

# STRATEGIC ALIGNMENT OF IT AND FUNCTIONAL RESPONSIBILITIES IN TOP MANAGEMENT TEAMS: AN EMPIRICAL PERFORMANCE STUDY

*Completed Research Paper*

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## **Abstract**

*Prior research has found mixed results regarding the performance impact of chief information officers (CIOs) included on top management teams (TMTs). This study answers the question, under which circumstances firms should include IT responsibility in the TMT and how to integrate IT in the TMT to successfully enhance firm financial performance. We explain business/IT alignment based on the distribution of functional responsibilities within the TMT and on the intra-person role effects that stem from heading multiple functional areas. This study empirically shows that having a TMT member responsible for IT and additional externally focused business functions increases firm performance in labor-intensive industries. In addition, we show that a misaligned TMT structure decreases firm performance in labor-intensive industries. Our results are based on a multi-industry panel data set of 372 listed German companies from 2002 to 2009 and on a firm fixed-effects regression model.*

**Keywords:** chief information officer, top management teams, IT leadership, firm performance, functional responsibilities, role synergies, role conflicts, labor-intensive industries

## **Introduction**

Without a doubt, information technology (IT) plays a decisive role in delivering business value (Melville et al. 2004). More and more companies recognize this opportunity and strive to use the competitive advantage IT can deliver (Sambamurthy et al. 2003). A common way of acknowledging the strategic relevance of IT is including a chief information officer (CIO) on the top management team (TMT) (Preston et al. 2008). But does having a CIO on the TMT already yield the desired results, e.g., better firm performance? Most prior studies on CIOs on TMTs do not assess the direct impact on firm performance, and studies that consider performance effects used a broad variety of measures to examine how CIOs may be of value. The measures include the rank of the CIO (Karimi et al. 1996; Larson and Adams 2010; Raghunathan and Raghunathan 1989), CIO reporting relationships (Banker et al. 2011), IT knowledge in TMTs (Armstrong and Sambamurthy 1999), the announcement of new CIO positions (Chatterjee et al. 2001; Guan et al. 2006; Khallaf and Skantz 2007, 2011), or simply the presence of a CIO on the TMT (Ranganathan and Jha 2008). Although the main argument in most papers is understanding the strategic alignment between business and IT by having a CIO on the TMT, none of the studies directly consider governance structures. From our point of view, strategic alignment depends not on whether the person with the CIO title is part of the TMT or reports to a CFO or COO but on who within the TMT is ultimately responsible for IT. Therefore, instead of using the person with the CIO title as a proxy for the importance of IT topics to the TMT, we propose that focusing on governance structures will help better understand business/IT alignment. This shift in focus also allows a more detailed view on how alignment happens on the level of business functions: since the business strategy may influence the IT strategy and vice versa, business and IT should be functionally integrated (Henderson and Venkatraman 1993). However, little knowledge exists on how functional integration differs for specific business functions (Kearns and Lederer 2001). Even recent studies on the effect of strategic positioning of the CIO call for an extended study of how to align IT with all business functions represented in the TMT (Banker et al. 2011). To explain the effects of functional integration on firm performance, we use upper echelon theory, because the functional experience of TMT members moderates their managerial perception and strategic decisions (Hambrick and Mason 1984; Menz 2012). More specifically, we explain business/IT alignment and functional integration on an intra-personal level due to the multiple additional functional responsibilities that CIOs increasingly tend to hold (Larson and Adams 2010).

To summarize the open issues mentioned above, this paper addresses the following research questions: Do the additional functional responsibilities of a TMT member who is also responsible for IT affect firm performance? If so, which cross-functional setup yields the best business/IT alignment and therefore has a positive impact on firm performance? By answering these questions, this paper contributes to the literature in three dimensions. First, we shift our focus from individual TMT members to functional responsibilities. By analyzing governance structures instead of individuals, we provide a deeper understanding of how strategic IT decision rights are distributed within TMTs. Second, by considering the full distribution spectrum of functional responsibilities among the TMT members we show that business/IT alignment depends on the type of business function. Third, we empirically not only provide further evidence to the existing literature on IT and firm performance but also contribute to how and under which circumstances IT can yield better organizational outcomes. In addition, we fulfill the urgent call for more longitudinal studies (Bharadwaj 2000; Ranganathan and Jha 2008; Sambamurthy et al. 2007; Santhanam and Hartono 2003) with a panel data set of 372 firms ranging from 2002 to 2009.

We organize the next sections of this paper in the following structure. As the first step, we develop hypotheses based on the theoretical framework and the research gap as identified in a literature overview. Then we describe the methodology. As the third step, we provide details on the data collection process and the results of our analyses. The paper ends with a discussion and conclusion that also summarizes the limitations and contribution of our research.

## **Theoretical Framework and Hypotheses**

Research on TMT members with functional responsibilities has evolved more or less separately for each function and with limited consideration of findings from research on TMT members with other functional responsibilities (Menz 2012). Defining the CIO as the TMT member responsible for IT, we observe that

research on CIOs does not consider performance effects due to the CIO's additional functional responsibilities. The following chapter therefore first summarizes prior research on the performance effects of TMT members responsible for IT. Then we discuss labor intensity as an industry characteristic that signals an increased need for IT in organizations. Finally, we theorize about the use of IT derived from interaction effects between IT and the additional functional responsibilities of a TMT member.

### ***TMT Members with IT Responsibility – An Upper Echelon Perspective***

We draw upon upper echelon theory to examine the performance effects of IT responsibility in TMTs (Hambrick and Mason 1984). Upper echelon theory indicates a relationship between executives' individual characteristics and organizational results. The background of TMT members can serve as proxy for their unobservable values and cognitive base, and can therefore explain executives' actions and firm performance within and across industries (Carpenter et al. 2004; Hambrick and Mason 1984; Norburn and Birley 1988). Furthermore, functional expertise can serve as such a proxy (Hambrick and Mason 1984). Hence, we specifically examine the performance implications of TMT members with IT responsibility. Prior studies have investigated this relationship with a focus on individual CIOs rather than governance structures. Table 1 summarizes the research results for studies on CIO/TMT interaction and the impact on financial firm performance. Overall, prior research on this topic has generated mixed results. Some studies show a positive effect of CIO presence on the TMT and financial performance (Ranganathan and Jha 2008), whereas other studies have recently found a negative relationship between the CIO's rank and firm performance (Larson and Adams 2010). Some studies also find only indirect benefits of a CIO's TMT membership: for example, CIO/TMT engagements influence the CIO's capabilities but have no significant direct impact on the CIO's role effectiveness (Smaltz et al. 2006). Therefore, it is questionable whether the presence of a TMT member responsible for the IT function leads to better financial firm performance in any case. The range of results clearly shows the need for a deeper understanding of factors that moderate the positive or negative effects of having a CIO on the TMT (Wade and Hulland 2004). Thus, we analyze two potential moderating factors. First, the performance effect of IT depends on the strategic importance of IT and the need for IT in a firm (Chatterjee et al. 2001; Khallaf and Skantz 2011). Second, the intended use of IT within the firm influences whether the presence of the CIO on the TMT is related to improved organizational outcomes (Armstrong and Sambamurthy 1996). Figure 2 outlines these two moderators, which we discuss in the following sections.

