close proximity to the top finance executive who has the requisite financial skills to pursue ways to reduce costs and contribute to the firm's cost leadership strategy. Besides, since IT initiatives for cost leadership are easier to quantify, a CIO who reports to the CFO will enjoy a better relationship that can contribute to the firm's need for efficiencies. Therefore, a cost leadership strategy with a CIO–CFO reporting structure also achieves strategic IS alignment.

Besides these two proposed aligned configurations, there are two misaligned configurations: cost leaders whose CIO reports to the CEO and differentiators whose CIO reports to the CFO. First, for differentiators, the CIO–CEO reporting structure helps the CIO educate the CEO about novel IT initiatives that would contribute to the firm's differentiating strategy. However, if the CIO has to go through the CFO to secure funding for IT initiatives for differentiation, it may hinder the CIO from pursuing valuable, yet less quantifiable, IT initiatives (Slater 2002), hurting strategic IS alignment. Hence, differentiators with a CIO–CFO reporting structure are likely to have a lower performance than differentiators with a CIO–CEO reporting structure. Second, for cost leaders, the goal of IT initiatives is to promote the firm's cost-driven strategy. However, when the CIO reports to the CEO, there is a tendency to pursue IT initiatives without a clear payoff and quantified targets (Koch 2006) that can shift the focus from the firm's core strategy. Also, a lack of direct supervision from the CFO may prevent the CIO from being closely tied to the firm's financial and cost controls, thus encouraging overspending that may hurt the firm. Hence, cost leaders with a CIO–CEO reporting structure are likely to underperform relative to cost leaders with a CIO–CFO reporting structure.

The proposed aligned configurations are consistent with the resource-based view of the firm, which argues that managerial IT skills can be a source of strategic advantage (Mata et al. 1995), and also the theory of complementarities among firm resources that can be combined in innovative ways to create business value (Milgrom and Roberts 1995). When the CIO's skills are matched with complementary managerial skills (either the CEO's or the CFO's), these complementary resources can serve to promote the firm's strategic positioning. Specifically, the CFO offers the financial skills to complement the CIO's technical skills to support cost cutting, while the CEO provides the total management skills and broad vision to pursue differentiation. The complementary combination between the managerial skills of the CIO and the other C-level executives is expected to be a valuable combi-

Table 2. Control Variables	
IT Intensity	IT intensity is proposed to capture the strategic versus nonstrategic role of IT. It is measured as the firm's total IT spending divided by its total assets. Firms with higher IT spending are more likely to use IT more strategically. Since the IS literature has linked the strategic role of IT with a CIO–CEO reporting structure, the effect of IT intensity is controlled on both strategic positioning and the CIO reporting structure.
IT Orientation (Automate/ Informate)	IT orientation (automate/informate) is a dummy variable that is used to capture how IT is used in the firm (*InformationWeek*'s industry designations) (Chatterjee et al. 2001). While there is also a *transform* category, since we only have six firms in this category from the airline industry, we combine informate with transform (the results are similar with or without the transform firms). Since IT for automation is more quantifiable and CFOs prefer such IT initiatives, it is likely to be linked to a CIO–CFO reporting structure. In contrast, since IT that informates is less quantifiable, firms that use IT to informate may have their CIO report to the CEO. We also measured IT orientation based on industry SIC codes with no significant difference in the results.
High Tech Versus Low Tech Industry	Industries can be classified as either high tech or low tech following Francis and Schipper's (1999) classification scheme based on the three-digit SIC industry code. Since CIOs are more likely candidates for CEOs for technology firms (Synott 1987), we expect a CIO–CEO reporting structure to be more likely for high tech firms. However, we make no prediction for performance difference among these two industries.
Industry Concentration	This is measured as the annual sales revenues for the four largest firms in each four-digit SIC code divided by the sales for all firms in the industry. The CIO is likely to focus on more quantifiable IT initiatives in highly concentrated industries, and a high industry concentration ratio is likely to be associated with a CIO–CFO reporting structure. Industry concentration is also included to control for its potential effect on performance.
CIO Tenure	CIO tenure is also a potential control variable since CIOs who stay longer may gain clout in the firm and strive to report to the CEO. Contrary evidence suggests that CIOs with longer tenure tend to move away from the CEO (Luftman and Kempaiah 2008). However, the two data sets in our study did not measure CIO tenure. Using data from a different SIM study (reported in Luftman and Kempaiah 2007), we ran a logistic regression that uses CIO tenure to predict CIO reporting structure. The results show that CIO tenure is not significantly associated with the CIO reporting structure (either to the CEO or to the CFO). This is consistent with our logic that a firm's strategic positioning must influence its CIO reporting structure, and not the CIO's tenure.

nation that can enhance firm performance by achieving IT strategic alignment.

Summarizing the previous arguments, we offer the following hypothesis:

H3: Alignment between strategic positioning (differentiation and cost leadership) and CIO reporting structure (CEO and CFO) is associated with a higher firm performance.

