

**EFFECTS OF IT CHARGEBACK ON STRATEGIC ALIGNMENT AND PERFORMANCE: CONTINGENT
ROLES OF BUSINESS EXECUTIVES' IT COMPETENCE AND CIOs' BUSINESS COMPETENCE**

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Structured Abstract

Purpose – In the era of the digital economy, organizations are under much pressure to justify their IT spending on digital transformation. Some organizations have thus implemented IT chargeback, an IT governance (ITG) mechanism, to clarify and allocate IT costs among various business units. While practitioners have stressed the importance of IT chargeback, there has been little theoretical effort that investigates its strategic effects and boundary conditions.

Design/methodology/approach – Synthesizing the ITG literature and the resource-based view (RBV), we develop a research model to examine if IT chargeback affects IT-business strategic alignment and, in turn, organizational performance and how human IT resources strengthen the impacts of IT chargeback. We designed a survey to collect data from 103 firms and tested the model using partial least squares.

Findings – We found that IT chargeback promoted strategic alignment and then organizational performance only for firms with business-competent CIOs rather than IT-competent business executives.

Originality/value – This study enriches the ITG literature by exploring the strategic value of an IT cost governance mechanism (i.e., IT chargeback). This study further proposes and validates a measure of IT chargeback. Drawing on RBV, this study quantitatively investigates the strategic impacts and boundary contingencies of IT chargeback. This study also advances the CIO literature by identifying the strategic leading role, instead of the traditional supporting role, of CIOs in modern organizations.

Key Words: IT governance, IT chargeback, CIOs, IT-business strategic alignment, organizational performance, resource-based view

Paper Type: Research Paper

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1. Introduction

Organizational IT spending continues to increase in the era of the digital economy. Gartner (2020) showed that across all industries, median IT spending as a percentage of operational expenses rose from 3.1% in 2019 to 3.7% in 2020. Firms are thus pressed to economize on their IT service consumption to generate business value (De Haes *et al.*, 2020). Traditionally, business units demand IT services, and in response, IT units supply those required services and bear the relevant costs. However, IT units usually have little knowledge of whether such demands for IT services are reasonable and little influence on asking business units to make economical use of IT services. Against this backdrop, firms urgently need effective IT governance (ITG) mechanisms that can ease the tension between IT units and business units and promote constructive partnerships to make IT expenditures cost effective in generating business value (Charles, 2019).

To this end, IT chargeback is an ITG mechanism that could align the responsibility of managing IT costs with business units and help them use IT services economically and effectively (Friedman and Grayson, 1996; Weill and Ross, 2005). In a multi-continent survey across all industries (Gartner, 2021), 67% of the responding firms indicated that they used IT chargeback to manage their costs for IT services. Business units in firms that have adopted IT chargeback are more willing to change their IT consumption behavior because they must pay for IT services (Heslin, 2015). More importantly, IT chargeback fosters communication and mutual understanding of IT value between business units and IT units, which enable them to collaboratively leverage IT to obtain organizational benefits (Johnson and Lederer, 2005; Ross *et al.*, 1999). Thus, in addition to controlling IT costs, IT chargeback could also promote the strategic

alignment between IT units and business units (Brown and Ross, 1996; Heslin, 2015), which is critical for organizational performance (Gerow *et al.*, 2014; Wu *et al.*, 2015). While senior IS scholars have suggested IT–business strategic alignment as an untapped potential of IT chargeback (Ross *et al.*, 1999), to the best of our knowledge, few have empirically investigated this potential of IT chargeback.

Indeed, despite the popularity of IT chargeback in industry, it has attracted little academic attention. Although the ITG literature has identified the effects of *general ITG* mechanisms on *organizational costs* (Devaraj and Kohli, 2003; Williams and Karahanna, 2013), much remains unknown about the effects of a *specific IT cost governance mechanism*, namely, IT chargeback, on *organizational benefits*. To bridge this gap, we adopt the theoretical lens of the resource-based view (RBV) and conceive IT chargeback as an IT resource that could generate organizational benefits (Mata *et al.*, 1995; Wu *et al.*, 2015). Considering the strategic role of IT chargeback, this study aims to explore the influence of IT chargeback on organizational benefits such as strategic IT–business alignment and organizational performance, leading to our first question:

RQ1: Does IT chargeback improve IT–business strategic alignment and, in turn, organizational performance?

RBV further suggests that organizational capital (e.g., human IT resources), could amplify the downstream impacts of IT resources (Brynjolfsson *et al.*, 2002; Melville *et al.*, 2004). IS scholars have long proposed that business executives' IT competence and CIOs' business competence are two of the human IT resources (Bassellier *et al.*, 2003; 2004). Therefore, we examine the contingent role of these two types of human IT resources in shaping the relationship between IT chargeback and IT–business strategic alignment. Thus, our second research question is:

RQ2: Do business executives' IT competence and CIOs' business competence strengthen the relationship between IT chargeback and IT–business strategic alignment?

2. Theoretical Background

2.1 IT Governance and IT chargeback

ITG is “the framework for decision rights and accountabilities to encourage desirable behavior in the use of IT” (Weill and Ross, 2004, p. 2), ensuring that IT sustains and extends organizations’ strategies and objectives. Overall, ITG involves decision rights along two dimensions: the vertical dimension where decision rights are allocated between corporate-level executives and unit-level managers, and the horizontal dimension where decision rights are allocated between IT-unit managers and business-unit managers. In this research, we focus on the horizontal dimension of ITG to study its effect on IT–business strategic alignment.

Gregory *et al.* (2018) reviewed and analyzed the ITG literature in terms of three aspects: the focus of ITG (*what* to govern), the scope of ITG (*who* to govern), and the patterns of ITG (*how* to govern). Gregory *et al.*’s (2018) content analysis revealed that most of the extant ITG literature had studied the patterns of ITG (e.g., centralization, decentralization, and hybrid mix), as well as the contingency factors shaping these patterns (e.g., environment uncertainty), while only a few studies had explored the scope of ITG (e.g., IT functions or business units) and the focus of ITG, such as IT architecture (e.g., Winkler and Brown, 2013), IT applications (e.g., Tiwana and Kim, 2015), and IT infrastructure and standards (e.g., Constantinides and Barrett, 2015). Although the value of general patterns of ITG for reducing *organizational costs* has been well studied (e.g., Devaraj and Kohli, 2003), only one recent case study by Williams and Karahanna (2013) has extended the focus of ITG to a specific mechanism that governs the *cost of IT itself* (i.e., customer IT services spending). Further empirical studies are needed to advance this line of research to investigate such *IT cost-related* ITG mechanisms and their organizational impacts.

One of the most important objectives of ITG is to ensure that IT-related activities align with the organization's business goals (Tiwana and Kim 2015; Wu *et al.*, 2015). To this end, IT chargeback is an IT cost alignment mechanism that “help[s] IT units clarify costs for IT services and instigate[s] discussions of the kinds of services the business requires” (Weill and Ross, 2005, p. 28). Specifically, the relationship between business units and IT units could be viewed as a “constructive tension” (Ross *et al.*, 1999, p. 232), as business units demand *advanced* IT services to support business processes, while IT units only want to supply *reasonable* IT services and require business units to use them economically. When an IT service is free, business units typically take it for granted. However, when business units must pay for an IT service, they tend to change their mindsets and adjust their IT consumption behavior. Some studies have identified different approaches to chargeback, such as charging for IT evenly across units or charging for IT based on unit headcounts (e.g., Friedman and Grayson, 1996; Gartner, 2017).

Although IT chargeback has been proposed by scholars for years (e.g., Ross *et al.*, 1999) [1], newly emerging IT-enabled business models, such as cloud services and the sharing economy, once again put IT chargeback in the spotlight because organizations are now pressed to understand where their IT spending goes in order to better control their IT costs (Baars *et al.*, 2014; Gartner, 2021). Our literature review suggests that the cost-reduction effect of IT chargeback has been well studied. Prior research has found that IT chargeback could motivate business units to identify the drivers of their IT consumption and adjust their use of IT accordingly through such actions as demanding more budget-friendly facilities, sharing servers with other units, and reducing internet surfing for personal affairs (e.g., Huang and Sundararajan, 2011; Ross *et al.*, 1999).

However, it is worth noting that IT chargeback is not only about reducing IT costs. By requiring business units to share the responsibility of managing IT costs, IT chargeback also

increases communication between IT units and business units. This communication not only helps IT units better understand the technical needs of business units, but also makes business units more aware of the intricate relationships between IT usage, IT costs, and the business value associated with IT (Ross *et al.*, 1999). Such communication could ease the “constructive tension” between business units and IT units, thus enhancing the partnerships and alignment between these units for attaining strategic organizational goals (Brown and Ross, 1996; Gartner, 2021).