### ***Strategic Importance of IT in Labor-intensive Industries***

We propose to assess the labor intensity of an industry as an indicator of the strategic importance of IT because labor-intensive industries are driven by unique and fundamental challenges that inflict a distinctive set of strategic business imperatives on firms (Taplin et al. 2003). Firms in labor-intensive industries face two interlinked challenges: highly *fragmented value chain and markets* and the limited remaining opportunity to further *automate business processes* (Scott 2006; Taplin et al. 2003). The *fragmented value chain and markets* have three underlying causes: high import/export activity, significant trade within firms, and increased relevance of outsourcing (Scott 2006). The import/export relationships of labor-intensive industries are highly strategic and even entail competitive behavior (Bhagwati et al. 2004). Trade within firms is a symptom of internationally fragmented manufacturing processes most likely to be present in labor-intensive industries (Helg and Tajoli 2005). Outsourcing is especially being used to contract out labor-intensive tasks to reduce costs (Scott 2006; Wood 1998). In the 1970s, outsourcing played a major role, and its relevance has increased since the 1990s as Chinese firms provide supplies for most labor-intensive industries (Scott 2006). This extensive usage of outsourcing can also be explained by the limited remaining opportunity to further *automate business processes*. On the one hand, since the 1960s administrative processes in labor-intensive industries, such as insurance, have been strategically automated (Hecht 2001). On the other hand, as production processes in these industries are labor-intensive by nature, automation imposes many challenges (Taplin et al. 2003) and is limited to cases of large-scale firms with standardized products (Scott 2006). Overall, firms in labor-intensive industries generally do not use much automation (Hendricks and Singhal 2001), and there is little possibility of further automation (Taplin et al. 2003).

**Table 1. Literature Overview of Performance Studies on CIO and TMT Interaction**

Study	Focus	Data	Scope	Period	Longitudinal	Findings
Li and Ye (1999)	<b>CIO in TMT:</b> CEO/CIO relationship	Archive data	513 firm-years (216 firms)	1992-1994	Yes	CEO/CIO relationship positively moderates IT investment financial impact.
Chatterjee et al. (2001)	<b>CIO appointment:</b> Announcements of new CIO positions	Event study	96 events	1987-1998	No	New CIO appointment announcements improve market value mainly in industries transformed by IT.
Guan et al. (2006)	<b>CIO appointment:</b> Announcements of new CIO positions	Event study	96 events	1987-1998	No	New CIO appointment announcements improve market value mainly for firms not tracked by analysts.
Boritz and Lim (2007)	<b>IT knowledge in TMTs</b>	Archive data	84 pairs*	2004	No	IT knowledge in TMTs improves firm performance.
Khallaf and Skanz (2007)	<b>CIO appointment:</b> Announcements to fill or create CIO position	Event study	461 events	1987-2002	No	New CIO appointment announcements and CIO replacement lead to a better market valuation.
Preston et al. (2008)	<b>CIO in TMT:</b> CIO/TMT partnership, CIO decision-making authority	Survey	174 pairs*	Not specified	No	CIO/TMT partnership only indirectly increases firm performance, but CIO decision-making authority has a direct impact.
Ranganathan and Jha (2008)	<b>CIO in TMT:</b> CIO presence	Archive data	205 pairs*	2002	No**	Firms with CIOs in TMTs show better financial performance.
Larson and Adams (2010)	<b>Rank of CIO</b>	Archive data	186 firms	1993-2007	Yes	The higher rank of the CIO is related to lower firm performance.
Banker et al. (2011)	<b>CIO in TMT:</b> CIO/TMT reporting structure	Archive data	200 firms	1990-1993 and 2006	Yes	Alignment between strategic positioning and related CIO reporting structure improves performance.
Khallaf and Skantz (2011)	<b>CIO appointment:</b> Announcements to fill or create CIO position	Archive data	1407 firm-years (359 firms)	1987-2002	Yes	New CIO positions lead to better firm performance, especially for first or late mover firms.

\* Studies using matched pair methodology have additional observations from a chosen control group

\*\* Performance measured until 2004 to consider time effects.

These two challenges also have strong implications for how IT can effectively support business value creation. If IT is used to automate, it will aim to increase efficiency and reduce costs (Armstrong and Sambamurthy 1996). As this automation-oriented business strategy is rather challenging in labor-intensive industries, there are limited possibilities for IT to add value, although firms could profit from further efficiency improvements. If IT is used to transform a business, then IT strives to change business practices (Armstrong and Sambamurthy 1996). Therefore, especially improving market access and dealing with the fragmented value chain predominant in labor-intensive industries may be a value-adding IT setup.

### ***Use of IT – A Role Theory Perspective Based on Cross-functional Responsibilities***

The behavior and authority of TMT members depend on their managerial and functional roles within the firm (Boeker 1997; Menz 2012; Yukl 1989). Therefore, enriching upper echelon theory with role theory enables a better understanding of the work roles TMT members occupy (Baron and Bielby 1986; Higgins and Gulati 2006). Role theory describes the influence of people's roles on their actions within an organization (Welbourne et al. 1998). The theory considers the interaction between individual properties and the social context, such as role expectations. As roles serve to describe job requirements, occupational expectations (Welbourne et al. 1998), and job-related responsibilities (Quick 1979), role theory is well suited for investigating the impact of the functional responsibilities of TMT members. If individual TMT members have multiple functional responsibilities, interaction effects between the multiple roles can occur. These interactions can have positive role performance effects due to *cross-role synergies* (Lang and Lee 2005; Sieber 1974) or lead to negative effects due to *intra-person inter-role conflicts* (Goode 1960; Rizzo and House 1970). *Intra-person inter-role conflicts* are defined as conflicts between the multiple roles of one person that may be challenging to resolve or may impose incompatible behaviors on that person (Rizzo and House 1970). Inter-role conflicts stem from resource allocation challenges or contradicting performance requirements, as a broad range of role obligations can lead to contradictory role requirements (Goode 1960). *Cross-role synergies* are positive spillovers between one person's multiple roles. These synergies arise from four sources (Sieber 1974): First, more roles not only increase role obligations but also enhance personal rights and role privileges. Second, more roles secure better access to resources and facilitate flexible allocation and transfer of resources (Lang and Lee 2005). Third, more role-based connections to business partners lead to a bigger personal network. Fourth, multiple roles enrich cognitive skills and role perception. The broader reference frame due to multiple roles enables a better understanding of other people's points of view and allows the TMT member to put various business matters into perspective (Ruderman et al. 2002). The broader reference frame also helps to gather and process information more effectively (Sieber 1974).