Support for H3 would provide evidence to challenge the long-held intuitive assumption in the IS literature is that the CIO is always better off reporting to the CEO (e.g., Applegate and Elam 1992; Luftman and Kempaiah 2007; Raghunathan and Raghunathan 1989; Ross and Feeny 2000), thus questioning the absolute optimality of the CIO–CEO reporting structure and calling for a contingent view. Also, our theory predicts no significant differences between either the two proposed aligned configurations or the two proposed misaligned configurations, implying the existence of equifinality between the two sets of configurations between CIO reporting structure and strategic positioning.

Control Variables: Table 2 summarizes the control variables considered in this study.

Research Method and Results

Data Description

Data were collected by integrating data from two surveys of CIO reporting structure with financial information from *Compustat* and corresponding stock returns from the Center for Research on Security Prices (**www.crsp.com**). The primary dataset used for our main data analysis was obtained from the *InformationWeek* (IW) (1990–1993) survey of IT

Table 3. Demographics of Firms in the Study's Two Data Sets

Item	1990–1993 Period			2006 Period		
	Mean	Median	STD	Mean	Median	STD
Income Before Extraordinary Items ($M)	354	201	750	3122	1098	4223
Net Sales ($M)	7,771	4,516	9,350	28,861	14,119	32,400
Total Assets ($M)	15,762	7,519	24,885	166,582	27,073	395,735
Employees (thousands)	44	26	55	70	55	86
CIO Reporting Structure (CEO)	0.7412	1.0000	0.4385	0.6300	1.0000	0.4889
Operating Income over Sales	0.0557	0.0500	0.0562	0.0903	0.0825	0.0637
Sales over Assets	0.9683	0.8842	0.7935	0.7499	0.6689	0.5203
IT Orientation (Automate Vs Informate)	0.7176	1.0000	0.4507	0.7143	1.0000	0.4558
High Tech Dummy	0.1553	0.0000	0.3626	0.3925	0	0.4928
Low Tech Dummy	0.0847	0.0000	0.2788	0.0536	0	0.2272
Industry Concentration Ratio	0.3640	0.3571	0.1426	0.3506	0.3245	0.1924
Abnormal Stock Returns	0.0406	0.0280	0.2441	0.0258	0.0314	0.1792

executives of U.S. firms.[3] The original IW dataset has 425 firms in 27 industries. The second dataset was obtained from a survey of 124 CIOs of Fortune Global 1,000 firms (Luftman and Kempaiah 2007). From those, we retained the 58 publicly traded U.S. firms whose financial and stock information could be matched. This gives us a total of 200 distinct firms for the 1990–1993 period and 58 firms for the 2006 period. The demographics of the firms in these two data sets (1990–1993 and 2006) are shown in Table 3.

Measure Development

CIO Reporting Structure

Following our proposed conceptualization of CIO reporting structure, we classified firms into two groups: firms whose CIO reports to (1) the CEO and (2) the CFO. The CIO reporting structure is viewed as a binary variable where "1" represents firms whose CIO reports to the CEO and "0" represents firms whose CIO reports to the CFO. The CIO–CEO reporting structure includes firms whose CIOs report to the CEO, chairman, executive vice president, executive officer, general manager, or president/CEO. The CIO–CFO reporting structure includes firms whose CIOs report to the CFO, EVP/Finance, EVP/CFO, treasurer, controller, senior vice president/CFO, vice chairman/CFO, and vice president of Finance. In our first sample, 153 (76.5 percent) firms have their CIO report to the CEO and 47 (23.5 percent) to the CFO. In our second sample, 78 (63 percent) of CIOs report to the CEO and 46 (37 percent) to the CFO.

Strategic Positioning

Snow and Hambrick (1980) proposed four approaches for measuring strategic positioning: researcher's inference, self-assessment, external assessment, and objective indicators. Most studies have used self-assessment methods (e.g., Govindarajan 1989; Miller and Friesen 1986). Instead, this study employs external assessment, the DuPont method for analyzing ROA into profit margin and asset turnover (Fairfield and Yohn 2001; Nissim and Penman 2001; Stickney and Brown 1998) to use common accounting ratios to capture Porter's (1980) two generic strategies,[4] specifically *profit margin* for differentiation and *asset turnover* for cost leadership (Selling and Stickney 1989).

[3]Since only a very few of these firms have changed their reporting structure over the first period (1990–1993), for that sample, we only kept the first (chronologically earliest) instance of the firm's CIO reporting structure and excluded all subsequent occurrences. The results did not change if we kept any other instance.

[4]The classification of firms as either differentiators or cost leaders based on OPIS and sales/assets is not relative to industry, and it is possible for virtually all firms in a given industry to be classified as either differentiators or cost leaders. This is consistent with Porter's (1980) "generic" strategies that apply across industries. Similarly, the proposed CIO reporting structure could be the same for all firms in an industry.

Product Differentiation: Differentiators are likely to be high profit margin firms that command higher margins as returns for their superior product/service quality or greater customer intimacy (Selling and Stickney 1989). *Operating income over sales* (OPIS) measures the profit margin[5] and is used to capture a firm's differentiation strategy.