Although this strategic effect of IT chargeback might be more valuable than the cost-reduction effect, prior IT chargeback literature has only conceptually discussed this strategic effect (Drury, 2000; Hamblen, 2005; Peppard, 2007; Weil, 2004) or empirically investigated it through qualitative case studies (Curley, 2006; Fonstad and Subramani, 2009; Ross *et al.*, 1999). More theoretically grounded quantitative research is warranted to advance our knowledge of IT chargeback. To this end, we have conducted a quantitative research study to examine IT chargeback and its untapped strategic value for promoting strategic IT–business alignment.

2.2 *Strategic alignment*

Strategic alignment is a top priority for organizations in the era of the digital economy where organizations and their environments are going through rapid change (Coltman *et al.*, 2015). The literature has theorized three forms of strategic alignment to realize the business value of IT: *intellectual alignment* between the business and IT strategies, *operational alignment* between the business and IT infrastructures and processes, and *cross-domain alignment* (e.g., Henderson and Venkatraman, 1993). Because the IT chargeback in our study involves strategic collaboration regulated by senior executives (CIOs and business executives), we focus on the *intellectual dimension* of alignment at the strategic level, consistent with Chan *et al.* (1997), Preston and Karahanna (2009), and Tallon *et al.* (2016). Following Chan *et al.* (2006, p. 27), we define IT–

business strategic alignment as “the degree to which the missions, objectives, and plans contained in the business strategy are shared and supported by the IT strategy.”

2.3 The Resource-Based View

RBV is a theory that has received wide acceptance in the strategy, marketing, and IS fields. RBV argues that an organization possesses a bundle of different resources, among which only those that are *valuable, unique, and imperfectly imitable* could provide competitive and strategic business value (Mata *et al.*, 1995). Through the lens of RBV, the resources of a firm are defined as “assets and capabilities that are available and useful in detecting and responding to market opportunities or threats” (Wade and Hulland, 2004, p. 109). RBV is a useful tool to help researchers understand whether and how specific resources (e.g., IT and non-IT resources) independently or collectively generate strategic value.

According to prior RBV-based IS research, IT chargeback could be viewed as a strategic IT resource for the following reasons. First, IT chargeback is *valuable*. It motivates business units to make rational demands for IT services and to use these services economically, thus making IT consumption more cost effective. Second, IT chargeback is *unique* to the organization that adopts it. IT chargeback facilitates strategic alignment between the organization’s IT units and business units, and such cross-functional strategic alignment is exclusive for most organizations (e.g., De Haes and Van Grembergen, 2009; Wu *et al.*, 2015). Third, when an organization successfully implements IT chargeback, it might be *difficult and tricky for other organizations to replicate* it, because the success of cross-functional activities (e.g., IT chargeback) is often contingent on many other organizational factors (Wade and Hulland, 2004).

Further, RBV not only implies that some IT resources could directly generate strategic value, but also suggests a complementarity between IT resources and other types of organizational

resources (e.g., Brynjolfsson *et al.*, 2002; Melville *et al.*, 2004; Powell and Dent-Michallef, 1997; Ray *et al.*, 2005; Wade and Hulland, 2004). Complementarity means that one resource can magnify the impact of another resource. Business executives' IT competence and CIOs' business competence are examples of organizational resources (i.e., human IT resources) that can amplify the strategic value of an IT resource (Bassellier *et al.*, 2003, 2004; Bharadwaj 2000). For instance, studies have shown that greater technical competence in a business unit (or greater business competence in an IT unit) increases the benefits of ITG (Tiwana and Kim 2015). Following this line, we extend the IT chargeback literature by incorporating these two types of human IT resources in our research model to examine the contingencies that moderate the organizational impacts of IT chargeback.

Drawing on the RBV, we propose a research model to explain how IT chargeback promotes IT–business strategic alignment and consequently organizational performance (RQ1), and how business executives' IT competence and CIOs' business competence complement IT chargeback in improving IT–business strategic alignment (RQ2). Figure 1 summarizes the research model.

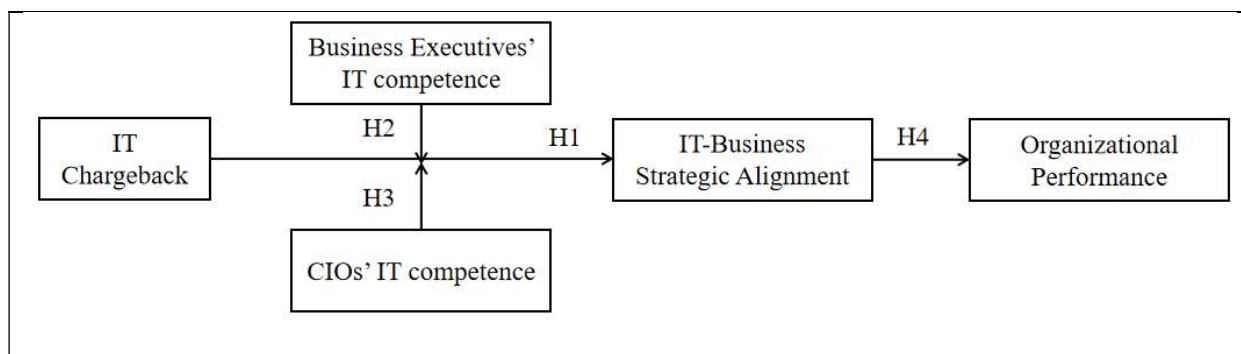


Figure 1. Research Model

3. Hypothesis Development

3.1 IT Chargeback and Strategic Alignment

From the RBV perspective, IT chargeback could be viewed as an IT resource that has strategic effects above and beyond its intended effect of reducing IT costs. Case studies of

organizations in different industries have found that the effect of IT chargeback is not only determined by the specific chargeback practices, but also shaped by whether IT chargeback fosters communication between business units and IT units (Ross *et al.*, 1999; Weill and Ross, 2005). Such cross-functional communication is an opportunity for these two units to share technical and business knowledge and thereby build mutual understanding (Reich and Benbasat, 2000; Wu *et al.*, 2015), which may foster partnerships that enhance the IT–business strategic alignment.

When organizations implement IT chargeback, business units are required to be accountable for managing IT costs. As the business units must pay for their IT consumption, they will be more willing to communicate with the IT units to gain technical knowledge about the IT services they use. This communication helps them better understand how much each IT service costs and how it supports their business goals (Drury, 2000). Equipped with such understanding, business units are more likely to be strategic in analyzing their IT consumption, economizing their IT usage, and adjusting their plans to use alternative IT services that are more cost effective. Through cross-functional communication, IT chargeback also stimulates business units to appreciate the value of IT, making them more willing to cultivate partnerships with IT units and factor in IT strategies when developing business strategies, thereby promoting the IT–business strategic alignment.

Moreover, IT chargeback helps IT units understand business processes and align IT cost-related activities with the organization’s strategic priorities. With more opportunities to communicate intensively with business units during IT chargeback, IT units could work more directly with business units and thus better understand and satisfy the business units’ IT needs (Johnson and Lederer, 2005; Reich and Benbasat, 2000; Ross *et al.*, 1999). In other words, IT chargeback makes it easier for IT units to evaluate and interpret business units’ IT needs and hence supply IT services more effectively for achieving business goals. With the implementation of IT

chargeback, IT units are more likely to work in partnership with business units and adjust the IT budgets and plans so as to better support the business strategy, thereby promoting IT–business strategic alignment (Preston and Karahanna, 2009; Wong *et al.*, 2012).

In sum, IT chargeback is a valuable resource that helps business and IT units build mutual understanding to support each other’s strategic plans and goals. On the one hand, IT chargeback motivates business units to better assess their IT costs, appreciate the value of IT services, and economize their use of IT in order to be consistent with the organizational IT strategy. On the other hand, IT chargeback helps IT units better interpret business units’ technical needs and adjust their supply of IT services to align with the business goals. Such cycles of shared understanding and mutual benefits enabled by IT chargeback make it a resource that is valuable, unique to the organization and difficult for competitors to completely imitate. Therefore, according to RBV, IT chargeback can offer strategic value to organizations by fostering better synergy between the business units and IT units to attain IT–business strategic alignment. We thus hypothesize:

H1: IT chargeback is positively associated with IT–business strategic alignment.

3.2 The Contingent Role of Human IT Resources

IT chargeback requires a series of trade-offs for organizations to balance the cost-reduction objective sought by IT units with the high expectations of IT from business units (Gartner 2021). Therefore, the engagement and support of CIOs and business executives could be instrumental in lowering the barriers to implementing IT chargeback. Prior IS research that has leveraged RBV suggests that the effect of IT resources could be contingent on other types of organizational resources (Ray *et al.*, 2005; Wade and Hulland, 2004), including human IT resources (Bharadwaj 2000; Brynjolfsson *et al.*, 2002; Melville *et al.*, 2004).