Overall, the TMT member responsible for IT should benefit from additional functional non-IT roles. Cross-role synergies based on spillovers from the business functions lead to greater business proficiency, better organizational understanding, and therefore increased role effectiveness (Wu et al. 2008). In addition to increased understanding and better knowledge, the active component of responsibility for a functional area creates dedication and empowerment. Hence, functional responsibilities generate organizational ownership and personal involvement (Bassellier and Benbasat 2004). Furthermore, business experience fosters IT assimilation and an effective use of IT (Armstrong and Sambamurthy 1996, 1999). On a more detailed, function-specific level, we have to expect role synergies and role conflicts between the TMT members' IT responsibility and the additional functional non-IT responsibilities. The functions can be classified as *externally focused* or *internally focused* based on the business processes the functions cover. An external focus refers to a TMT member's responsibility for business processes that manage the interaction between the firm and its markets, such as R&D, Marketing, Sales, and other front-office activities. An internal focus refers to a TMT member's responsibility for business processes that primarily cover activities within the firm such as Operations, Finance, human resources (HR), General Management, and other back-office activities (Chen and Popovich 2003; Kim et al. 2003).

*Externally focused* business functions, such as R&D, Marketing, or Sales, are time sensitive and quickly need to respond to volatile market requirements (Stoel and Muhanna 2009). Therefore, these externally focused functions benefit from IT that enables market research, e-commerce, customer interaction, and customer relationship management (CRM) (Stoel and Muhanna 2009). Especially in labor-intensive industries, R&D activities, such as new product design, are strategically important and are usually not

outsourced (Scott 2006). IT can support R&D processes through computer aided design (CAD), which increases flexibility and enables more rapid product development in labor-intensive industries (Lal 2004; Loo 2002). In addition, the Marketing function faces substantial challenges in labor-intensive industries that IT can solve. Due to fragmented value chains and complex markets, firms in labor-intensive industries often need to target niche customers in local and international markets with finished and unfinished products (Scott 2006). IT-based CRM technologies enable the customer proximity needed to successfully address heterogeneous customer demands in niche markets (Tu et al. 2004). Furthermore, the Sales function in labor-intensive industries such as retail, textile, or clothing greatly benefits from new technologies, such as electronic point-of-sale systems (EPOS) with direct access to pricing information through universal product codes (UPC) and order management with electronic data interchange (EDI) systems (Loo 2002; Palmer and Markus 2000). If the TMT member responsible for IT also holds these externally focused functional roles, we expect positive spillovers that lead to strong role synergies. These combinations of roles give that TMT member the ability to clearly understand the essential business requirements of labor-intensive industries. In addition, that TMT member has the authority to align business and IT resources to successfully implement revenue-oriented and value-adding technologies. Therefore, we propose:

**H1:** Having a TMT member with IT responsibility and additional externally focused functional responsibilities has a positive influence on firm performance in labor-intensive industries.

*Internally focused* business functions that include fulfillment, back-office, and support processes aim to deliver trustworthy and cost-effective output (Stoel and Muhanna 2009). Therefore, internally focused functions, such as Operations, HR, Finance, and General Management, typically require use of IT that improves efficiency and reliability, e.g., ERP systems (Stoel and Muhanna 2009). In contrast, the need for IT in internally focused functions in labor-intensive industries is limited. For example, the Operations function of firms in labor-intensive industries historically has had little need for information technologies to monitor production throughput (Chandler 1992). The challenge for Operations in labor-intensive industries is to manage the fragmented production network and relationships with outsourcing partners (Scott 2006). IT has only partially been able to support Operations in this matter. Even recent progress in information and communications technologies has increased the geographic closeness of low-wage production centers of firms in labor-intensive industries (Scott 2006). In addition, the use of computer-aided manufacturing (CAM) technologies in Operations is merely a consequence of the use of CAD technologies in the externally focused function of R&D (Lal 2004; Loo 2002). Valuable levers for improving Operations processes are not related to IT but aim to increase labor force effectiveness with concepts such as total quality management that have been more effective in labor-intensive industries (Hendricks and Singhal 2001). In line with these observations, the HR function is very important in labor-intensive industries, especially in planning for a continuous labor force supply with as little employee turnover as possible (Miller and Cardinal 1994; Taplin et al. 2003). But again, it is also questionable how valuable IT can be for the HR function in labor-intensive industries as related HR measures are oriented toward the short term and without IT implications. Although HR requirements planning may be oriented toward the long term, the flexibility to change employees is significantly higher compared to equipment changes in capital-intensive industries (Miller and Cardinal 1994). In addition, turnover mainly occurs due to low salary levels (Taplin et al. 2003). Increased use of IT would not solve these HR issues. The short-term orientation also diminishes the strategic role of financial information systems in labor-intensive industries as forecasting is less relevant compared to capital-intensive industries (Thomas 1986). Only administrative processes as part of the General Management function have shown great IT-based optimization potential in labor-intensive industries such as insurance (Hecht 2001). As the need for IT in externally focused functions is limited to automating non-value-adding administrative processes, we do not see role synergies in being responsible for IT and these functions. Beyond that, we even expect role conflicts to occur because the cost-oriented goals of internally focused functions contradict the need to use IT in a revenue-oriented way to add value in labor-intensive industries. Hence, we propose:

**H2:** Having a TMT member with IT responsibility and additional internally focused functional responsibilities has a negative influence on firm performance in labor-intensive industries.