Cost Leadership: To be the lowest cost producer, firms must achieve operational efficiency and high asset turnover (Selling and Stickney 1989). Since cost leaders utilize their assets efficiently, they must maintain lean operations (e.g., Fairfield and Yohn 2001). Since cost leaders efficiently utilize their assets to generate sales, *sales over assets* is used as a proxy for such firms.

OPIS and sales/assets capture a firm's realized *success* in each strategic position, which may differ from the firm's *intended* strategic position (Mintzberg 1978). While both ratios predict performance, there may be a negative link between OPIS and sales/assets (Nissim and Penman 2001). In fact, our data show a negative correlation (-.27, $p<.01$) between OPIS and sales/assets.

Alignment Between CIO Reporting Structure and Strategic Positioning

The alignment between CIO reporting structure and strategic positioning is operationalized by comparing the actual and predicted CIO reporting structure. The predicted CIO reporting structure was inferred by calculating the probability that the CIO will report to the CEO (Equation 1).[6]

$$\text{CIO Reporting Structure}_{i,\,t} = \alpha_0 + \alpha_1 \times \text{Average (Operating Income/Sales)}_{i,\,t-4\ldots t} + \alpha_2 \times \text{Average (Sales/Assets)}_{i,\,t-4\ldots t} + \alpha_3 \times \text{Control Variables}_{i,\,t} \quad (1)$$

Since the CIO–CEO reporting structure has value of 1 and a CIO–CFO structure has a value 0, the probability has a value between 0 and 1. The threshold value for predicting the CIO reporting structure was determined based on the empirical distribution of the firms in our sample. Since 153 out of our 200 firms have a CIO–CEO reporting structure, the threshold is 0.77. We rank the probability from the biggest to the smallest and those firms ranked among the top 77 percent are classified as having their CIO report to the CEO; otherwise, they are classified as having their CIO report to the CFO.

For each year in our sample, we divided our firms into four groups (Table 4). For example, for firms in Group CEO-PD, at time *t*, the CIO of those firms actually reports to the CEO, and, based on our model (Equation 1), we prescribe that the CIO must report to CEO because they are classified as product differentiators. In our sample, 122 firms are classified in Group CEO-PD. Also, firms in Group CFO-CL (n = 16) denote that the CIO reports to the CFO, and our model suggests that they should be classified as cost leaders, also denoting an aligned configuration.

The configurations in Table 4 were operationalized in a discrete way with three dummy variables (CEO-PD, CFO-CL, CFO-PD) to approximate the alignment between the actual and the predicted CIO reporting structure relative to the misaligned CEO-CL configuration that serves as the base case.

- CEO-PD =1 for firms in the Group CEO-PD; otherwise 0 (aligned configuration)
- CFO-CL =1 for firms in the Group CFO-CL; otherwise 0 (aligned configuration)
- CFO-PD =1 for firms in the Group CFO-PD; otherwise 0 (misaligned configuration)

Firm Performance

To capture firm performance, we measured how the firm creates value in terms of enhancing future cash flows. We employed two conceptually consistent measures to capture value creation, one that captures the change in the firm's value as perceived by investors based on their expectations about the firm's discounted future operating cash flows (*abnormal stock returns*), and one that captures whether investors' expectations were realized (*cash flows from operations*).[7]

[5]We also use *gross margin* instead of *profit margin* (i.e., OPIS) to predit the CIO reporting structure as a robustness check, and qualitatively and quantitatively our results (omitted for brevity) did not change.

[6]Since it is possible for virtually all firms in an industry to have their CIO report to their CEO or CFO if they are all differentiators or cost leaders, respectively, we did not adjust our variables relative to industry (either 2- or 4-digit SIC code) median value. This is because firms in mostly differentiating industries tend to have much higher OPIS and much lower sales/assets than firms in other industries, and we expect most of them to have a CIO–CEO reporting structure. For example, 90% of firms in our sample in the retail industry have their CIOs report to the CEO. The opposite situation prevails for industries, such as commodities, that are dominated by cost leaders that have low OPIS, high sales/assets, and have their CIO report to the CFO.

[7]Abnormal stock returns are serially uncorrelated because efficient markets capture all available information. Thus, in the portfolio approach, past performance measures should not be included. However, when we use accounting performance measures (e.g., cash flows from operations), we do control for past performance. A problem when directly comparing future performance is that firms with superior past performance might selectively choose a certain CIO reporting structure. In such cases, it is not alignment that drives performance; it is the past performance that drives future performance. To minimize such possibility, we predict future firm performance after controlling for past performance.