In this regard, IS researchers have identified the IT competence of business executives (e.g., CEOs, COOs, and CMOs) (Bassellier *et al.*, 2003) and the business competence of IT executives (i.e., CIOs and leaders of IT functions) (Bassellier and Benbasat, 2004; Preston and Karahanna, 2009) as two key human IT resources that are needed to facilitate the benefits of IT resources. Moreover, such shared domain knowledge between IT and business executives enables them to participate in each other's processes and respect each other's contributions to the organization, thus facilitating the IT–business strategic alignment (Reich and Benbasat, 2000). Following this vein, we formulate two hypotheses that explain the complementary roles of business executives' IT competence (H2) and CIOs' business competence (H3) in enhancing the effect of IT chargeback on strategic alignment.

Business executives' IT competence

The business executives' IT competence includes fundamental technical knowledge and the ability to put such knowledge into practice (Bassellier *et al.*, 2003). Implementing IT chargeback may be a daunting task if business executives do not possess sufficient IT competence. If IT chargeback is poorly understood and conducted by business units, it may backfire and worsen the relationship between the business units and IT units, especially when IT costs are high and ambiguous. Business executives' IT competence could complement IT chargeback to foster IT–business strategic alignment for the following reasons.

First, IT chargeback is not the sole responsibility of IT units. Business units that drive the demand side of IT should also play a part in managing these costs. To this end, business executives who have more technical knowledge than their counterparts could better help their business units to understand the technical terms in the IT chargeback policy. Hence, it is easier for these business units to identify the drivers of IT costs and work together with IT units to implement IT chargeback

(Chan *et al.*, 2006; Reich and Benbasat, 2000). Besides, business executives that are equipped with technical knowledge about the advantages and disadvantages of each IT service may be better positioned to arrange for alternative IT services that meet both business needs and IT cost constraints.

Second, the IS literature has shown that business executives with more IT competence than their counterparts are more likely to appreciate and extract business value from IT and thus have more positive attitudes towards IT (Benlian and Haffke, 2016). Such executives are more capable of encouraging business units to work with IT chargeback, promoting more effective IT chargeback in practice. In this respect, business executives with IT competence may encourage their business units to build collaborative relationships with IT units in fulfilling organizational goals, which will complement IT chargeback in cultivating IT–business strategic alignment (Bassellier *et al.*, 2003; Preston *et al.*, 2008).

In summary, business executives with IT competence could help their business units better understand the IT chargeback policy, develop a positive attitude toward IT chargeback, and rationalize their IT consumption. Therefore, according to RBV, business executives' IT competence (a human IT resource) can complement IT chargeback (a strategic IT resource) in fostering IT–business strategic alignment. We therefore hypothesize the following:

H2: Business executives' IT competence positively moderates the relationship between IT chargeback and IT–business strategic alignment.

CIOs' Business competence

Traditionally, CIOs have been viewed as a supporting role in organizations, which is to provide technical assistance for business functions (Chen *et al.*, 2010). However, with the rise of data-driven business in the digital economy era, organizations have gradually recognized that CIOs are a strategic resource (Matt *et al.*, 2015; Weill and Woerner, 2013). In this vein, IS studies

have highlighted the importance of CIOs' business competence in extracting business value from IT (Bassellier and Benbasat, 2004).

First, business-competent CIOs usually have a holistic view of the organizational vision (Bassellier and Benbasat, 2004), which enables them to translate organizational strategies into IT principles that facilitate the implementation of IT chargeback (Weill and Ross, 2005). Therefore, IT units led by CIOs with more business competence than their counterparts could better analyze and charge for IT consumption from the business units' viewpoints. Such CIOs could also help IT units better understand the technical challenges that business units face (Bassellier and Benbasat, 2004; Preston and Karahanna, 2009) and then provide the most appropriate IT services that satisfy the business units' technical needs.

Second, to attain effective IT chargeback, it is particularly important that CIOs are able to understand how IT costs might affect or be affected by various business units and to communicate such insights to business units (Ross *et al.*, 1999). CIOs with business competence usually communicate and network effectively with business units (Preston and Karahanna, 2009). When communicating with business executives, these CIOs often use business language, rather than technical jargon, to explain how IT adds value to business strategies. These CIOs usually have high prestige among the business executives (Armstrong and Sambamurthy, 1999). Such a good relationship may facilitate business units' engagement in IT chargeback and amplify the effect of IT chargeback on IT-business strategic alignment (Tallon, 2014).

In sum, CIOs with business competence could better analyze IT costs from the perspective of the business and cultivate closer relationships with business units to implement IT chargeback in a way that aligns with strategic business goals. Both IT units and business units can thus better engage in IT chargeback for organizational benefits. From the perspective of RBV, CIOs' the

business competence (a human IT resource) can complement IT chargeback (a strategic IT resource) in fostering IT–business strategic alignment. We thus hypothesize the following:

H3: CIOs' business competence positively moderates the relationship between IT chargeback and IT–business strategic alignment.

3.3 Strategic Alignment and Organizational Performance

Strategic alignment is the key to realizing performance outcomes from ITG mechanisms (Wu *et al.*, 2015). Gerow *et al.* (2014) conducted a meta-analysis of the IT–business strategic alignment literature and found that IT–business strategic alignment generally improved organizational performance. Strategic alignment is instrumental for business units and IT units in developing mutual understanding, making business-oriented IT decisions, and collaboratively adjusting their own units' actions, missions, and plans for better organizational performance (Preston and Karahanna, 2009; Wagner *et al.*, 2014). A high level of IT–business strategic alignment could also improve organizations' agility in responding to market dynamics (Tallon and Pinsonneault, 2011); in this regard, IT units become more sensitive and responsive to necessary business adjustments, thereby ensuring strong organizational performance. We thus hypothesize the following:

H4: IT–business strategic alignment is positively associated with organizational performance.

4. Methodology

4.1 Data Collection

We conducted preliminary interviews with CIOs or IT heads from firms of different sizes and found that small firms typically lacked the capacity to implement IT chargeback. This is consistent with observations in prior literature that large organizations are more likely to implement IT chargeback (Drury, 2000; Raghunathan and Raghunathan, 1994). Therefore, we aimed at firms with at least 500 employees.

Next, as we intended to use partial least squares (PLS) analysis to test our hypotheses (as elaborated in Section 5), the minimum sample size should be 65, because the maximum arrows (including both entering paths and formative indicators if applicable) going into a focal construct is 13 (i.e., strategic alignment) and the minimum ratio for entering items versus the sample size is 1-to-5 (Bentler, 2006). Given that the typical response rate in CIO studies ranges from 15% (e.g., Tiwana and Kim, 2015) to 20% (e.g., Tiwana and Keil, 2009), we thus needed between 325 (i.e., $65 \div 20\%$) and 434 (i.e., $65 \div 15\%$) respondents. To be conservative, we planned to administer the survey to 500 firms for data collection.

To identify the firms, we first searched the Hong Kong Stock Exchange (HKSE) for firms with at least 500 employees, because IT chargeback is more likely to be implemented by large firms (Drury, 2000; Raghunathan and Raghunathan, 1994). The search process provided us with a total of 1,394 firms. Next, we numbered these firms from 1 to 1394 (so that each firm had a unique ID number) and used Microsoft Excel's RAND function to randomly generate 500 numbers in this range. Finally, we selected the 500 firms represented by the 500 generated numbers. We then sent the official survey to the CIOs or IT heads of these sampled firms [2].

To address privacy concerns and minimize the possibility of self-reporting bias, we assured respondents that their responses would remain confidential and that we would only report the aggregated results. To encourage a high response rate, we also indicated that, for each respondent, we would donate \$HK100 to Médecins sans Frontières as our appreciation for the executives' support [3]. We received responses from 103 CIOs or IT heads with a raw response rate of 20.6%.

To rule out non-response bias, we carried out several tests to compare the early and late respondents. The assumption is that respondents who respond late are similar to non-respondents (Armstrong and Overton, 1977). Following Smyth *et al.* (2009), we coded a respondent as an

early respondent if the reply arrived on or before the median response date; otherwise, we coded that respondent as a late respondent. We compared early respondents ($N = 51$) vs. late respondents ($N = 51$) and found no significant between-group differences in the values of focal constructs, including IT chargeback ($p = 0.391$), business executives' IT competence ($p = 0.825$), CIOs' business competence ($p = 0.598$), IT-business strategic alignment ($p = 0.812$), the customer perspective ($p = 0.682$), financial return ($p = 0.594$), operational excellence ($p = 0.939$), and organizational performance ($p = 0.772$). Likewise, we also found no significant between-group differences in control variables, namely the CIO's age ($p = 0.171$), education ($p = 0.123$), gender ($p = 0.271$), and tenure ($p = 0.185$), firm size ($p = 0.133$), the size of the firm's IT staff ($p = 0.107$), and the firm's IT budget ($p = 0.252$). Following Kim *et al.* (2016), we further compared the first and last third of the respondents based on the response date and still found no significant differences between the early and late respondents in the focal constructs and control variables. Taken together, this evidence minimizes the concern of non-responses bias, if any exists.