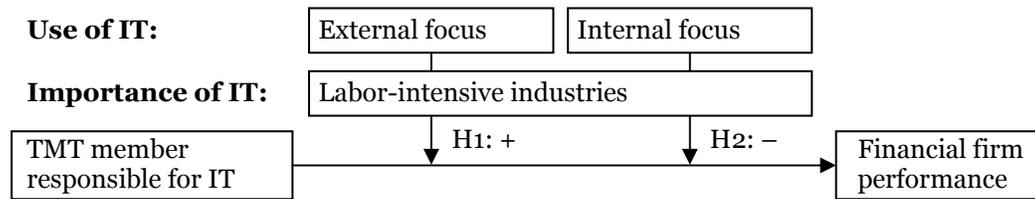


Figure 2. Research Model with Hypothesized Effects

## Research Methodology

### Sample Description

The initial sample spans all shares listed in the German Prime Standard between 2002 and 2009. Firms in this German index comply with international accounting standards such as GAAP and fulfill strict disclosure requirements (Goergen et al. 2008). In contrast to the US governance system, German firms have a two-tier board system with a supervisory board controlling the managerial board. The managerial board is composed of the TMT members responsible for managing the company's operations (Crossland and Hambrick 2007). The distinctive characteristics of the German governance system make our dataset the ideal basis for investigating cross-functional role effects: we explicitly chose German Prime Standard companies to answer our research questions for three reasons. First, role conflicts and role synergies in the TMT occur frequently and are most likely intentional. The structure of the managerial board is not regulated in Germany. Organizations are free to decide how to distribute functional responsibilities. In addition, decision making among the TMT members is by law a group process and not dominated by a powerful CEO (Crossland and Hambrick 2007). Strategic initiatives that affect the functional areas of more than one TMT member have to be discussed by the managerial board and usually require a majority of votes to pass. Therefore, cross-role synergies and the handling of inter-person conflicts become even more relevant. Second, role conflicts and role synergies in the TMT are highly transparent. Firms can choose whether to assign functional responsibilities or even the CEO role to their TMT members at all (Crossland and Hambrick 2007). If companies choose to use dedicated functional responsibilities, the companies have a strong incentive to publish the responsibilities and the names of the respective TMT members in the annual reports. Although TMT members are liable as a group, in case of lawsuits published individual functional responsibilities matter because they imply different levels of information and involvement for each TMT member.

We remove dual class shares, companies with a foreign International Securities Identification Number (ISIN), and all financial institutions (SIC codes between 6000 and 6999) to ensure the comparability of the firms in our sample (Andreas et al. 2012). We then enrich our unbalanced panel of 2,353 firm-year observations with governance data on ownership and TMT composition based on hand-collected information from Hoppenstedt Aktienführer, Lexis-Nexis, and annual reports. We also add financial data from Thomson Worldscope and Datastream. The final sample includes 2,295 firm-year observations after removing 58 firm-year observations with insufficient data available for firms that did not submit an annual report due to bankruptcy or mergers. Earlier firm-year observations of the firms that exit the panel before 2009 still contribute relevant information. By not excluding them from our analyses, we also mitigate the risk of potential sample selection bias such as survivor bias.

### Measures and Descriptive Statistics

Our measures cover the explanatory variables for the functional responsibilities of TMT members and the labor-intensiveness of industries. In addition, we include control variables to explain firm performance without bias.

#### TMT Members' Functional Responsibilities

Based on published annual company reports and Hoppenstedt Aktienführer, we identify all functional

responsibilities for all TMT members. These stated responsibilities indicate which business functions each TMT member heads. We use a classification scheme that differentiates between 11 functions: IT, Operations, Human Resources, Finance, Legal, General Management, R&D, Marketing, Sales, Customer Support, and External Relations (Barsade et al. 2000; Bunderson 2003; Hambrick 1981; Hambrick et al. 1996). To our surprise, none of the classification schemes in prior research on functional TMT experience considered IT. We then categorized the five functional responsibilities of Operations, Human Resources, Finance, Legal, and General Management as internally focused and accordingly the remaining five functional responsibilities of R&D, Marketing, Sales, Customer Support, and External Relations as externally focused. For each firm-year, we then create a dummy variable called *IT\_Any* that indicates whether the firm-year has a TMT member with IT responsibility. This is the case for 467 firm-years. Then, for all TMT members with IT responsibility we count 862 internally focused and 261 externally focused additional functional responsibilities. That equals to 2.4 additional functional responsibilities on average. A second dummy called *IT\_Internal* measures whether the majority of the additional functional responsibilities of that TMT member with IT responsibility are internally focused, and a third dummy called *IT\_External* specifies whether the majority of the additional functional responsibilities of that TMT member with IT responsibility are externally focused. If the TMT member responsible for IT has no additional functional responsibilities, a fourth dummy called *IT\_Alone* is set equal to one and therefore indicates that this TMT member exclusively holds the role of CIO.

### Labor-intensive Industries

First, we cluster industries based on the Fama-French 10-industry portfolio (Fama and French 1997). On the industry level, we follow a standard approach for calculating labor-intensity as Employees/Sales for every year (Dewenter and Malatesta 2001; Norton 1988). We set a dummy called *Labor\_Intensive* equal to one for a firm-year, if the firm belongs to that industry and the Employees/Sales on the industry level was above the median in that year. Our resulting labor-intensive industries include textbook examples such as Textiles and Apparel (Bhagwati et al. 2004; Loo 2002), Software (Chandler 1992), Retail (Thomas 1986), Services (Chandler 1992; Menon et al. 2009), Construction (Thomas 1986), and Healthcare (Menon et al. 2009). However, industries typically known for high capital investments such as Automotive, Telecommunications, and Utilities are classified as non-labor-intensive. As shown in Table 3, our panel includes 1.635 firm-year observations classified as labor-intensive. Table 4 provides an overview of the distribution of the 1.635 observations across industries.

**Table 3. Descriptive Statistics on the Data Panel**

Year	Full sample			Labor-intensive industries		
	Number of firms	TMT member with IT responsibility		Number of firms	TMT member with IT responsibility	
		Total number	Percentage		Total number	Percentage
2002	307	32	0.104	239	20	0.084
2003	286	49	0.171	221	33	0.149
2004	269	41	0.152	209	28	0.134
2005	281	54	0.192	222	35	0.158
2006	290	67	0.231	190	35	0.184
2007	302	69	0.228	234	48	0.205
2008	301	79	0.262	165	33	0.200
2009	259	76	0.293	155	41	0.265
All	2295	467	0.203	1635	273	0.167

### Financial Firm Performance

We measure the financial firm performance as our dependent variable based on accounting figures. We use Operating Income over Assets (OI/A) as our primary dependent variable. We also consider Return on Assets (ROA), Return on Invested Capital (ROIC), and Return on Equity (ROE) as alternative proxies for robustness tests. Following a standard approach, we winsorize all variables at the 1% and 99% quantiles to reduce possible bias due to outliers.

## Control Variables

Our control variables include common corporate governance characteristics such as firm characteristics and ownership structure. Firm characteristics comprise firm size, risk, leverage, R&D spend, growth, firm age, and board size. *Firm size* is measured as the natural logarithm of assets to control for economies of scale and scope associated with larger firms. We use the debt-to-equity ratio as our proxy for *Leverage* and define *Risk* as the absolute value of the 3-year coefficient of variation of the firm's Return on Assets, because instability in returns is a sign of business risk (Miller and Bromiley 1990). We calculate *R&D* intensity as the natural logarithm of R&D expenditures. The variable *Growth* captures the growth potential of a firm as the annual increase in sales as a percentage. The firm's *Age* is measured in years since founding. We also control for supervisory board characteristics (*Board\_Size*) by controlling for the number of directors (Andreas et al. 2012). Ownership structures influence firm performance due to potential monitoring activities (Bhagat and Bolton 2008; Lehmann and Weigand 2000; Maury and Pajuste 2005; Preston et al. 2008). We measure the ownership structure with two dummy variables called *Internal\_Blockholder* and *External\_Blockholder* to control for ownership concentration and type of owners. *Internal\_Blockholder* is equal to one if a TMT member holds at least 25% of all stock. *External\_Blockholder* is equal to one if investors other than TMT members own more than 25% of all stock. The 25% threshold is relevant, as it denotes a blocking minority in Germany. In addition, to control for time effects that may stem from business cycles and economic conditions such as recessions we define dummy variables for each year (Maury and Pajuste 2005). The descriptive statistics with an annual breakdown are provided in Table 3. Table 5 shows the mean, standard deviation, median, and variance inflation factors for all variables. Table 6 summarizes the sources and definitions of all variables.