Table 4. Configurations Between Actual and Predicted CIO Reporting Structure		
	Predicted Reporting Structure (Based on Strategic Positioning)	
Actual Reporting Structure	Higher Operating Income over Sales (Product Differentiation)	Lower Sales over Assets (Cost Leadership)
CIO Reports to CEO	Group CEO-PD (n = 122)	Group CEO-CL (n = 31)
CIO Reports to CFO	Group CFO-PD (n = 31)	Group CFO-CL (n = 16)

Abnormal Stock Returns: As the CIO reporting structure brings an intangible value to the firm that might not be fully captured by the current firm performance, but is likely to materialize over time, abnormal stock returns are likely to reflect the value potential of an aligned CIO reporting structure because stock price reflects investors' expectation about future performance. We used the Fama-French four-factor model. For each firm, 12 months of cumulative abnormal returns were calculated for the next year. We also tried the Fama-French two-factor and CAPM model with similar results.[8]

Cash Flows from Operations: Financial analysts determine a firm's current value based on estimated future cash flows. Since we have past data on realized firm performance, we also use actual future cash flows from operations as a performance measure. This is conceptually appropriate since the value of the firm depends on the present value of its expected future cash flows, and an aligned CIO reporting structure is likely to enhance the firm's value by raising future cash flows. We expect an aligned CIO reporting structure with strategic positioning at time *t* to predict a firm's realized future operating cash flows after controlling for the firm's operating cash flows at time *t*.

Primary Data Analysis and Results (InformationWeek 1990–1993 Data)

To test H1 and H2, a logistic regression (Equation 1) uses the firm's actual strategic positioning (as reflected by its OPIS and sales/assets ratios)[9] to predict its CIO reporting structure. As shown in Table 5, the results for Equation 1 show that $\beta_1 = 8.5345$ ($p = 0.0052$) and $\beta_2 = -0.4269$ ($p = 0.0252$) are significant and follow their predicted directions, thus supporting H1 and H2. Table 5 also reports the model fit statistics. The χ^2 of the goodness-of-fit test is 9.3157 ($p = .3164$), showing no evidence of lack of model fit and implying that our model adequately fits the data.

To test H3, we examine if aligned firms are likely to have superior firm performance by linking the two dependent variables (abnormal stock returns and cash flows from operations) with the three dummy variables (CEO-PD, CFO-CL, CFO-PD) while controlling for the variables in Table 2. Because OPIS and sales/assets were used to identify the firm's strategic positioning and alignment with CIO reporting structure, they are also controlled for their potential effects.

Since OPIS and sales/assets can be viewed as performance measures for the differentiation and cost leadership strategy, they may be correlated to our two performance measures. For example, the correlation analysis (Table 6) shows that the correlation between OPIS and future cash flows from operations is significant ($r = 0.4896$, $p < 0.001$), while the correlation between sales/assets and future cash flows is significant and negative ($r = -0.2450$, $p \leq 0.001$). Also, since the IS literature has linked the strategic role of IT with firm performance, IT intensity is also included as a control variable.[10]

[8]For the two-factor model, we calculated abnormal stock returns following Fama and French (1992), in which they extended the CAPM model with two factors (small cap and book-to-market ratio) because stocks with small cap and a high book-to-market ratio are associated with higher stock returns. Thus, this method fully controls for the impact of industry, size, and past performance. Specifically, abnormal stock returns are measured relative to the market portfolios of similar firms in terms of (1) the ratio of book equity to market equity and (2) size (market equity). The market portfolios represent the intersections of five portfolios formed based on the ratio of book equity to market equity and five portfolios based on market equity. The 5 × 5 portfolio returns (taken from **http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html**) were subtracted from the normal returns to get each firm's abnormal stock returns. We also performed our analysis using the capital asset pricing model (CAPM), which states that the expected returns of a security equal the rate on a risk-free security plus a risk premium, and found similar results.

[9]The reliability coefficients (Cronbach's alpha) during the 5-year period are 0.80 for OPIS and 0.99 for sales/assets. These high reliabilities imply that strategic positioning remains consistent over time.

[10]We tested the correlations among IT intensity, CIO reporting structure, and strategic positioning (see Table 10). The correlation between IT intensity and actual CIO reporting structure (.04) is insignificant; the correlation between IT intensity and strategic positioning is modest ($r = 0.1482$, $p = 0.0363$). This implies that firms with higher IT intensity do not necessarily have a CIO–CEO reporting structure. These results confirm the logistic regression results (Table 5) that IT intensity does not predict CIO reporting structure ($\beta = 0.2629^{N/S}$). Thus, firms that have higher IT intensity do not necessarily have a CIO–CEO reporting structure.

Table 5. Predicting CIO Reporting Structure with Strategic Positioning

Odds Ratio Estimates			Coefficient Estimation		
Effect	**Point Estimate**	**90% Wald Confidence Limits**	**Predicted Sign**	**Logit Coefficient**	**Significance (p-value)**
Operating Income over Sales (Differentiation)	> 999.999	21.303 – 999.999	(+)	9.5345	0.0052
Sales over Assets (Cost Leadership)	0.653	0.456 – 0.934	(-)	-0.4269	0.0252
IT Intensity	1.301	0.327 – 5.171	(0)	0.2629	0.0252
Industry Concentration Ratio	0.139	0.021 – 0.938	(0)	-1.9697	0.089
Automate Industry Dummy	0.924	0.451 – 1.893	(0)	-0.0787	0.8568
High_Tech Dummy	1.029	0.438 – 2.415	(0)	0.0281	0.9568
Low_Tech Dummy	2.351	0.709 – 7.797	(0)	0.859	0.2408