4.2 Measurement

To the best of our knowledge, no prior academic research has measured IT chargeback empirically and quantitatively. Most research examining IT chargeback has been in the form of practitioner-oriented reports (KPMG, 2013), conceptual discussions (Drury, 2000; Hamblen, 2005; Peppard, 2007; Weil, 2004), or qualitative case studies (Curley, 2006; Fonstad and Subramani, 2009; Ross *et al.*, 1999). To fill this gap, we developed a measure to quantitatively operationalize the concept of IT chargeback based on a systematic review of the academic and practitioner-oriented literature, as well as in-depth consultations with accounting professors who are experts on general chargeback and CIOs who are experienced with IT chargeback.

In the IS literature, IT chargeback was first categorized by Ross *et al.* (1999), who conducted a case study in ten different firms. The IT chargeback practices delineated in this paper included sourcing policy, level of accountability, calculation of charges, communication of charges, and supporting processes. Many practitioner-oriented consulting reports have focused on the calculation of charges to measure IT chargeback. For instance, Busch (2011) identified a six-level IT chargeback: spread evenly among users, spread by assigned percentages, by weighted costs of each IT category, by weighted direct spending on the shared expense, by activities, and a mix of above. Similarly, KPMG (2013) summarized a five-level IT chargeback: no cost allocation, revenue- or headcount-based costs, activity-based costs, service-based costs, and flexible pricing for cost reduction [4]. Gartner (2017) and Heslin (2015) identified IT chargeback at three major levels of sophistication: spread by each unit's headcount, by direct spending, and by activity-based IT service consumption.

Drawing on the measures discussed above, we first designed a preliminary measure of IT chargeback. Second, we invited three accounting professors who were knowledgeable about the general chargeback practices in organizations to review the preliminary measure and then offer their insights about how to further improve this measure. Third, after modifying the measure based on the accounting professors' feedback, we invited eight CIOs of leading Hong Kong firms to assess the measure and offer comments based on their industrial and organizational knowledge. Incorporating their professional advice, we finally arrived at a 1–5 scale to measure IT chargeback at 5 levels (Appendix A), with a higher value on the scale suggesting a more sophisticated IT chargeback.

The summary statistics of our data are shown in Table I, which shows both the industrial distribution and the IT chargeback levels of the 103 responding firms.

Table I. Descriptive Statistics						
Industry	Obs	IT Chargeback				
		Level 1	Level 2	Level 3	Level 4	Level 5
1. Finance/Banking	36	9	7	3	11	6
2. Information Technology/Telecom	23	6	4	1	5	7
3. Manufacturing	9	4	4	1	0	0
4. Government	5	4	1	0	0	0
5. Healthcare	4	1	2	0	0	1
6. Retail	1	0	0	0	0	1
7. Pricing/Transaction Management	1	0	1	0	0	0
8. Sales/Marketing	1	0	0	0	1	0
9. Other	23	13	1	2	5	2
Total	103	37	20	7	22	17

We measured all other constructs on a seven-point Likert scale, with 1 = “strongly disagree” and 7 = “strongly agree”. Items for IT–business strategic alignment, organizational performance, CIOs’ business competence, and business executives’ IT competence were adapted from prior studies. Specifically, we adapted three items from Chan *et al.* (1997, 2006) and Preston and Karahanna (2009) to measure IT–business strategic alignment, eight items from Bassellier *et al.* (2003) to measure business executives’ IT competence, and eight items from Bassellier and Benbasat (2004) to measure CIOs’ business competence. Organizational performance was measured by comparing the respondent’s firm to its industry peers. Following Rai *et al.* (2006) and Wu *et al.* (2015), we modeled organizational performance as a second-order formative construct based on three first-order reflective constructs: operational excellence, financial return, and customer perspective (each reflectively measured with three items). Appendix B provides the detailed items for each construct.

Since our two dependent variables, IT–business strategic alignment and organizational performance, could be affected by factors other than the focal constructs in our research model, we controlled for several organizational properties and CIO characteristics to rule out alternative explanations. First, because studies have found that larger firms, or firms with more IT staff and

larger IT budgets, are more likely to implement IT chargeback effectively and thus to easily achieve its strategic value (e.g., Drury, 2000; Kobelsky *et al.*, 2008), we controlled for firm size, size of IT staff, and IT budget. We also included industry as a control variable to control for industry-specific effects. Second, given CIOs' role in influencing IT–business strategic alignment (Preston and Karahanna, 2009), it is important to control for the potential influence of CIOs' characteristics on the dependent variables. Experts on survey research have also suggested that it is important to control for respondents' characteristics in the research design (Dillman *et al.*, 2009). Specifically, we controlled for the CIOs' age and education because CIOs with more current and superior technical knowledge are more likely to collaborate with business units to achieve strategic alignment and also more inclined to pursue innovations that facilitate organizational performance (Yan and Tan, 2013). We further controlled for the CIOs' tenure, because some researchers consider long CIO tenure as a competence that guarantees technological advantage (Bassellier *et al.*, 2004) and improved organizational outcomes (Finkelstein and Hambrick, 1990). Consistent with prior CIO literature, we also controlled for CIOs' gender, even though some researchers have mixed findings about the effects of CIOs' gender (Preston and Karahanna, 2009).

5. Analysis and Results

5.1 Measurement Model

We used partial least squares (PLS) as the analytic tool for evaluating our measurement model and hypothesis testing, because the model includes both formative and reflective constructs, which PLS can handle robustly (Chin, 1998; Gefen *et al.*, 2011).

Before testing our research model and hypotheses, we evaluated the measurement properties based on our PLS results. As shown in Table II, the factor loadings of all items on their respective constructs were all significant and higher than the recommended value of 0.7 (Nunnally and

Bernstein, 1994). As shown in Appendix B, the Cronbach's alpha and composite reliability (CR) values were also all higher than the recommended value of 0.7 (Nunnally and Bernstein, 1994), indicating that the scales exhibited good internal consistency. Discriminant validity, which reflects the extent to which the measurements for the different constructs are distinct from one another (Hair *et al.*, 2011), was also supported in our case because the item loadings on their corresponding constructs were all higher than the cross-loadings on the other constructs (see Table II), the average variance extracted (AVE) values were all above 0.50 (see Appendix B), and the square roots of the AVE values were also higher than their correlations with the other constructs (see Table III).

Because we adapted the measures for the multi-item reflective constructs from the established literature, we also performed confirmatory factor analysis (CFA) to evaluate their validity in a more conservative manner. The CFA results ($\chi^2/df = 1.78$, CFI = 0.91, TLI = 0.91, IFI = 0.91, RMSEA = 0.079, SRMR = 0.078) suggested an acceptable measurement model fit. The CFA item loadings are shown in Appendix B.

Importantly, given the model's complexity and the available sample size, we conducted a bootstrapping simulation to gauge statistical reliability (Bollen and Stine, 1992; Hsieh *et al.*, 2011). We first generated 2,000 sets of samples that had a size equal to the original sample size and then tested these against the measurement model. The resulting Bollen-Stine *p*-value (0.195) was much higher than the recommended threshold (0.05), suggesting statistical reliability. The above results collectively support that our measurement model has good psychometric properties.

Table II. PLS Item Loadings and Cross-Loadings

	IT Chargeback	IT-Business Strategic Alignment	BizHead_ITComp	ITHead_BizComp	Operational Excellence	Customer Perspective	Financial Return
IT Chargeback	1.000	0.113	-0.074	0.088	0.066	0.028	0.090
IT-Business Strategic Alignment_1	0.095	0.925	0.345	0.522	0.406	0.335	0.328
IT-Business Strategic Alignment_2	0.160	0.936	0.349	0.560	0.412	0.408	0.376
IT-Business Strategic Alignment_3	0.059	0.946	0.376	0.517	0.399	0.329	0.347
BizHead_ITComp_1	-0.062	0.326	0.859	0.155	0.429	0.379	0.286
BizHead_ITComp_2	-0.057	0.345	0.850	0.226	0.483	0.396	0.290
BizHead_ITComp_3	-0.119	0.194	0.865	0.123	0.392	0.380	0.312
BizHead_ITComp_4	-0.133	0.162	0.864	0.101	0.386	0.390	0.279
BizHead_ITComp_5	-0.104	0.246	0.869	0.154	0.373	0.332	0.280
BizHead_ITComp_6	-0.088	0.318	0.807	0.249	0.482	0.318	0.327
BizHead_ITComp_7	-0.036	0.435	0.836	0.364	0.516	0.367	0.363
BizHead_ITComp_8	0.010	0.361	0.851	0.273	0.521	0.390	0.309
ITHead_BizComp_1	0.006	0.591	0.231	0.883	0.419	0.242	0.276
ITHead_BizComp_2	0.079	0.569	0.212	0.907	0.428	0.265	0.275
ITHead_BizComp_3	0.074	0.560	0.388	0.785	0.448	0.205	0.270
ITHead_BizComp_4	0.074	0.597	0.184	0.916	0.411	0.321	0.258
ITHead_BizComp_5	0.057	0.528	0.241	0.927	0.473	0.356	0.327
ITHead_BizComp_6	0.060	0.510	0.244	0.817	0.362	0.244	0.223
ITHead_BizComp_7	0.147	0.603	0.225	0.879	0.401	0.255	0.323
ITHead_BizComp_8	0.121	0.579	0.172	0.900	0.436	0.334	0.294
Operational Excellence_1	0.045	0.380	0.470	0.493	0.906	0.575	0.571
Operational Excellence_2	0.047	0.433	0.476	0.400	0.891	0.515	0.583
Operational Excellence_3	0.088	0.343	0.517	0.393	0.880	0.583	0.469
Customer Perspective_1	0.115	0.328	0.328	0.328	0.555	0.877	0.526
Customer Perspective_2	-0.033	0.404	0.476	0.327	0.581	0.920	0.513
Customer Perspective_3	-0.005	0.296	0.365	0.197	0.555	0.892	0.596
Financial Return_1	0.056	0.286	0.240	0.234	0.469	0.507	0.905
Financial Return_2	0.079	0.442	0.364	0.371	0.525	0.590	0.923
Financial Return_3	0.108	0.260	0.377	0.243	0.529	0.521	0.850

Note. BizHead_ITComp = business executives' IT competence, ITHead_BizComp = CIOs' business competence.