**Table 4. List of Fama-French 10-Industry Classifications**

Fama-French 10-industry class name	Fama-French code	Included industries	Number of labor-intensive firm-years
HighTech and Business Equipment	5	Computers, Software, Electronic Equipment	657
Others*	10	Mining, Construction, Building Management, Transportation, Hotels, Business Services, Entertainment	374
Manufacturing	3	Machinery, Trucks, Planes, Chemicals, Office Furniture, Paper, Commercial Printing	318
Healthcare	8	Healthcare, Medical Equipment, Drugs	211
Shops	7	Wholesale, Retail, Repair Shops	65
Non-durable consumer goods	1	Food, Tobacco, Textiles, Apparel, Leather, Toys	10
Durable consumer goods	2	Cars, TV's, Furniture, Household Appliances	0
Energy	4	Oil, Gas, Coal Extraction, and Products	0
Telecommunications	6	Telephone, Television Transmission	0
Utilities	9	Utilities	0
Sum			1635

\* Financial institutions excluded due to biasing firm characteristics (e.g., leverage and total assets not comparable between industrial firms and financial institutions).

**Table 5. Descriptive Statistics for the Variables**

Variable	Number of firm-years	Mean	Standard deviation	Median	VIFs
<b>Firm performance</b>					
<i>OI/A</i>	2295	0.328	18.231	3.816	--
<i>ROA</i>	2295	0.554	16.118	4.012	--
<i>ROIC</i>	2295	1.567	23.918	6.145	--
<i>ROE</i>	2295	-5.006	70.508	7.595	--
<b>TMT responsibilities</b>					
<i>IT_Any</i>	2295	0.203	0.403	0.000	1.07
<i>IT_Alone</i>	2295	0.017	0.129	0.000	1.03
<i>IT_External</i>	2295	0.017	0.131	0.000	1.02
<i>IT_Internal</i>	2295	0.162	0.368	0.000	1.07
<b>Firm characteristics</b>					
<i>Size</i>	2295	5.597	2.198	5.154	3.42
<i>Leverage</i>	2295	0.706	1.217	0.344	1.14
<i>Risk</i>	2295	2.080	10.265	0.509	1.01
<i>R&amp;D</i>	2295	-1.444	4.920	0.340	1.35
<i>Growth</i>	2295	10.747	66.194	4.600	1.03
<i>Age</i>	2295	43.004	48.321	20.000	1.50
<i>Board_Size</i>	2295	5.103	2.195	5.000	2.49
<b>Ownership structure</b>					
<i>Internal_Blockholder</i>	2295	0.217	0.412	0.000	1.34
<i>External_Blockholder</i>	2295	0.370	0.483	0.000	1.28
<b>Industry characteristics</b>					
<i>Labor_Intensity</i>	2295	0.712	0.453	1.000	1.09

### ***Multiple Regression with Firm Fixed Effects as the Empirical Model***

Our empirical model uses a well-established and state-of-the-art analytical approach to corporate governance research by considering firm fixed-effects and cluster-robust Huber-White standard errors that are clustered by firm. As a Hausman specification test is highly significant, we cannot assume random effects and adapt the more conservative fixed-effects model (Carpenter and Fredrickson 2001). Longitudinal methods have been successfully applied to unbalanced panels with similar or even fewer observations per year (Adams and Fereirra 2009; Nickell 1996). The firm fixed-effects model removes inter-firm heterogeneity and controls for unobserved and time-invariant firm characteristics such as primary industry membership or higher average levels of prior firm performance. As the firm fixed-effects model implies having firm dummy variables and the primary industry member does not change during our sample period, we do not have to include industry dummy variables (Carpenter and Fredrickson 2001) and still address potential heterogeneity on the industry level by using such firm dummies. Furthermore, we avoid potential halo effects in firm performance (Bharadwaj 2000; Santhanam and Hartono 2003) because the firm fixed-effects model captures firm-specific and potentially unobserved higher levels of firm performance. In addition, the firm fixed-effects model controls for endogeneity between the individual effects and all regressors (Baltagi et al. 2003). To also avoid potential heteroskedasticity bias, we use cluster-robust Huber-White standard errors (Petersen 2009). Our multivariate regression model has the form

$$\text{Firm Performance}_t = \beta_{0,t} + \beta_1 (\text{TMT responsibility})_{t-1} + \beta_{2-8} (\text{Firm characteristics})_t + \beta_{9-10} (\text{Ownership structure})_t + \beta_{11-17} (\text{Year dummies})_t + \varepsilon \quad (1)$$

Table 6. Full List of Variables

Variable	Description	Source
<b>Firm performance</b>		
<i>OI/A</i>	Ratio of Operating Income to Total Assets	Datastream/Worldscope
<i>ROA</i>	Return on Assets	Datastream/Worldscope
<i>ROIC</i>	Return on Invested Capital	Datastream/Worldscope
<i>ROE</i>	Return on Equity	Datastream/Worldscope
<b>TMT responsibilities</b>		
<i>IT_Any</i>	Dummy variable indicating the presence of a TMT member responsible for IT	Hoppenstedt Aktienführer, annual reports
<i>IT_Alone</i>	Dummy variable indicating the presence of a TMT member responsible for IT who has no additional functional responsibilities	Hoppenstedt Aktienführer, annual reports
<i>IT_External</i>	Dummy variable indicating the presence of a TMT member responsible for IT who has the majority of externally focused additional functional responsibilities	Hoppenstedt Aktienführer, annual reports
<i>IT_Internal</i>	Dummy variable indicating the presence of a TMT member responsible for IT who has the majority of internally focused additional functional responsibilities	Hoppenstedt Aktienführer, annual reports
<b>Firm characteristics</b>		
<i>Size</i>	Natural logarithm of total assets	Datastream/Worldscope
<i>Leverage</i>	Debt-to-equity ratio	Datastream/Worldscope
<i>Risk</i>	Absolute value of the coefficient of variation based on 3 years of firm's annual ROA	Datastream/Worldscope
<i>R&amp;D</i>	Natural logarithm of research and development expenditures	Datastream/Worldscope
<i>Growth</i>	Sales growth per year in percent	Datastream/Worldscope
<i>Age</i>	Firm age in years since founding	Datastream/Worldscope
<i>Board_Size</i>	Number of directors (without employee representatives when the firm acts under codetermination)	Hoppenstedt Aktienführer, annual reports
<b>Ownership structure</b>		
<i>Internal_Blockholder</i>	Dummy variable indicating that the largest blockholder holds at least 25% of shares and is a TMT member	Hoppenstedt Aktienführer, annual reports
<i>External_Blockholder</i>	Dummy variable indicating that the largest blockholder holds at least 25% of shares and is not a TMT member	Hoppenstedt Aktienführer, annual reports
<b>Industry characteristics</b>		
<i>Labor_Intensity</i>	Dummy variables that indicates high labor intensity if Employee/Sales is above the median for an industry, based on the 10-industry portfolio by Fama and French (1997)	Datastream/Worldscope, German Stock Exchange, website of K. French