Predicted Probabilities and Observed Responses				Model Fit Statistics		
Percent Concordant	71.6	Somers' D	0.436	Criterion	Intercept Only	Intercept and Covariates
Percent Discordant	28	Gamma	0.438	AIC	220.099	214.299
Percent Tied	0.4	Tau-a	0.158	SC	223.397	240.685
Pairs	7191	C	0.718	-2 Log L	218.099	198.299

R^2 (Cox & Snell)	.0943	Max-Rescaled R^2 (Nagelkerke)	.1420	Testing Global Null Hypothesis: BETA = 0			
				Test	**χ^2**	**d.o.f**	**Pr > χ^2**
Hosmer and Lemeshow Goodness-of-Fit Test				Likelihood Ratio	19.8004	7	<.0060
χ^2	d.o.f	Pr > χ^2		Score	18.9643	7	<.0083
9.3157	8	0.3164		Wald	16.8320	7	0.0185

Table 6. Correlations among IT Intensity, CIO Reporting Structure, and Performance

	OPIS	**Sales/ Assets**	**Past Cash Flows**	**Future Cash Flows**	**Actual CIO Reporting**	**Predicted CIO Reporting**	**IT Intensity**
OPIS	1	-0.2707***	0.4528***	0.4896***	0.2245***	0.7686***	$0.0668^{N/S}$
Sales/assets		1	-0.342***	-0.2450***	-0.2096***	-0.5823***	$-0.0208^{N/S}$
Past Cash Flows			1	0.6017***	0.1815*	0.4252***	$-0.0411^{N/S}$
Future Cash Flows				1	0.1750*	0.4855***	$-0.0232^{N/S}$
Actual CIO Reporting					1	0.2647***	$0.0416^{N/S}$
Predicted CIO Reporting						1	0.1482*
IT Intensity							1

***p < .001; **p < .01; *p < .05; $^{N/S}$Not Significant

Table 7 reports the regression results for abnormal stock returns. The justification of aligned firms having superior future performance is similar to Sloan's (1996) analysis of stock earnings.

Compared to the misaligned group CEO_CL, the aligned CEO-PD and CFO-CL groups enjoy higher abnormal stock returns, 0.1160 (p-value = 0.0671) and 0.2177 (p-value = 0.0054), respectively. Still, there is no difference in abnormal stock returns between the two misaligned CEO-CL and CFO-PD groups, nor is there a difference between the aligned CEO-PD and CFO-CL groups, supporting H3, despite accounting for OPIS, sales/assets, and the other control variables (Table 7).

Table 7. Abnormal Stock Returns across Firms

Variable	Hypothesized Sign	Regression Coefficient	Significance (p-value)
Intercept		-0.7624	0.0436
CEO_PD	(+)	0.1160	0.0671
CFO_CL	(+)	0.2177	0.0054
CFO_PD	(0)	0.1461	0.3011
OPIS	(0)	0.6576	0.0377
Sales/Assets	(0)	0.0121	0.6304
IT Intensity	(+)	0.0092	0.2992
High_Tech Dummy	(0)	0.0613	0.2227
Low_Tech Dummy	(0)	-0.0154	0.8200

N = 200 and Adjusted R^2 = 0.0535

Table 8. Differences in Abnormal Stock Returns on Equally Weighted Portfolios

CIO Reporting Structure		Abnormal Return (CEO Group)	Abnormal Return (CFO Group)	Abnormal Return Difference (CEO-CFO) Hypothesized Sign (0)
Actual	Mean	0.0174	0.0432	-0.258 (p = 0.4474)
	N	153	47	

Table 8 shows the abnormal stock returns of the CEO versus the CFO panels. The difference in abnormal stock returns between the reporting to the CEO versus the CFO is not significantly different from zero, showing that whether a CIO reports to the CEO or to the CFO does *not* affect firm performance on average. Thus, what causes the performance difference across firms is whether the CIO reporting structure fits the firm's strategic positioning, as H3 proposes.

Table 9 reports the effects of the alignment between the CIO reporting structure and the firm's strategic positioning on future cash flows from operations (Equation 2).

$$\text{Log}(\text{Cash\_Flow}_{j,t+1} / \text{Sales}_{j,t+1}) = \alpha_1 + \beta_1 \times \text{Log}(\text{Cash\_Flow}_{j,t} / \text{Sales}_{j,t}) + \beta_2 \times \text{CEO-PD}_{j,t} + \beta_3 \times \text{CFO-CL}_{j,t} + \beta_4 \times \text{CFO-PD}_{j,t} + \beta_5 \times \text{IT Intensity} + \beta_6 \times \text{Automate\_Dummy}_{j,t} + \beta_7 \times \text{Concentration\_Ratio}_{j,t} + \beta_8 \times \text{High\_Tech}_{j,t} + \beta_9 \times \text{Low\_Tech}_{j,t} + \varepsilon_{j,t} \quad (2)$$