Table III. Correlation Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. IT Chargeback	N/A														
2. IT-Business Strategic Alignment	.112	.902													
3. BizHead_ITComp	.089	.675 ^b	.858												
4. ITHead_BizComp	-.087	.349 ^b	.241 ^a	.823											
5. Organizational Performance	.071	.447 ^b	.425 ^b	.498 ^b	N/A										
6. Operational Excellence	.066	.432 ^b	.484 ^b	.524 ^b	.890 ^b	.833									
7. Customer Perspective	.027	.382 ^b	.316 ^b	.433 ^b	.903 ^b	.638 ^b	.843								
8. Financial Return	.092	.369 ^b	.317 ^b	.360 ^b	.861 ^b	.607 ^b	.677 ^b	.836							
9. CIO Age	-.174	-.113	-.186	-.125	-.072	-.134	-.041	-.012	N/A						
10. CIO Education	-.102	-.254 ^b	-.212 ^a	-.03	-.108	-.13	-.101	-.054	.253 ^b	N/A					
11. CIO Gender	-.415 ^b	-.138	-.142	.172	.044	.038	.091	-.007	.254 ^b	.060	N/A				
12. CIO Tenure	-.046	.048	.087	.084	.079	.04	.101	.073	.190	.068	.156	N/A			
13. Firm Size	.002	.121	.087	-.063	.088	.053	.04	.138	-.017	.017	.031	.159	N/A		
14. IT Staff Size	.021	.241 ^a	.208 ^a	0	.115	.085	.04	.177	.030	-.075	.044	-.014	.655 ^b	N/A	
15. IT Budget	-.037	.184	.132	-.135	-.023	-.059	-.078	.073	.169	-.044	.129	.082	.668 ^b	.682 ^b	N/A
Mean	2.631	5.667	5.593	4.568	5.131	5.036	5.061	5.294	3.282	3.951	1.427	2.505	3.068	2.524	2.903
Standard Deviation	1.547	1.095	.968	1.248	0.904	1.088	1.035	0.947	0.901	0.705	0.497	1.743	1.896	1.748	1.724

Notes.

(1) ^a $p < 0.05$, ^b $p < 0.01$.

(2) The numbers on the diagonal are the square roots of the AVE values. AVE values are not relevant for formatively modeled constructs. The off-diagonal numbers are inter-construct correlations.

(3) BizHead_ITComp = business executives' IT competence, ITHead_BizComp = CIOs' business competence.

To assess organizational performance as a second-order formative construct, we evaluated the following aspects. First, the causal directions from the first-order dimensions to the second-order constructs were conceptually supported by prior literature (i.e., Rai *et al.*, 2006). Prior to the official survey, we also ran pilot tests with several senior executives to further ensure the construct validity of the questionnaire and measures. The results of our survey data suggest that the weights of all first-order dimensions, including operational excellence (weight=0.37, $p<0.01$), customer perspective (weight=0.39, $p<0.01$), and financial return (weight=0.36, $p<0.01$), were significant, supporting the relevance of these first-order dimensions for the second-order constructs (Hair *et al.*, 2011). Next, the variance inflation factor (VIF) values for all first-order dimensions were less than 3.3, suggesting no harmful multicollinearity (Diamantopoulos and Siguaaw, 2006; Hair *et al.*, 2011). Finally, the correlations among the three first-order dimensions were all less than 0.7, supporting discriminant validity (MacKenzie *et al.*, 2005).

To control for common method bias (CMB), we used two techniques to assess its severity. First, we conducted a Harman's single-factor test to detect whether any single factor accounted for most of the variance (Podsakoff and Organ, 1986). The first factor accounted for only 33% of the variance, which was much lower than the general threshold of 50%. Second, we added a latent common method variance factor (Podsakoff *et al.*, 2003) and found that the corresponding significance levels remained stable in our original measurement model and the measurement model with the common method variance factor. Therefore, CMB is not a serious concern for our data. Finally, we computed the VIFs and found that all VIF values were below the strict threshold of 3, minimizing any threat of multicollinearity.

5.2 Structural Model

Figure 2 presents the path coefficients and explained variance for the structural model. The

arrows with solid lines indicate significant paths, while arrows with dotted lines indicate insignificant paths. The thick lines indicate the relationships that we hypothesized. To keep the figure concise, only significant coefficients are given. Appendix C provides more detailed results.

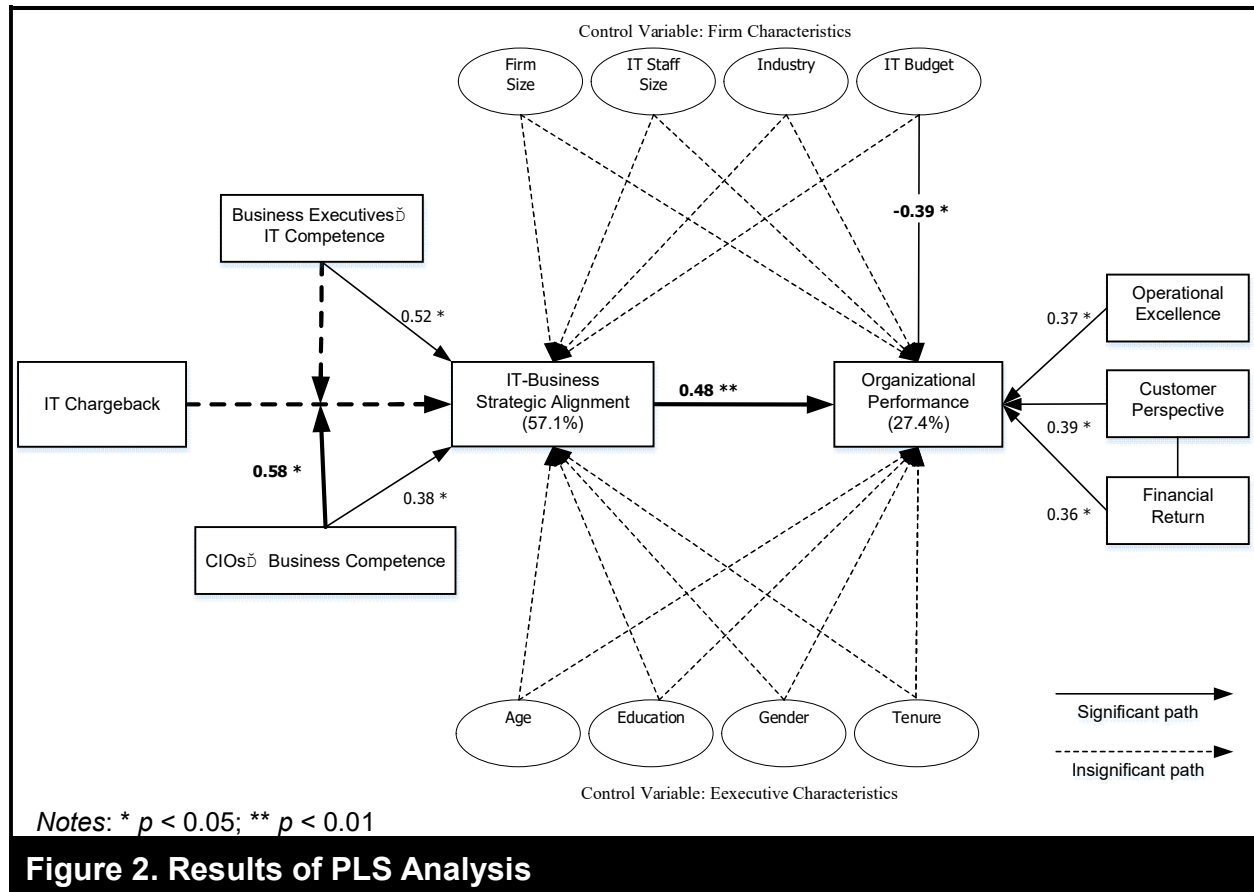


Figure 2. Results of PLS Analysis

First, IT chargeback does not have a significant impact on strategic alignment ($p > 0.05$), so H1 is not supported. Second, business executives' IT competence has a direct positive effect on strategic alignment ($\beta=0.52$, $p<0.05$), but it does not moderate the relationship between IT chargeback and strategic alignment ($p > 0.05$). H2 is thus also not supported. Third, CIOs' business competence not only has a direct positive effect on strategic alignment ($\beta=0.38$, $p<0.05$), but also positively moderates the relationship between IT chargeback and strategic alignment ($\beta=0.58$, $p < 0.05$). H3 is therefore supported. Fourth, our results also show that strategic alignment positively affects organizational performance ($\beta=0.48$, $p<0.01$). H4 is therefore also supported. As a whole,

the model explains 57.1% and 27.4% of the variance in IT–business strategic alignment and organizational performance, respectively.