As a reference test, we first use the full sample and *IT\_Any* as the variable for TMT responsibility. This standard regression without any moderating effects tests if the presence of a CIO leads to better firm performance. Also as a reference, we rerun the test with a similar specification, but on the subsample of highly labor-intensive industries (*Labor\_Intensity* equal to one). Additionally, we conduct a regression with *IT\_Alone* on the subsample of labor-intensive industries. All three reference tests allow us to see how our results fit into the prior research on the performance implications of CIOs in TMTs. As theorized, we then test our hypotheses on the subsample with *IT\_External* and *IT\_Internal* as the TMT responsibility measure. In all models, we lag the variables of TMT responsibility because strategic IT initiatives tend to take more time to implement before delivering measurable performance results (Brynjolfsson 1993; Jurison 1996). Therefore, lagging the variable ensures that the CIO has enough time to have a relevant impact on the firm (Khallaf and Skantz 2011). In addition, by lagging the independent TMT variable we avoid reverse causality and fulfill an essential premise for upper echelon research (Hambrick 2007).

Additionally, we extend Model 1 by including *IT\_Alone*, *IT\_External*, and *IT\_Internal* simultaneously in Model 2 that we define as

$$\text{Firm Performance}_t = \beta_{0,t} + \beta_{1-3} (\text{TMT responsibility})_{t-1} + \beta_{4-10} (\text{Firm characteristics})_t + \beta_{11-12} (\text{Ownership structure})_t + \beta_{13-19} (\text{Year dummies})_t + \varepsilon \quad (2)$$

## Data Analysis and Results

In this section, we first discuss the results of our empirical analysis and then challenge their robustness by applying a series of tests. In our statistical model, we examine financial firm performance by regressing on various exogenous corporate governance variables such as TMT responsibilities, firm characteristics, and ownership structures. Table 7 shows the results of the regressions with the coefficients, significance levels, and t-statistics for each variable and model specification.

As described, we initially assess the performance effect of simply having a TMT member with any kind of IT responsibility and no additional moderators as a reference. Model 1.1 in Table 7 is based on Formula 1 and shows the results for this pretest. Due to lagging the variable *IT\_Any*, we lose the first year of observations. The remaining 1,888 observations are still sufficient to generate significant and valid results. To our surprise, our test results show that having a TMT member who is responsible for IT has a significant negative impact on firm performance. To further investigate this first result, we rerun the regression on the subsample of labor-intensive industries. Model 1.2 in Table 7 supports these findings because the t-statistic for the variable *IT\_Any* in the labor-intensive subsample is also significantly negative. Again, we have to drop some observations, as not all industries are labor-intensive. A possible explanation for these two findings may be the dominating effect of role conflicts for TMT members with additional internally focused roles in labor-intensive industries. Model 1.3 helps us investigate this explanation. This third regression uses *IT\_Alone* as the TMT variable and covers the labor-intensive subsample. We observe that the t-statistic for the variable *IT\_Alone* is not significant. Therefore, a dedicated TMT member who serves only as a CIO without additional functional responsibilities has an undetermined effect on firm performance. This may explain the mixed findings of prior research on CIOs. The differences between models 1.1, 1.2, and 1.3 show that additional roles must have a significant impact. It also becomes clear that simply a need for IT or the importance of IT in a certain industry does not justify having a TMT member with IT responsibility in any case. As theorized earlier, we must consider the positioning and setup of the IT function to enable IT to generate positive outcomes.

To test Hypothesis 1, we run the regression with a specification according to Formula 1 and the variable *IT\_External* as the measure for TMT responsibility in labor-intensive industries. Model 1.4 in Table 7 shows the results for this regression. We observe a very strong positive t-statistic that is significant at the 1% level. Therefore, we conclude as theorized that having a TMT member responsible for IT and additional externally focused functional areas of responsibility leads to better firm performance in labor-intensive industries. This shows that the IT function can be most valuable in these industries if firms combine IT with Sales, Marketing, R&D, or other market-facing or customer-oriented business function. By heading IT and externally focused functional business areas, these TMT members are well equipped to align the strategic goals of business and IT on a functional level. This cross-functional setup allows the firm to benefit from role synergies as IT goals are aligned with the key success factors in these industries. Furthermore, TMT members with this combination of cross-functional responsibilities ensure business/IT alignment on an intra-person level as the different roles do not impose resource allocation conflicts.

We can also fully support our proposition for Hypothesis 2. Model 1.5 in Table 7 outlines the findings. Again, we use Formula 1 and labor-intensive industries but run the regression with the variable *IT\_Internal* as the measure for TMT responsibility. The t-statistic for *IT\_Internal* is significantly negative at the 5% level. Thus, we show that combining IT responsibility with internally focused functional areas such as Operations, Finance, or HR returns lower firm performance in labor-intensive industries. As argued, we find empirical support for the expected role conflicts between the automation-oriented targets of these internally focused business areas and the need to use IT as a revenue driver. If TMT members with this combination of responsibilities use IT to support the fulfillment of their functional obligations, e.g., deploying IT to support operations automation, IT cannot generate business value in labor-intensive industries. In addition, even when using IT in a value-adding way as a revenue driver, the TMT member

cannot generate role synergies, as the efficiency goals of the internal functions are opposed to the revenue goals of IT. When the TMT member depends on limited resources, this contrary arrangement will create role conflicts that hinder the TMT member from being effective.

The findings are unchanged when we use Formula 2 for the model specification. Table 7 summarizes the regression results for all three TMT variables *IT\_Alone*, *IT\_External*, and *IT\_Internal* in labor-intensive industries as Model 2.1. We see the same effects as in models 1.3, 1.4, and 1.5 and as theorized in our hypotheses. Although the significance level has changed slightly for externally focused responsibilities, the findings are still very significant. This model emphasizes that the observed effects are in fact different and that it truly matters which functional areas the TMT member responsible for IT additionally leads.