Table 9 shows that the alignment between CIO reporting structure and strategic positioning has a significant effect on future cash flows from operations, supporting H3 even after controlling for past cash flows from operations that captures the residual effect of past on future performance.[11] Table 9 shows that compared to firms in the misaligned CEO-CL group, both firms in the aligned CEO-PD and CFO-CL groups enjoy higher cash flows from operations during the following year, $\beta = 0.1847$ (p-value = 0.0572) and $\beta = 0.2460$ (p-value = 0.0379), respectively. There is no difference in future cash flows from operations, neither between the two aligned (CEO-CL and CFO-PD) groups nor between the two misaligned (CFO-PD and CFO-CL) groups, consistent with our overall logic.[12]

Robustness Check: Replication of Data Analysis and Results with 2006 Data

The generalizability of the 1990–1993 IW data may be an issue because of their age. Given the many changes in IT

[11]The regression model initially included the variables that were used to estimate the strategic positioning (OPIS and sales/assets). However, since OPIS is highly correlated with past cash flows from operations, including OPIS increases the conditional index from 12 to 79. This is because the information contained in OPIS is already included in past cash flows, causing severe collinearity between OPIS and past cash flows. Therefore, OPIS was excluded from the regression model, and only sales/assets was retained.

[12]As a robustness check, we also examined the firm's future *gross* margins, and our results still hold. Compared to firms in the CEO-CL group, firms in the CEO-PD and CFO-CL groups enjoy higher gross margins for the subsequent year, 0.0495 (p-value = 0.0808) and 0.0381 (p-value = 0.0086), respectively; however, there is no difference in abnormal returns between the CEO-CL and CFO-PD group, rejecting H4.

Table 9. Predicting Cash Flows in Period *t+1* to Cash Flows in Period *t* (1990–1993 IW Data)

Variable	Coefficient	Significance (p-value)	Coefficient	Significance (p-value)	Coefficient	Significance (p-value)
Intercept	-0.9755	0.0003	-1.2014	< .0001	-1.4605	< .0001
CEO_PD (+)	0.1847	0.0572	0.2703	0.0346	0.2890	0.0400
CFO_CL (+)	0.2460	0.0379	0.3254	0.0263	0.3621	0.0207
CFO_PD (0)	0.0710	0.3671	0.0970	0.6446	0.0601	0.7783
Past Cash Flows$_{i,t}$ (+)	0.4987	< .0001	0.5713	< .0001	0.5583	< .0001
sales/assets$_{i,t}$ (0)	-0.1560	0.0636				
IT Intensity (+)	0.0022	0.4795	0.0067	0.4384	-0.2443	0.3647
Automate Dummy$_{i,t}$ (0)					0.1950	0.0887
Concentration$_{i,t}$ (0)					0.2026	0.5867
High Tech$_{i,t}$ (0)	0.0320	0.7981	0.0270	0.8307	0.0382	0.7685
Low Tech$_{i,t}$ (0)	-0.0107	0.9479	-0.0397	0.8098	-0.0722	0.6641
N	159		159		159	
Adjusted R^2	0.411		0.4013		0.4077	

Table 10. Predicting CIO Reporting Structure with Strategic Positioning (2006 Data)

Predicted Probabilities and Observed Responses				Model Fit Statistics		
Percent Concordant	80.7	Somers' D	0.614	Criterion	Intercept Only	Intercept and Covariates
Percent Discordant	19.3	Gamma	0.614	AIC	76.095	71.466
Percent Tied	0.0	Tau-a	0.293	SC	78.12	85.643
Pairs	735	C	0.807	-2 Log L	74.095	57.466

R^2 (Cox & Snell)	.2569	Max-Rescaled R^2 (Nagelkerke)	.3502	Testing Global Null Hypothesis: BETA = 0			
				Test	χ^2	d.o.f	Pr > χ^2
Hosmer and Lemeshow Goodness-of-Fit Test				Likelihood Ratio	16.6293	6	0.0107
χ^2	d.o.f	Pr > χ^2		Score	31.8985	6	0.0234
3.7963	7	0.8029		Wald	29.2968	6	0.1180

	Odds Ratio Estimates		Coefficient Estimation	
Effect	Point Estimate	90% Wald Confidence Limits	Logit Coefficient	Significant (P-Value)
Operating Income over Sales (Differentiation) (+)	> 999.999	1.778 – 999.999	10.2511	0.0404
Sales over Assets (Cost Leadership) (-)	0.2	0.046 – 0.862	-1.6118	0.035
Industry Concentration (0)	2.241	0.476 – 10.56	0.8069	0.3919
Automate Industry Dummy (0)	0.171	0.007 – 4.476	-1.7648	0.3737
High_Tech Dummy (0)	0.226	0.05 – 1.032	-1.4854	0.1074
Low_Tech Dummy (0)	0.991	0.069 – 14.275	-0.0088	0.9957

Table 11. Abnormal Stock Returns Based on Equally Weighted Portfolios (2006 Data)