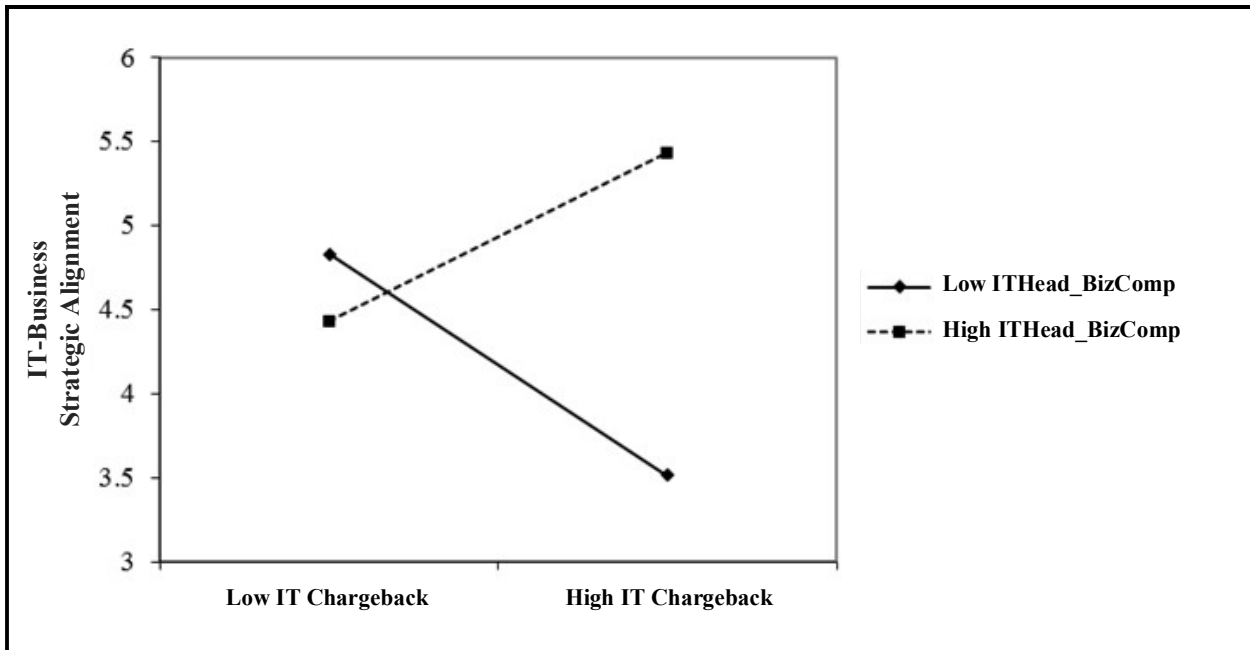


Figure 3. Interaction Effect between IT Chargeback and CIOs' Business Competence

To better interpret the interaction effect between IT chargeback and CIOs' business competence on strategic alignment, we followed the procedures recommended by Aiken and West (1991) and plotted the interaction diagram using a tool developed by Dawson [5]. To gain a more nuanced understanding of the interaction effect, we tested the simple slopes for the link between IT chargeback and strategic alignment. The interaction plot in Figure 3 suggests that IT chargeback exerts a negative effect ($\beta=-0.66, p<0.01$) on strategic alignment when CIOs have low business competence (low value is the sample mean minus one standard deviation), but a positive effect ($\beta=0.5, p<0.05$) on strategic alignment when CIOs have high business competence (high value is the sample mean plus one standard deviation). In other words, the practice of IT chargeback may either weaken or strengthen the strategic alignment between IT and business units, and CIOs' business competence is what makes the difference.

Finally, we conducted a two-step Heckman analysis (Bharadwaj *et al.*, 2007) to gauge potential endogeneity, such as selection bias and reverse causation. The results of the Heckman analysis (Appendix D) suggest that our findings are robust after addressing potential endogeneity.

6. Discussion

6.1 Summary of Findings

This study aims to answer two research questions: (RQ1) Does IT chargeback improve IT–business strategic alignment and, in turn, organizational performance? (RQ2) Do business executives’ IT competence and CIOs’ business competence strengthen the relationship between IT chargeback and IT–business strategic alignment? Our empirical results show a positive effect of IT–business strategic alignment on organizational performance, indicating that strategic alignment is the key to achieving the desired effect of IT chargeback on organizational performance. However, our results do not support a direct effect of IT chargeback on IT–business alignment. Rather, our results suggest that IT chargeback improves IT–business strategic alignment only when CIOs have a high level of business competence. The results of the interaction plot (Figure 3) further illustrate that IT chargeback could affect IT–business strategic alignment either negatively or positively, depending on whether the CIOs’ business competence is low or high. This result is consistent with findings in prior literature that IT chargeback alone may not result in organizational consequences (e.g., Ross *et al.*, 1999). This finding suggests that to extract the strategic value of IT chargeback, it is crucial for firms to have CIOs with sound business competence. We do not find evidence supporting the hypothesis that business executives’ IT competence moderates the impacts of IT chargeback. One possible explanation is that some business executives with IT competence may be pickier about the quality and costs of IT services, leading to greater dissatisfaction with their IT units. In addition to the findings related to the proposed hypotheses, we also find that both the

business executives' IT competence and the CIOs' business competence directly improve IT–business strategic alignment.

6.2 Theoretical Contributions

This study makes several theoretical contributions to the literature. First and foremost, this study represents a significant contribution to the ITG literature in general and the IT chargeback research in particular. While extant ITG literature has mainly examined how ITG mechanisms *in general* benefit an organization with little operational specificity (e.g., Gregory *et al.*, 2018), we advance this line of research by focusing on a *specific cost-related* ITG mechanism (namely, IT chargeback). This study thus represents a meaningful contribution to the ITG literature and warrants more scholarly investigations into ITG mechanisms at different levels of specificity.

Second, this study is among the first to quantitatively investigate IT chargeback, its organizational consequences, and its boundary contingencies, thereby representing a valuable contribution to our knowledge of ITG and IT chargeback. The research on IT chargeback in extant academic literature has mostly been in the form of conceptual discussions (Drury, 2000; Hamblen, 2005; Peppard, 2007; Weil, 2004), and a few empirical studies are qualitatively based case studies (Curley 2006; Fonstad and Subramani, 2009; Ross *et al.*, 1999). Thus, a theoretically grounded, quantitative investigation is crucial for pushing the envelope of our understanding about IT chargeback. Through a review of both academic studies and practitioner-oriented reports, together with in-depth consultations with accounting professors who are knowledgeable about chargeback in general based on the literature and CIOs who have experience with IT chargeback in practice, this study develops a quantitative scale to operationalize the concept of IT chargeback in both a pilot study and in administration of an official survey. This is a measure that future research could easily apply to quantitatively operationalize IT chargeback.

Third, while prior studies have empirically verified the *cost-reduction effect* of IT chargeback (e.g., Drury, 2000; Huang and Sundararajan, 2011), this study is one of the first to examine the under-investigated *strategic value* of IT chargeback suggested by Ross *et al.* (1999). Drawing on the lens of RBV, we conceive IT chargeback as a valuable resource that makes IT expenditures cost effective. IT chargeback is also a unique and imperfectly imitable resource for organizations by virtue of fostering cross-functional communication and mutual understanding between the organizations' business units and IT units (e.g., Wade and Hulland, 2004). This relationship-specific alignment enabled by IT chargeback leads business units and IT units to collaboratively leverage IT to promote the organizational performance. Therefore, we have empirically demonstrated that although IT chargeback is designed as a mechanism for managing IT costs, it is also a resource that provides organizations with competitive strategic value.