### **Additional Robustness Tests**

We conduct a variety of robustness checks. After reviewing our statistical assumptions for the model used, we check if different measures change the regression results.

We specifically address the three common challenges of *heteroskedasticity*, *multicollinearity*, and *endogeneity* that may threaten statistical robustness. *Heteroskedasticity* occurs when the variance of the residuals is not constant but varies according to the magnitude of the independent variables. This does not change the regression results but may lead to wrong significance levels. Therefore, the regression model must mitigate this potential bias if heteroskedasticity is present. As described, we use cluster-robust Huber-White standard errors clustered on the firm level as a precaution. Cluster-robust Huber-White standard errors address any potential bias due to heteroskedasticity and are consistent with regular covariance matrix estimators when heteroskedasticity is not present (White 1980). *Multicollinearity* describes an unwanted high correlation between any independent variables. Multicollinearity can be an issue as the t-statistics of correlated independent variables may become misleading. To test for multicollinearity, we calculate the variance inflation factors (VIFs) of all independent variables. Table 5 shows that all VIFs are smaller than 4 and therefore well below common barriers (Shipilov et al. 2010). This allows us to rule out the presence of multicollinearity, and we do not need to center any of our variables. *Endogeneity* refers to issues arising when the assumption of independence does not hold for the explanatory variable. This may be the case when reverse causality is present. In addition, omitted variables can lead to endogeneity within a regression model. This may cause the residuals and the coefficients to be biased. To address endogeneity, we use three approaches. First, we add multiple control variables known to explain firm performance. Second, we apply a firm fixed-effects model that controls for unobserved firm characteristics. Third, we lag our independent explanatory variable for TMT responsibility to rule out reverse causality and to address endogeneity (Maury and Pajuste 2005).

To further validate our findings, we apply a range of different measures. We replace our variables for performance, the industry measure for labor intensity, the measurement of TMT responsibilities, and the control variables on the firm level. Instead of OI/A as our firm performance measure, we also test robustness based on ROA, ROE, and ROIC as performance proxies. The results are unchanged. For all three measures, we obtain significant support on hypotheses 1 and 2 at least at the 5% significance level. TMT members with IT responsibility and no additional functional affiliation still have no significant impact on firm performance with these three measures. Measuring *Labor\_Intensity* with a 3-year horizon also does not change the results for hypotheses 1 and 2. In addition, applying the Fama-French 12-industry portfolio classification generates the same significant outcome. We then test if considering the background of the TMT member changes the results. One can argue that a TMT member may prioritize additional roles that this person has been holding longer in the past. Therefore, instead of defining *IT\_Internal* and *IT\_External* based on the majority of the other roles within that year, we take the overall average since the first appearance as a TMT member. Still, we find significant support for hypotheses 1 and 2 and no significant effects regarding a dedicated CIO. Finally, we also consider different proxies for the firm-level control variables that can be found as standard measures in other research studies. The results remain at the same significance level when defining *Size* as the natural logarithm of total sales or employees. In addition, not applying the logarithm to all three definitions of *Size* does not modify the results. *Risk* measured with a 5-year horizon and *Leverage* replaced by Liabilities over Assets as a standard leverage proxy still has no influence on the significance of our regressions. Using the time in years since initial public offering (IPO) instead of the founding age for the variable *Age* or measuring *Board\_Size* with all directors in the supervisory board including employee representatives does not alter the results.

## **Discussion and Conclusion**

In this study, we examine the effect of IT responsibility in TMTs on financial firm performance. We show that in labor-intensive industries TMT members with IT responsibility contribute to their firm's success when their additional functional responsibilities foster role synergies and avoid role conflicts. Being responsible for IT and externally focused functions such as Sales, Marketing, R&D, or External Communications allows that TMT member to use IT to improve customer and market orientation. This is a key success factor in these industries and has a positive impact on firm performance, such as Operating Income over Assets, Return on Assets, Return on Equity, and Return on Invested Capital. Being responsible for IT and internally focused functions such as Operations, Finance, HR, or General Management either induces role conflicts as that TMT member cannot efficiently use IT with a revenue orientation or leads to a use of IT to further attempt business process automation. This misalignment leads to negative performance effects.

So what are the implications for CIOs on TMTs and for IT investment research in general? From our point of view, the implications are threefold with contextual, personal, and structural meaning. First, CIOs can add significant value to their firms, but it depends on the industry context and the situation the firm is facing. To determine whether the presence of IT responsibility in the TMT can contribute to a firm's financial success, the needs and strategic challenges must be understood. Simply including a CIO on the TMT because other companies observed higher firm performance after adding a CIO to their TMT will most likely not yield the desired benefits. Firms should carefully assess their competitive situation and then create a suitable position that allows the CIO to aid the firm's financial success. Second, on a personal level, CIOs strongly depend on their business affiliation. More specifically, a CIO should not just rely on prior experience in a business function, but rather aim to take full responsibility for additional functional areas on an executive level to become more influential. Our findings show that the intra-personal alignment that comes with cross-functional responsibility does make a considerable difference. CIOs without additional functional responsibilities in the TMT have no influence on firm performance, whereas CIOs with additional functional responsibilities can change firm performance significantly. Although we do not investigate other alignment techniques, these results show that functional alignment on an intra-personal level clearly assists the CIO in being more effective in his or her role. Taking personal responsibility further increases the CIO's involvement (Bassellier and Benbasat 2004). In addition, striving for more functional responsibility ensures that the CIO takes the full position of a business executive and is not simply the IT representative (Stephens et al. 1992). Hence, from a personal career perspective and to increase the impact of IT CIOs should participate in the TMT power game and accumulate functional responsibilities. Third, firms must strategically align the structural setup and the TMT composition with their competitive situation. As the results show, misaligning the CIOs' additional functional responsibilities destroys rather than creates value. This implies that firms carefully structure their TMT as this highly influences firm performance. Thus, firms in labor-intensive industries should avoid staffing IT responsibility and internal functional roles with the same TMT member. Splitting these roles and assigning the CIO additional externally focused functions will prevent role conflicts and will generate positive organizational outcomes.

Alternatively, if structural modifications are not feasible firms should consider other mechanisms to create the beneficial effects that we show for intra-personal alignment. This may be the case if the firm cannot find a TMT member who is capable of fulfilling the combined role requirements or if a firm is for some reason required to entrust IT and internally focused additional responsibilities to the same TMT member. These other alignment mechanisms could focus on improving relationship quality or on linking different TMT members' goals and targets, for example. Improving the quality of the relationships between the TMT members may lead to social alignment due to better communication and cooperation between TMT members. Establishing individual and group targets for TMT members can also lead to improved collaboration. These two proposed alternative alignment mechanisms have to be tested for their potential to substitute the beneficial intra-personal alignment effects of multiple functional responsibilities.