Variable	Hypothesized Sign	Regression Coefficient	Significance (p-value)
Intercept		-0.0759	0.4623
CEO_PD	(+)	0.1340	0.0654
CFO_CL	(+)	0.1639	0.0538
CFO_PD	(0)	0.0182	0.8603
OPIS	(0)	-0.0078	0.9868
Sales/Assets	(0)	0.0171	0.7904
High_Tech Dummy	(0)	-0.0373	0.4972
Low_Tech Dummy	(0)	-0.1143	0.3282

N = 56; Adjusted R^2 = 0.0497

Table 12. Differences in Abnormal Stock Returns on Equally Weighted Portfolios (2006 Data)

CIO Reporting Structure		Abnormal Return (CEO Group)	Abnormal Return (CFO Group)	Abnormal Return Difference Hypothesized Sign (0)
Actual	Mean	0.0197	0.0229	-0.0032 (p = 0.9368)
	N	35	21	

during the last decade (e.g., dot.com expansion and bust, Y2K, IT outsourcing), we replicated the data analysis with data from 58 Fortune Global 1,000 U.S. firms collected in 2006.

As shown in Table 10, the results of the logistic regression (Equation 1) show both $\alpha_1 = 10.2511$ (p = .0404) and $\alpha_2 = -1.6118$ (p = .0350) to be significant, thus supporting H1 and H2. This shows that strategic positioning influences the CIO reporting structure, also in 2006, similar to the *IW* data. Table 10 also reports the model fit statistics when predicting CIO reporting structure with strategic positioning for the 2006 data. The χ^2 of the goodness-of-fit test is 3.7963 (p = .803), rejecting the null hypothesis of lack of fit, implying that our model's estimates adequately fit the data.

As Table 11 attests, the alignment between CIO reporting structure and strategic positioning is associated with higher abnormal stock returns, supporting H3, consistent with the 1990–1993 IW data.

Table 12 shows the abnormal stock returns of the CIO–CEO versus the CIO–CFO portfolios. Since there are no performance differences between the firms that reporting to the CEO or the CFO, H4 is also rejected, consistent with the 1990–1993 IW data.

Table 13 reports the results of predicting future cash flows from operations in the following year (2007) based on the fit between the CIO reporting structure and strategic positioning in 2006.

Similar to the 1990–1993 IW data, the results show that firms with a fit between their CIO reporting structure and strategic positioning have higher cash flows from operations during the next year, even after controlling for past cash flows from operations. These results support H3.

Taken together, the 2006 results closely correspond to the 1990–1993 IW results. These findings indicate the robustness of the results over time, implying that the optimal CIO reporting structure relative to the firm's strategic positioning has not changed, at least during the last two decades.

Finally, while our theoretical logic suggests the CIO reporting structure is not industry-specific, we ran all analyses with industry median-adjusted scores, and the results hold (omitted for brevity). These findings support Porter's (1980) theory that the generic strategies apply across industries, and they support our classification of differentiators and cost leaders based on OPIS and sales/assets values. The results also support that the alignment between the firm's CIO reporting structure and its strategic positioning is not industry-specific, but it should generalize across industries.

Table 13. Regression Results Predicting 2007 Cash Flows from Operations with 2006 Data

Variable	Coefficient	Significance (p-value)	Coefficient	Significance (p-value)
Intercept	-1.9903	<.0001	-2.3722	<.0001
$CEO\_PD_{i,2006}$ (+)	0.8555	0.0083	1.1084	0.0018
$CFO\_CL_{i,2006}$ (+)	0.9969	0.0005	1.1758	0.0002
$CFO\_PD_{i,2006}$ (0)	0.9720	0.5900	1.2231	0.1300
Past $CashFlows_{i,2006}$ (+)	0.4708	0.0017	0.5011	0.0008
$OPIS_{i,2006}$ (+)	2.7132	0.0644	2.0126	0.1299
$Sales/Assets_{i,2006}$ (0)	-0.2460	0.3564	-0.2238	0.3888
Automate $Dummy_{i,2006}$ (0)			-0.2366	0.3509
Industry $Concentration_{I,2006}$ (0)			1.4456	0.0617
High $Tech_{i,2006}$ (0)	0.0673	0.6919	0.2064	0.2976
Low $Tech_{i,2006}$ (0)	-0.2891	0.3420	-0.6755	0.0656
N	38		N	38
Adjusted R^2	0.7674		Adjusted R^2	0.7815

Discussion

Key Findings

This study has three key findings. First, strategic positioning influences CIO reporting structure, irrespective of IT intensity (or strategic role of IT). Differentiators tend to have their CIO report to the CEO, while cost leaders tend to have their CIO report to the CFO. Second, alignment between a firm's strategic positioning and its CIO reporting structure positively affects firm performance (measured with abnormal stock returns and future cash flows from operations), despite accounting for past performance. While the IS literature has mainly used field interviews and case studies to identify the ideal CIO reporting structure, this study uses longitudinal secondary data from many firms with data over two decades, testifying to the study's external validity and robustness. Third, the study refutes the long-held naïve assertion that any single CIO reporting structure is always ideal for all firms by showing that *either* of the two well-aligned reporting structures outperforms any of the two misaligned structures. Similarly, there are no significant performance differences between the two proposed aligned and between the two proposed misaligned configurations, implying equifinality.