Fourth, this study also contributes to the CIO literature. Guided by RBV, we investigate the complementary role of human IT resources (e.g., CIOs' business competence) in strengthening the link between IT chargeback and strategic IT–business alignment. This study provides evidence that hiring or developing CIOs with strong business competence is vital for firms to realize the strategic value of IT chargeback. Specifically, IT chargeback only promotes strategic IT–business alignment for firms with business-competent CIOs. Unfortunately, IT chargeback may compromise such alignment if firms hire CIOs with little business competence. While some CIO research has argued for the importance of establishing CIO positions in firms (Chatterjee *et al.*, 2001), our findings suggest that having CIOs alone may not always result in desirable outcomes. Rather, having CIOs with more business competence is the necessary condition for firms to reap the organizational benefits of IT chargeback. Consistent with RBV, this unique combination of IT chargeback and business-competent CIOs makes it difficult for competitors to imitate and replicate

an organization's beneficial relationship between IT chargeback and business-IT strategic alignment.

It is also noteworthy that prior literature has typically suggested that the CIOs' business competence and the business executives' IT competence are both important for exploiting business value from IT (e.g., Bassellier *et al.*, 2003; Bassellier and Benbasat, 2004). For instance, Tiwana and Kim (2015) found that IT units' knowledge about business as well as business units' knowledge about IT could both stimulate positive results in the ITG context. Advancing this line of research, this study discovers a differential role of CIOs *versus* business executives in shaping the relationship between IT chargeback and IT-business strategic alignment. This research hence contributes to the CIO literature by demonstrating that it is the CIOs' business competence, rather than the business executives' IT competence, that boosts the effectiveness of IT chargeback. This is a critical finding that highlights the unique asymmetric value of CIOs compared to business executives in the era of digital economy.

In addition, CIOs have traditionally been assumed to play a support-oriented (e.g., Chen *et al.*, 2010) and reactive role that has little strategic value for organizations. Our study, however, provides evidence that in the digital economy era, CIOs with a strong understanding of their organizations and business are indispensable in implementing ITG mechanisms and converting these mechanisms into business value. Indeed, in order to champion digital transformation and innovation in contemporary organizations, CIOs should serve as more proactive and strategic partners of business executives. Interested researchers may further examine CIOs' evolving roles in the digital economy to advance the theoretical understanding of CIOs.

6.3 Practical Implications

This study also has several practical implications. IT spending in organizations continues to

increase in the digital economy era. Emerging IT-enabled business models such as virtual cloud services and the sharing economy further highlight the importance of understanding where IT expenditures go (Baars *et al.*, 2014). For instance, a survey by Gartner (2021) shows that 64% of organizations chargeback for the public cloud service. Given this trend, it is increasingly important for firms to implement proper IT chargeback to rationalize their IT budgets, economize their IT consumption, and then attain desirable organizational outcomes.

IT chargeback is usually a significant undertaking that requires IT units to work hand in hand with business units. The results of our study suggest that if organizations aspire to have effective IT chargeback, it is more important to have business-competent CIOs than to have IT-competent business executives. CIOs should avoid the common pitfall of building a chargeback practice based purely on the technical perspective, without considering their business counterparts' actual needs. CIOs should evaluate business units' objectives and establish collaborative partnerships. CIOs with business competence can easily explain the methodology and guidelines behind IT chargeback to help business units better understand the cost and value of each IT service. With the engagement of business-competent CIOs, business units should be more willing to follow the chargeback policy and economize their IT consumption behaviors accordingly. In the worst-case scenario, in organizations that implement IT chargeback but hire CIOs without business competence, the business units may push back if the intricate relationships between IT costs, IT usage, and the business value of IT are not effectively explained by such CIOs. Rather than strengthening the organization's IT-business strategic alignment, implementing IT chargeback in this scenario may even cause confusion and resistance in business units, thereby damaging the IT-business strategic alignment.

Today, increasingly more business strategies are driven by emerging technologies such as

artificial intelligence, big data, cloud computing, 5G, and so forth. Since it is challenging and will take a long time for business executives to master these emerging technologies, it could be more cost-effective for organizations to invest in cultivating business-competent CIOs rather than IT-competent business executives. In today's digital economy, CIOs with business competence could effectively help business executives scrutinize the value of IT and improve the IT–business strategic alignment and hence organizational performance. Organizations may encourage their CIOs to proactively pursue business education and include CIOs in their governance committees and top management teams (e.g., Matt *et al.*, 2015; Weill and Woerner, 2013). Job rotation between technical and business positions is also a good way for CIOs to enhance their business competence, as this will allow them to expand their organizational perspectives, learn to communicate and collaborate with employees from other functional areas, and develop interpersonal networks.

6.4 Limitations and Future Research

Like most empirical studies, this study has several limitations, which also open opportunities for future research. First, our findings are potentially limited by the sample size and economic region from which we collected our data. The causality of the hypothesized relationships should also be interpreted with caution because our cross-sectional data were collected at only one point in time. We therefore encourage researchers to replicate this study in other economic regions with longitudinal data to assess the generalization of our findings.

Second, the findings may be limited by our measure of IT chargeback. In this study, after reviewing both the academic and practitioner-oriented literature, we developed a preliminary measure of IT chargeback. We then invited three accounting professors who were experts on general chargeback practices to suggest ways to improve the scale. After modifying the measure based on their professional insights, we further invited eight CIOs of leading Hong Kong firms to

assess the measure and offer comments based on their industrial and organizational knowledge. By incorporating these CIOs' professional advice, we finally arrived at the single-item 1–5 scale for IT chargeback. Before administering the official survey, we also conducted a pilot test and did not find any problems with this item. Additionally, at the end of the official survey, we included an open-ended question asking the respondents to comment if they experienced any difficulty with or had any recommendations for our survey questions, and we received no comments criticizing our measure of IT chargeback. Nevertheless, we admit that our findings could be limited by our single-item measure of IT chargeback. We therefore encourage interested researchers to further improve the measure of IT chargeback through grounded theory and exploration-based studies [6].

Another limitation is that although we tested for common method bias and found that it was not severe in our study, such a bias may still exist to some extent due to the self-reported data from one executive of each organization via one method. Hence, we encourage interested researchers to design match-paired surveys for more than one respondent from each organization (e.g., CIO, CFO, and CEO) or to collect different types of data (e.g., objective, subjective, and archival data) from different sources to better gauge this concern.

Note

- [1] Although IT chargeback has long been proposed in the academy, it has received little scholarly attention. We used “IT chargeback” as a keyword to search for relevant studies in top IS journals from 2000 to 2020. We found only two studies in *MIS Quarterly*, four studies in *Information Systems Research*, one study in *Journal of Management Information Systems*, one study in *European Journal of Information Systems*, one study in *Journal of Strategic Information Systems*, and none in *Information Systems Journal*, *Journal of the Association of Information Systems*, *Journal of Information Technologies*, *Management Science*, *Decision Support Systems*, and *Internet Research*.
- [2] Prior to the official survey, we ran pilot tests with several senior executives and accounting professors to ensure the validity of the questionnaire and measures and made minor changes based on their feedback.
- [3] Charitable or monetary incentives are a common way to increase response rates in empirical studies based on survey data. Studies have shown that such incentives do not bias the survey results (e.g., Asch *et al.*, 1997; Furse and Stewart, 1982; Groves, 2006). In addition, the variables of our interest from the survey (i.e., IT chargeback and strategic alignment) are organizational outcomes that are not directly correlated with CIOs' propensity to respond to a survey.
- [4] After consulting with accounting professors and CIOs, we learned that the highest level of IT chargeback proposed by KPMG (i.e., flexible pricing for cost reduction) remained ideological and was rarely

implemented in practice.

[5] Interpreting interaction effects. <http://www.jeremydawson.co.uk/slopes.htm>

[6] We thank one of the anonymous reviewers for this valuable comment.

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Appendix A: Measure for IT Chargeback (Excerpt from the Questionnaire)

IT chargeback is the practice of identifying and allocating the costs of IT services to various departments in a firm. IT chargeback usually divides IT costs into small units related to specific IT tasks, objects, and projects; such cost units can be assigned to departments that use IT-related services. Below, we describe five levels of the IT chargeback practice. Please select the one that best describes the practice in your organization.

- 1. No IT Chargeback:** The IT department or the firm bears all IT costs.
- 2. Even Spread across Departments or by Headcount:** IT costs are (a) evenly allocated to each department that needs to bear IT costs, (b) proportionally allocated to each department based on its headcount, or some mix of (a) and (b).
- 3. Shared Expenses by IT Category:** IT costs are divided into different categories (e.g., infrastructure, office automation [OA], customer relationship management [CRM]). The costs for each category are evenly allocated to every department that uses this category of assets/service.
- 4. Direct Expenses + Shared Expenses:** Based on Practice 3, the costs for some IT categories (e.g., CRM) can be further divided into direct expenses and shared expenses. For direct expenses, the units that are the primary users of a specific IT category (e.g., service and sales units that use CRM) bear a major portion of the costs. For shared expenses, other units that use this category of asset/service share a minor portion of the costs.
- 5. Activity-Based Costs (ABC):** Consumption of all IT resources (e.g., CPU, memory, network, storage, manpower) is recorded at the activity level. IT costs are allocated to each department based on this consumption record.