**Table 7. Regression Results**

Industry characteristics Dependent variable	Model 1.1		Model 1.2		Model 1.3		Model 1.4		Model 1.5		Model 2.1	
	Full sample		Labor-intensive		Labor-intensive		Labor-intensive		Labor-intensive		Labor-intensive	
	OI/A		OI/A		OI/A		OI/A		OI/A		OI/A	
	Coeff.	t-Stat.	Coeff.	t-Stat.	Coeff.	t-Stat.	Coeff.	t-Stat.	Coeff.	t-Stat.	Coeff.	t-Stat.
<b>TMT responsibilities</b>												
<i>IT_Any</i>	-1.888	(-2.41)**	-2.290	(-1.97)**								
<i>IT_Alone</i>					-1.033	(-0.39)					-1.176	(-0.45)
<i>IT_External</i>							5.944	(2.69)***			4.748	(2.24)**
<i>IT_Internal</i>									-2.714	(-2.40)**	-2.411	(-2.10)**
<b>Firm characteristics</b>												
<i>Size</i>	4.692	(2.69)***	4.580	(2.11)**	4.487	(2.07)**	4.630	(2.13)**	4.668	(2.14)**	4.761	(2.19)**
<i>Leverage</i>	-1.344	(-2.85)***	-0.638	(-1.32)	-0.607	(-1.26)	-0.595	(-1.24)	-0.619	(-1.29)	-0.261	(-0.72)
<i>Risk</i>	0.047	(1.53)	0.055	(1.69)*	0.054	(1.68)*	0.054	(1.67)*	0.055	(1.68)*	-0.614	(-1.28)
<i>R&amp;D</i>	-0.154	(-0.56)	-0.233	(-0.64)	-0.244	(-0.67)	-0.263	(-0.72)	-0.248	(-0.68)	0.055	(1.69)*
<i>Growth</i>	0.010	(1.09)	0.004	(0.67)	0.004	(0.66)	0.004	(0.66)	0.004	(0.66)	0.004	(0.66)
<i>Age</i>	0.213	(0.83)	0.604	(1.69)*	0.564	(1.55)	0.561	(1.55)	0.603	(1.68)*	0.596	(1.66)*
<i>Board_Size</i>	0.640	(1.26)	0.926	(1.29)	0.982	(1.36)	0.989	(1.37)	0.963	(1.33)	0.948	(1.32)
<b>Ownership structure</b>												
<i>Internal_Blockholder</i>	-0.327	(-0.22)	1.238	(0.68)	1.151	(0.63)	1.121	(0.61)	1.202	(0.66)	1.181	(0.64)
<i>External_Blockholder</i>	1.398	(0.93)	2.363	(1.17)	2.337	(1.16)	2.299	(1.14)	2.362	(1.18)	2.331	(1.16)
Constant	Yes		yes		yes		Yes		yes		yes	
Firm effects	yes (fixed)		yes (fixed)		Yes (fixed)		yes (fixed)		yes (fixed)		yes (fixed)	
Year dummies	Yes		yes		yes		Yes		yes		yes	
No. of observations	1888		1325		1325		1325		1325		1325	
No. of firms	372		320		320		320		320		320	
R-squared (within)	0.073		0.065		0.063		0.065		0.066		0.068	
R-squared (between)	0.128		0.085		0.087		0.088		0.085		0.086	
R-squared (overall)	0.077		0.059		0.060		0.061		0.059		0.060	

This table shows the regression results of our firm fixed-effects model describing financial firm performance (OI/A). Robust t-statistics are reported in the parentheses and are based on the Huber-White sandwich estimator of variance. Definitions of variables are provided in Table 6.

\*, \*\*, \*\*\* significance is at the 10%, 5%, and 1% levels, respectively.

## **Limitations and Future Research**

As our study focuses on the performance effects of intra-personal alignment in labor-intensive industries many opportunities remain for investigating other competitive situations and deriving IT implications. The limitations we would like to address can be classified into five groups. First, we show only our alignment effects for labor-intensive firms. Hence, a fruitful extension would be to theorize and empirically show how IT responsibilities have to be set up to deliver value in the remaining capital-intensive industries. Second, we explain financial firm performance that we obtained from public data sources. A common critique of this kind of research is that various additional factors can influence firm performance. Although we use many control variables and mitigate the risk of unobserved firm heterogeneity with the firm fixed-effects model, validating the findings with alternative dependent measures may be helpful. These dependent measures should not be limited to public data but could also stem from non-disclosed internal data. This would allow future researchers to gather more detailed firm-specific data such as process performance, the success of IT projects, or other IT-related performance measures for testing a potential indirect performance relationship. Third, the public data we use restricts us to focusing on effects of intra-personal alignment based on multiple responsibilities. Future research could also use non-disclosed internal data from case studies, surveys, or interviews to include more detailed explanatory variables. This can be helpful for assessing the effects of alternative alignment mechanisms, such as social alignment. It would be also very interesting to test how other explanatory variables on individual characteristics of TMT members (e.g., educational background) alter the performance relationships we show. Additionally, we also do not assess power distribution within the TMT. Power distribution and individual role preferences may strongly moderate role conflicts and synergies. Extending our theoretical view from role theory to role identity theory could be a good opportunity for generating even more understanding. Fourth, our results stem from a German dataset and therefore may be influenced by characteristics of the German corporate governance system. Future research could focus on other national settings such as the US to validate and potentially extend our findings. Fifth, with the focus on labor-intensive industries we reduce our final sample size compared to the initial set of firms. Although we retain more observations than most CIO performance studies (see Table 1), it would be beneficial to validate our findings with an even larger dataset. As more and more firms have CIOs with additional functional responsibilities, it will be worth testing if the relationship shown also holds over longer periods of time and for other firms as well.

## **Contributions**

Founded in upper echelon theory and role theory, this study answers the research question, whether and under which conditions the additional functional responsibilities of a TMT member who is also responsible for IT affect firm performance. We contribute to the existing literature on CIO/TMT research by shifting the reference frame from a classical view on CIOs to a broader perspective on TMT governance structures. This differentiation helps us generate insightful results for role synergies and role conflicts between IT and other functional responsibilities. Thus, we increase the understanding of how IT-related governance structures should be set up at the highest firm level. This study also contributes to the literature on business/IT alignment by showing significant differences between specific business functions. We show that business/IT alignment based on multiple intra-personal responsibilities by itself does not always generate positive outcomes; instead, specific functions and circumstances matter. Finally we answer these questions with a longitudinal dataset and sophisticated statistical models that are essential for generating valid results in corporate governance research.

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