Implications for Theory and Practice

Despite many factors that affect firm performance, the significant effect of the CIO reporting structure on firm performance is an interesting finding. While the reporting structure of other C-level executives (e.g., CFO, COO) has been determined, the reporting structure of the CIO is still an unresolved and debated issue in the literature, and IS academics and practitioners have yet to prescribe the ideal CIO reporting structure. Correctly structuring the CIO position to align with the firm's strategic positioning can have implications for firm performance. We challenge the consensus that the CIO must report to the CEO to enhance the CIO's clout in the firm. We posit that the optimal CIO reporting structure should not be a proxy of the strategic role of IT or the CIO's clout, but rather a means to create value by matching the CIO with the most relevant C-level executive to support the firm's strategic positioning by leading valuable IT initiatives. This implies that a CIO–CFO reporting structure must not be viewed as a sign of a diminished role of IT, but rather that IT is effectively used to pursue a cost leadership strategy by allowing the CIO to work closely with a top finance executive. A CIO–CFO reporting structure aligned with a cost leadership strategy can be equally successful to a differentiation strategy with a CIO–CEO reporting structure. This study implies that there may be two types of CIOs, at least for firms where IT has a strategic role and their CIOs report to the CEO or CFO - CIOs who focus on IT initiatives for differentiation and CIOs who use IT for efficiency. This logic is consistent with the resource-based view that calls for complementary managerial skills that, when used in combination, can create value. The IS literature should focus on how *both* types of CIOs should extend their managerial IT skills to complement those of the CEO or the CFO.

The results suggest that the prescribed CIO reporting structure is not industry-specific but generalizes across industries. This follows Porter (1980), who proposed these as "generic" strategies that apply across industries. This is because most firms in an industry can be either differentiators or cost leaders, and they should thus have their CIO report to either the CEO or the CFO, respectively. In some industries, such as banking and finance, most firms are differentiators, have high OPIS and low sales/assets, and have their CIO report to the CEO. In other industries, such as commodities, most firms are cost leaders, have low OPIS and high sales/assets, and their CIO reports to the CFO. Thus, it is not necessary to examine each industry separately to specify the CIO reporting structure.

Despite many changes in IT during the last two decades, the ideal CIO reporting structure has remained consistent in our two data sets which span almost two decades. While the exact IT initiatives may have changed, similar to the endurance of Porter's generic strategies, the role of IT initiatives to facilitate differentiation and cost leadership has not. CFOs are more appropriate overseeing CIOs who lead IT initiatives for cost leadership with quantifiable targets for efficiency and cost cutting, while CEOs are more appropriate supervising CIOs who lead IT initiatives for differentiation that tend to promote broader, cross-functional differentiating goals with less quantifiable targets. Thus, the importance of IT initiatives for differentiation and cost leadership and the salient role of the CIO to lead these IT initiatives are likely to persist over time despite changes in particular IT systems.

Limitations and Suggestions for Future Research

First, the DuPont ratios are merely proxies for capturing a firm's strategic positioning, and it is unlikely to perfectly categorize all firms as either pure differentiators or cost leaders. Still, the use of secondary measures to capture Porter's (1980) strategies is not new. In industry-specific studies, cost leadership was measured with *cost* per ton, while product differentiation was measured with *value* per ton (Kald 2003). Future research could attempt to validate the proposed accounting ratios with researcher's inference, self-assessment, or external assessment (Snow and Hambrick 1980). Also, the proposed differentiation or cost leadership classification is clearly a simplification of reality, and future research could include finer characterization of a firm's strategic positioning. Second, the theoretical explanations for the proposed hypotheses have not empirically been tested, and they are merely presented to justify our hypotheses. Future research could test these explanations.

Third, several other variables could help predict the CIO reporting structure, such as the CIO's background, salary, education, past positions, TMT membership, skills, and others. Future research could examine such other variables that predict the CIO–CEO or CIO–CFO reporting structure.

Finally, having specified the CIO's reporting structure and since the reporting structure for the CFO and COO have been prescribed, future research can specify the ideal reporting structure of other emerging C-level executives, such as chief marketing officer and chief creative officer.

Ending Note

Despite the increased importance of the CIO, the CIO reporting structure is still a debated issue. Counter to the long-held intuitive assumption that the CIO must *always* report to the CEO, we show that a CIO–CEO reporting structure is not necessarily superior for all firms, and it is not a function of the strategic versus nonstrategic role of IT. Rather, the CIO reporting structure largely depends on the firm's strategic positioning. Contrary to the literature, this study concludes that the CEO–CIO reporting structure may not be the best approach for all firms, but the alignment of the CIO reporting with strategic positioning helps positively affect firm performance. Most important, an aligned CIO reporting structure can affect firm performance, testifying to the CIO's importance in the firm and the significance of aligning IT initiatives with firm strategy under the CIO's leadership.

Acknowledgments

We thank Rajkumar Kempaiah for his research assistance in the data collection and analysis.

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