Appendix B: Measure for the Multi-Item Latent Constructs

Item	Wording	CFA Loading
	IT-Business Strategic Alignment <i>Cronbach's Alpha = 0.928, CR = 0.929, AVE = 0.814</i>	
IT-Business Strategic Alignment_1	The IT strategy is congruent with the business strategy in the organization.	0.876
IT-Business Strategic Alignment_2	Decisions on IT planning are tightly linked to the organization's strategic plan.	0.907
IT-Business Strategic Alignment_3	The business strategy and IT strategy in the organization are closely aligned.	0.923
	Business Executives' IT Competence <i>Cronbach's Alpha = 0.946, CR = 0.957, AVE = 0.736</i>	
BizHead_ITComp_1	Senior executives (excluding the IT head) are knowledgeable about computer devices (e.g., PCs, laptops, mobile devices), client servers, databases, and internet.	0.847
BizHead_ITComp_2	Senior executives (excluding the IT head) are knowledgeable about office software (e.g., email, Microsoft Office), internet applications (e.g., social media, e-banking), e-commerce, and enterprise-level applications like enterprise resources planning (ERP) systems (e.g., SAP, Oracle, Kingdee, Yonyou).	0.874
BizHead_ITComp_3	Senior executives (excluding the IT head) are knowledgeable about emerging technologies like FinTech, artificial intelligence, blockchain, cloud computing, big data, business analytics, and the Internet of Things.	0.734
BizHead_ITComp_4	Senior executives (excluding the IT head) are knowledgeable about software development, IT outsourcing, and IT project management.	0.918
BizHead_ITComp_5	Senior executives (excluding the IT head) are knowledgeable about our organizational IT assets (e.g., hardware, software, data), IT budgets, IT strategies, and IT policies.	0.925
BizHead_ITComp_6	Senior executives (excluding the IT head) are aware of the right people to contact within or outside our organization as the sources (including internet resources) of IT knowledge and information.	0.787
BizHead_ITComp_7	Senior executives (excluding the IT head) often participate in various aspects of an IT project (e.g., initiation, requirements, cost-benefit analysis, planning, budgeting, implementation, monitoring, change management).	0.853
BizHead_ITComp_8	Senior executives (excluding the IT head) often participate in the development of our IT strategy, IT-related policies, and IT budgets.	0.907
	CIOs' Business Competence <i>Cronbach's Alpha = 0.957, CR = 0.943, AVE = 0.677</i>	
ITHead_BizComp_1	IT head(s) are knowledgeable about organizational goals, core competencies, key success factors, and external environments.	0.832
ITHead_BizComp_2	IT head(s) are knowledgeable about the products/services, work processes, department interdependencies, and main challenges of our organization.	0.807

ITHead_BizComp_3	IT head(s) proactively stay informed about organizational performance and business development and participate in business activities not directly related to IT.	0.904
ITHead_BizComp_4	IT head(s) are experienced in evaluating the performance impact of IT.	0.917
ITHead_BizComp_5	IT head(s) are experienced in providing IT-based solutions to address business problems and exploit new business opportunities.	0.902
ITHead_BizComp_6	IT head(s) have the ability to coordinate the right people inside and outside our organization (consultants, vendors) when facing a business question or problem that they cannot solve by themselves.	0.727
ITHead_BizComp_7	IT head(s) are effective in communicating with people at different levels (e.g., subordinates, peers, supervisors) in various functional areas (e.g., marketing, finance, manufacturing) in our organization.	0.707
ITHead_BizComp_8	IT head(s) are effective in managing projects and acting as leaders.	0.754
	Operational Excellence <i>Cronbach's Alpha = 0.871, CR = 0.871, AVE = 0.693</i>	
Operational Excellence_1	In general, the organization responds faster to customer needs compared to others in the same industry.	0.868
Operational Excellence_2	In general, the organization has better productivity improvements compared to others in the same industry.	0.837
Operational Excellence_3	In general, the organization has shorter cycle times for service/production compared to others in the same industry.	0.791
	Customer Perspective <i>Cronbach's Alpha = 0.878, CR = 0.881, AVE = 0.711</i>	
Customer Perspective_1	In general, the organization has a better organizational image compared to others in the same industry.	0.807
Customer Perspective_2	In general, customers perceive the organization's product and service quality as better than others in the same industry.	0.887
Customer Perspective_3	In general, the organization has higher customer satisfaction compared to others in the same industry.	0.834
	Financial Return <i>Cronbach's Alpha = 0.871, CR = 0.873, AVE = 0.699</i>	
Finance Return_1	Roughly speaking, the organization's financial performance is better compared to others in the same industry.	0.832
Finance Return_2	Roughly speaking, the organization's cost-to-profit margin is better compared to others in the same industry.	0.942
Finance Return_3	Roughly speaking, the organization's cost-to-revenue ratio is better compared to others in the same industry.	0.719

Appendix C: PLS Results

Table C presents the path coefficients and explained variance for the structural model.

Table C. PLS Results						
Dependent Variables	IT-Business Strategic Alignment			Organizational Performance		
	β	<i>t</i> -Value	Sig.	β	<i>t</i> -Value	Sig.
Control Variables						
CIO Age	0.09	1.45	n.s.	0.00	0.07	n.s.
CIO Education	-0.11	-1.71	n.s.	0.00	0.07	n.s.
CIO Gender	-0.12	-1.76	n.s.	0.15	1.73	n.s.
CIO Tenure	-0.01	-0.21	n.s.	0.05	0.61	n.s.
Firm Size	0.06	0.86	n.s.	0.14	1.25	n.s.
IT Staff Size	-0.01	-0.21	n.s.	0.20	1.62	n.s.
Industry	-0.11	-1.44	n.s.	0.01	0.16	n.s.
IT Budget	0.11	1.13	n.s.	-0.39	-2.17	* $p < 0.05$
Main Factors						
IT-Business Strategic Alignment				0.48	5.43	** $p < 0.01$
IT Chargeback (ITC)	-0.08	-0.31	n.s.			
BizHead_ITComp	0.52	2.37	* $p < 0.05$			
ITHead_BizComp	0.38	2.40	* $p < 0.05$			
ITC x BizHead_ITComp	-0.05	-1.15	n.s.			
ITC x ITHead_BizComp	0.58	1.97	* $p < 0.05$			
R-square	57.1%			27.4%		

Note. BizHead_ITComp = business executives' IT competence, ITHead_BizComp = CIOs' business competence.

Appendix D: Heckman Analysis of Relationship between IT Chargeback and IT–Business Strategic Alignment

Our framework posits IT chargeback as an antecedent of strategic alignment, while it could be argued that strategic alignment may also help improve IT chargeback. We conducted a Heckman analysis to evaluate this possibility and selection bias, if any, for our results (Bharadwaj *et al.*, 2007). The steps of the analysis are described below, and the results are presented in Table D.

First, because a Heckman analysis employs regressions as the statistical technique, we used construct scores to replicate our model. The results of the regression analysis (column 1) are highly consistent with our PLS results in Figure 2 of the main manuscript. Second, we followed the literature that used Heckman analysis (Bharadwaj *et al.*, 2007) to dichotomize IT chargeback, coding firms with an IT chargeback value above (below) the sample median as one (zero). We estimated a Probit model to explain the dichotomized IT chargeback by IT–business strategic alignment along with the control variables in the main manuscript. The results of the Probit model (column 2-1) show that strategic alignment has no impact on IT chargeback ($\beta = 0.09$, n.s.),

suggesting that it was not likely that IT chargeback was endogenous. We then computed the Inverse Mills Ratio (IMR) based on the Probit model and added this in column 2-2 to account for any endogeneity. After controlling for the IMR, the coefficients on the antecedents, contingencies, and their interactions remained qualitatively unchanged. This suggests that our conclusions about the role of IT chargeback in explaining strategic alignment holds true even after controlling for potential endogeneity.

Table D. Heckman Analysis Results			
Columns	(1) OLS	(2) Heckman analysis	
		(2-1) Stage 1: Probit	(2-2) Stage 2: OLS
Predictors	DV = IT-Business Strategic Alignment	DV = IT Chargeback	DV = IT-Business Strategic Alignment
<i>R-square</i>	56.0%	11.9%	51.5%
Endogenous Factors			
IT-Business Strategic Alignment		0.09	
Inverse Mills Ratio			-0.66
Antecedents of IT-Business Strategic Alignment			
IT Chargeback (ITC)	-0.08		0.02
Moderators			
BizHead_ITComp	0.52 *		0.32 *
ITHead_BizComp	0.38 *		0.53 **
Interactions			
ITC x BizHead_ITComp	-0.03		-0.04
ITC x ITHead_BizComp	0.52 *		0.44 *
Controls			
CIO Age		-0.18	
CIO Edu		0.12	
CIO Gender		-0.26	
CIO Tenure		0.03	
Firm Size		-0.10	
IT Staff Size		0.09	
Industry		0.01	
IT Budget		0.03	

Notes.

(1) * $p < 0.05$, ** $p < 0.01$.

(2) BizHead_ITComp = business executives' IT competence, ITHead_BizComp = CIOs' business competence.